

Legal Aspects of Electronic Contracts

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1 Introduction

According to several surveys one of the biggest hindrance of commercial use of new media in business is the lack of trust of users in the legal binding of electronic contracts. Another impediment for further spread of e-commerce is the lack of trust in the security of the electronic communication in general.

Our modern society relies on an economic system that is mainly based on the mechanism of contracts. Right now our industrial and service society is changing to an even more modern information society. One of the most important indicators that shows this change is the growing digital economy. But without any trust of the economic community in electronic contracts the new economy will not be able to unfold its full potential and the benefit for our society will stay behind the possibilities the new technology is able to offer. Either we can build up the trust in technical solutions for electronic contracts or we have to find a new concept for the exchange of goods in the digital age.

It surely is easier to create a technical solution for legally valid Electronic Contracts than to redefine a legal mechanism that exists since centuries. But on the other hand a legal system that was generated thousands of years ago does not have the necessary basics to include modern ways of communication. We may have to rethink and to broaden our contract law to enable legally binding Secure Electronic Contracts (SeCo).

This paper tries to find a solution for the technical aspect as well as for the legal aspect of this discussion. On one hand it will show the problems that turn up when eContracts shall fulfill the requirements of today's contract law and give some ideas how contract law should be evolved. On the other hand it will discuss the elements that must be included in a technical solution for Secure Electronic Contracts.

The first part of the paper introduces the basics of contract law. We will need this knowledge for later discussions of the problem. The second part shows how a framework for Secure Electronic Contracts could look like based on the Swiss Contract Law. The third chapter presents one possible solution for a Secure Electronic Contract developed at the Institute for Media and Communications Management of the University of St. Gallen. Section four concludes the paper with an outlook of further work.

2 Basics of Contract Law

The basis of a modern model of competitive economy is the fulfillment of needs of the members of this economic community. Since robbery, theft and blackmail are not accepted means to do so in civilized cultures the society had to find other mechanism for an accepted exchange of goods. As ancient cultures developed the first legal systems, a concept arose, that we call today a contract. The Roman civilization improved the existing law in a way that its basics are today's fundamentals of our occidental legal system. (For an overview on the history of legal systems see (Sumner 1996)).

The concept of contracts survived and is nowadays the most important mechanism for the exchange of goods. Only one other concept is nearly as famous as contracts are: the reallocation of resources based on governmental power as for example taxes.

The importance of contracts in our society is also obviously when regarding the huge systematic of contracts prevailing contract laws know. The Swiss Contract Law for example describes about 30 predefined contracts. And this besides the possibility to create new kinds of agreements according to the freedom of contract. Most common type of contract is a sales contract. The legal framework in this paper will respectively focus on this kind of contracts.

The common understanding of a contract is that it is a legally binding agreement between two or more parties. Such a contract can be used as an evidence to prove acceptance of liabilities Nevertheless prevailing contract law knows also unilaterally contracts which bind only one party (e.g. a donation contract). But this paper will focus on contracts that involve two parties. Contracts that bind more than two parties are also not considered by this paper.

A contract as we understand it today is an agreement between two or more parties to create legal obligations between them. This assumes the mutual exchange of concordant declaratory acts. According to modern contract law this condition is fulfilled by the acceptance of an offer.

The offer is one of the essential elements of a contract. It expresses the willingness one party to do something. This party is called the offeror. Such a declaratory act will not have any legal influences if there is not a person who receives the offer. This party is called the offeree. This allows us to define the two roles in a contract:

- The *offeror* is the person who makes an offer,
- The *offeree* is the person who receives an offer.

In a legally correct sales contract one of this role is taken over by a buyer, the other role by a seller. There is no predefined relation between those two kind of roles. The offeror as well as the offeree can turn to a buyer or a seller. It depends if the customer asks the vendor to sell him a subject or if the vendor asks the customer to buy a subject.

The offeror is legally bound to his offer in the way he made it until the offeree responds to the offer. That means if the offeree accepts the offer a legal correct contract is established. Of course an offer will not exist eternally: The offeror is allowed to assume that the offeree did not accept the offer when he does not react in a reasonable length of time.

Besides the declaratory act of an offer the modern contract law knows another mechanism to express your will to enter into a contract. We call this an invitation to treat. The difference to an offer is that the originator of an invitation to treat is not bound to his declaratory act. He can revoke it at any time. When the addressee of an invitation to treat wants to accept this

declaratory act he has to make an offer, and this offer has to be accepted again by the originator of the invitation to treat.

The addressee of an offer or of an invitation to treat can accept or turn down the received declaratory act. Besides this there is a third way to react: If the addressee is willing to enter into the proposed contract but wants to change the conditions he can make a counter invitation to treat or even a counter offer. They turn into a normal invitations to treat or a normal offer again when the addressee receives them. They can be accepted, turned down or answered with another counter invitation to treat or another counter offer again. Whenever a new counter offer is created the originator of the former offer is no longer bound to his declaratory act.

So we can summarize that the contract negotiation starts always either with an invitation to treat or with an offer. There are several ways to react to those first declaratory acts. A disaccept or a missing answer ends the contract negotiation. With a counter invitation to treat or a counter offer the contract negotiation continues. Only an accept to an offer establishes a contract. An invitation to treat can not be accepted but must be answered with an offer if a contract shall be established. This offer must be accepted by the originator of the invitation to treat in order to create a legally binding contract.

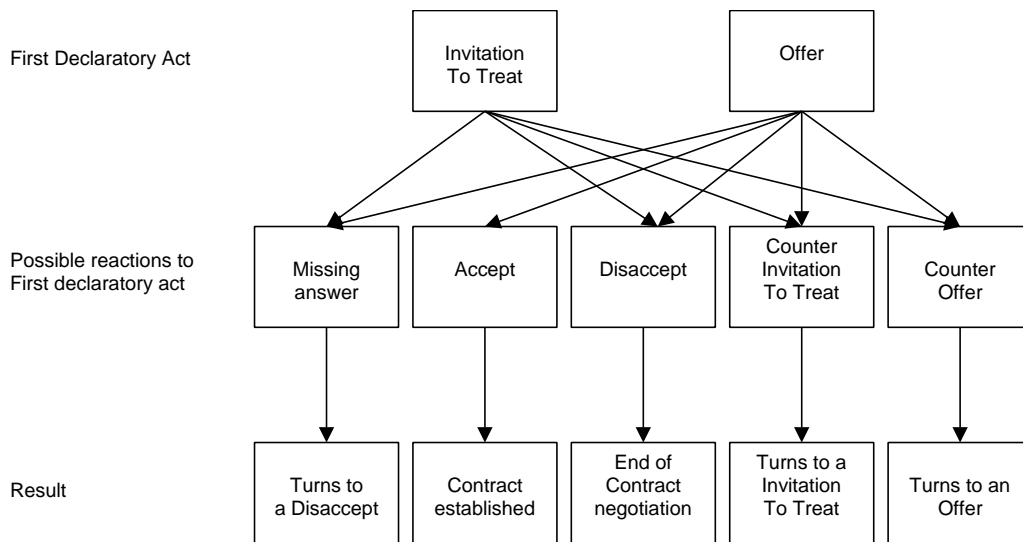


Figure 1: Reactions to Declaratory Acts

In case an offer is accepted by both parties it turns to a legally binding contract providing evidence for accepted liabilities. The contract provides an evidence by containing a clear description of the involved parties, clear description of liabilities as well as original signatures of the involved parties when law requires a written form for the contract.

Especially the signature causes some legal problems. Per definition all contracts can be established verbally, so they don't need a signature. But for some categories of contracts the law requires a written form. Here a signature is absolutely necessary. Meanwhile in a lot of countries the law has changed and digital signatures can fulfill the requirements of handwritten signatures (see the Legal Framework Directive of the European Community (European Community 2000)). The Swiss Contract Law on the other side still demands a

signature to be handwritten. Even though the Swiss Federal Office of Communication created a first attempt to enable digital signatures (Swiss Federal Office of Communication 2000) the problem still remains for contracts, that have to be in written form.

3 A Legal Framework for Secure Electronic Contracts

3.1 Business Phases of a Contracting Process

Electronic contracts are created during online buying and selling on electronic markets. Electronic Markets are platforms, which offer support for market transactions for online selling or buying of goods and services. Electronic contracts document the expressions of willingness during market transactions. According to the reference model of Electronic Markets (Schmid, 1999), we distinguish from the business aspect four phases in a market transaction. Each step creates several documents which describe the status quo of the process at a point of time. An Electronic Contract is one of these documents.

To find out what electronic documents are created besides of an Electronic Contract during the process we need to have a closer look at the market phases. In literature a lot of solutions can be found to divide the whole process in smaller steps (e.g. (Zbornik 1996) or (Krähenmann 1994)). In this paper we will focus on the attempt of Schmid (c.f. 2):



Figure 2: Business Phases of a Contracting Process

- **Information Phase**

In the information phase business partners inform themselves about market situation, sectorial trends, potential contract partners, products, services, prices and further conditions. Out of this information an offer might be created in the next phase.

- **Intention Phase**

While in the information phase information is provided in an unstructured way and in a way which is not legally binding, in the intention phase offers and invitations for trades are presented in a structured way. The common mean to express offers within electronic markets are electronic product catalogs, which usually contain a short reference to the product, a reference to price as well as payment and delivery conditions.

- **Agreement Phase**

The agreement phase aims at establish a contract. This phase starts with the offer of one of the potential contract partners from created in the previous phase and ends with the accept of this offer. During the negotiation process the business partners are fixing details of the aimed contract based on the initial offer of the intention phase. Elements which might be subject of

negotiation are: the procedures of payment, the product price, delivery options and others. In case the negotiations are successful, this phase results in a contract between the partners.

- **Settlement Phase**

In the settlement phase the contract parties fulfill the liabilities they accepted in the contract. This phase ends with the contract performance.

3.2 Legal Phases of a Contracting Process

Besides the business relevant phases there are also legal phases according to the contract steps foreseen in the contract law. We will also find four phases with legal influences on the process (Gisler, 1999) (c.f. 3):

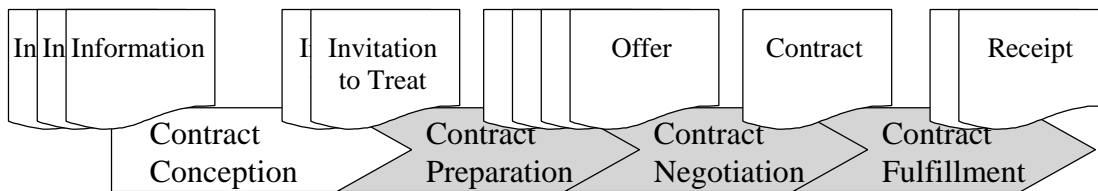


Figure 3: Legal Phases of a Contracting Process I

- Information Phase → Contract Conception
- Intention Phase → Contract Preparation
- Agreement Phase → Contract Negotiation
- Settlement Phase → Contract Fulfillment

During the business phases the will of the contract partners is changing permanently. This is not a suitable situation for legally binding transactions. Here we need a mechanism that freezes the will of a contract party at a certain point of time. This will cause the legal consequences regardless of the aspects that it may change later on. This is necessary to create a certain trust in the process. We call this mechanism a declaration of will.

Such a declaration is very often expressed verbally. But to ensure Secure Electronic Contracts we use the written complement to such a verbally expression. This complement is called a document. Such a document is suitable to generate proofs to be used in front of a court.

This allows us to define the legal process as a combination of dynamic aspects – the phases – where the will of the contract parties changes permanently and of static aspects – the documents – that freeze the will of the contract parties at a certain point of time (for detailed information to the legal consequences of each document see (Koller 1996) or (Gauch/Schluep 1995)).

- **Contract Conception**

The process starts with the necessary information about the market in general. Therefore the contract parties use information provided to them by suppliers. This phase is based on information that are not an invitation to treat or an offer. Because this information will not

legally bind their originator this phase does not have any legal consequences for the following contract phases.

- **Contract Preparation**

This phase starts the real contracting process that will have legal consequences for the contract parties. At the begin of this phase a document class called “invitation to treat” is created. The invitation to treat does not legally bind the originator. He can revoke his declaration of will at any time. Therewith the legislator created an instrument that is suitable for a contract preparation where you want to find out the existing possibilities in a market by gambling a little bit. The difference between an invitation to treat and the normal information in the phase of contract conception is that the invitation to treat is already focussed on a more or less defined transaction the contract parties wants to generate while during the contract conception generic information about markets, enterprises or products are generated without the goal to create a transaction.

- **Contract Negotiation**

The contract negotiation starts with an offer. This is the first legally binding document in the process. The offeror has to settle the contract as described in his offer if the offeree accepts it. This would be the shortest way of a contract negotiation and happens mostly with consumer goods as for example food, books and so on. But contracting about investment goods the buyer very often generates a counter offer. This happens already when the offeree asks for a discount.

- **Contract Fulfillment**

After one party accepts the offer or the counter offer of the other party this last declaration of will turns to a contract. Both parties have obligations. Most common phase is the obligation of the seller to deliver a product and the obligation of the buyer to pay for it. This exchange of goods happens during the phase of contract fulfillment. The buyer mostly gets a receipt for the amount he paid for the product. Such a receipt is the last document produced during the process. Not very common are receipts for the seller that confirms that he fulfilled his obligations of the contract. We suggest that for Secure Electronic Contracts also a receipt for the vendor is created. This has mainly two reasons. The argument that the customer would not have paid if the vendor would not have delivered will not be applicable because the exchange of the good and the payment happens synchronous. At this point of time the customer was not able to know if the ordered product was correctly delivered. Second reason is that electronically produced goods can be destroyed after the use. So the vendor has no way to proof that the product was delivered to the customer because the authorities will not be able to find a product in a legal procedure.

We already mentioned the possibilities of counter offers and counter invitation to treat. In consequence of this fact several documents of the same document class can be produced during the process (c.f. 3). The only fixed relation is the one between the number of obligations and the number of receipts. For each obligation that arises out of the contract there must be a receipt after the fulfillment of this obligation.

4 Implementation of an Electronic Contract

4.1 Requirements on Electronic Contracts

In order to support electronic transactions in a similar way as conventional transactions electronic contracts are required, which perform the same function and meet the same requirements as conventional contracts. Out of the basics of the contract law and the contracting process described in the previous sections, the following legal requirements can be summarized upon electronic contracts:

- Clear identification of the contracting parties
- Clear indication of the subject of the contract
- Clear indication of the time period of validity
- The contract has to have valid signatures of the involved parties certifying their acceptance of the liabilities laid down in the contract. The signature should be accompanied by a date indicating the start of the contract validity.
- Non-repudiation, i.e. nobody should be able to change the content of the contract after the contract is signed.

In the next section an implementation of an electronic contract meeting the above requirements will be described.

4.2 The Secure Contract Container

The basic function of a contract is to store information about accepted liabilities in a legally binding manner. Thus one function of an electronic contract is to support the storage of contract information. For structuring the data of a contract the concept for an XML based secure contract container (SeCo Container) was developed (Bray et al., 1999). A Data Type Definition (DTD) defines a document template for the container which specifies the basic data elements of the contract. Figure 4 shows the basic structure of the SeCo Container.

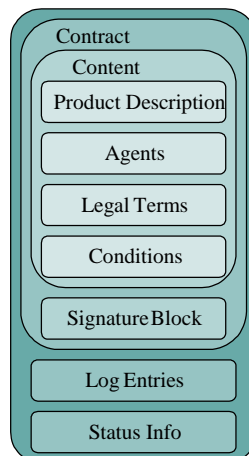


Figure 4: Basic Structure of the SeCo Container

A SeCo container comprises two parts: a contract section and an administrative section. The *content section* contains all data that is relevant for the contract and that the contracting parties have to agree on. It includes:

- the product or service descriptions with agreed upon quality or specifications of all products and services the customer intends to purchase;
- the identification and address data of the contracting parties (mandatory), as well as other involved market agents such as an arbitrator, a recipient other than the customer, or a notary (optional);
- the delivery and payment conditions together with the communication protocols applied in the integration of payment and logistics services (i.e. SET);
- the legal terms of the contract as well as the arbitration code.

This data is represented at a very fine grained level in XML. In order to facilitate the interoperation with other transaction services (E.g.: payment services), parts of the contracting container DTD comply with the Internet Open Trading Protocol (IOTP) (Burdett, 1999). DTD.

Since the information stored in a SeCo Container describes the rights and obligations of the contracting parties, it is desirable that the contract is protected against unauthorized manipulation. Therefore each contract section has a *signature block* which holds the digital signatures signing the content section. Furthermore, the signature block contains the corresponding X509 certificates (Solo et al., 2000) that hold the public keys of the signers. Thus, the contract section of a SeCo Container includes all data that is necessary to authenticate the contracting parties and to guarantee the non-repudiation of origin of the content. Authentication is provided by a certification authority which guarantees the authentication of the electronic signature.

Supporting the contract negotiation, each container can hold more than one contract section, which allows tracking of the historical evolution of the contract. However, at any given time, there is only one valid contract section, that can be distinguished by a time stamp. The most recent contract section represents the current state of the contracting process.

In order to support the contracting process, a SeCo Container holds two more sections: a log section and a status section. The *log section* logs the events that occur during the contracting process, as well as any relevant information that arises during the fulfillment of the contract. The information of the log section primarily supports the monitoring service. It allows to trigger events according to the current state of the contract. These events could start services in the contracting phase or of services in other phases of the market transaction, e.g.. the start of the payment process after the shipment. In addition, a log entry may also contain related documents (e.g. a receipt) that can be integrated into the SeCo Container either by reference or by directly embedding the data into the container by means of BASE64 encoding (Borenstein and Freed, 1993).

Finally, there is a *status section* that holds information about the current state of the SeCo Container. It can be used as a quick reference for queries for the status of a contract and may also answer queries for the payment and the delivery status if the applied payment and delivery protocols support exchange of status information. The log and the status section contain data representing the logic layer, and, therefore, support horizontal integration by providing process information needed for contract monitoring.

4.3 Support for the Contracting Process

Based on the above described contract structure the contracting process is supported as follows (c.f. 5):

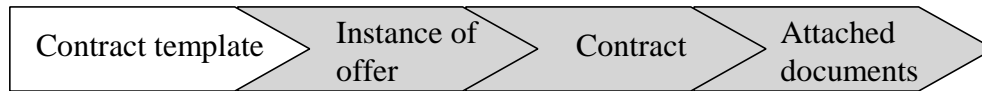


Figure 5: Technical Phases of the Contracting Process

1. In order to express offers an instance of the document is created, which contains only one signature of the offeree. In addition a deadline for the validity of the offer is set.
2. The offerer has two choices he either accepts the offer with a second signature and in that case the offer is transformed in a contract. Or he counters with a counter-offer. In that case the first version is kept for archiving reasons and a new offer document is created containing the altered proposal.
3. Step two can be repeated several times until a valid contract is established or until no new counteroffers are generated within the defined deadlines.

With the above procedure each step in the contracting process is documented by a document, which meets legal requirements. The whole package of related legal documents is archived as an entity and at any time the process can be reconsidered.

5 Conclusion and Further Work

Legally valid electronic contracts are a prerequisite for further development of electronic commerce. In this paper first the legal aspects and requirements on contracts have been presented. Then a possible solution based on XML and electronic signatures was described. The prototype shows that it will be possible to develop a technical solution for electronic contracts. But, in order to get a broad acceptance of electronic contracts further prerequisites are necessary as: legal validity of digital signatures, wide spread of digital signatures, trusted third parties guaranteeing signatures and identities.

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