E-COMMERCE:
CONCEPTS, BENEFITS AND TECHNOLOGIES

ABSTRACT

The past few years have witnessed a sudden explosion of businesses onto the Internet. But, there also seems to be a lot of confusion and fear surrounding electronic commerce on the Net. This paper helps to clear up this confusion and fear. The paper provides an introduction to e-commerce, discusses its categories, scope and the benefits. It looks at the e-commerce share in today’s Internet economy and explores its potential in future. It also discusses the basic requirements for setting-up an e-commerce site, identifies a number of open issues, looks at the e-commerce status in Pakistan, and outlines a number of successful examples.

The paper also provides a basic explanation of security and available options in electronic money transfer, from simple exchange of credit card numbers to digital cash that enables anonymous, highly flexible, and fully automated digital accounting systems.

INTRODUCTION

With the tremendous growth of the Internet, businesses are beginning to find new ways to expand their opportunities. Approximately 300 million people worldwide (Nielsen//NetRatings, September 2000) have now access to the Internet. No matter what your business is, it is not possible to ignore 300 million potential customers.

The astonishing growth of the Internet, and particularly the World Wide Web (WWW), has led to a critical mass of consumers and companies participating in a global on-line marketplace. Business owners around the world are increasingly turning to the Internet to increase their efficiency and profitability. A large number of companies have come to the Net to maintain an electronic presence, market products, generate sales leads, provide customer support and open up electronic stores that can be accessed by the Internet users. Some of the benefits enjoyed by these companies include lower purchasing costs, reduced inventory, lower cycle times, more efficient and effective customer service, lower overhead, lower sales and marketing costs, increased awareness of competition, new sales opportunities and a global customer base. The Internet is also proving to be the great equalizer, allowing the smallest of companies to access markets and present a presence that allows them to compete against the giants in the industry.

The rapid adoption of the Internet as a commercial medium has caused companies to experiment with innovative ways of marketing to consumers in computer-mediated environment. These developments on the Internet are expanding beyond the utilization of the Internet as a communication medium to an important view of the Internet as a new market.

WHAT IS E-COMMERCE?

Electronic Commerce (e-commerce or EC) is a general term applied to the use of computer and telecommunications technologies to support trading in goods and services. It is defined as “any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical
contact”. In simple words, it is a term for buying, selling, ordering, or delivering something (goods, services, etc.) electronically - usually over a network.

Most people think e-commerce means online shopping. But the shopping is only a small part of the e-commerce picture. The term something refers to any form of business operation or transaction, including online stock and bond transactions, buying services, buying and downloading software, music, and movies.

From a customer's perspective, the purpose of an e-commerce system is to enable the customer to locate and purchase a desired commodity or service over the Internet. Its function is no more or less than providing a virtual store.

From a merchant's perspective, the purpose of an e-commerce system is to generate higher revenues than he would achieve without the system. In order to achieve this, the merchant must have all the business processes in place for an electronic purchase that he would have for an in-store or catalog purchase. These business processes include product information, inventory systems, customer service, and transaction capabilities.

**E-COMMERCE CATEGORIES**

Technology is transforming many aspects of business and market activities. In its broadest sense, e-commerce refers to the use of electronic means and technologies to conduct commerce between following interactions:

- Business-to-Business (B2B)
- Business-to-Consumer (B2C)
- Business-within-Business (Intra-Company)

These categories are described briefly as follows:

**Business-to-Business**

The Internet can connect all businesses to each other, regardless of their location or position in the supply chain. This ability presents a huge threat to traditional intermediaries like wholesalers and brokers. Internet connections facilitate businesses to bargain directly with a range of suppliers, thereby eliminating the need for such intermediaries. An example in this category would be a company that uses a network for ordering from its suppliers, receiving invoices and making payments. This category of e-commerce has been well established for several years, over private or Value-Added Networks (VANs).

The end-to-end business processes, such as fulfillment and procurement, are being reengineered to function electronically and without the need for private and value-added networks. This is an area where many business application suppliers in the accounting, supply-chain, and manufacturing sectors are focusing their attention right now.

E-commerce enables companies to be more efficient and flexible in their internal operations, to work more closely with their suppliers, and to be more responsive to the needs and expectations of their customers. It allows companies to select the best suppliers regardless of their geographical location and to sell to a global market.

E-commerce uses a range of technologies. Some technologies such as Electronic Data Interchange (EDI), Electronic Mail (E-mail) and Electronic Funds Transfer (EFT) are already in wide use. But the e-commerce in business applications is no longer confined to EDI and EFT. The openness of the Internet facilitates interoperability between different computer platforms and supports the exchange of human-readable messages. Because of this, the potential of e-commerce over the Internet far surpasses that of EDI or private Value-Added Networks (VANs). The new technologies have opened up an array of e-commerce options; there's one to suit every need and requirement.

**Business-to-Consumer**

The business-to-consumer (B2C) e-commerce is focused on the use of a virtual storefront on the World Wide Web that allows an Internet user to browse and order goods or services from the storefront's online catalogue. This category largely equates to electronic retailing. It is clearly modeled on the real-world shopping experience, with “carts” (order forms) to drop your goods into and “checkouts” (payment processing) to settle your bill with a credit card. There are now shopping malls all over the Internet offering all kinds of consumer goods, from sweets and cakes to computers and cars.

Companies are rushing to take advantage of this market. Availability of secure web transactions is enabling companies to allow consumers to purchase products directly over the Web. The most prominent of the new paradigms is that of relationship marketing. Because consumer actions can be tracked on the Web, companies are experimenting with this commerce methodology as a tool for market research and relationship marketing. An example of a company that has leveraged the power of Internet interactivity to revolutionize customer relationships is Firefly. Firefly is creating a custom product for each of its customers, based on the customer's profile and buying behavior.
Business-within-Business (Intra-Company)

Companies worldwide are embracing the application of web-based technology to improve and transform internal business communications and processes. The business-within-business e-commerce takes the intranet beyond its popular role as a corporate and product information center. Here the e-commerce is strictly intra-company and payment processing is not an issue. The transfer of funds is purely an accounting transaction via a charge back or an inter-company billing, rather than a true payment where details of a credit card or bank account are being passed over the Internet.

In this scenario the intranet becomes a service center for the exchange of goods and services among the subsidiaries of a large company. This is a significant new market opportunity for existing and startup e-commerce application vendors to exploit.

THE SCOPE OF E-COMMERCE

E-commerce encompasses a broad range of activities. The core component includes electronic trading of physical goods and services and of information-based electronic material (digital products). The conventional activities include:

- Searching for product information
- Ordering products
- Paying for goods and services
- Customer service

The whole of the commercial transaction, including ordering, invoicing and payment, and delivery cycle can be supported electronically. What characterizes electronic commerce is the pervasiveness of technology. The use of the Internet to support marketing and customer-interface is only part of electronic innovations that are changing the way firms do business. With intranets, corporations distribute internal memos and announcements to their employees, and knowledge exchange and scheduling communications flow worldwide in a timely fashion. With direct connection to suppliers using extranet, the same technology is used for manufacturing and supply-chain management. To sum up, the electronic commerce process also includes the following business activities:

- Pre-sales and post-sales support
- Internal electronic mail and messaging
- Online publishing of corporate documents and forms
- Managing corporate finance and personnel systems
- Manufacturing logistics management
- Supply chain management for inventory, distribution, and warehousing
- Facilitation of contacts between traders
- Tracking orders and shipments
- Advertising and promotion of products and services

There are a number of other business activities that are also covered by e-commerce. More important than the mere number of areas being affected by e-commerce is the fact that these activities can be integrated into a holistic business process. Thus, all the areas mentioned above are not really a separate application, but rather, one aspect of the whole electronic commerce process. Hence, the business potential of e-commerce is the capability to innovate and integrate business and market processes.

A distinction should be made between electronic trading of physical goods and services and electronic trading of digital products that can be delivered directly through the network. The electronic trading of physical goods and services represents an evolution of present systems of trading. This form of electronic commerce is expected to have a great impact on competitiveness and a limited impact on employment. The trading of digital products (music, video, software, images, etc.) represents a revolutionary new way of trading, for which the full commercial transaction cycle, including delivery, can be conducted simultaneously via the same network. Depending on the solutions that will be successful in the market place, traded “electronic products” could create totally new markets. This highly innovative form of e-commerce is expected to have an important impact on competitiveness and create employment.

BENEFITS TO CUSTOMERS AND SUPPLIERS

The provision of an electronic marketplace within the Internet significantly improves the productivity and competitiveness of all participating companies regardless of whether they are customers and suppliers. As a commercial medium, it offers a number of benefits to both the customers and the suppliers.

Benefits to Customers

Consumer benefits arise primarily from the structural characteristics of the medium and include availability of information, provision of search mechanisms, and online product trial, all of which can lead to reduced uncertainty in
the purchase decision. The major benefits include the following:

**Access to more information**
An important consumer benefit associated with marketing on the Web is the access to greater amounts of dynamic information to support queries for consumer decision-making. Marketing communication on the Web are more consumer-driven than those provided by traditional media.

**Rapid response to needs**
The customer benefits partly arise from the use of the Web as a distribution channel. It provides customer an ability to rapidly obtain the precise product that is required, without being limited to those currently in stock at local suppliers. The extreme example arises in the case of digital products and services that can be obtained immediately.

**Lower costs and prices**
Increased competition in procurement, as more suppliers are able to compete in an electronically open marketplace, cause a greater competition that lowers prices and costs. This increase in competition, leads to better quality and variety of goods through expanded markets and the ability to produce customized goods.

**Global choice**
The global nature of e-commerce provides a benefit of “Global Choice” to the customer. A customer can select from all potential suppliers of a required product or service, regardless of their geographical location.

**Easier market research and comparison**
The ability of the Web to amass, analyze, and control large quantities of specialized data can enable comparison-shopping and speed the process of finding items. The Web facilitates trial and provides instant gratification; customers can test digital products online, which may stimulate purchase. There is also the potential of wider availability of hard-to-find products and wider selection of items due to the width and efficiency of the channel.

**Benefits and Opportunities to Suppliers**
The supplier benefits arise from the potential of the Web as a distribution channel and as a communication medium for marketing. These efficiencies are associated with web technology and the interactive nature of the medium. The major benefits include the following:

**Shorten supply chains**
Electronic commerce often allows traditional supply chains to be shortened dramatically. There are many established examples where goods are shipped directly from the manufacturer to the end consumer, by-passing the traditional staging posts of wholesaler’s warehouse, retailer’s warehouse and retail outlet. The extreme example arises in the case of products and services that can be delivered electronically (e.g. music, video, magazines, newspapers, books and computer software etc.) when the supply chain can be eradicated entirely.

**Substantial cost savings**
Buyers and sellers can access and contact each other directly, potentially eliminating some of the marketing cost and constraints imposed by such interactions in the terrestrial world. Time to complete business transaction may be reduced as well, translating into additional efficiencies for the supplier. While the cost of a business transaction that entails human interaction might be measured in dollars, the cost of conducting a similar transaction electronically might be a few cents or less.

**Mass customization**
With electronic interaction, suppliers are able to gather detailed information on the needs of each individual customer and automatically tailor products and services to those individual needs. This results in customized products comparable to those offered by specialized suppliers but at mass market prices. The potential for customer interaction offers another category of supplier benefits since it is especially conducive to developing customer relationships.

**Global presence**
The boundaries of electronic commerce are not defined by geography or national borders, but rather by the coverage of computer networks. Since the most important networks are global in scope, creation of new markets and segments, increased generation of sales leads, easier entry into new markets and faster time to market is facilitated. The electronic commerce enables even the smallest suppliers to achieve a global presence and to conduct business worldwide.

**Competition on specialty**
The Web offers opportunity for competition on the "specialty" axis instead of the price axis. Such opportunity arises when the offering is differentiated by elements of the marketing mix other than price. The ability to compete on dimensions other than price become especially critical in categories where brands are perceived as substitutes, since it allows far more opportunities to differentiate along other dimensions.
**Improved competitiveness**

Electronic commerce enables suppliers to improve competitiveness by becoming “closer to the customer”. As a simple example, many companies are employing electronic commerce technology to offer improved levels of pre-sales and post-sales support, with increased levels of product information, guidance on product use, and rapid response to customer inquiries.

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**Operational benefits**

Operational benefits of Web use for industrial sellers are reduced errors, time, and overhead costs in information processing; reduced costs to suppliers by electronically accessing online databases of bid opportunities, online abilities to submit bids, and online review of awards.

While these various opportunities and benefits are all distinct, they are to some extent inter-related. For example, improvements in competitiveness and quality of service may in part be derived from mass customization, while shortening of supply chains may contribute to cost savings and price reductions.

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**E-COMMERCE MARKET**

The Internet has grown more rapidly than anyone could have imagined even a few years ago. It has changed the way in which the world conducts business. Goods are purchased and sold, services are rendered, stocks are traded, newspaper and magazine subscriptions are sold, and up-to-the-minute news and financial information is readily available. The potential scope, size and overall economic impact of this economic system is much larger than what we can comprehend today. To get an idea, we will first look at the size, growth and status of this new market, and then will try to find out its potential in future.

**The Internet Economy**

The growth of Internet economy is accelerating and shows no signs of letting up. The key characteristics that distinguish this new economy are information, knowledge and speed. To measure this new economy, the researchers at University of Texas at Austin, USA divided the companies that are generating all or some part of their revenues from Internet, in four groups based on their businesses. First, there are Internet infrastructure player that consist of the telecommunications companies, Internet Service Providers, Internet backbone carriers, and manufacturers of end-user networking equipment. Second, there is Internet Applications business that involves software products and services necessary to facilitate Web transactions and transaction intermediaries. This also includes the consultants and service companies that design, build and maintain all types of web sites, from portals to full e-commerce sites. Third, there is Internet Intermediary class that includes the companies that are conducting web-based commerce transactions. So the overall Internet Economy is made up of the revenues of infrastructure and applications players, electronic intermediaries and online sellers. The results of the study conducted by University of Texas at Austin, USA, based on this model of Internet Economy, are shown in Table 1 (Measuring the Internet Economy, June 6, 2000 – [http://www.internetindicators.com](http://www.internetindicators.com)).

The report shows that the Internet Economy, based on US companies, grew to $523.9 billion in 1999 and could grow to $850 billion in 2000 if current growth conditions continue. A snapshot of the 33 largest companies in the study indicated revenue growth of 40 percent from Q1 (Quarter 1) 1999 to Q1 2000.

While economic activities are strong in all four layers (ranging from 41 percent to 72 percent growth), the e-commerce increased from $99.8 billion in 1998 to $171.5 billion in 1999 (an increase of 72 percent). To put that in perspective, the e-commerce portion of the Internet Economy alone tops the banking, aerospace and drug industries’ in revenues. Interestingly, the infrastructure layer also showed continued high growth, suggesting online retailers and e-commerce enablers (web portals and brokerages, for example) could be far more explosive growth.

The research also shows that the Internet Economy now directly supports 2.476 million workers, more than the insurance, communications and public utilities industries.

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<table>
<thead>
<tr>
<th>Annual Revenue and Growth Summary by Layer and Total Internet Economy (millions)</th>
<th>1998</th>
<th>1999</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer 1 - Infrastructure Indicator</td>
<td>$117,143</td>
<td>$197,853</td>
<td>68%</td>
</tr>
<tr>
<td>Layer 2 - Application Indicator</td>
<td>$71,615</td>
<td>$101,304</td>
<td>41%</td>
</tr>
<tr>
<td>Layer 3 - Intermediary Indicator</td>
<td>$63,629</td>
<td>$96,809</td>
<td>52%</td>
</tr>
<tr>
<td>Layer 4 - Internet Commerce Indicator</td>
<td>$99,813</td>
<td>$171,473</td>
<td>72%</td>
</tr>
<tr>
<td>The Internet Economy (After removing overlap)</td>
<td>$322,530</td>
<td>$523,923</td>
<td>62%</td>
</tr>
</tbody>
</table>

Source: Measuring the Internet Economy, June 6, 2000

Table 1: Internet Economy Indicators
and twice as many as the airline, chemical and allied products, legal and real estate industries. The Internet Economy supported an additional 650,000 jobs in 1999, a 36% growth, as revenues soared to over half a trillion dollars. In addition, revenue for Internet Economy companies grew at an annual rate of 11 percent in the year 1998-99, nearly three times the growth rate of the economy as a whole for the same period in the year 1997-98.

One of the most important aspects of any economy is its growth rate. This relates to the total output produced within the economy. It should be evident that a large part of the growth in the emerging Internet Economy will come at the expense of the physical economy through a substitution effect.

**Commercial Potential of the Internet**

The e-commerce is expanding fast and the size of the market judged by the number of users, number of customers and suppliers, available products, and the sales figures, is growing very rapidly. The following findings by number of different groups give an idea of commercial potential of the Internet.

1. According to Computer Industry Almanac (http://www.c-i-a.com), the USA has an overwhelming lead in Internet users with more than 110 million projected for year-end 1999, which is nearly 43 percent of the total 259 million worldwide Internet users. The number of these users is constantly growing and it is estimated that by the year 2002, about 490 million people around the world will have Internet access, that is 79.4 per 1,000 people worldwide. By the year 2000 there will be 25 countries where over 10 percent of the population will be Internet users. Table 2 shows a list of the top 15 nations with highest number of Internet users at the end of 1999.

2. Nearly 120 million of the estimated 300 million worldwide Internet users have already made a purchase or transaction online, according to an Angus Reid Group (http://www.angusreid.com) study of Internet users in 34 countries. The study also found that, contrary to popular belief, the vast majority of shoppers were very satisfied with their online experience.

3. Forrester Research (http://www.forrester.com) predicts that e-commerce will account for 8.6 percent of worldwide sales of goods and services in 2004. The expansion of online trade, however, will be highly concentrated, with 12 countries representing nearly 85 percent of $6.45 trillion worldwide Net sales. As shown in Table 3, the US will continue to be the global e-commerce leader, with online sales reaching $3.2 trillion in 2004.

![Table 3: E-Commerce Sales in 2004 by Region](http://www.forrester.com)


5. US consumer e-commerce sales will reach $37 billion by the end of year 2000, double from the previous year and will grow by a factor of 13 overall from 1998 to 2003, according to a report by eMarketer (http://www.emarketer.com). eMarketer's report, “eCommerce: B2C Report,” also found that shoppers are buying online at increasing frequency and that e-retail spending will top $100 billion by 2003.

6. International Data Corp. (http://www.idc.com) predicts that by the end of 2000, about 29 percent of people who go online will purchase a good or service, and that percentage will swell to 38 percent by 2003. Not only is the number of Web purchasers going up, according to IDC, but also is the size of the average transaction. When they add all this up, IDC predicts $1.6 trillion being spent on Internet commerce in 2003.

7. Sustained e-commerce growth of more than 100 percent per year through 2003 will drive Europe to $1.5 trillion in online sales in 2004, making Europe a major contributor to the global Internet economy, which will reach $6.9 trillion in 2004 according to Forrester Research (http://www.forrester.com).
8. According to the *ecommercePulse* survey by Harris Interactive (http://www.harrisinteractive.com), consumers spent an estimated $7 billion online in the first quarter of 2000, the same amount they spent in the fourth quarter of 1999 (Table 5). Auction sites, health and beauty sites, and sites that sell travel services showed the greatest increase in quarterly revenues. The highest spending, estimated $2 billion – an increase of 25 percent from Q4, was in the sector of Travel Services. The most popular items -- computers, books, and music/videos -- all showed steady growth in the first quarter.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>REVENUE</th>
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<tbody>
<tr>
<td>Travel services</td>
<td>$2 b</td>
</tr>
<tr>
<td>Computer hardware and peripherals</td>
<td>$852 m</td>
</tr>
<tr>
<td>Clothing apparel</td>
<td>$619 m</td>
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<tr>
<td>Auction</td>
<td>$644 m</td>
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<tr>
<td>Books</td>
<td>$461 m</td>
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<tr>
<td>Electronics</td>
<td>$287 m</td>
</tr>
<tr>
<td>Music and video</td>
<td>$340 m</td>
</tr>
<tr>
<td>Computer software</td>
<td>$257 m</td>
</tr>
<tr>
<td>Flowers, gifts, and cards</td>
<td>$195 m</td>
</tr>
<tr>
<td>Health and beauty</td>
<td>$153 m</td>
</tr>
<tr>
<td>Toys</td>
<td>$147 m</td>
</tr>
<tr>
<td>Home and garden</td>
<td>$82 m</td>
</tr>
<tr>
<td>Fitness and sports equipment</td>
<td>$69 m</td>
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</tbody>
</table>

Table 4: E-Commerce Revenue in Q1 2000

9. According to “eAdvertising” report issued by eMarketer (http://www.emarketer.com), the US Web advertising spending will reach $6 billion by the end of year 2000, an increase of 69 percent over 1999 spending of $3.6 billion. By 2004, the market will reach $21 billion, 3.5 times its size this year.

10. ACNielsen's (http://www.acnielsen.com) survey of nearly 40,000 individuals found that the books and the music/video CDs were the top purchased items on the Internet in 1999, followed by computer software, travel related services, and clothing/apparel as shown in Table 5).

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PERCENTAGE</th>
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<tbody>
<tr>
<td>Books</td>
<td>42%</td>
</tr>
<tr>
<td>CDs, DVDs and videos</td>
<td>38%</td>
</tr>
<tr>
<td>Other</td>
<td>37%</td>
</tr>
<tr>
<td>Computer software</td>
<td>29%</td>
</tr>
<tr>
<td>Travel-related services</td>
<td>28%</td>
</tr>
<tr>
<td>Clothing apparel</td>
<td>27%</td>
</tr>
<tr>
<td>Specialty gift items</td>
<td>24%</td>
</tr>
<tr>
<td>Computer hardware</td>
<td>18%</td>
</tr>
<tr>
<td>Entertainment services</td>
<td>17%</td>
</tr>
<tr>
<td>House-ware items</td>
<td>16%</td>
</tr>
<tr>
<td>Grocery or drug products</td>
<td>13%</td>
</tr>
</tbody>
</table>

Table 5: Top purchased items on Internet in 1999

The Internet can certainly be used as an alternative marketing channel, selling existing products online, but the future of electronic commerce will be guided by innovative digital products and services that will emerge in the electronic marketplace. No one is certain how big the digital product market will become. But, to get an idea, one only needs to list products that can be digitized: all paper-based information products such as newspapers, magazines, books, journals, and databases; computer software, and games; audio products, including music, and speeches; video and multimedia products, such as movies and television programs.

**E-COMMERCE SECURITY**

One of the biggest obstacles for realizing the full potential of the Internet has been the issue of security. Fears of corporate espionage and sabotage, theft of personal identities and credit, lack of privacy in correspondence, and potential access to confidential records have led to a cautious approach in online transactions. The reality is that proper mechanisms are now in place to protect customers and vendors. The big hurdle is user confidence, which should come as financial institutions and other trusted sources educate the public.

While payment security usually means protecting sensitive information from eavesdropping and theft, a secure transaction has a broader set of requirements as follows:

- **Non-repudiation** - The parties in a transaction cannot deny it after the fact
- **Authentication** - The ability to verify the identity of persons involved in transactions
- **Integrity** - The data transferred should not be modified in transit or in storage
- **Privacy** - The transaction is only between participants

The emerging services and security technologies like advanced encryption, digital certification, and digital signatures, have dramatically addressed these issues and they are producing a significant impact on e-commerce and user confidence.

**Encryption**

On the Internet, millions of messages are sent back and forth everyday. These regular messages can be read by...
many people before they reach the destination. Sending an un-encrypted e-mail message is just like sending a letter in an open envelope. Using an encryption scheme is the equivalent of putting a letter in a sealed envelope that can only be opened by a proper recipient. It is a process of turning a message into gibberish before sending it and then converting it back into a readable form upon arrival.

Encryption schemes are typically based on mathematical algorithms and keys. For example, suppose you replace every letter in a document with the letter that comes two places after it in the alphabet; for example, replace “A” with “C,” “B” with “D,” and so on. “Replacing with another letter” is your encryption algorithm and the number “2” is your encryption key. The same encryption algorithm may have different keys, for example, the key of “4” means that you replace “A” with “E” instead of “C”.

There are two kind of cryptography: symmetric key and public key. In symmetric key cryptography, the same “secret key” is used to encrypt and decrypt a message. This is the fastest method, but transmitting the secret key to the recipient is not secured. In public key cryptography, there is a “public key” to encrypt a message, which is published or given out freely, and a “private key” to decrypt, which is kept secret. These two keys are mathematically related to an encryption algorithm, and a message encrypted by a public key must be decrypted by its associated private key, and vice versa.

The public key cryptography is used in secure Internet communication. Each recipient runs a program that generates a “public key” and a “private key”. The private key is never shared with anyone, while the public key is announced so that everybody knows it. The sender looks up the recipient’s public key and uses it to encrypt the message, and the recipient uses his private key to decrypt the message. There is never any need to share the private keys, so they are never in transit and are not vulnerable to being discovered by unauthorized parties.

The level of security of the encryption system is dependent on its key length. The more digits in the key, the longer it will take to break. There are two levels of encryption used in Internet communication: 40-bit and 128-bit. With 40-bit encryption, there are billions of possible keys to decipher the coded information, and only one of them works. Someone intercepting the information would have to find the right key - a nearly impossible task. With 128-bit encryption, there are 300 billion trillion times as many keys as with 40-bit encryption. It is virtually impossible for an unauthorized party to find the right key, even if they are equipped with the best computers; hence the U.S. export laws permit it to be used only within the United States. Currently the strongest recommended key length is 1024 bits.

Digital Certificates

In physical markets, checking an identity or a signature is usually enough to establish identity and trust among traders. However, in an electronic market, where face-to-face interactions are replaced by electronic messages, it is not possible to know for sure that someone is who he or she claims to be. Authentication is used to determine if a person is really the one who he claims to be. Since it is not possible to see a person’s face, digital ID and verification systems are used to prove a person’s identity.

Digital ID, commonly referred to as “Digital Certificate”, is an electronic equivalent of an Identity Card or a Passport and is used to provide a secure and trusted means of verifying the identity of each party in an electronic transaction. A digital certificate is an owner’s public key, which a Certification Authority (CA) has digitally signed. A CA is a public or private entity that acts as a trusted third party. The CA issues these certificates to be used by sellers and buyers to authenticate identities and messages, or to attest that a deed has occurred. Encryption alone is not enough, as it provides no proof of the identity of the sender of the encrypted information. Besides authentication, a certificate authority assures both parties that no outsider saw or changed a message. It also offers assurance that once a deal is completed; neither side can say it didn’t happen.

The process of sending a message works like this. A person sends a digital certificate along with an encrypted message to show that the sender is truly who he claims to be. The recipient uses the CA’s public key, which is widely publicized, to decrypt the sender's public key attached to the message. The sender's public key is then used to decrypt the actual message.

The certification process varies depending on the certificate authority and the level of certification. The process may require identification such as identity card, drivers license, notarization, or fingerprints. CA such as VeriSign, Inc. (http://www.verisign.com) offers different levels of digital IDs, ranging from Class 1 identifying certificates, which verify only the uniqueness of a name or e-mail address without contacting the person, to Class 4 identifying certificates, which are issued after VeriSign investigates the person thoroughly and personally. The reliability of digital certificates depends heavily on the strength of the cryptographic technologies employed.

A digital certificate contains a name of the person or an organization to which it is issued, a serial number, expiration dates, a copy of the certificate holder's public key (used for encrypting and decrypting messages and digital signatures), and the digital signature of the certificate issuing authority. Most of the digital certificates conform to a standard X.509v3, which is one of the most popular standards for certificates.

Microsoft Explorer and Netscape Navigator offer comprehensive support of the digital certificate within the software. Once registered with the certificate authority, the user can surf the Net while the browser automatically establishes secure connections with servers, and verifies that both parties are who they say they are. This also eliminates the need to enter a user name and password at a web site.
Digital Signatures

Digital signatures are generated by digital certificates. They are not scanned images of someone's paper-based signature. They are a complex series of characters that are generated for each electronic document. They can be used not only to identify the sender but also to solve the problem of non-repudiation. They create a means by which a person may verify a signer. They work just like paper-and-ink signatures, allowing document recipients to confirm the source of a document. They may help to overcome current barriers to e-commerce.

World Wide Web Security

Because the Internet is a notoriously insecure network, the electronic commerce server designers realized that people wouldn’t want to use their credit card numbers to place orders on the Internet. The anticipated problem of automated fraud led the early server designers to a cryptographic-based solution. Instead of transmitting information from a customer’s browser as “plain” text during an order or other “secured” session, the information sent to the merchant’s server would be encrypted. Any “listener” on the network that intercepted the data packets would see only unintelligible data if the encryption was effective.

Two of the methods used for Web security, based on this concept, are Secure HyperText Transport Protocol (S-HTTP) and Secure Sockets Layer (SSL). These methods usually use “one-time” secret key encryption. Both methods encrypt the messages that pass through them, once the client browser and server agree on how they will understand each other. Anything that occurs between client and server gets encrypted, not just financial transaction data.

Secure HyperText Transport Protocol (S-HTTP)

S-HTTP, developed by Enterprise Integration Technologies (EIT), uses a modified version of HTTP clients and servers to allow negotiation of privacy, authentication and integrity characteristics. It provides transaction security at a document or even a field level. Fields, for example an account code or electronic signature, or entire documents may be marked as private and signed by the sender. Unlike SSL, S-HTTP requires some HyperText Markup Language (HTML) changes to invoke it. Therefore, its implementation is not as straightforward as SSL implementation. However, the fact that the granularity of security is at the documentation level, the flexibility increase and performance improves.

Secure Sockets Layer (SSL)

The SSL is a leading security protocol for the Internet and is developed by Netscape. The primary goal of the SSL protocol is to provide a private channel between communicating applications, which ensures privacy of data, data integrity and authentication.

The major web browsers can provide you with a great deal of online security when you connect to a web site that is using SSL. The web site sends a certificate to your browser that guarantees that the site is both secured and authentic. During this process, your browser sends its public key to the site so the site's server can securely send a secret key to the browser. The browser and server are then able to exchange data using secret key encryption. You may notice that at this point the Web address changes to “https”, rather than “http”. The “s” in “https” indicates that SSL is in effect. Other than this, the only difference you will notice when you’re connected to a secure site is the small closed padlock security icon at the bottom of the browser. When you see that icon, you’ll know that any data you receive or send will be encrypted, or encoded, so that the information will be meaningless to anyone except the recipient.

There are many areas within the selection and buying process that are considered public information and therefore don’t need security. In fact, the whole process would be slowed down if everything were sent through a SSL server. So the SSL is used only when you are expecting sensitive data from the customer, like a credit card number. Protect that from eavesdroppers with SSL, everything else should go through the non-SSL server.

ELECTRONIC PAYMENT SYSTEMS

Although the majority of payments in web stores are made through credit card transactions, many customers prefer to use more traditional payment methods such as paper checks, cash on delivery, or credit cards via telephone. One recent survey shows that 52 percent of online households in USA and Canada do not shop online due to a fear of stolen credit card information and the distribution of personal information.

Much of the media coverage about the dangers of using a credit card on the Internet centers’ around the interception of data being passed from the customer to the web store. In reality, the greatest risk arises from the theft of data from the web store's server after it has been transmitted, either by a hacker or a dishonest employee. Consumers don’t really believe it yet, but experts say e-commerce transactions are safer than ordinary credit card purchases. Though, the major concerns in using credit cards online have already been addressed by built-in SSL security in Microsoft Internet Explorer and Netscape Navigator, and by encrypting the sensitive information on the web store’s server, for e-commerce to have a chance to meet the soaring expectations, efficient and effective payment
services need to be established and accepted by businesses and consumers alike.

Recognizing this, virtually all interested parties in academia, governments, and financial services are exploring various types of payment services and the issues surrounding electronic payment systems and digital currency. Some proposed electronic payment systems are simply electronic versions of existing payment systems, such as checks and credit cards, whereas others are based on digital currency technology and have the potential for definitive impact on today's financial and monetary systems. These electronic payment systems can be broadly classified into three groups: Payment Clearing Services (payment through an intermediary), Notational Funds Transfer (payment based on Electronic Funds Transfer) and Digital Currency Payment Systems (payment based on electronic currency).

Payment Clearing Services

Payment clearing services handle only instructions to settle payments and are organized around a trusted third party. Payment information transmitted by the buyer may contain only customer order information, such as the identity of the buyer and seller, name of the product, amount of payment, and other sale conditions—but no payment information, such as credit card numbers or checking account numbers. In this case, the intermediary (trusted third party) acts as a centralized commerce enabler, maintaining membership and payment information for sellers and buyers. A buyer needs only to send the seller his identification number assigned by the intermediary. Upon receiving the purchase order, the intermediary verifies it with the buyer and the seller and handles all sensitive payment information on behalf of both.

A critical requisite for this system to work is the users' trust in the intermediaries (trusted third party). A trusted third party acts like a firewall that maintains the integrity of the payment and sometimes the whole commerce system. Thus, if the firewall breaks down, the whole system's security is compromised.

The advantage of payment clearing system, especially for small vendors and consumers, is that it offers a secure commerce environment without heavy investment in security technologies and hardware. Because sensitive financial information is never transmitted online in this system, the insecurity of the Internet is not a concern. VirtualPIN of First Virtual Holdings, Inc. of USA is an example of a trusted third party that does not even use encryption for its messages.

VirtualPIN

On the Internet right now, the most common scheme in use is clearing credit cards on-line. For consumers who are not keen to transmit their credit card numbers across the Internet, First Virtual Holdings, Inc. (http://www.fv.com) provides an additional level of security. First Virtual issues their users a VirtualPIN after they register their credit card number off-line (by telephone or fax). Customers can then use their VirtualPIN in lieu of a credit card number. For each purchase, First Virtual sends the user an e-mail message asking them to confirm the transaction. Once First Virtual receives the confirmation back, the credit card transaction is processed off the Internet and e-mail is sent to the merchant authorizing them to ship the goods.

Notational Funds Transfer

This payment method requires buyers to send their account or credit card information to sellers, who forward it to an intermediary or a currency server, which verifies the information and relays it to the affected financial institutions. The banks, in turn, adjust the users' notational accounts. Thus, the system is called a Notational Funds Transfer (NFT) system.

Any Internet payment system that is check or credit card-based is an example of an NFT. Whether an image of a check is transmitted or credit card numbers are merely exchanged, NFT systems are the most prevalent payment mechanisms for Internet commerce simply because they represent a natural extension of the existing Electronic Funds Transfer (EFT) system. An EFT is a financial application of Electronic Data Interchange (EDI), which sends credit card numbers or electronic checks via secured private networks between banks and major corporations. As in payment clearing systems, an NFT system still involves an intermediary. The intermediary's role, however, in this case is limited to serving as a conduit of messages between the open Internet and closed financial networks.

NFT systems differ from payment-clearing services in that the payment information transferred online contains sensitive financial information. Thus, if a third party intercepts the sensitive information, it may be abused like stolen credit cards or debit cards. The fact that NFT payment systems simply extend the existing model of physical markets seem to suit vendors who sell physical products on the Internet, especially because consumers seem to prefer extended credit terms to cash payments. A majority of proposed electronic payment systems fall into this type of payment system. The major systems in this group are the following:

CyberCash

CyberCash payment system (http://www.cybercash.com), an implementation of NFT, uses CyberCash servers to authorize transactions and forward payment information to banks and processing houses. CyberCash provides consumers a software program called “CyberCash Internet Wallet” to store all of their credit cards. In the process of setting up the wallet, the consumer provides their credit-card information and receives an encrypted code that refers to their credit card in return. When making a purchase at a participating web store, the user chooses a card from their digital wallet and the CyberCash software sends the encrypted credit card number in conjunction with the web browser. The merchant then hands that encrypted number, along with the purchase price, to the CyberCash server who
verifies the transaction with the credit-card company and transfers the funds to the merchant along with an authorization to ship the product. CyberCash relies on both public key and secret key encryption technologies to secure its messages.

**Secure Electronic Transaction (SET)**

To support the increasing use of credit card payments on the open Internet, Visa ([http://www.visa.com](http://www.visa.com)) and MasterCard ([http://www.mastercard.com](http://www.mastercard.com)) proposed in 1996 a protocol, named Secure Electronic Transaction (SET), to ensure interoperability across different hardware platforms and web browsers. This protocol uses digital certificates that are an electronic representation of consumer’s payment cards (Visa, MasterCard, etc.) and is now also backed by American Express. Most of the major players in e-commerce, networking and computing (for example Microsoft, Netscape, IBM, GTE, VeriSign) are behind the SET specification and therefore, it is likely to become the common standard for secured payments on the Internet. Besides offering standard communication protocols and message formats for credit card-based transactions, SET provides confidentiality through encryption, message integrity using digital signatures, and authentication of consumer and merchant identities. The processing uses public key cryptography, so each party in the system needs one or more public key certificates.

The system works like this. First you download a digital wallet from the approved vendors online (already available in new versions of popular browsers) and then obtain digital certificates from your financial institution. When you make a decision to purchase an item online, the merchant sends an order form together with its merchant certificate. You simply select the payment card you want to use. Payment instructions are created by the cardholder software and sent to the merchant fully disguised using public key cryptography. Once the purchase and payment information has been safely received, the merchant's financial institution requests an authorization from the cardholder's financial institution. Once authorized, the merchant can confirm the sale to the cardholder. Clearing and settlement take place just as they do for today's payment card transactions.

**Digital Currency Payment Systems**

This type of payment system does not transmit payment information but a digital product representing values: electronic currency. The nature of digital currency mirrors that of paper money as a means of payment. As such, digital currency payment systems have the same advantages as paper currency payment, namely anonymity and convenience. As in other electronic payment systems, security during transmission and storage is a concern, although from a different perspective. For digital currency systems, double spending, counterfeiting, and storage become critical issues, whereas for notational funds transfers, eavesdropping and liability (when charges are made without authorization) are important concerns.

The intermediary in this type of payment system acts as an electronic bank that converts outside money (for example, dollars, pounds, or franks) into inside money (for example, tokens or e-cash), which is circulated within online markets. However, as a private monetary system, digital currency will have a wide-ranging impact on money and monetary systems with implications extending far beyond mere transactional efficiency.

Some of the factors that are acting as driving force in use of digital currency are as follows:

1. The digital cash as a payment system has the capability to make peer-to-peer transactions, either online or offline, in which two persons can exchange money without involving a third party.
2. None of the electronic payment system is as easy, complete, or efficient in preserving consumer privacy as is the digital currency system, in which only values are transferred without payer information. The bank issuing digital currency keeps track only of serial numbers to authenticate the value of a currency but prevents them from matching the tokens to the person they issued them to.
3. Relatively low transaction costs of digital cash and the fact that it can be divided into smaller denominations makes it suitable for use in low value transactions such as paying for a stock quote or news article. These small denomination tokens are known as microcash and transactions with them are called microtransactions or micropayments.

There are many proposed digital currencies. Two of the major ones are eCash and Mondex-card (Smart Card).

**eCash**

eCash is a digital currency protocol developed by DigiCash ([http://www.digicash.com](http://www.digicash.com)) and is the forerunner of Internet payment systems based on online transactions. eCash uses public key encryption technologies to maintain the integrity of digital tokens. DigiCash licenses eCash technologies to banks, which convert outside money (for example, dollars or pounds) into digital currency and serve as currency servers in authenticating, and clearing accounts. Mark Twain Bank of USA ([http://www.marktwain.com](http://www.marktwain.com)) is the first electronic bank to license the eCash technology that serves interface functions between dollar-denominated accounts and eCash accounts.

To use digital cash, both the customer and the merchant need to have an account with a bank that issues it. The bank provides “purse” software to its customers for managing their digital cash and transferring it to computer’s hard drive. Customers convert funds from their regular accounts into digital cash and then transfer it to the purse software.
where it is stored on their hard drive in encoded form until it is spent.

When making a purchase with eCash, the customer transmits the relevant amount of tokens to the merchant who relays them to the bank for verification and redemption. Since eCash is not a physical object, a complex series of serial numbers are used to assure that eCash “token” can only be spent once.

**Mondex-Card (Smart-Card)**

Mondex-Card, developed by Mondex International (http://www.mondex.com/mondex), is a smart-card system that transfers stored balances. These cards hold prepaid account information and merchants who accept these cards are usually credited for the transaction amounts by the card issuer. Mondex-card is a hardware platform with an integrated circuit chip inside the card (hence the name smart-cards). The money is downloaded from a bank into a card instead of a computer's hard drive, using Mondex capable telephones and payphones. These phones are also used to deposit money to a bank or transfer it to anyone else who has the Mondex card and phone. Money is spent by inserting the card into a point-of-sale (POS) machines located at stores and banks. These POS machines also allow retailers to transfer the funds to a bank. A pocket-sized card reader lets users check the amount of money on the card and keep notes. The Mondex card is an international card and it can be used in many countries. The card carry up to five different currencies at one time and can also be used for purchasing low-value goods on the Internet. The card can be programmed to prevent double spending without resorting to online verification.

Smart cards are different from debit cards, which do not require pre-withdrawal of cash. Similar to eCash users, smart card users must withdraw money from a currency-denominated account to a digital currency account. Both eCash and smart-card are prepaid systems, unlike debit cards, which might be considered “just-in-time” pay cards.

The difference between eCash and Mondex lies in their hardware organization. For one, a Mondex-card is capable of offline transactions whereas eCash needs to be online. For another, a Mondex-card uses hardware to make the system tamper-resistant whereas eCash relies on software encryption and a trusted third party or currency server. Despite the higher hardware costs, a Mondex-card is a superior payment platform because of its security, its applicability to peer-to-peer transactions, and its versatility in handling multi-currency payments online or offline.

**REQUIREMENTS FOR AN E-COMMERCE SITE**

Creating a complete on-line selling environment can require considerable time, money, and technical expertise. Enterprises, large or small, tend to develop their Web presence in stages. Once a Web presence is created then the enterprise wants to use that site to enhance customer service and to produce revenue. It is at the latter stage that electronic commerce comes into play. The basic components involved in becoming commerce enabled are following:

**Storefront**

The “storefront” or content for a business may be simple or sophisticated. A simple storefront may contain a few pages with description of business, a few product pictures, prices and contact information for potential customers. It can be designed using development tools, such as Microsoft FrontPage, with only a few days of work. A more sophisticated store may include a product catalogue with the ability to order goods directly from the pages using some form of Shopping Cart program. Larger sites may include free content related to their business area to encourage return visitors.

**Domain Name**

To make it easy for customers to find the site it is important to establish a site’s “Domain Name”. Choosing a domain name that is easy to remember is particularly important for repeat customers who may want to return to the site quickly without going through a search engine. The domain name must be registered before it can be accessed. In USA, a domain name such as “company_name.com” can be registered by applying to Register.com (http://www.register.com) or directly to InterNIC (http://www.internic.net). The $70 registration fee for two years is well worth it. Using a uniform resource locator (URL) such as “http://www.your_company.com” will be perceived as more credible than an obviously hosted site.

**Internet Merchant Bank Account**

Merchant Bank Account is an industry term meaning a banking relationship that allows a business to accept credit cards. In order to be able to accept credit cards over the Internet, a business must apply to a bank for an Internet Merchant Bank Account. This can be relatively easy or somewhat difficult, depending on the bank that the merchant is dealing with or a country where merchant lives. In the USA, this is a fairly simple procedure. Many banks offer Internet Merchant Accounts, and most Online Transaction Providers support them. There are usually several costs associated with setting up a merchant account; for example, a setup cost, a monthly fee and per-transaction fees. As an idea of what to expect, a very good arrangement would be $100 setup, $10 per month and 30 cents + 2.5% transaction fee. If a merchant already has a merchant
account, he must make sure that Internet orders are allowed, as this is not automatically the case.

**Web Hosting**

Once the Internet storefront is complete, the site can be published to any server the business customer prefers. It is important that the Web hosting company is capable of providing a merchant with the level of service that he needs to maintain his web store. A few things to look for include good uptime, good technical support, fast connection to the Net and compatibility with major e-commerce providers. There are quite a number of hosting options such as Shared Hosting, a client’s web site is located on an Internet Service Provider’s (ISP) shared web server; Dedicated Hosting, a client’s web site is located on an ISP’s dedicated web server; and Co-location, a client’s web site is located on his own web server and he merely connects it to Internet through an ISP.

One of the most important choices to be made is choosing the ISP. The Ultimate Hosting List (http://www.webhostlist.com) provides a searchable list of ISPs and their monthly rankings.

**Digital Certificate**

If a merchant intends to accept payments through his web site, he must obtain a Digital Certificate. A digital certificate, also known as Secure Socket Layer (SSL) server certificate, allows a merchant to use a secure server and SSL which gives its customers a confidence that the merchant is actually who he claims to be. It also allows payment information to be encrypted so that the merchant can take credit card orders securely and ensure that hackers cannot eavesdrop. A certificate costs about $125.00 and can be obtained from a Certification Authority (CA) such as Verisign, Inc. (http://www.verisign.com).

**Online Transaction Provider**

To accept credit card orders, a merchant will need a "transaction server". A transaction server is one that handles credit-card transactions, using secure electronic standards technology, on behalf of the merchant and the end customer. It handles the necessary authorization requests and recording of the transaction, and settlement of the transaction information with the merchant, the credit-card company and the customer. The transaction server should also contain a component to process digital certificates from an organization using CA software. Multiple merchants can operate on a single transaction server.

Online Transaction Providers, commonly known as Commerce Service Providers (CSP), are likely to configure their offerings in a number of different models on an e-commerce platform. Deciding on a provider’s package that fits the merchant’s need is perhaps the most important aspect in creating an e-commerce web site.

**Shopping Cart Software**

A merchant needs an order form for his web site so that he can get the orders from his customers. Writing this capability into a web page requires a lot more than some HTML knowledge. A “shopping cart software” can be used to allow people to purchase the items from on-line store, keep track of merchant’s accounts, and tie together all of the aspects of merchant’s e-commerce site into one cohesive whole. While there are many other types of software that work in it's place, such as catalogue software or a flat order form, shopping cart software is the most popular and the most widely known. Many Online Transaction Providers will have shopping cart software that comes with their service, but it can often be very expensive.

**Back-End Processing of Orders**

A merchant needs a methodology of tracking his orders. These can include, e-mail notification, electronic receipts, on-line reports, internal database tracking, on-line query search capability, conversion programs, etc. Many on-line businesses rely purely on e-mail for getting orders from their on-line stores into their order processing departments where they are re-keyed into their existing systems. If the business is running successfully then the merchant may want to consider enhancing his on-line business by removing this intermediate processing and having the on-line orders loaded directly into his order fulfillment and accounting systems. The actual techniques for doing this vary greatly on the type of his on-line business and the kinds of his order fulfillment and accounting systems.

**OPEN ISSUES IN E-COMMERCE**

While e-commerce is growing rapidly, there are several issues that must be resolved if its full potential is to be realized. The basic questions remain regarding how the commodity sellers and buyers will actually come together in a market that still lacks many essential features necessary for secured commercial transactions. The most important of these issues are the following:

**Globalization**

Potentially, global networks could make it as easy to do business with a company on the other side of the world as with one in the next street. However, the communication medium alone, while necessary, is far from sufficient. How do companies in different continents become aware of their existence, and the products and services that are offered or required? How can a company gain an understanding of the
business traditions and conventions of some country on the opposite side of the globe? And how can the linguistic and cultural diversity of a global user community best be respected and supported? These and related questions are all part of the broad issue of globalization - making truly global e-commerce a practical reality.

Contents and Quality
In any market, traditional or electronic, uncertainty regarding the quality of products can lead to the collapse of that market. For physical products, consumers may prefer to inspect products and actually try them out instead of looking at a picture or reading a description. Lacking a proper means to verify quality, commercial opportunities may be limited to a few whose quality consumers already know about or can easily learn online. Online banking and travel services are two examples for which consumers are already familiar with electronic processing and purchasing.

Another reason for heightened uncertainty is the diversity of producers. Conventional means to convey product quality, such as reputation and brand name, are less useful in this type of market with a vast array of sellers who may be in the market only for a short time. One typical means of resolving the quality uncertainty in similar situations in physical markets is through the use of trusted third parties; for example, consumer advocacy groups publish product evaluation reports.

Copyrights and Ownership
Inadequate copyright protection discourages content owners from offering their products. Efforts to protect copyrights on the Internet have evoked legal as well as emotional responses, for example in case of music contents, and have clearly revealed the inadequacy of current copyright legislation. Without resolving this issue, selling online may not be the future in distributing contents.

For the goods that can be distributed electronically, and hence can readily be copied, the issue of protecting copyright and intellectual property rights represents a major challenge. The current debate on digital copyrights focuses on the ambiguities in legal definitions and the technical means of control that must be modified to accommodate digital products. Although the problems are well debated, what is still lacking for a solution is the economic arguments as to why and how copyrights should be applied to digital products and electronic commerce.

Privacy and Security of Transactions
Unsecured transmission on the Internet is often cited as the main deterrent for a rapid growth of electronic commerce. Although much progress is being made in terms of security, the Net is still considered to pose a risk for commercial transactions. 52% of the users do not trust the Web as a payment channel. Anyone who transfers data of a credit card on the Web cannot be sure that his credit card number will not be used for some malicious purposes; and the salesman cannot be sure that the credit card owner will not deny the acquisition.

Security takes on added importance when we look at the special case of financial payment mechanisms. While payment security usually means protecting sensitive information from eavesdropping and theft, a secure transaction has a broader set of requirements, including non-repudiation, authentication, integrity, and confidentiality. While the data integrity and confidentiality issues have been radically addressed by advanced encryption and digital signature technologies, non-repudiation and authentication are aspects that require further developments in certification technologies and services.

The concern for confidentiality turns into an economic issue when transactional data are used or sold by sellers for other purposes. The desire, as well as technologies, to conceal such information has resulted in anonymous payment systems.

Online Taxation, Legal and Economic Issues
As the number of Internet users grow, many areas of commerce begin to feel the effects of e-commerce activities, legal and regulatory environments for the electronic marketplace are increasingly scrutinized by the media and the legislators in a growing number of areas like taxation for online sales; global framework to deal with trademark violations, copyright infringements and electronic crimes; digital currency regulation and monetary policies; consumer protection in online transactions; etc.

Of particular importance to today's growing on-line commerce is to have a uniform and global commercial environment. This global nature of on-line market highlights the need to cooperate among governments to streamline different commercial laws and regulations prevalent in physical markets.

Targeted Advertising and Privacy
The essence of targeted advertising lies in the Internet's interactivity via two-way communication. For example, when a web user types the keywords “Italian pizza”, the response page displays not only the search results but also advertising messages by booksellers. This interaction between advertisers and buyers brings up a highly sensitive issue in Internet advertising, for example, the use of consumer information. Consumer surveys and market research has always been an intrinsic part of a successful advertising campaign. Now, extensive data on consumers are being gathered from various sources, like telephone records, credit card usage, and web browsing. Computers can easily cross-reference this data to generate databases for specific advertising purposes.

The economic implications of the use and misuse of this consumer information cannot be ignored. First, sellers are able to offer customized products instead of one of average
taste. From another perspective, refined demand information can reduce waste, such as over-production resulting from market uncertainty.

**Internet Intermediaries**

Intermediaries play a far more important economic role in physical markets than it might be first apparent. For example, retailers provide consumers with access to goods produced by remote sellers. Beyond this distribution function, however, they also act as insurers of product quality and diversity, and provide product information. Even so, intermediaries are often perceived to add unnecessary costs to consumers. An efficient market is defined as one that reduces the number of intermediaries, or the number of intermediary steps necessary for a market transaction.

It follows then that an efficient market such as the electronic market should do without intermediaries, and instead, consumers should buy products directly from producers. However, retailers perform functions other than distribution. When an intermediary has superior experience, knowledge, and authority in evaluating product quality, the need for its service will persist. Also, customers will incur increased costs if they have to deal with as many sellers as needed to purchase goods. Thus, there will remain a need for intermediaries and brokers in electronic commerce.

**E-COMMERCE IN PAKISTAN**

In order to enjoy e-commerce benefits and to become an on-line global trading partner, Pakistan is required to install necessary e-commerce infrastructure on urgent basis. The question, for Pakistan, today is first of survival and then for creating a niche in the emerging digital economy. Considering this fact, the federal government has adopted urgent measures for the promotion and expansion of IT industry in the country. The most important aspect is the announcement of an “IT Policy and Action Plan” on 23rd August 2000. The policy lists a number of recommendations to promote electronic commerce. The most important recommendations are as follows:

- Establish high profile Electronic Commerce Council of Pakistan (ECCP), to govern all the e-commerce affairs in Pakistan.
- Establish specialized work groups for planning and implementing different aspects of electronic commerce, such as awareness, promotion, education and training; e-commerce infrastructure implementation; Electronic Data Interchange (EDI); the Internet and other emerging technologies for e-commerce services; and laws, regulations and standards for e-commerce. The groups should work in consultation with the government, businesses and e-commerce organizations.
- Create EC-PAK, a national network for electronic commerce that will be the major service provider for B2B, B2C and B2G (Business-to-Government) services and will be the contact point for various incoming or outgoing networks.
- Establish National Electronic Fund Transfer (EFT) System linked to all the banks and financial institutions in the country and connected to the international financial systems.
- Facilitate international trade through an e-commerce infrastructure.
- Encourage use of e-commerce in government for procurement, promotion of trade, provision of information and trade related services.
- Frame legislation based on the recommendations of Information Technology (IT) and legal experts to provide protection and enhance confidence of users and providers.
- Laws be enacted and/or amended to recognize digital IDs, signature certificates, and electronic authentication and verification.

The following steps have already been taken to encourage the IT industry and e-commerce in the country:

- The cost of Internet bandwidth of PTCL has been reduced up to 53%, which has led to reduction in Internet end user prices.
- Universal Access to the Internet, even to non-connected areas, at the cost of a local call using the unique ‘131’ numbers of ISPs has been extended.
- Internet delivery on Cable TV has been permitted which would result in substantial increase in the Internet usage.
- The market is being opened up for the private sector participation in joint venture with PTCL in terms of tele-housing arrangements, voice over Internet, setting up international bandwidth gateways via satellite and cable.
- Computer networking and majority of IT equipment has been exempted from custom duties.
- The State Bank of Pakistan (SBP) has allowed banks to open Internet Merchant Accounts within Pakistan. This was a major hindrance in start of e-commerce activities in the country.
- Draft “IT Ordinance 2000” has been formulated to provide legal recognition to electronic transactions and digital signatures and has been circulated to the concerned Ministries for comments. The final Ordinance would be submitted for approval of the Cabinet by the end of October 2000.
## E-Commerce: Concepts, Benefits and Technologies

### Table 6: Popular On-line Stores and Businesses

<table>
<thead>
<tr>
<th>COMPANY URL</th>
<th>COMMENTS</th>
<th>PROJECTED BUYERS (Monthly)</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.amazon.com">http://www.amazon.com</a></td>
<td>Largest retail shop on the Internet - Sells books and CDs</td>
<td>1,500,000</td>
</tr>
<tr>
<td><a href="http://www.barnesandnoble.com">http://www.barnesandnoble.com</a></td>
<td>Sells books, music, video, and software</td>
<td>350,000</td>
</tr>
<tr>
<td><a href="http://www.cdnow.com">http://www.cdnow.com</a></td>
<td>Largest collection of music on the Internet</td>
<td>325,000</td>
</tr>
<tr>
<td><a href="http://www.drugstore.com">http://www.drugstore.com</a></td>
<td>Sells drugs, nutrition, vitamins and beauty items</td>
<td>325,000</td>
</tr>
<tr>
<td><a href="http://www.planetrx.com">http://www.planetrx.com</a></td>
<td>Sells drugs, nutrition, vitamins and beauty items</td>
<td>300,000</td>
</tr>
<tr>
<td><a href="http://www.more.com">http://www.more.com</a></td>
<td>Sells drugs, nutrition, vitamins and beauty items</td>
<td>250,000</td>
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<tr>
<td><a href="http://www.mothernature.com">http://www.mothernature.com</a></td>
<td>Sells natural products like vitamins, herbs and minerals</td>
<td>200,000</td>
</tr>
<tr>
<td><a href="http://www.jcpenney.com">http://www.jcpenney.com</a></td>
<td>Sells apparel, home and sport items, electronics, toys, and gifts</td>
<td>225,000</td>
</tr>
<tr>
<td><a href="http://www.sears.com">http://www.sears.com</a></td>
<td>Sells appliances, computer and office supplies, electronics, etc.</td>
<td>200,000</td>
</tr>
<tr>
<td><a href="http://www.buy.com">http://www.buy.com</a></td>
<td>Sells computers, software, electronics, books, music, etc.</td>
<td>250,000</td>
</tr>
<tr>
<td><a href="http://www.spiegel.com">http://www.spiegel.com</a></td>
<td>Sells fashion, home, and electronics items</td>
<td>100,000</td>
</tr>
<tr>
<td><a href="http://www.1800flowers.com">http://www.1800flowers.com</a></td>
<td>Largest online flower shop - Sells flowers, gifts and plants</td>
<td>100,000</td>
</tr>
<tr>
<td><a href="http://www.ftd.com">http://www.ftd.com</a></td>
<td>Internet's fresh flower market - Sells bouquets for all occasions</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.estyle.com">http://www.estyle.com</a></td>
<td>Sells gifts and clothing for mom, baby and kids</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.ebay.com">http://www.ebay.com</a></td>
<td>Largest site - Private sellers hawk a variety of merchandise</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.onsale.com">http://www.onsale.com</a></td>
<td>Auction market for computer equipment</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.wwauction.com">http://www.wwauction.com</a></td>
<td>Auction market for collectibles, diamonds, watches, and coins</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.barclays.co.uk">http://www.barclays.co.uk</a></td>
<td>Offers full banking services to customers from home computers</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.citibank.com">http://www.citibank.com</a></td>
<td>World's largest bankcard and charge card issuer</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.wellsfargo.com">http://www.wellsfargo.com</a></td>
<td>One of the most Internet-savvy bank in the industry</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.schwab.com">http://www.schwab.com</a></td>
<td>Charles Schwab - Online trading of stocks</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.ml.com">http://www.ml.com</a></td>
<td>Merrill Lynch - Online access to account resources</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.coldwellbanker.com">http://www.coldwellbanker.com</a></td>
<td>Coldwell Banker - Largest company-owned real estate firm</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.listinglink.com">http://www.listinglink.com</a></td>
<td>ListingLink - Homes and ranches throughout the USA</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.iflyswa.com">http://www.iflyswa.com</a></td>
<td>Southwest Airlines - One of the first airlines on the Internet</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.travelocity.com">http://www.travelocity.com</a></td>
<td>Travelocity - Travel information services from Sabre Group</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.prenhall.com">http://www.prenhall.com</a></td>
<td>Prentice Hall - Publisher of academic and reference textbooks</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.wiley.com">http://www.wiley.com</a></td>
<td>John Wiley &amp; Sons – Products in print and electronic media</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.ticketmaster.com">http://www.ticketmaster.com</a></td>
<td>Sells tickets of popular events like music, sports and arts</td>
<td>625,000</td>
</tr>
<tr>
<td><a href="http://www.pets.com">http://www.pets.com</a></td>
<td>This superstore is famous for selling pets online</td>
<td>450,000</td>
</tr>
<tr>
<td><a href="http://www.victoriassecret.com">http://www.victoriassecret.com</a></td>
<td>Sells women items like undergarments, lingerie, etc.</td>
<td>170,000</td>
</tr>
<tr>
<td><a href="http://www.eToys.com">http://www.eToys.com</a></td>
<td>Largest toy shop on the Internet - Toys for all age groups</td>
<td>125,000</td>
</tr>
<tr>
<td><a href="http://www.yahoo.com">http://www.yahoo.com</a></td>
<td>Provides various types of services to its customers</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.iprint.com">http://www.iprint.com</a></td>
<td>Provides professional printing services</td>
<td></td>
</tr>
</tbody>
</table>
E-COMMERCE EXAMPLES

There are many success stories and well-established examples of e-commerce in a wide range of industry sectors and a wide range of application areas. A few of these are shown in Table 6 to illustrate the nature of activity.

Note: The statistics of the projected buyers is based on the monthly surveys conducted by PC Data Online (http://www.pcdataonline.com) and represents a rough average of 2nd Quarter 2000.

CONCLUSIONS

E-commerce is not a futuristic dream. It is happening now and it is happening fast, with many well-established success stories and examples. E-commerce is essentially global in both concept and realization. Millions of individuals and companies, around the world, are already buying, selling, bidding, advertising, brokering and collaborating on daily basis.

The impact of e-commerce will be pervasive, both on companies and on society as a whole. Companies that choose to regard it only as an “add on” to their existing ways of doing business will gain only limited benefit. For those companies that are willing to change their organizations and business processes to fully exploit its potential, e-commerce offers the possibility of breakthrough changes. All the companies, including those that try to ignore the new technologies, will then be impacted by these changes in markets and customer expectations.

It’s not too late for the rest of the economy to join the electronic commerce. By encouraging e-commerce, all sides will gain. The companies that are currently operating outside the boundaries of e-commerce can realize cost savings, productivity gains, increased market share and penetration of new markets by incorporating electronic commerce technology into their business strategies.

Businesses, wishing to join the e-commerce, should continually examine the risks and opportunities created by electronic commerce. Their information technology organizations must prepare enabling capabilities and technologies. The risks of lagging probably exceed the risks of proceeding with less than optimal adoption strategies.

The overall impact of e-commerce on lifestyle could well be comparable to, say, that of the growth in car ownership or the spread of the telephone. It is only a matter of time before e-commerce will become an obvious part of our lives.

*** Date: 20th September 2000

REFERENCES


IEP-SAC Journal 2000-2001 57


