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# ELECTRONIC COMMERCE AND INTELLECTUAL PROPERTY ON THE INTERNET: AN OVERVIEW OF THE CONCEPTS

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Abstract: Business use of the Internet has increased dramatically. New technologies and procedures involving Intellectual Property and Electronic Commerce will revolutionize the marketing of products and other business transactions. Intellectual Property Assets are expensive to develop and with electronic mediums can be disseminated widely, with or without the owner's approval, in minimal time and minimal cost. Electronic Commerce transactions must be secure and must be integrated into an organization's marketing and information dissemination procedures. Without controls in place the assets and information can be pilfered or misused without the owner's knowledge. The following is a brief discourse into the subject matter and will provide a beginning point into understanding these two complex subjects.

## INTRODUCTION

A recent study by International Data Corporation estimated that annual retail sales for products such as apparel and computer software conducted over the Internet will be nearly $7 billion by the year 2000. Efforts by financial institutions to develop secure Internet transactions and the limitations on consumer liability will increase consumer confidence for making Internet purchases. Improvements in communications speed by telephone and cable providers will improve the usefulness and content of computer-stored product information available on the Internet. These two factors alone will propel the distribution and use of electronic commerce and intellectual property at an exponential rate. The coatings industry will be among the sellers and consumers of Internet based products and services.

This paper explains the areas of electronic commerce and intellectual property and how they can be used by coating industry organizations. Current private industry and government efforts designed to establish a framework for these two important areas of Internet activity will be described. Finally, anticipated benefits to the coating industry will be stated.

## POTENTIAL USE FOR ELECTRONIC COMMERCE AND INTELLECTUAL PROPERTY IN THE COATING INDUSTRY

Many coating industry organizations are currently evaluating the practicality and benefits of conducting Electronic Commerce (e-

commerce) and distributing Intellectual Property (IP) on the Internet. However, several constraints exist, and company and consumer attitudes currently limit significant progress. Examples of these constraints and attitudes include:

- product information maintained by companies is not in an appropriate electronic format, or the lack of staff prohibits computerization of product information
- consumers are concerned about inadequate security for conducting business transactions electronically
- in some cases, communication is slow when sending and receiving graphics and images that describe products
- many consumers are not connected to the Internet, resulting in a limited market.

While the potential for applications seems endless, solutions to difficult problems such as the security of information must be implemented and agreed upon.

From the e-commerce point of view, the questions could be: "How do I as a company or organization sell products (e.g. coating systems, publications) that I now market using a sales force or advertising?" or "What marketing strategies must be changed within my organization" and "can I still maintain my marketing niche through the Internet?" From a consumer perspective, a simple question could be: "Is the information that I receive online over the Internet sufficient for me to make a decision to purchase a product, or will it be necessary to conduct a consultation with a human?" The answer to these questions will vary, depending on each situation. However, it can be stated that the frequency of electronic purchases will increase significantly as improved methods (e.g. speed, security) are implemented and information content improves on the Internet. Companies deciding to market products will be able to leverage their position through the many new startup companies that provide the service for designing, maintaining, and distributing information in electronic form. Consider the CD-ROM and its popularity today. Periodic updates are the norm, which may result in numerous obsolete versions, a prime example being encyclopedia and published standards and guidelines. The electronic distribution of such information, via the Internet, will reduce the overhead costs by allowing consumers access to all or parts of the information base.

## ELECTRONIC COMMERCE AND INTELLECTUAL PROPERTY EXPLAINED

Business enterprises are constantly looking for new ways of reducing costs and improving the efficiency of their companies. The acquisition of new technology affects the way in which business is conducted. Technological advances available in the area of e-commerce are designed to help businesses accomplish these goals.

E-commerce is a commercial exchange system which has been developed and makes use of the new computer hardware, software, and communications network advances that are now available. It may be defined as the use of product information (e.g. product literature, financial documents) in electronic form instead of paper, for business or government operations. In the broadest sense, e-commerce can mean using technological advances to promote everything that is commerce.

The implementation of e-commerce offers many advantages to the "trading partners" or companies involved in the conduct of business. First of all, it eliminates a great amount of human work. One of the significant advantages of using e-commerce is the time it saves companies, therefore, saving money. An example would be the billing process which could save labor and materials costs. The transactions are processed faster using computer networks rather than having to rely on paperwork transactions. Also, the risk of lost or damaged documents is reduced when documents are transmitted electronically. Another advantage of e-commerce is the quality of service is improved since automation of the process reduces errors, payment delays can be avoided, and the information is transmitted more accurately. Also, the volume of transactions exceeds that which is feasible for human processing. Current and future e-commerce tools available on the Internet will help the economy significantly by bringing companies and customers together. It will result in expanded markets, and theoretically, lower prices.

## DEVELOPMENTS IN ELECTRONIC COMMERCE

E-commerce involves the exchange of business information among computers and humans, or traders and customers. Electronic Data Interchange (EDI) is the commercial interchange system which permits the computer to computer transmission of strictly formatted messages that represent documents. A discussion of EDI and the transition from EDI to e-commerce is described by Sokol [1]. EDI provides the facility for the supporting electronic trade between a company and its trading partners. EDI is an essential component of e-commerce. Figure 1 represents a diagram of the information flow that utilizes EDI and e-commerce capabilities. Several organizations have been involved in the standards for EDI since the 1970's. These include: Data Interchange Standards Association (DISA) [2], the Uniform Communication Standard/Voluntary Interindustry Communications Standard (UCS/VICS) [3], and the American National Standards Institute standards committee X12 [4]. EDI involves standardized methods aimed at the elimination of paper in business transactions. EDI contributes in the process of helping industries save millions annually.

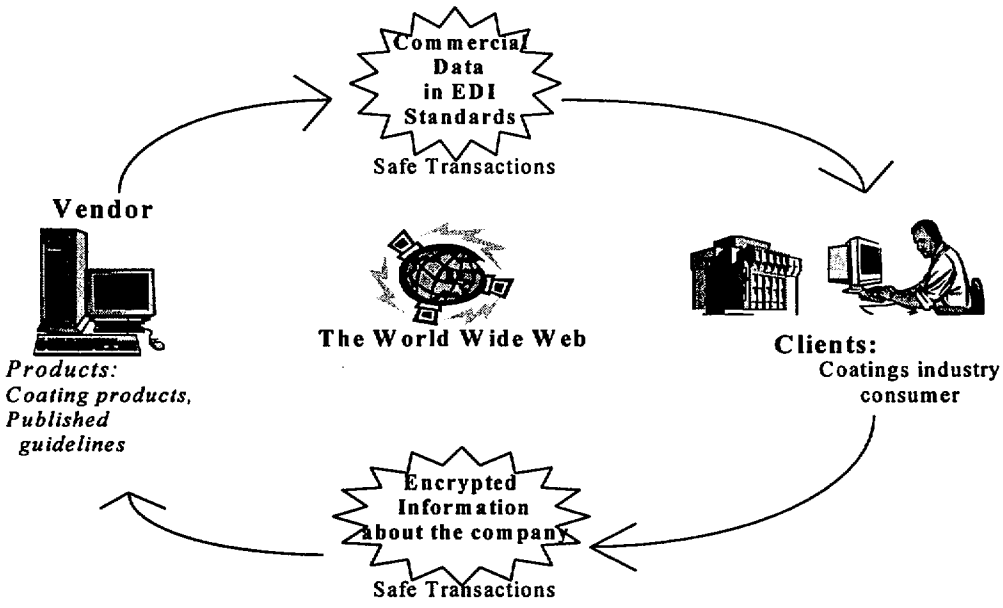


**Figure 1: Diagram of the information flow for e-commerce, including EDI.**

In implementing and EDI system, the first step is to substitute the existing paper documents with an EDI format. EDI translation software is needed to accomplish this task. Two methods are typically used to implement. The most efficient method involves connecting a service company that receives the information to be processed. The service company then converts it to EDI for transmission to the trading partners. When the information is received, the service company converts it from machine language into a human readable document again. There is normally a monthly fee for this service, and an additional charge for every document sent.

The second, and most efficient long-term solution for a company is to maintain its own application programs and an EDI translator on an in-house computer. This makes transactions faster, although this alternative is the most expensive. EDI software would have to be purchased, installed, integrated with business applications, and synchronized with the other trading partners.

## ELECTRONIC COMMERCE AND SECURE TRANSACTIONS

Four methods that are most often used to secure electronic information: 1) authentication, 2) encryption, 3) firewalls, and 4) proxy servers. Table 1 lists the methods and how they are used. Of the four, encryption techniques are becoming widely used for financial information. For example, when using e-commerce, data is transmitted via EDI with a high degree of security since successful implementation of these systems depends on the adequate provision of security. Several tools have

been developed in order to provide a safe transfer of information so that the companies can be protected as well as the Intellectual Property Rights (IPR) of individuals. One way of sending information safely through the Internet, World Wide Web is by using encryption methods [2]. Encryption is the transformation of data into an unreadable form, for those who don't possess a secret decryption key. This tool ensures privacy since the data is written in a code which can't be read. In a secure cryptosystem (a system containing encrypted text), the plain text cannot be recovered from the cyphertext (secret text), without the decryption key.

| Security Method | Technique |
|---|---|
| Authentication | entry identification and password |
| Encryption | encoding and decoding information being transmitted |
| Firewall | installation of computer hardware and software that restricts to computers or protocols |
| Proxy server | type of service restrictions placed on the use of computer facilities and data |

**Table 1: Security methods and techniques.**

Another way of securing information on the Internet is with digital authentication of the documents. In this process, where the receiver knows the real identity of the sender of a message. Authentication protocols exist which can be based the use of cryptosystems, or digital signatures. A secure digital signature consists of two parts: a method of signing a document so that it can't be falsified, and a method of verifying the true nature of the signature. Digital signatures are similar to e-mail messages in that, by default, the person who wrote it is known. This system can also be implemented using public keys. A public key system consists of each person getting a pair of keys called public and private keys. Each person's public key is published while the private key is kept secret. This way, no secret information needs to be shared. It has the advantage of increased security. The person that wants to send you a message finds out your public key. The message can only then be read using your private key. This makes you the only possible reader since nobody else knows your private key. The only disadvantage to this security system is the speed, since it takes longer for the person to receive and read the message when it is encrypted.

An example of a cryptographic system is the Data Encryption Standard (DES) [5a, 5b]. This was endorsed by the government as an official standard in 1977. It is a secret key, symmetric

cryptosystem; both, the receiver and the sender must know the same secret key. It can also be used for single user encryption. Another cryptographic system called Secure Electronic Transaction (SET) [6a, 6b] was developed by Visa and Mastercard companies. SET specifies standards for a very powerful encryption system. This protocol is used to verify that the actual cardholder is the one making the purchase. At the time of this writing, this standard is perceived by industry to be the best solution for securing financial transactions on the Internet.

Some companies already have their own secure methods for protecting consumers when doing business on the Internet. For example, Cyber Cash is a company that works as a media for conducting transactions on the World Wide Web. The company creates what is called a "wallet" which keeps a subscriber's credit card number so that transactions can be completed in a secure way. With Cyber Cash, you can buy many different types of merchandise such as food, and computer products, among others, can be purchased.

Companies exist that sell EDI packages so that others use join e-commerce. Examples of these are EDICT [7] Systems and Premenos[1] [8]. These companies provide the price lists of their products on line. In most cases, the products can be purchased electronically.

Internet sites can be a source of up-to-date information on e-commerce. Electronic Commerce Resource Centers [9], for example, promote awareness and the implementation of e-commerce and related technologies. The purpose of the centers is to help industry (e.g. manufacturers) improve their position in the international market.

Previously referenced companies and others can be reached on the Internet and are examples of e-commerce and of the diversity of products available electronically. There are other links in the net which discuss IPR and how these are affected by the ease of replication and transmission of data on the Internet. The sites are too numerous to reference in this paper. Some examples are given in Table 3.

[1] The reference to commercial companies, products, and services in this paper, does not constitute an endorsement by the National Institute of Standards and Technology.

| Title | Link | Topic |
|---|---|---|
| Cyber Cash | www.cybercash.com | Electronic Commerce |
| EDICT Systems | www.edictsystems.com | Electronic Commerce |
| Premenos | www.premenos.com | Electronic Commerce |
| ECRC | www.ecr.gmu.edu/ | Electronic Commerce |
| Master Card | www.mastercard.com | Electronic Commerce |
| Premenos | www.premenos.com | Electronic Data Interchange |
| Pharmavite | www.vitamon.com | Electronic Data Interchange |
| Data Interchange Standards Association | www.disa.org | Electronic Data Interchange |
| IPR: Universities and Wealth Creation | www.smithsys.co.uk/smithsys/techp/ipr/ipr.html#relevance | Intellectual Property Rights |
| Information Security Committee Homepage | www.intermarket.com/ecl/inform.html | Intellectual Property Rights |
| Information Infrastructure Task Force | www.nii.nist.gov/iitf.html | National Information Infrastructure |
| RSA Data Security, Inc. | www.rsa.com | Secure Electronic Transactions |
| Netscape, Inc. | home3.netscape.com/comprod/server_central/tech_docs/oif.html | Secure Electronic Transactions |

**Table 3: Internet World Wide Web sites for e-commerce and IPR.**

## INTELLECTUAL PROPERTY RIGHTS

All economic systems need to be based on an understanding of Intellectual Property Rights (IPR) [10]. Enforcing IPR can reduce the cost of conducting business by reducing operating costs and losses. IPR are legal rights granted by governments to protect individual effort and creativity (see figure 2). IPR such as copyrights have become a major issue today due the Internet phenomenon and the proliferation of e-commerce. The Internet has expanded so fast in such a short period of time, that it has become extremely vast in terms of the volume and type of information that can be communicated. Due to its rapid growth and acceptance, the Internet has become a relatively unorganized system. This has resulted in an entity that is very difficult to regulate. Documents available on the Internet are implicitly protected by copyright laws. Today, American copyright laws protect literary works from being copied without the author's permission. Any document available in the World Wide Web is a

literary work and as such is protected against people that want to copy it for personal profit.

The Information Security Committee of the American Bar Association, Electronic Commerce and Information Technology Division [11] is another group working on the protection of the IPR of individuals who place their work on the World Wide Web. Its members are professionals are from the private and government sectors. The committee explores and discusses security issues on the Internet.

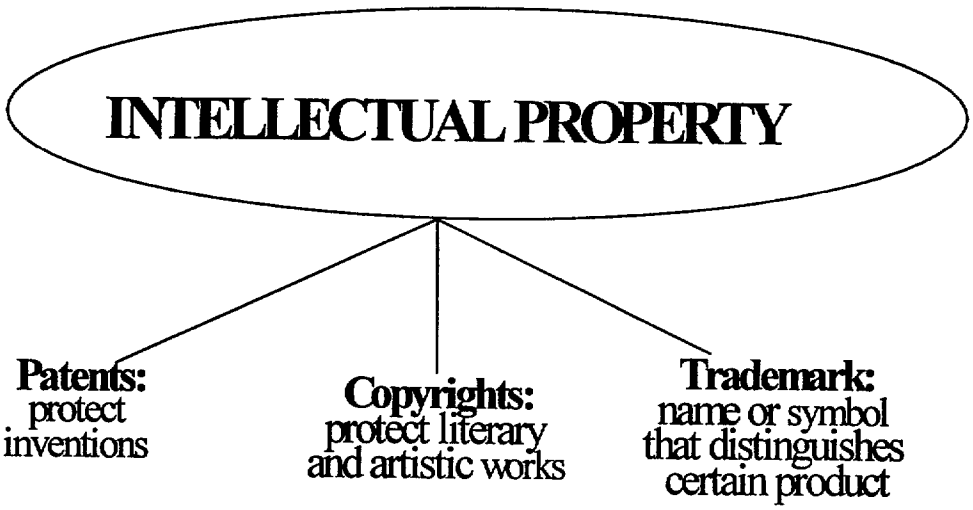


**Figure 2. Examples of entities covered under IPR.**

## A NATIONAL PROGRAM: THE NATIONAL INFORMAITON INFRASTRUCTURE

U.S. Government agencies are working on a national program called the National Information Infrastructure (NII) [12,13]. The NII is intended to create regulations to protect the Intellectual Property Rights of individuals who place documents on line. For example, the NII Task Force (NIITF) is a government group whose goal is to accelerate and organize all government activities related to the National Information Infrastructure. The NII activity is described in more detail later in this paper. The NII activity also focuses on the needs of the private sector. A special working group within NII is dealing specifically with IPR. The NIITF is chaired by the Commerce Department Secretary Mickey Kantor.

The NII includes more than the physical facilities used to transmit and process information. It will consist of the integration of several communication and data processing devices connected together to form a huge information network. The appliances will include computers, televisions, telephone lines and fax machines, among other communication devices.

The National Information Infrastructure will evolve with each advance in the communications field. The value of the NII depends on various elements such as the information that is transmitted. Most importantly, the NII depends on the people who create the information and build the necessary facilities for the proper transmission of the data. All the components must be integrated in order to obtain a useful information network. An example of the use of the NII is currently being demonstrated in the medical field. Patient information, such as prior medical histories, and patient critical information such as allergies can be transmitted among medical doctors and hospitals in a timely manner (e.g. immediately after an accident), and to virtually any geographic location throughout the world.

E-commerce will be a major application area for the NII. The services that the NII provide will grant access to business information in an organized and efficient way, thus creating a suitable environment for e-commerce to grow and develop.

## SUMMARY

Although e-commerce offers many advantages, some barriers will be encountered when trying to implement the systems within companies. Some organizations will resist the change. This is largely due to the process involving total reengineering of the companies' business process, which may be expensive. Resistance also exists among customers due to the perceived value of information and services available and the perceived lack of security and liability on the Internet. Despite these barriers, advantages to using e-commerce exist, largely in the area of efficiency and timely delivery and access to information. Activities such as the SET standard increase consumer confidence, network bandwidth will expand and companies will find it easier to market products and services over the Internet due to the existence of tools for developing electronic-based information.

## REFERENCES


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[6a] **Secure Information Transfer: PC Encryption: A Practical Guide,** Keith M. Jackson, CRC Press, Boca Raton, FL (1990).

[6b] **Secure Electronic Transactions,** RSA Data Security, Inc., Redwood City, CA.

[7] **Electronic Commerce Technologies and Applications,** EDICT Systems, 1619 Mardon Drive, Dayton, OH 45432.

[8] **Electronic Data Interchange,** Premenos, 1000 Burnett Avenue, Concord, CA 94520.

[9] **Electronic Commerce,** Electronic Commerce Resource Center, Fairfax Regional ECRC, 10640 Page Ave., Suite 400, Fairfax, VA 22030.

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