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Interoperability is an important element that enables commerce. It allows two or more systems, built and operated by different parties, to successfully exchange and process information. Successful examples of open standards that enable interoperability and commerce is the Internet and the US telephone system. The Internet provides interoperability of many important services built on top of its information transport, email and web standards and the telephone systems allows parties to make seamless connections and to converse with each other globally across many different telephone systems run by many different companies. The Credit Card System is another good example. It enables customers of many different financial institutions to purchase goods, conveniently and safely, at many different merchants, both in the U.S. and abroad.

Interoperability opens up markets to the greatest number of firms, lowers the barriers of entry and fosters competition and innovation. It gives customers a greater choice and the service providers a much larger potential marketplace.

Global electronic commerce advances has forced increasing reliance on interoperability, in order to enable people to exchange many types of information and perform many types of transactions seamlessly for different business uses and across borders. Thus, Interoperability is critical for the " seamless" interaction of users in the electronic marketplace. The lack of interoperability translates to inefficiency, loss in productivity, confusion, and failures.

One key component for achieving interoperability is through standards. The word " standard" covers several different types of specifications, including:

An API published by a software provider. One needs a contract to use it, and it may change at any time;

A complete specification openly published by a corporation (e.g., Sun's Java language or

the Microsoft/Intel-driven PC architecture). This gives rise to a " club" in which members have some control over changes;

An open specification published by a neutral institution, such as the Web consortium or the IETF. The process enables multiple actors to control the standard without running afoul of the antitrust laws;

A standard that is enforced by some regulation authority, such as for example radio transmission standards attached to the right to use a specific frequency.

The challenge is for these standards to be widely adopted, to be clear and unambiguous, but minimal enough to allow for the introduction of a rich array of competing and differentiated services.

FSTC activities support the principle of open standards, which enable interoperability. Open standards basically mean that a standard is available for everyone to use and not controlled by one party to the exclusion of others. FSTC has found open standards, such as the Internet protocols, foster an open marketplace where competition is encouraged. Increased competition provides innovation in development of new products and choices for end users. Innovation and competition frequently results in lower costs and better products.

The Web has achieved rapid growth due to such a set of open standards. Users from many countries can exchange information given that they follow the Web's underlying standards (HTML, HTTP and other Internet protocols). These standards are very clear and have few interoperability issues. From the perspective of customers, an open Internet maximizes the benefits that users obtain according to Metcalfe's law. As long as everyone has the same service, then adding a new user benefits everyone on the network (not just users on a single ISP).

Generally closed systems do not have market share and do not interoperate with other closed systems, and frequently do not interoperate with open systems. And even when closed systems have great market share, there are interoperability issues. For example, word processing software applications that produce data in proprietary formats pose particular interoperability issues for users, when the formats or applications change. Many users have experienced that of lack of interoperability when trying to share documents, with different versions of the same software.

However open standards alone are not enough to produce interoperability. The lack of interoperability within open standards (or the implementations based on those standards) also causes failures and impediments to global commerce. The more complex the system and the standard, the harder it is to achieve interoperability. Also, in an open marketplace there may be multiple approaches to accomplish a similar function. Open standards are arrived at through a consensus building process and this often takes time or does not always produce the best standard. And standards may not interoperate between each other and between different versions of the standard. Interoperability issues are often a result of the complexity of the technology combined with different business requirements. Also Interoperability issues are not easy to solve once standards are implemented and in

use.
FSTC recognizes the issues with interoperability and works in a cooperative environment to resolve those issues, especially in the formative stages of technologies and standards. Achieving interoperability does require cooperation, industry debate, testing of solutions, as well as vetting of solutions within the marketplace. FSTC provides a forum for the Financial and technology industries to come together to work on these issues.

But there are many challenges to the open standards process. Chief among these is that technical issues are becoming complicated by the desire to optimize a competitive or proprietary advantage. People frequently call for optimization, for reasons including performance needs, lack of reliability, security issues, and poor control over bandwidth or latency. On the other hand, today's optimization is tomorrow's roadblock; design choices made to optimize a particular application may or may not prove the right ones to make when a new application emerges. And optimization in a decentralized network such as the Internet is delimited by difficulties in reaching agreement to deploy optimizations network-wide and could lead to vendor lock-in.

Customer requirements offer an argument against the likelihood of such a lock-in. Chief among these is that anonymous rendezvous is an essential capability. Business-to-business e-commerce is an important application; it depends on the ability to establish connections between two previously-non-corresponding companies; without this capability you cannot get any new customers. In fact, there are many customers whose requirements are characterized by the explicit need to work across multiple organizational overlays without having to agree on a common service provider. The automobile industry, for example, requires that manufacturers and parts suppliers are able to interact with each other absent agreement on a single network provider to serve them all.

Reflecting the fact that the Internet Commerce is today a major commercial market, and growth in the financial interest, the growing stakes involved in the standards process itself threaten to overwhelm the traditional mechanisms. First, a wider market and more widespread interest means that the number of participants has grown; it is impossible for a working group of 100 or 200 people to do design work, and the inevitable compromises often degrade quality and crispness. Another factor is that the IETF does not hold the monopoly on Internet standards development. A proliferation of groups affects standards in the Internet, including the World Wide Web Consortium and the Wireless Access Protocol Forum. These are more closed, narrow in scope, and more industry-centered. Companies and industry groups, in developing Internet standards, generally use whichever standards body they believe to be the most effective avenue for their business plan. The same company may pursue different standardization efforts in different forums simultaneously, for this reason.

Institutions have reacted to these challenges in many different ways. The IETF standard process underwent several revisions, which all tended towards more formality in order to cope with the increased attendance. The ITU and ANSI have tried to streamline its process, in order to shorten the standard cycles. Various forums have arisen that focus on specific subjects; they have adopted policies that expedite the development of standards

while coping with the antitrust regulations.

Standards are currently being developed today in an active and very mobile market space—a model that parallels the freewheeling creativity of the Internet. There are two basic and conflicting attitudes toward standards. One view is that there should be exactly one standard for any function, and that this standard should be debated in an environment that guarantees fair representation of all parties and fair processing of all contributions. Another view is that there may well be many competing specifications for the same function, and that market competition will select which products serve best a given function. The telecommunications world of the old CCITT and CCIR, now the International Telecommunications Union (ITU), traditionally adopted the first view. The reality of the Internet market, on the other hand, points toward the second view. Today it can be argued that the market impact of standards from treaty bodies such as ITU is essentially indistinguishable from the impact of those of other bodies. The acceptance and use of a standard has more to do with its applicability to marketplace demand than who approved it. In fact, examples such as Java, developed by Sun, or the initial Web protocols, which were developed by an informal group of research institutions, show that the market can also widely adopt solutions before they are blessed by any standard group.

The right formula for standards evolution and maintenance is still evolving and uncertain, but market forces are likely to produce the right result. We believe that watchful waiting is the appropriate course of action.

The major components of ecommerce systems, what needs to interoperate for a global system of electronic commerce to operate seamlessly, include those elements necessary to support the confidential exchange of authenticated electronic documents and information that can be readily processed by both humans and computer systems. This includes the reliable exchange of value (e.g. payment) in a safe, trusted manner, capable of non-repudiation. An example of such a standards effort is the Electronic Commerce Modeling Language, an effort which FSTC supports and belongs to that is developing standards in the digital wallet area involving the exchange of payment, shipping and billing information. Another FSTC secure payment initiative has been its Electronic Check project; a secure means of paying by check electronically over the Internet.

Besides working on the interoperabililty of open standards and their implementations in the area of electronic payments, FSTC has identified that the lack of trusted authentication in electronic commerce may inhibit the growth of electronic commerce. Today it is not possible for entities unknown to one another to authenticate each other and/or validate information needed to securely complete transactions on the Internet. Authentication is available only when the entities know each other in some manner or share a common credential authority. Existing solutions are not widely distributed to date and have been technically difficult and expensive to implement. Most do not fully address issues of attribute validation, privacy, anonymity, or warranty. The growth in many areas of e-commerce is hindered by these authentication/validation inadequacies.

To understand this problem more and what the issues are with existing technology, FSTC has brought together organizations in the financial and technology industries to explore issues, in a project it calls Financial Agent Secure Transaction (FAST). Given the trust relationships financial institutions have with their customers, Financial Institutions are in a position to provide authentication services to their customers on the Internet. FAST hopes to leverage these trust relationships by creating a framework and protocol that will allow financial institutions to provide the authentication/validation services to each other on behalf of their respective customers. This enables e-commerce to securely take place while protecting anonymity of the parties, privacy of sensitive data, and guarantee of any payment obligations.

Providing Authentication services needs to be understood in the context of industry requirements, other initiatives, and technologies. Issues with current technologies, including interoperability will be identified. The goal of the project is to develop an interoperable framework that leverages as much of the existing technology infrastructure, but that also addresses gaps in the systems and improves ease of use. FSTC is seeking participation from all market segments to help define business requirements and to work together to identify issues and solutions.

FSTC's main focus is on technology issues that face the Financial Industry, and not on legal issues. However FSTC recognizes the importance that business and legal requirements have upon the implementation of technology and routinely seeks the advice and support of others that are working in these areas.

FSTC is only now in the beginning of its FAST project formation and discussion. It is not clear how to establish a legal or policy framework that would be conducive to developing a framework for authentication services. However, FSTC believes that by working together, the project may be able to make some recommendations in this area. Members of the government are invited and have come to some of the FSTC FAST Project formation meetings. FSTC seeks participation and input to the FAST project to help work through these questions.

FSTC is also eager to work with other organizations to share results of its research, support the effort of other cooperative initiatives, and/or to solve problems jointly within and across industries. More information can be found about FSTC at www.fstc.org.