LEGAL CHALLENGES IN THE IMPLEMENTATION OF ELECTRONIC DATA INTERCHANGE IN TRANSPORT DOCUMENTS

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I INTRODUCTION

One of the basic factors in international trade transactions is the exchange of information. Each commercial transaction usually involves movement of goods, money and information. For a contract to be concluded and performed, the exchange of information is necessary. Goods cannot be sold, carried or insured if all involved parties are not in possession of relevant information. The information can be exchanged in different forms: orally, in writing, or electronically. For centuries the data required in business transactions was entered on a piece of paper, represented by a standard document with defined form, content and functions. Paper documents are complex, and often contain unnecessary data, while their transfer is slow, which causes problems and additional costs for the parties. Moreover, the paper documents themselves are expensive because of their number and the quantity of paper used.

A new stage in industry development was announced by the introduction of computers after World War II. Computers are machines first intended for performing mathematical operations, but now used widely in almost every

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aspect of everyday life. They have an enormous ability to store, process and transfer information. This has resulted in a radical change in the way of conducting business. The most important change is that information is stored in the computer and does not need to be printed on paper in order to read and transfer it.

The decisive factor in expanding the role of computers in handling information is the technology of communications. Computers operate increasingly as parts of networks which link different users. Computers connected in a network can exchange data directly among each other. The combination of computers with telecommunication systems has enabled the development of a new kind transmission of business data: electronic data interchange (EDI). This new way of creating and communicating information promoted by computers and EDI is called "electronic commerce", and "includes any computer or other technology by means of which information or other matter may be recorded or communicated without being reduced to documentary form".[1] By using electronic commerce the parties in international trade can now exchange information electronically instead of using paper documents. This radical change from paper based transfer of information to electronic transfer offers great advantages to companies due to the greater speed, accuracy and efficiency with which commercial transactions may be conducted.

The use of EDI is still not widespread in international trade transactions, but there are strong grounds to believe that it will become a dominant way of conducting international business in the near future. However, there are some legal obstacles which have slowed the introduction of EDI. These obstacles must be eliminated to clear the way for more extensive use of EDI in international business. Most of the international conventions and national laws was drafted in an age where EDI was clearly not envisaged. The law of evidence also traditionally relies on paper records. This causes uncertainty regarding the legal recognition of computer generated records, so that the parties to commercial transactions are still reluctant to accept electronic records and prefer traditional paper documents.

The rapid development of EDI has contributed to a great interest on the part of international organisations, private companies and lawyers with respect to legal problems with which the commercial implementation of EDI has been confronted. To facilitate and promote the commercial implementation of EDI, an understanding of these problems is required in order to find appropriate solutions.

This article aims to examine the main legal problems associated with the commercial use of EDI. In Part I the main technical features of EDI will be dealt with to describe how electronic commerce is carried out. Part II briefly introduces the legal regulation of EDI and its impact on commercial transactions. The rest of the article then focuses on its main object: legal problems posed by EDI and possible solutions.

[1] English Carriage of Goods by Sea Act (1992) Section 5(1).

II ELECTRONIC COMMERCE

To be able to deal with legal problems which arise as a result of use of computers and electronic data interchange, it is useful to set out their basic technological features.

A. Computers

The computer is a machine able to store and process information with great speed. It processes data by transforming it into binary digits represented by only two numbers: "0" and "1". Every kind of information (text, sound, graphs, image) can be represented by a combination of zeros and ones. Every letter of the alphabet can be expressed by a combination of zeros and ones representing one byte.[2] The computer translates the words into "computer language" automatically by using special programs created for this purpose.

It is not intelligence that makes the computer so important, since a computer is not able to think. Rather, it is a series of its features that makes computers important:

- computer can store a large amount of information in small digital recording devices such as floppy discs;
- computer can quickly retrieve any piece of information stored in its memory;
- such information can easily be available to many users at the same time and can be transmitted electronically with high speed to other users.

Another characteristic of computerized data which can be advantageous, but also disadvantageous, is the ability to change the content of data without leaving a trace. This is very convenient for users when they need to correct data. However, it is also a menace which exposes the users to a risk that valuable data can be destroyed or distorted by third parties, without the user being aware of it. This can have serious implications for business operations and can also be an instrument of fraud. In order to prevent undesirable consequences, several technological devices have been created to restrict unauthorized access to the data stored in computers.

B. Electronic Data Interchange

To understand the impact of electronic data interchange (EDI) on commercial transactions, it is important to know what EDI is and how it functions.

EDI is a new type of communication based on direct exchange of business data performed electronically between computers in a standardized form.

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[2] In the American Standard Code for Information Interchange (ASCII) each 8-bit binary word represents a letter, e.g. the letter "A" is expressed as 11000001.

The EDI enables data in the form of an electronic message to be transmitted from a computer where it was created to another computer. After the message is entered at the keyboard of a sender's computer, it is copied onto a hard or floppy disc. The computer then transmits data to the recipient's computer using its communication software. The transmission of data is effected electronically via satellite or telephone lines to which both computers are connected through modems (MOdulator-DEModulator). The modem at the sender's side converts digital information as processed by the sender's computer to the analogue signals used for telecommunication over an ordinary telephone line. When data is received at the recepient's side it is again converted by modem into digital information. The received data can be stored in the recipient's computer or on disc and retrieved when necessary, with no need to be printed on paper. That is why EDI is often referred to as a "paperless" operation.[3]

EDI offers many advantages for their users, since it is the fastest, cheapest and most reliable way of communication. It is predominantly used in business operations to replace standard paper documentation such as invoices, purchase orders, shipping notices, etc.

EDI operates on the basis of several programs:

- a program for communication;
- a program for translation of messages;
- a controlling program; and
- a program for connection with data bases.

These programs enable a message to be transmitted directly from one computer to another, from one data base to another. An output on the sender's side automatically means an input on the receiver's side.

The user must use a certain precisely defined format to be able to operate EDI. The format is an information structure which defines the syntax, data elements and structure of the message. The syntax corresponds to the grammar in a language. Data elements correspond to the vocabulary. The structured message represents a combination of syntax and data elements and by its content it is similar to a paper document. The message is transmitted between computers using software interfaces which serve to translate data from one application program for use by another. This means that a computer receiving a message can recognize the language of the message only if fed into programs compatible with the standard used by the computer sending the message.

EDI standards provide what and how information is to be transmitted between the users. Basically, there are two types of EDI standards: formatting standards and communication standards. Formatting standards define

[3] "Paperless" does not mean that paper is actually not used, since it is usual to have print outs of data stored in a computer, but only that paper is not indispensable.

what documents can be communicated electronically, what information such documents are to contain, what form of information should be used and the meaning of individual pieces of information. Communication standards determine the way of transmission of the messages between the computer systems.

III LEGAL REGULATION OF EDI

There is one problem that must be resolved if international trade wants to enjoy the benefits offered by EDI: the law must be changed, since the existing legal infrastructure is based on paper documents. Many statutes currently require or assume commercial documents to be a "writing" containing a "signature".[4] Sometimes these documents are "negotiable" and the presentation of an "original" is required. All these phrases face serious difficulties when applied to electronic messages.

When the law provides for written form of documents it never says that the written form means paper documents, but this has been understood for centuries, since until now paper has been the most convenient means for making documents. Now computers enable information to be available and visible on a computer's screen, which is equally readable and contains the same content as a paper document, can be considered to be in writing. Or, is it necessary for information to be in writing at all?

So far, there are very few statutes which specifically address the fundamental issues concerning EDI. The lack of legal regulation has negative consequences in practice. The parties in international trade might refuse to accept documents in electronic form because of doubt as to their legal value. If such a document is to enjoy the same legal status as a paper document, the law must be changed so that legal effect can be recognized not only as to paper documents, but also as to documents created and transmitted by computers. The law has already made several steps in this direction.

The increasing commercial use of EDI has been accompanied by a growing interest in the development of an international legal framework to govern such transactions. Several international organizations, such as the United Nations and the International Chamber of Commerce (ICC), have been studying the legal problems related to the use of EDI in the commercial transactions. Special tribute should go to UNCITRAL which was very active in this field for years and has produced several detailed analyses related to the legal validity of electronic commercial practices.[5]

In 1987 the ICC in conjunction with UNCITRAL published the Uniform Rules of Conduct for Interchange of Data by Teletransmission (UNCID). The

[4] See ROLAND and MACDONALD, *INFORMATION TECHNOLOGY LAW* (1996) 231-4.

[5] For UNCITRAL working group activities see its web site: www.un.or.at/uncitral/sessions/wg.ec/index.htm.

purpose of these Rules is to facilitate electronic transmission of data by establishing basic standards of technical requirements and procedure. These Rules include several provisions concerning the content and structure of message, as well as the ways of transmission. They also set out security procedures that should be observed by EDI users.

In 1988 the Working Party on Facilitation of International Trade Procedures within UN Commission on Europe adopted the Rules for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT), based on the EDIFACT standard. UN/EDIFACT consists of a set of internationally agreed standards, directories and guidelines for the electronic interchange of structured data, and in particular that relating to trade in goods and services. Among the main UN/EDIFACT standards are the International Forwarding and Transport Message Framework which relates to transport documentation, and Uniform Communication Standard which relates to the grocery industry. UN/EDIFACT has become an international standard on which EDI messages are structured and transmitted between independent computer networks, and it is in widespread use in international business transactions.

In the USA the American National Standards Institute Accredited Standards Committee X. 12 (ANSI X 12) is still the dominantly used standard, but there have been announcements that some major companies (e.g. General Motors Corporation) will soon replace it by the UN/EDIFACT standards. This indicates that the UN/EDIFACT standards may be universally adopted in the future.

UNCITRAL has a working group on EDI which prepares model statutory provisions which are designed to overcome legal obstacles to the use of EDI. After several years of preparation, in 1996 UNCITRAL adopted the Model Law on Electronic Commerce. It applies to all forms of information generated, stored or communicated by electronic, optical or analogous means, including EDI. The Model Law has succeeded in eliminating many of the barriers which have prevented electronic documents from having the same legal status as paper documents.

Several Conventions and Uniform Rules, as well some national legislation, contain provisions which made them applicable to documents issued in electronic form. Article 11 of the Vienna Convention on Contracts for the International Sale of Goods eliminates any requirement of a writing for the enforceability of a contract of sale of goods. Article 14(3) of the Hamburg Rules and Article 5(3) of the UN Convention for Multimodal Transport provide for the possibility that the signature can be made by any electronic means; the UNCTAD/ICC Rules for Multimodal Transport Document (Rule 2.6) and INCOTERMS (Rule A.8.) make a particular reference to the replacement of paper transport documents by EDI messages; Rule 1(ii) of the CMI Rules for Sea Waybills provides that they shall apply when adopted by a contract of carriage, whether the contract be in writing or not; and Article 20(b) of the UCP Rules (1993) provides that original document includes a document pro-

duced by reprographic, automated or computerized systems, while the signature is described to include an electronic method of authentication. In 1990 the CMI has adopted the CMI Rules for Electronic Bills of Lading. The CMI Rules apply "whenever the parties so agree" (Rule 1). These Rules apply only to electronic transfer of a bill of lading and are mostly concerned with its function as a document of title. In addition, the European Commission is sponsoring the BOLERO project which is intended for use in electronic letters of credit.

At the national level, an increasing number of national law-making bodies has been engaged in reviewing national laws to accommodate the needs of electronic commerce. As a result of, some existing laws have been amended, e.g. the English Carriage of Goods by Sea Act, 1992 which now expressly recognizes the possibility of use of electronic bills of lading, and Uniform Commercial Code which now contains provisions specifically related to electronic transactions (Section 2-208). Some countries have adopted legislation related to electronic commerce, e.g. the Utah Digital Signature Act 1995 and German Digital Signature Law 1997.

IV EDI INTERCHANGE AGREEMENTS

Worldwide, the law has not kept pace with the development of EDI and related technologies, and the legal situation with respect to EDI is still not entirely clear. Until the law is amended so to fully accommodate the needs of EDI, traders are advised to use EDI interchange agreements that can resolve any legal issue, affecting them.

EDI interchange agreements, or trading partner agreements, are written contracts between the parties wishing to trade electronically using EDI or similar technologies. They regulate the rights and obligations of the parties regarding technical and legal matters and provide the foundation for their EDI trading relationship.[6]

EDI interchange agreements usually contain a statement that, where the law so permits, EDI messages will have the same legal effect as paper documents. Some of these agreements provide that in the case of disputes, no party will be entitled to contest the validity or enforceability of their electronic transactions merely on the grounds they were carried out through EDI. The agreements regulate the practical arrangements the traders will adopt when transmitting and receiving electronic messages, as well as security procedures, confidentiality of certain data, storage, and authentication of messages. The interchange agreement should also regulate apportionment of liability and risk for error in the transmission of data, or for the failure of the system after transmission, especially when the agreement provides for use of a third party network.

[6] See, BOSS and RITTER, *ELECTRONIC DATA INTERCHANGE AGREEMENTS* (1993).

EDI interchange agreements can have bilateral or multilateral character depending on whether only two or more parties enter such agreement. Another possibility is to adopt model interchange agreements. One such model interchange agreement is adopted by UNCITRAL: the Model Interchange Agreement for the International Commercial Use of EDI. On the national level, several countries have adopted model interchange agreements, e.g. the Model Form of Electronic Data Interchange Trading Partner Agreement published by the American Bar Association (ABA) in 1989. Similar model agreements have also been published in Australia, Canada, France and United Kingdom.

V VALUE ADDED NETWORKS

Although EDI users can link their computer systems directly to each other, it is often more convenient to make use of a third party network. There are specialized firms that provide network services acting as EDI network operators. One type of such operators only transmit messages without providing additional services. These are so-called open systems, such as the Internet; EDI can operate using the Internet through e-mail and world wide web.

Another type of networks provides additional value-added services, besides transmitting messages. They are called Value-Added Network (VAN) service providers. VAN provides technical assistance in data security and the configuration of the required software. VAN operates on a commercial basis and provides its services to all parties entering into an agreement with it. The VAN services may be charged for explicitly, or may be covered by subscription. Main concerns of the users of VAN services will be to ensure that the messages transmitted are genuine and transmitted without delay to the recipient, and that the contents of messages have not been altered after transmission nor disclosed to third parties. VAN agreements should also regulate responsibility of the VAN provider to the users for errors in transmission of messages and their security.

VI LEGAL PROBLEMS POSED BY EDI

To evaluate the legal aspects of the replacement of paper documents by their electronic equivalents it is necessary to emphasize that the consequences of such change depend on type of document which is targeted for replacement. The legal problems related to electronic replacement of purchase orders, invoices, transport documents, funds transfer, or securities are not the same.

All documents do not perform the same functions. Certain documents serve only to carry information and have no legal importance. Such documents can easily be replaced by their electronic equivalents without provo-

king legal problems. The problems arise in case of documents which perform certain legal functions in commercial transactions, such as a receipt for cargo, evidence of contract, or document of title. Typical of such documents is the bill of lading. In such a case certain problems arise which relate to the formality requirements imposed by law concerning writing and evidence, as well as physical possession of a document.

The main question which arises here is whether EDI can replace classical paper documents. The purpose of EDI is not to create electronic equivalents of paper documents. This is shown by the fact that the word "data", rather than "document", is used in the name EDI. EDI is aimed at replacing paper documents by electronic transfer of data which will be able to perform the same functions as paper documents.

People are accustomed to paper documents so that many people tend to believe that if a document is not on paper it does not have a value; the attention is focused on the form rather then on the substance. Documents represent, in fact, a medium for transmitting necessary data. This data may serve to determine the rights and duties of those parties under a contract and as evidence of the accuracy of that data. The law has never stated that documents must be paper documents. What is important is communication of data, not the way it is communicated. "There is a document wherever there is writing or printing capable of being read, no matter what the material may be upon which it is impressed or inscribed".[7] A document should not be written with lead pencil or other evading substance, but it is none less valid if so written.

The written form is actually only an alternative to the oral form, which is preferred by the law because it is safer. Before paper started to be used for writing, the written form had been represented by stone plates, bronze, parchment and papyrus, while before computers and laser printers were invented, different tools had been used for writing. Nowadays, paper is used for writing only because it is the most convenient.[8] And now, the time has come to replace paper with EDI, which is still more convenient than paper.

Like paper documents, EDI is able to transmit and store information. However, the use of EDI faces some complicated legal problems. Present laws that govern commercial transactions are based on the assumption that data is normally presented in paper form. This assumption is understandable, since the paper was the only medium at the time of adoption of these

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[7] R.v.Daye *(1908) 77 L.J.K.B.* 659 at 661.

[8] As professor Gronfors, with a good sense of humor, wrote (concerning promissory notes): "Such a legal promise could easily be written down with black ink on a white cow and still be legally valid. The main reason why we do not use such a method is, of course, that it is most inconvenient to have one's promissory notes feeding on green pastures" ("The Paperless Transfer of Transport Information and Legal Functions", in SCHMITTHOFF and GOODE, *INTERNATIONAL CARRIAGE OF GOODS: SOME LEGAL PROBLEMS AND POSSIBLE SOLUTIONS,* (1988) at.p.20). An illustration of the above statement is that the winners of Wimbledon tennis tournaments receive their checks written on tennis balls.

laws. The problem with these laws, from the aspect of electronic commerce, is that they refer to notions such as "writings" and "signatures". Such notions seem to preclude replacement of documents by electronic messages.

The commercial application of EDI has a great impact on the way in which contracts are concluded and performed. In order to deal with the problems of the use of electronic messages in practice it is necessary to answer numerous questions posed by the use of EDI: is an electronic message a writing? ; can a computer record be admitted as evidence?; what is the evidential value of a computer printout?; how to replace the signature?; how to compensate the physical possession of document required for documents of title?; how to guarantee the safety of data stored in a computer?; how to imitate negotiability of documents of title?

These are difficult issues, but these difficulties should not be exaggerated. EDI has been in use for almost thirty years, and there have been very few, if any, disputes caused by above mentioned problems.

A. Writing

The laws of most jurisdictions require that certain documents must be in writing for valid and binding obligations to exist. This requirement is motivated by the greater reliability the written form has compared to the oral form. The requirements of a "writing" are often combined with requirements of a "signature" and an "original". In some countries there still exists a requirement that, in order to be valid and enforceable, a contract must be in writing and signed by one or both of the parties. For example, certain international conventions require written form (e.g. Article 6 of the Warsaw Convention for the Unification of Certain Rules Relating to International Carriage by Air, 1929 and Article 2 of the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards, 1958).

Differently from paper based data, in the case of data processed by a computer there is no original document which can be presented to evidence its content, since the data is stored in the computer's memory. In order to reach the data it is necessary to "call" it from the memory by giving a proper command to the computer, so that the data can appear on the computer's screen or be printed on the computer's printer. A computer database cannot be an original document in the sense of paper documents, since it represents, in fact, an electromagnetic record of the condition of the computer's memory at a certain moment. The concepts of original and copy documents are rendered indistinct in the case of information processed by a computer, and every copy seems the same as the original. The computer database also lacks an indispensable element of an original paper document: the signature of its issuer.

The question which arises is whether a writing contemplates only documents in tangible form. It is often stated that electronic messages do not meet legal standards to be accepted as writing, but that is not necessarily so.

Schedule 1 of the English Interpretation Act 1978 defines writing as including printing, type-writing and "other methods of representing or reproducing words in visible form". This definition seems to be wide enough to include EDI. Furthermore, some international conventions contain very flexible definitions of writing which clearly include electronic documents. For example, Article 4(3) of the Terminal Operators Convention provides that "a document ... may be issued in any form which preserves a record of the information contained therein. When the customer and the operator have agreed to communicate electronically, a document ... may be replaced by an equivalent electronic data interchange message". The Model Law on Electronic Commerce explicitly gives electronic transmissions the same legal value as writings. According to Article 5 of the Model Law "where a rule of law requires information to be in writing or to be presented in writing, or provides for certain consequences if it is not, a data message satisfies that rule if the information contained therein is accessible so as to be usable for subsequent reference".

B. Admissibility and Weight of Computer Records as Evidence

From the perceptive of the law of evidence, the key issue is not whether a computer generated record represents writing, but what weight should be given to it in a courtroom. The role of evidence is to enable the court to ascertain the truth respecting a question of fact. When an evidence is presented at the trial, the issues of its admissibility and weight may arise.

There are both technical and legal reasons which make difficult the admissibility of computer records, or which reduce their weight as evidence. From the technical perspective, computers are not absolutely reliable devices. Computers occasionally malfunction, while software systems are often attacked by viruses. Computer records also seem to be more vulnerable than paper documents to undetectable alteration. From the legal perspective, under traditional rules of evidence it seems that a computer generated record faces serious difficulties in order to be admitted as evidence. Most of the procedural rules dealing with admissibility of evidence are based on the admission of paper documents. In the common law the main problem appears to be the allegation that computer records constitute "hearsay" and fail to meet requirements of the "best evidence rule", while in the civil law tradition the main problem is the lack of signature.[9]

Common law is based on the adversarial system, which means that the judge acts as arbiter between the parties in dispute as they each put forward their case and he or she does not undertake any independent investigation into the subject matter of the dispute. In a dispute over admissibility of com-

[9] Amory and Poullet, "Computers in the Law of Evidence - a comparative approach in civil and common law systems", (1987), March/April, *Computer Law and Practice* 114. For English law, Bradgate, "The evidential Status of Computer Output and Communications", (1990), May/June, *Computer Law and Practice* 142.

puter records as evidence, the opposing party will probably argue that computer generated records do not represent reliable evidence because they can be easily altered. Consequently, it will be argued that, based on the "hearsay" and/or "best evidence" rules, such data may not be admitted as evidence.

The rules relating to the admissibility of documentary evidence are complex. The traditional rule that hearsay evidence may not be admitted is not so strict anymore and there are certain exceptions. The hearsay evidence may be admitted if it can be demonstrated to be reliable and its admission necessary for proper evaluation by the court. Also, a computer record will satisfy the best evidence rule requirements if the reliability of the record-keeping system which ensures the integrity of the records is demonstrated. In the courtroom, the admissibility of computer records will often depend upon an ability to prove that at the time of the transaction the computer system was properly operating, and adequate safeguards and control procedures were applied. In principle, it is not accepted a presumption that the computer is operating properly, but the party relying on computer evidence must prove that the computer is reliable. The court might require presenting evidence as to how the records were created, stored, transmitted and protected from tampering. In order to prove this, oral or affidavit evidence of the integrity of the computer system will probably be needed

Section 5(1) of the English Civil Evidence Act of 1968 makes provision for the fact that statements contained in a document produced by a computer shall be admissible as evidence of any fact stated therein of which direct oral evidence would be admissible, if it is shown that the conditions mentioned in subsection (2) are satisfied. The purpose of this provision is to admit hearsay statements contained in computer processed documents. Section 10 of the Civil Evidence Act defines "document" as including "any disc, tape, soundtrack or other device in which sound or other data (not being visual images) are embodied so as to be capable (with or without the aid of some other equipment) of being reproduced therefrom.[10]

Section 901 (b) (9) of the American Federal Rules of Evidence, which addresses the issue of authentication of computer produced documents, provides for a description of the process or system used to produce a result and a showing that it produces an accurate result. This description should contain evidence that:

- the computer equipment is accepted in the filed as standard and competent and was in good working order,
- qualified computer operators were employed,
- proper procedures were followed in connection with processing of information,

[10] In *Derby & Co. Ltd. V. Weldon* (No 9) (1991), 1 WLR 653) it was held that the database of a computer in so far as it contained information capable of being read and converted into readable form, and whether stored in the computer itself or recorded in backup files, was a "document" within the High Court rules regulating discovery of documents.

- a reliable software program was utilized,
- the equipment was programmed and operated correctly, and
- the exhibit is properly identified as the output in question.[11]

Civil law rules of evidence are based on the inquisitorial approach to trial procedure. The main task of the court is to establish the material truth on the basis of available evidence. The civil law makes a clear distinction between evidence of legal facts and that of legal acts. Legal facts can be proved by any means allowed by law. On the other hand, legal acts can be proved only by a signed written document with probative value (e.g. Article 1341 of the French Civil Code). On the basis of this rule it could be concluded that the computer records can be presented as evidence, but their weight as evidence in civil law is questionable because of importance attached to the requirement of signature. However, the rule on the signed written document is subject to many exceptions and it cannot apply to computer generated records. Similarly to a common law court, the civil law court might require evidence to be presented as to how the records were created, stored, transmitted and protected from tampering. In order to ascertain this, the court will usually appoint an independent computer expert to give an opinion concerning the integrity of the computer system.

If computer records are to be admitted as evidence in the courts a change of the rules of evidence must be made. The law of evidence must adjust to the new situation where not only paper records, but also electronic ones may be produced as evidence. The law of evidence should not focus anymore on whether a record is a copy or an original; the key issue is whether the record accurately evidences certain facts. The accuracy and reliability of computer records depends on the integrity and reliability of the computer system that generates the records. Therefore the law of evidence should introduce new rules and criteria to serve as the basis for evaluating the weight of computer records as evidence. The Model Law on Electronic Commerce adopted by UNCITRAL made one important step in that direction. Article 8 prohibits the use of the "hearsay rule" and "the best evidence rule" and provides for the admissibility of electronic documents as evidence in legal proceedings. It remains to be seen whether this Model Law will be used as model to harmonize divergent national laws.

C. Evidential Value of Computer Printout

The computer printout is only a hard copy of a message stored in computer. In principle, a computer printout is not needed, since the data contained in it is readily available at the computer screen. However, since traditional

[11] See, MUELLER, KIRKPATRIC, *MODERN EVIDENCE (1995)* 1523; Peritz, "Computer Data and Reliability: A Call for Authentication Under the Federal Rules of Evidence", *(1986) Northwestern University Law Review* 956.

law is based on paper documents, the question of the evidential value of computer printouts is important.

Under the rules of evidence, a question which arises is whether a printout can be admitted as proof of the existence and contents of the computer generated record and, if admitted, what weight should be given to such evidence. The printout is a copy of the data stored in computer because it is normally created after the handling process of creating the data is completed.

Due to the fact that printouts are paper documents, under the present rules on evidence they have a better chance to be admitted as evidence in the courts that an electronic message stored in computer. The electronic message may be the original, but this original can never be produced in the courtroom in the same sense as a piece of paper can be produced. That is why the law is more willing to accept a computer printout as evidence. It should be noted that telegrams and telex transmissions have been admitted as evidence by some conventions,[12] which opens the way for admission of printouts. Some legislation expressly allows the admissibility of computer printouts as evidence (e.g. section 5 of the English Civil Evidence Act 1968).

Even though a computer printout is admissible as evidence, its weight as evidence is at the discretion of the court. Under traditional law the evidential value of a printout is the same as of a copy. When considering the weight of a printout as evidence, the key issue for the court will be the possibility and probability that the printout is forged and the capability to determine its authenticity.

D. Signature and Authentication

When a paper document is issued, the signature on it serves to identify the party who signed the document. A document must be signed only by an authorized person, because of the binding effect of the signature. Signatures represent a ritual form of agreement and are used to prove the validity and authenticity of documents. A signature may serve to confirm that the party signing the document has approved the contents of the document, or has guaranteed the accuracy of its contents, depending on the nature of the document.

Various forms of signatures have been used in practice: a signature can be in handwriting, printed in facsimile, stamped etc. Among these different forms there are difference with respect to security: a handwritten signature is normally more secure than a stamp. However, the law does not require that a signature be secure in order to have legal effect.

Signature seems to be incompatible with electronic commerce. A person's signature is usually associated with a sense of uniqueness, which does not exist in case of computer produced records. The problem which arises in

[12] E.g. Article 13 of the UN Convention on Contracts for the International Sale of Goods.

case of electronic messages is that only data, but not a signature, can be transmitted, since handwriting, facsimile and stamps cannot be made except on paper.

In the case of electronic messages, technically the signature can be replaced by other forms of authentication. The authentication of electronic messages can serve the same function as a signature on a paper document, with the main difference that the signature identifies the issuer of a document, while in the case of EDI the source from where the message was sent is identified and not the person who actually sends the message (this authentication is mostly intended to prevent unauthorized access to a computer network, rather than to guarantee the authenticity of a signature). The problem is whether such authentication can be recognized by law, which means that the problem of authentication of electronic message is primarily a legal one.

The parties may agree that the authentication of documents is achieved by some of the techniques used for authentication of electronic messages. The problem that can rise in case of a dispute is whether the law will accept such authentication as valid. The law is still just beginning to adjust to electronic commerce, so that a number of laws still require a handwritten signature and provisions concerning electronic signatures are still scarce and general. In order to enable use of EDI techniques, the law should be adjusted to permit documents to be authenticated by electronic means. As already mentioned above, some international conventions and uniform rules provide for the possibility that the signature can be made by electronic means. In addition, Article 6 of the Model Law on Electronic Commerce gives appropriate technical methods the same legal value as a traditional signature.

People are prone to believe that the data passing through computer networks can be easily intercepted and read by unauthorized persons. So the risk of fraud is often emphasized as a problem in the use of EDI communication. This is a rather typical psychological reaction to innovations, when people who get used to a traditional way of doing things expect the innovations to be able to do more than traditional ways have ever been able to. A handwritten signature can be forged much easier than an electronic authentication. A bill of lading holder can only see that there is a signature and on whose behalf the bill is signed, but he normally cannot know whether the person who signed the bill of lading was actually authorized to sign it. This is particularly true when the bill of lading is issued in one country and is relied upon in another country. It is really difficult to imagine how an American buyer who holds bill of lading issued in Shanghai could know that the agent who signed the bill was really authorized by the carrier to sign it. Even if the bill of lading holder knows that the person signing bill was authorized, he usually cannot know whether it is his real signature. It is easy to imagine a person intentionally distorting his own signature in order to repudiate its authenticity at a later stage. However, these obvious risks have not prevented an almost fraud-free use of signature in practice and bill of lading hol-

ders usually do not even pay attention to the signature itself, but only on whose behalf the bill is signed.[13]

From the aspect of safety a thumbprint seems to be the safest, but is the least used way of authentication, at least in business transactions. Safety and practicability often cannot get long well. There is no authentication device which is absolutely safe. What is needed in commercial application of EDI is reasonable safety, which means that unathorized decoding is made so difficult and needs so much time that it is commercially unreasonable.[14]

E. Protection of Data

Besides legal problems in recognizing it as evidence, EDI also faces technical problems for reliability as evidence. One of the main concerns relates to the safety of electronic messages. In order to achieve the goal of a wide scale acceptance of EDI, it is necessary to provide a secure means of transmitting the information, so that the parties to a commercial transaction can feel confident that their electronic messages will be kept private and will have adequate protection against fraudulent misuse.

One of the essential characteristics of a writing is its immutability. Once a writing is created, changing its content without leaving a trace is perceived to be very difficult. On the other hand, one of the characteristics of computer processed data is the possibility to alter the content of data without trace. This can be done unintentionally by a user's mistake or technical error, or deliberately by another person without the user's authorization. The second case can be especially dangerous, and can be an instrument of fraud.

One serious problem of electronic commerce is that it is vulnerable to fraud, which can be carried out relatively easily due to the fact that it is possible to get remote access to computers which are connected to networks. Access to another's computer can be done for fun, by so called "hackers" who enjoy playing with computers and who find excitement in breaking into somebody else's computer systems (the more complicated: the more fun), but even such acts can do a lot of harm to computer users. More dangerous is the case of unauthorized access made with the intention of defrauding its users in order to get forged payment, or to make other illegal profit.

The alteration of data is useful in the preparation of documents and there is no problem with the user doing so when it is necessary to correct or update a data. However, once the document is final and transmitted to another person, it should not be altered if it is to serve between the parties as evidence of the data contained in it. The problem is how to make it unalterable.

Two kinds of protection are needed: a) to prevent unauthorized access to data by third persons and b) to prevent unauthorized access to data by users.

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[13] See Nicoll, "EDI evidence and the Vienna Convention", *(1995) Journal of Business Law* 21.

[14] Nicoll, *op.cit.*, p.21

a. Unauthorized Access by Third Persons

Various security devices are used to prevent unauthorized access by third persons to computer networks and to protect the data during transmission. The most widely used techniques are passwords, digital signatures and encryption. These techniques of protection serve also for authentication.

The most commonly used method to restrict access to the computer network is the use of a password or code consisting of a combination of numbers and/or letters known only to the user and the network. The use of password is aimed at ensuring that only an authorized person has access to the data and the computer system.

One of the most secure methods to protect data during transmission is cryptography or encryption which is used to ensure the confidentiality of data and to verify the authenticity and integrity of transmitted data.[15] Cryptography is used to transform a digital information into unintelligible code and subsequently to translate it back into its original form. This technique is based on confidential keys and complex mathematical processes, which prevent access to the information to a person who does not know the key needed to decode the message. Unauthorized access by third persons is restricted by a private key, which represents any technically appropriate form, such as a combination of numbers and/or letters, which the parties may agree on for securing the authenticity and integrity of transmission.

Cryptography represents the basis for the so-called "digital signatures".[16] A digital signature is a transformation of a record using an asymmetric cryptosystem and a hash function such that a person having the initial record and the signer's public key can determine whether the transformation was created using the private key that corresponds to the signer's private key and whether the initial record has been altered since the transformation was made. A digital signature can serve to authenticate a signer and to verify the integrity of a document. By using the signer's private key, the recipient of an electronic message can verify both the authenticity of the signer and the message.

Digital signatures play a very important role in a system of central registry. All the electronic messages are secured by the use of digital signatures so that the registry and the users can all be sure that the person sending the message is authorized to do so. The central registry provides the users with digital signatures, which enable the registry to authenticate messages, while also enabling users to verify electronically the origin of message, their integrity and their receipt.

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[15] See, Davies, "Legal Aspects of Digital Signatures", *(1995) 11 Computer Law and Practice* 165.

[16] The Utah Digital Signature Act 1995 is the first legislation in the world that has authorized the use of digital signatures. Similar acts were later promulgated in some other American states, as well in some other countries, e.g. Germany.

Some other techniques are also used, like message sequence numbering, microcircuit cards, magnetic stripes, personal identification numbers (PIN). Also, new techniques are in various stages of development, such as electronic analysis of signatures. The technology of protection continues to improve, but so does the technology of breaking through protection devices.

b. Unauthorized Access by Users

Another problem concerning security of computer records is that the users can have opposing economic interests, so that they may want to change the content of data without informing the other party. In the case of an electronic bill of lading, the shipper may admit that he sent electronically the data representing the bill of lading, but he might deny that the content of the data stored on the consignee's computer correspond with data he sent, e.g. claiming that the data on quantity of goods on consignee's computer is inaccurate and that the data he sent had stated a larger quantity.

Unauthorized access by users can be restricted by the private key. Under Rule 8 of the CMI Rules on Electronic Bills of Lading only the carrier and the holder of an electronic bill can have access to the data. The private key is issued by the carrier to the shipper after the carrier receives the goods for carriage. The private key is unique to each holder and is not transferable. Only the carrier and the holder know the private key and they must keep it secret. Recipients of a transmission are not authorized to act on a transmission unless they have sent a confirmation, i.e. unless they confirm that the content of a transmission "appears to be complete and correct" (Rule 2(e)). Rule 3(e) provides that in case of a dispute arising between the parties as to data actually transmitted, an electronic monitoring system may be used to verify the data received.

VII ELECTRONIC TRANSPORT DOCUMENTS

The replacement of traditional transport documents by their electronic equivalents is one of the most discussed areas of possible commercial application of EDI. There are two basic types of transport documents: the waybill and the bill of lading, or the consignment note. The main difference between these two documents is that a bill of lading is a document of title, while a waybill is not. The status of document of title given to bills of lading makes their electronic replacement much more difficult than it is the case with waybills.

International conventions which regulate the carriage of goods by sea never state that they are applicable only to paper bills of lading and they contain no restraint to be applicable to electronic bills of lading. The Hague Rules do not contain any specific requirement as to the form in which a bill of lading is to be issued. The Hamburg Rules even provide by Art. 14(3) that the signature on a bill of lading can be made by any electronic means. The INCOTERMS 1990 (Rule A.8) and the UNCTAD/ICC Rules for Multimodal Transport Docu-

ment (Rule 2.6.) provide that a transport document can be replaced by an equivalent electronic message. The UCP Rules (1993) provide that original document includes a document produced by reprographic, automated or computerized systems, while the signature is described to include electronic method of authentication (Art.20(b)). It seems that there are not international legal barriers for the use of electronic bills of lading. The problem lies in national laws. Most national laws do not provide for the possibility of an "electronic signature" and a number of laws also provide for issuance of bill of lading originals, which implies that only paper bills can perform the functions of a bill of lading. Moreover, the rules on evidence of most countries would not admit electronic bills as evidence.

Replacement of paper bills of lading with electronic bills of lading means that a paper bill of lading issued in a well defined standard form containing data on the parties, goods, conditions of carriage etc., signed by or on behalf of the carrier, issued in several originals which are delivered to the hands of shipper, who sends them by mail to consignee, should be replaced by an electronic bill of lading. An electronic bill of lading does not mean simply that a bill of lading is generated by a computer and contains the same data as a paper bill of lading. An electronic bill of lading means something more: the data inserted in a computer is transmitted electronically using EDI messages, so that an electronic bill of lading is consisted of the series of EDI messages sent and received among a carrier, shipper and consignee. Obviously, an electronic bill of lading cannot be issued in several originals, nor can it be signed in the same sense as a paper bill of lading. However, what is important is: can it perform the same functions as a paper bill of lading.

Electronic messages are aimed at replacing paper documents, but not their functions. An electronic bill of lading is supposed to perform the same functions as its paper equivalent and the only difference should be in the manner of performance. Before the law is amended in order to adjust to the changes occurred as result of replacement of paper documents by electronic messages, first it is necessary to determine what functions are performed by traditional bills of lading and how an electronic bill of lading can be enabled to perform the same functions.

A bill of lading serves: (a) as a receipt for the cargo by the carrier, (b) evidence of the contract of carriage, and (c) as a document of title.

a. Receipt for the Cargo

This function does not represent any problem for an electronic bill of lading, since the information about cargo could be transmitted through electronic messages. The transmission of information can be performed easily, provided the proper security and authentication procedures are applied.

b. Evidence of the Contract of Carriage

This function also relates to the transmission of information and can be easily performed by electronic bills of lading. The main problem related to

this function is that the use of standardized formats does not allow for the exchange of the terms and conditions of a contract of carriage normally printed on the reverse side of traditional bills of lading. It is obvious that an electronic bill of lading can not have reverse side, but that is not the only way how terms and conditions of a contract can be evidenced. The most convenient way to evidence terms and conditions of a contract of carriage for an electronic bill of lading would be to incorporate such terms and conditions by reference to standard bill of lading forms where these terms and conditions are set out like in case of "short form" bills of lading. In this way, terms and conditions of a standard form bill of lading are deemed to be incorporated and can apply as between the parties in a contract of carriage even if they are not contained in the bill of lading issued in particular case.

In some countries, like in England, the law has a favorable view regarding the incorporation of terms of a contract by reference and the main requirement for validity of incorporation clauses relates to their clarity and the accessibility of the terms incorporated by reference. On the other side, in some other countries the law requires actual knowledge of the terms incorporated by reference, while certain terms must be specifically accepted in writing. For example, such requirement is provided by the Art. 1341 of Italian Civil Code in case of onerous clauses (*clausole vessatorie*), i.e. clauses involving restrictions to the rights of the parties. According to the same provision of the Italian Civil Code, among these clauses are included arbitration clauses.

The use of EDI does not cause any particular problems in this context. One of the obstacles in evidencing the conditions of contract of carriage by reference to terms and conditions may be the fact that the location where the reference terms can be seen is not ready accessible. The ICC has been preparing a project known as ETERMS which deals with this problem. ETERMS is envisaged to serve as an electronic repository for legal clauses that can be incorporated in contracts by reference. For example, the terms and conditions of a contract placed into ETERMS could be incorporated by reference without actually having to include the full text of those terms and conditions in the messages.[17]

c. Document of Title

The negotiability of paper documents, typical for documents of title such as bills of lading, represents one of the biggest difficulty for EDI.[18] Documents of title control the transfer of certain legal rights, such as constructive possession and right to delivery of goods, which is based on physical posses-

[17] See ETERMS Repositoy Guidebook, ICC Document No. E100/INT. 3, October 1996.

[18] Van Der Ziel, "Main Legal Issues Related to the Implementation of Electronic Transport Documentation", *(1997) European Transport Law* 715; see also an excellent and extensive paper on the topic in the same issue of *European Transport Law*: Chandler, "Maritime Electronic Commerce for the Twenty-First Century", *(1997) European Transport Law* 655.

sion of an original document. EDI has an important handicap, which puts into doubt its capability of playing the role of a document of title: it is impossible to have it in physical possession. This means that it cannot be produced on delivery, nor endorsed to a new holder. Traditionally, the concept of transferability has been linked to paper documents, since only something tangible can be physically transferred from one person to another. In order to compensate for this handicap, it is necessary to find a way to imitate physical possession of a document, so that the negotiability of documents of title can be simulated.

Some of the attempts to create electronic transport documents are aimed at developing methods for cloning transferability of rights and liabilities electronically, with the objective of creating electronic documents which will be able to perform all functions of paper documents. Most of these attempts are based on a "registry" system, where the parties agree to use a trusted third party as a registry for electronic messages. The basic concept is that all parties to a transaction should use a registry, which is responsible for the integrity of the messages and the identity of the parties with which it communicates. The registry acts as depository for documents, while the rights to the goods are transferred by communicating of authenticated messages between the registry and the parties who have an interest in the goods. The registry is responsible for transfer of title from one party to another, cancelling the first party's title at the moment the title is transferred to the new holder.

In case of bills of lading the registry system functions this way: a carrier sends a message to a shipper that confirms receipt of goods by the carrier and provides all the data normally found on bills of lading. The carrier also directs the message to the registry where the shipper is logged as holder of the "document". If the shipper wishes to transfer the title to the goods, it sends to the registry instructions that identify the new "holder". Upon receipt of this message, the registry sends a message confirming the new owner as the holder having rights over the goods. The "holder" of an electronic bill of lading is in the same position as the holder of a paper bill of lading: he or she can claim delivery of the cargo against the carrier, or he or she can dispose with the goods by transferring the title to a new party. Thanks to digital signatures, all messages are authenticated, and all are secure. The registry employs security procedures to ensure that once there is a record of holdership, only the party recorded as holder can give message instructions to effect a transfer of rights in the goods. Therefore, from the technical perspective, the registry system can electronically simulate the negotability of a paper bill of lading. The problem is how to implement this concept in practice and how to give it legal validity.[19]

[19] It should be noted that in case of electronic bills of lading the use of bills of lading to bearer will not be possible. However, this does not represent a serious problem, since in practice they are used very rarely.

Several attempts have been made to create electronic transport documents. Some of these attempts were the result of independent efforts of certain private companies, and some resulted from the cooperation of various international organizations. The idea of electronic bill of lading was first put forward in 1985 by the Chase Manhattan Bank and INTERTANKO which had established Sea Docks Registry Ltd., which was supposed to act as a central registry for bills of lading. The idea was further developed by the CMI in its Uniform Rules for Electronic Bills of Lading adopted in Paris in June 1990. The newest attempt to enable commercial use of electronic bills of lading is a project known as BOLERO, sponsored by the European Commission. All these attempts can be considered as only experimental and it seems that actual replacement of paper transport documents by their electronic alternatives still lies in the future. One of the main reasons why electronic transport documents are not used more in practice is the lack of legal regulation which causes concern to the parties regarding their legal value and effect, so that they hesitate to accept electronic documents and prefer traditional paper documents.

VIII CONCLUSION

EDI is emerging as a genuinely new means of transferring information, completely different from paper documents. For centuries, paper documents were the dominant means of communicating information, and even now, at the end of 20th century, they still keep this position. However, there is no doubt that in first decades of next century EDI will replace paper documents to become the dominant and, in the future probably exclusive means of communicating information, at least in business transactions.

The existing laws affecting commercial transactions do not provide a satisfactory environment to allow the use of EDI or other similar means of data communication. The traditional law contains various requirements that are obstructive to electronic commerce. The computer revolution has found many jurisdictions not prepared to deal with the electronic transfer of data. In addition, there is considerable lack of international uniformity in this area.

In order to exploit advantages offered by the electronic commerce, the challenge will be to adjust the traditional rules based on paper documents and to draft viable solutions. To be able to adjust to EDI and similar technologies, the law must get away from the rules and principles based on paper documents and create new rules and principles which shall be based on new technologies. Such new rules should help in removing superfluous formal requirements which prevent admission of computer generated records as evidence and should also establish the criteria which shall serve as basis for the court when determining the weight of such evidence. Certain progress has already been made in that direction. Some national legislation have been amended and international model rules have been adopted aimed at recognizing electronic messages to have the same legal effect as paper documents.

Until the laws are amended in order to fully accommodate the needs of EDI, a temporary solution can be the adoption of voluntary model rules and interchange agreements by which traders can regulate their EDI relationship.

Besides legal problems, there are also technical problems which stand in the way of the replacement of paper documents by EDI. The main problem seems to be how to ensure privacy in electronic transfer of messages. At the moment the best solution to this problem is the use of a private key.

This article has shown that commercial implementation of EDI still faces many challenges. However, it is only a question of time before EDI is adopted as a new system for transmitting information. There is no doubt that legal obstacles to introducing EDI in business transactions can be eliminated. The real issue is what the consequences will be when the well established and precisely regulated system of exchange of information based on paper documents is abandoned and replaced by a new and yet unregulated one which is based on electronic messages.

Some of the problems related to the commercial use of EDI seem to be more psychological than real. This is a consequence of anxiety which is normally associated with radical changes, such as switching from paper documents which were in use for centuries to electronic messages which are a genuinely new method for transferring information. The impact of this change, however, should not be exaggerated. This is not a change which will happen at once; it will be a step-by-step process. Paper documents will not disappear overnight; they will continue to be used and their replacement will be gradual.

The adjustment of law should also be gradual. The new rules should be adopted only in the area where the need for new legal rules is clear, as in the case of digital signature. There is no need for hasty adoption of rules in the area where the problems are still not clearly identified or are only expected to appear in the future. In any case, the fact that many legal issues relating to EDI are still not solved has not prevented its commercial use in practice.

Sažetak

PRAVNI PROBLEMI U PRIMJENI ELEKTRONIČKE RAZMJENE PODATAKA U PRIJEVOZNIM ISPRAVAMA

Autor u ovoj raspravi izlaže pravne probleme vezane uz širu primjenu elektroničke razmjene podataka - EDI (electronic data interchange) u praksi. Elektronička razmjena podataka predstavlja relativno novi način prijenosa informacija koji bi u budućnosti trebao zamijeniti upotrebu papira i pisanih dokumenata pri sklapanju poslovnih transakcija.

U tekstu autor opisuje na koji način EDI funkcionira i njegove prednosti nad dosadašnjim načinom sklapanja poslova.

Autor nadalje navodi teškoće koje postoje uslijed nedostatka pravne regulative za primjenu EDI. Naime, dosadašnje pravo sadrži odredbe koje su smetnja primjeni EDI.

U zaključku je istaknuto kako će u budućnosti morati biti prevladane sve poteškoće koje se odnose na EDI. Iako su neke zemlje već postigle napredak u tom pogledu, još je potrebno dosta učiniti za uspješnu primjenu EDI u praksi.