OBI&XML Standard Based Business to Business
Electronic Business Solution

Deren CHEN ¹, and Jen-Yao CHUNG ²
¹ Department of Computer Science & Engineering, Zhejiang University, P. R. China, 310027, drchen@cs.zju.edu.cn
² IBM T. J. Watson Research Center, Yorktown Heights, NY 10598, USA, jychung@us.ibm.com

ABSTRACT: With the widespread popularity of the Internet, specifically the World Wide Web, Internet Electronic Commerce provides a revolutionary way of doing business, offers tremendous opportunities for business, and, most importantly, represents a market worth potentially hundreds of billions of dollars. Internet electronic commerce has become an active area recently, with many standards and solutions defined, proposed, and emerged. This paper will cover basic concepts of electronic commerce and framework of application lifecycle and three levels of approach from electronic commerce to electronic business., and give electronic business three dimension model which are customer, enterprise, partner and relative with CSM, CRM and ERP. We will discuss recently proposed B2B internet standards OBI and other relations such as EDI, XML, and ebXML We will give an electronic Business Solution based on standardized products and conclude with the e-marketplaces trends and directions.

KEY WORDS: Electronic Commerce (EC); electronic Business (EB); Standard; Open Buying on Internet (OBI); XML; EDI; ebXML; Application Framework

1. Introduction
Internet has made the Web a valuable platform for conducting business and the application of electronic commerce is changing the traditional economic activities and human life style. Electronic Commerce (EC) is the process of linking businesses electronically with their suppliers, distributors, manufacturers, and customers to facilitate, create, or support the whole or part of the commerce cycle. Traditional commerce activities developed around seller market and concentrate the main task into promoting the sales of products. The EC is changing the traditional commerce activities and forming a new pattern of international commerce running. There are four perspectives to understand EC:

Table1. Traditional and EC activities compared

<table>
<thead>
<tr>
<th>Contents</th>
<th>Traditional Commerce</th>
<th>Electronic Commerce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modus // Results</td>
<td>Secretarial // Business record</td>
<td>Service-self // Intelligence</td>
</tr>
</tbody>
</table>
- **Communications** E-commerce (EC) is the delivery of information, products/services, or payments via telephone lines, computer networks, or any other means.
- **Trades Process** EC is the application of technology toward the automation of trade transactions and workflow.
- **Service** EC is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.
- **Online** EC provides the capability of buying and selling products and information on the Internet and other online services.

The key to EC is trade transactions over the network. Transactions are exchanges that occur when one economic entity sells a product or service to another entity. A trade transaction takes place when a product or service is transferred across technologically separable interface that links a consumer with a producer.

2. **EC Application Lifecycle**

The application of EC runs through the whole trade process from pre-trade, the trade to post-trade and forming a circle. During the pre-trade, sellers need to prepare to publish/update catalog and prices, for the buyers to browse catalog and to negotiate terms. In the middle of trade, buyers place order and make payment, and the sellers will do billing and manage inventory. In the post-trade, sellers manage inventory with suppliers, coordinate with shipping company, resolve issues and maintain
relationship.

According to the figure presented, EC establishes both the integration between modules and chairs (buyer and seller). It can reach dynamic modification of flow and feedback loop, and is related to transaction, contractual and partnerships as well as industry specific requirements. Specially important, the model and flow can help corporations perform efficient business activities between companies (business to business or B2B), and can also assist merchant sites to set up on-line shopping stores (business to consumers or B2C).

3. From EC to EB

Internet based EC has flourished mostly in the B2C fields and some successful applications of EC are also involved in B2C. There are some reasons about this status including the lack of well-accepted security, technology, standards, application environment etc. According to the development of EC, there are currently three different approaches labeled EC. They are[6]:

- **Web Storefronts** They provide a web interface to a vendor’s catalog of products of services just like many software companies are advertising them as electronic business solutions. This may be an acceptable solution for B2C commerce. However customers would have to visit hundreds of suppliers’ websites. This would be an intolerable way to conduct business for a large manufacture with thousands of suppliers.

- **EC Portals** EC Portals automate both vendor and customer buying and selling of goods and services. A major shortcoming of this approach is the security of information which resides outside of its internal firewalls while its data is being updated and maintained by a third party on the portal website.

- **E2E EC** In this approach, every enterprise establishes its own server. All of the internal applications of different companies share information directly by some standard data interchange format such as EDI or XML (presented following). That B2B solution builds an end-to-end, enterprise-to enterprise (or E2E) EC system.

Electronic Business (EB) is wider than EC both in content and concept. Commercial activities such as buying and selling, as the term electronic commerce suggests, are certainly an important part of electronic business but they don’t include the full range of EB activities (inside, outside and between) in enterprise, finance, customers, suppliers, services, government, and distribution. The following definition by Lou Gerstner, IBM’s CEO, matches closely with general idea of EB:

We coined the term ‘e-business’ to describe all the ways individuals and institutions derive value from the Net-buying and selling , but also the important transactions between teachers and students, doctors and patients, governments and citizens[9].

The goal of most EC and EB research and their associated implementations is to reduce the transaction cost in online transactions. The reduction of such transactions will enable smoother transactions between buyers, intermediaries from online production process, and sellers. Recently, B2B marketplaces and exchanges are the
emergent areas.

4. **EB Application Framework**

Customer, enterprise and partner are three dimensions of EB and there are three relative goals for each one. They are:

**Customer Goal** Maximize customer relationships for increasing loyalty and grow marketshare;

**Enterprise Goal** Optimize internal operations for maximizing return on investment in people and infrastructure;

**Partner Goal** Maximize partner relationships for increasing collaboration via process integration.

Figure 2 describes an E-Business application framework. EB is becoming critical in three interrelated dimensions.

- **B2C interactions**, which enables the customer to have a more direct influence in what products are made and how services (by Customer Relationship Management or CRM) as delivered intra-business interactions.
- **EB** enables the shift from a hierarchical command-and-control organization to the information (by Enterprise Resource Process or ERP) based organization B2B interactions.
- **EB** facilitates a network of loosely connected organizations where small flexible firms relying on each other to manage an integrated and/or extended supply chain (Supply Chain Management or SCM).

CRM, ERP, and SCM are each expanding their business across these traditional boundaries in E-Business environment. It’s necessary for the business/commercial application to make some standards or proposals to integrate,
translate, exchange information. OBI and XML are two different useful standards would be applied in the model.

5. Standards and Proposal

The EB activities, such as document exchange, should be standardized across all of the different system platforms and business practices. For example, Standard General Markup Language (SGML) is a useful meta-language standard and Hyper Text Mark Up Language (HTML) which is a simple markup language and commonly used in network environment. Electronic Data Interchange (EDI) is a common document exchange format that has been widely used among auto industry, health care providers, insurance companies, retailers, transportation, manufacturing, grocery, and financial banks. In the EB security protocol fields, there are some related standards such as Secure Electronic Transactions (SET) for secure on-line payment and Secure Socket Layer (SSL) for secure internet communication. Ongoing industrial standards mainly include Open Trading Protocol (OTP) for on-line shopping procedures; Open Buying on the Internet (OBI) for B2B non-production materials purchasing; Information and Content Exchange Protocol (ICE) for content exchange; XML/EDI for efficient EDI document exchange and Electronic Business Extensible Markup Language (ebXML) for both B2B and B2C activities.

5.1 Open Buying on Internet

The purpose of the OBI is to provide a standard framework for secure and interoperable B2B internet commerce with an initial focus on automating high-volume, low-dollar transactions between trading partners. There are four essentials entities involved in an OBI system[2]. The Buying Organization procures items as part of its daily business operations. The Requisitioner, a member of the buying organization, is interested in procuring certain items as part of the non-mission critical process of the organization within his/her command. The Selling Organization supplies goods and services to other businesses. The Payment Authority, which may not exist in an OBI scenarios, as a clearing-house for all payment and settlement activities between the selling and buying organizations. All the aforementioned entities should be connecting to the Internet and have digital certificates that uniquely and securely establish their identities. The whole OBI architecture is based on the following model of B2B commerce (see also figure 3):
Electronic Data Interchange (EDI) is a set of specification for formatting machine-readable documents that is designed to automate business flow among businesses by replacing paper documents (such as purchase orders and invoices) with paperless ones. Traditional EDI system contains two major components: EDI translation software that converts and maps EDI formats to/from internal business applications, and communication channels that deliver EDI documents to the desired trading partners[1]. Over these years, some different industries and countries have developed their own EDI standards for representing ANSI X12 (US standard) or EDIFACT (international one). Although EDI also has been successfully employed in specific industries (such as retail) and in some large enterprises, it has not been widely adopted. The primary barriers to widespread acceptance of EDI are the costs of implementation and the costs of communication, which is frequently implemented by using ValueAdded Networks (VANs). These costs are generally too high for companies that do not conduct large numbers of EDI transactions.

The eXtensible Markup Language (XML) is an initiative proposed by the W3C as an alternative to HTML which currently dominates web publishing. Unlike HTML, XML is a meta-language - a language that allows you to create your own markup languages for your purposes. There are three essential factors in XML: Document Type Definition (DTD or XML Schema), eXtensible Stylesheet Language (XSL) and eXtensible Link Language (Xlink). DTD and XML Schema define the logic structure of XML files, elements or their attributes and the relation between them. XSL defines the grammar normalized while Xlink describes the link between each resources based web. The application of XML involves producing and parsing (by parser using DOM or SAX standards).

5.2 XML/EDI
The difference between EDI and XML is summarized in table 2.

<table>
<thead>
<tr>
<th>EC solution</th>
<th>XML</th>
<th>EDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimized for</td>
<td>Easy programming</td>
<td>For compressed messages</td>
</tr>
<tr>
<td>Server costing</td>
<td>Requires standard web server</td>
<td>Dedicated EDI server, more costly</td>
</tr>
<tr>
<td>Connection</td>
<td>Uses your existing Internet</td>
<td>Uses VAN and charged by usage</td>
</tr>
<tr>
<td>Message format</td>
<td>Easy to learn, tool available</td>
<td>Takes time to learn and manipulate</td>
</tr>
<tr>
<td>Language</td>
<td>Only requires JavaScript, VB, Python or Perl script writers</td>
<td>Requires trained programmers</td>
</tr>
<tr>
<td>Programming</td>
<td>Easy to read and debug</td>
<td>Difficult to read and debug</td>
</tr>
</tbody>
</table>

There are many useful features for the application and development of XML such as extensible, cheaper for related software, chance to unify and simplify, more strongly typed data representation, utilize well-defined DOM functions, well interface for EDI, more convenient for development web-based. All of these standards mentioned such as OTP, ICE and OBI (V3.0) have supported or will support XML format.

The XML/EDI initiative is to provide a common framework, based on XML, for those messages formats EDI provided and to leverage existing tools for the production and processing of that information. The combination of XML with EDI holds the promise of extending the advantages of Web-based EDI through an open standard to the millions of small and medium sized enterprises.

5.3 Electronic Business XML (ebXML)

Electronic Business Extensible Markup Language (ebXML) is an international initiative established by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and the Organization for the Advancement of Structured Information Standards (OASIS). The purpose of the ebXML is to provide an XML-based open technical framework to enable XML to be utilized in a consistent and uniform manner for the exchange of EB data in application to application, application to human, and human to application environments—thus creating a single global market[4].

ebXML is based on international standards and is itself intended to become an international standard. The scope of the ebXML business requirements is to meet the needs of both B2B and B2C activities. General ebXML principles to be followed in developing ebXML deliverables are to create technical specifications that:

(1) Enable simple, easy and ubiquitous electronic business through use of XML;
(2) Use XML technical specifications to the maximum extent practicable;
(3) Provide a global cross-industry open/interoperable standard for B2B and B2C trade;
(4) Coalesce the structure and content components of divergent XML initiatives into a single useable XML business standard;
(5) Provide impetus so that common resources currently engaged in short-term; solutions shall be marshaled to reach a common long-term solution goal
(6) Support vertical and horizontal segments of industry and business participants;
(7) Avoid proprietary solutions that impose financial or software requirements constraints on ebXML users to buy, install or programmatically support any ebXML unique software products in the conduct of business information exchange;
(8) Strive to minimize costs of doing business electronically;
(9) Provide multi-lingual support;
(10) Accommodate national and international trade requirements;
(11) Provide a migration path from accredited EDI and developing XML business standards;
(12) Apply when possible the simplification principles of SIMAC Business Requirements.

6. EB Solution based Standardized products
Several important issues which are critical for wide spread adoption of EB includes merchant-side solutions and procurement-side solutions based on related standards in trading protocol (such as OBI), interoperability and exchange (such as XML/EDI), security and confidentiality (such as SET) with these solutions. Most sell-side applications involve component solutions, such as catalog, language translation, supply chain management, payment processes, shipping and handling, customer service and support, customer profiling analysis, Web site analysis, and security. Total solution applications can provide a single set of solutions for companies to sell their products over the Internet. Buy-side applications can enable companies to purchase products and services over the Internet from a web-enabled supplier. Procurement solutions should include workflow approval processes, integration to back-end enterprise resource planning systems and accounting systems, user authentication and identification, and secure payment protocols.

A successful EB application solution needs an open, standards-based platform, design patterns for EB, and a comprehensive set of leadership products. There are some available commercial products based on standards by some companies such as IBM. The figure 4 describes a roadmap for application development that spans multiple platform of EB solution in which the model presented figure 2.
7. **Future Trends and Summary**

EB is moving from experimental prototype to business-critical system. The growth of E-Business expectations and requirements will be exponential, revenue will be doubling every 12-18 months, especially in B2B marketplaces and exchanges. EB is not only focus on these primary fields such as business, economics, communication, computer (software and hardware) engineering and applications, security, transactions, but also more and more related disciplines including law, politics, anthropology, sociology, organization theory, process engineering, linguistics, and collaboration multimedia. EB progresses driven by combination of these fields and standardized based solution will be the future of EB.

There are several revolutionary trends of E-Business such as [10]: (i) from buy-side and sell-side centric to B2B marketplace and exchange, (ii) from fixed price model to the dynamic pricing including auctions, reverse auction and dynamically negotiated pricing, (iii) from standard catalog buying to build to order and design to order, (iv) from one to one interaction to many to many interactions, (v) from the pre-planed model to the on-line decision support and deep computing, (vi) from the static HTML to dynamic HTML then to the XML based JSP, and (vii) the integrated supply chain management, collaborative and mobile commerce.

**References**

