

A XML/EDI System for Maritime Export Customs Clearance

Hyun S. Kim^a, Nam K. Park^b and Hyung R. Choi^c

^aDivision of Management Information Science, Dong-A University
Hadan-Dong, Saha-gu, 840, Pusan, 604-714, Korea
Tel: +82-051-200-7478, Fax: +82-051-200-7481, E-mail: hskim@daunet.donga.ac.kr

^bDepartment of Distribution Management, Tongmyong University of Information Technology
Yongdang-Dong, Nam-Gu, 535, Pusan, 608-711, Korea
Tel: +82-051-629-7005, Fax: +82-051- 629-7139, E-mail: nkpark@tmic.tit.ac.kr

^cDivision of Management Information Science, Dong-A University
Hadan-Dong, Saha-gu, 840, Pusan, 604-714, Korea
Tel: +82-051-200-7477, Fax: +82-051-200-7481, E-mail: E-mail: hrchoi@daunet.donga.ac.kr

Abstract

Korean government and companies have given a lot of their efforts to exchange electronic documents between themselves and their partners. As the results of them, Korean EDI standards were made by Korean EDIFACT Committee and the standards have been used by companies and governmental organization in Korea.

However, Korean export customs clearance EDI system is based on VAN(Value Added Network) and one VAN company has monopolistic right to relay EDI documents to Korean Customs Service. Therefore it leads to a lot of problems such as inconvenient software, expensive transmission fee and the difficulty of connection with the in-house systems of user companies. To solve these problems, a few good solutions and systems have been suggested and one of them is the Internet EDI.

we will suggest a new export customs clearance EDI system running on the Web. This system is basically an Internet EDI system, but we have developed this system using XML instead of HTML. XML is a new markup language with merit such as isolating data from style of documents.

This system consists of 7 modules, schema/style/template management, XML/EDI document management, XML/EDI transformation, EDI transmission, certification management, and log management. Also, this system can be used with other traditional EDI systems that have UN/EDIFACT standards. We will discuss the advantages and disadvantages of XML/EDI system for customs clearance.

The development of this system will be a leading study for XML/EDI standards in export clearance EDI system.

Key words:

XML/EDI; Internet EDI; VAN/EDI; Customs Clearance; UN/EDIFACT; IVANS

Introduction

Document exchange between organizations is a common business process. However, It is a very critical issue how to make it secure, accurate and efficient. Electronic Data Interchange(EDI) is a solution that makes document exchange through computer networks. Until now, EDI has been great contribution to trade process automation. Also, EDI has a lot of advantages comparing with the traditional paper-document process. For example, it can certainly reduce document handling cost and document exchange cost, and it increases rapidity of information exchange and correctness of data.

Therefore, Korean government and companies have given a lot of their efforts to exchange electronic documents between themselves and their partners. As the result of them, Korean EDIFACT Committee, established in 1991, made Korean EDI standards and Korean companies and governmental organization have used them.

However, new networking technology – the Internet - has emerged and it has been adopted as a major stream of infrastructure for organizations to rely on for doing their communication and business process with other organizations including document exchange. Now the EDI without Internet technology becomes “traditional EDI”.

However, Korean export clearance EDI system is now based on VAN(Value Added Network) and one VAN

company has monopolistic right to relay EDI documents to Korean Customs Service. Therefore, it leads to a lot of problems such as inconvenient software, expensive transmission fee and the difficulty of connection with the in-house systems of user companies. To solve these problems, a few good solutions and systems have been suggested and one of them is the Internet EDI.

Viewed in users' point, they really want a low-cost, technically simple, easy to use, secure, and efficient EDI system. Will the Internet EDI be the ultimate solution? Is the Internet EDI system secure, easy to use, efficient and technically simple? And is it really low-cost? Maybe the Korean monopolistic VAN/EDI company couldn't say affirmatively to these questions. Therefore, our focus is to practically approach this problem. As a step toward to these problems, we have developed an XML/EDI system for export customs clearance and discussed the result in the view of EDI users in this paper.

Traditional EDI vs. Internet EDI

EDI is a method of exchanging documents. The EDI document is a standardized and structured data stream that can be readable and translatable by computers. The document is transmitted via computer network without paper work. So, The EDI format should follow agreed message standards between their users.

The components of EDI are EDI standard, EDI system, EDI users and EDI service provider. Internet EDI is named because it uses the Internet communication protocol – TCP/IP. Internet is now everywhere, namely ubiquitous network. At a first glance, it is unavoidable that the traditional EDI must evolve to Internet EDI. Now, we will compare the traditional EDI with Internet EDI in the point of the components of EDI.

EDI Standard

EDI standard can be subcategorized into formatting standards and communication standards. In accordance with the scope of standards, there are proprietary standards, common standards and international standards. For the formatting standards, traditional EDI obeys UN/EDIFACT, the international standard, or some regional common standards such as ANSI X.12 in U.S.A or KEDIFACT in Korea. However, the formatting standard of the Internet EDI is not officially declared in Korea. Internationally, UN/CEFACT and OASIS are jointly initiating ebXML which is a set of specifications that together enable a modular electronic business framework. With this framework, XML can be standardized. The goal of ebXML is to facilitate open trade between organizations regardless of size by enabling XML to be used in a consistent manner to exchange electronic business data(Park et al., 2000).

Therefore, although we have not the Internet EDI standard that adopts XML technology now, we will prospect the Internet EDI standard will adopt it in the near future. The communication standard of traditional EDI has been X.25 or X.400/X435 which is more higher layer of protocol than

X.25. Also, The Internet EDI uses TCP/IP protocol that is a standard communication of protocol of the Internet. Based on TCP/IP, the Internet EDI can use more higher communication protocol such as FTP, SMTP/MIME and WWW.

EDI System

EDI system consists of application software, translating software and communication software. The application software helps users compose EDI standard document for target domain such as export customs clearance. Document creating, updating, deleting, inquiring, searching, printing out are the minimum function.

The translating software transforms the format of a file from internal structured format to EDI or vice versa. The communication software help EDI files to transmitted or received between trading partners.

The traditional EDI system in Korea is based on thick client architecture. The client software has all the software facilities: application, translating, and communication. Therefore, the software is expensive and has to be maintained because KEDIFCT committee announces new EDI standard periodically. So, the EDI users have to pay the maintenance fee.

If the EDI system were based on thin client model, the client software just would have an application software and communication software. In this case, the VAN/EDI company has a translating software. The client software need not to be maintained for the reason of modification of EDI standard, but the VAN/EDI company's server has to endure heavier computing load than when the client software have all the three functions.

On the contrary, Internet EDI systems usually rely on thin client model, because WWW is basically a thin client model. EDI clients just have to install Web browser. The server side has translator and application logic. Of course, Web EDI is not unique model of Internet EDI. Web is still slow and poorer working environment than standalone client software.

We can use FTP on the Internet to transmit EDI file that follows UN/EDIFACT standard using the existing EDI client software that VAN/EDI company sells. But, in this case, the maintenance problem still remains unchanged.

Other solution is downloadable thick client model and the client software has all the functions. In this case, the portion that should be modified is downloaded via Internet when new standard is established.

EDI Users

EDI users are not individuals but business organizations. In Korea, most users of EDI for export/import customs service are customs brokers because they do agent service for export/import customs clearance. Therefore, as like general B-to-B electronic commerce, the EDI users should and want to keep the transaction data on their own computer.

Therefore, users may not use Internet EDI systems that accept only key-in data from users without leaving the data in users' computer.

EDI Service Provider

Traditional EDI is so complex in technology that users should rely on a VAN/EDI service provider. The VAN does service such as EDI relay, time stamping, authentication, EDI document management, supporting client EDI software and leasing network line.

The Internet EDI does not have to have EDI service provider, and just if trading partner open their Web server, Mail server, or FTP server for their EDI trading partners, the trading partners can exchange EDI message via Internet between each other even between customs service. The customs service institutions can open their server and admit EDI file directly without EDI intermediaries, i.e., Internet VAN service (IVANS).

However, the customs service institution may prefer outsourcing of the EDI facilities to self-managing of EDI system. The level of EDI service and fee may be dependent on whether the EDI intermediary is accepted or not. If governmental customs service directly manages EDI, the fee will be down because the operating institution is public organization. However, in this case, the providing service may be low or very simple. If private EDI service provider acts as an intermediary of customs clearance EDI, the fee cannot be so cheap. If the EDI intermediary has a monopolistic position, the service fee may be higher without guaranteeing higher service level.

Currently, in Korea, a VAN/EDI company has a monopolistic position and their source of revenue is service fee, leasing fee of exclusive network line for EDI transmission and maintenance fee of EDI client software. The high cost structure of VAN/EDI service is the major reason of Internet EDI initiatives.

XML and XML/EDI

WWW is the most famous application of Internet. With the Web technology, we can present a fantastic screen on the Internet, and HTTP and HTML are the key technologies of WWW. So, we can imagine WWW as a major vehicle of Internet EDI. However, HTML using only for presentation can't be a carrier of data. If we do not mind presentation, flat text file is the most convenient way to send data.

XML(eXtensible Markup Language) has advantages of representing style and keeping data and it is extensible. It means that XML can have its own tags and furthermore, it can define new tags. In addition, it can manipulate the logical structure of items in a document and validate the content and structure of document.

XML document is composed of XSL, XML schema and DI. XSL(eXtensible Style Language) is used for presenting XML document. XML Schema defines the item types of XML document. DI(Document Instance) is an instance of document that is composed by following XML schema's specification. XML/EDI means that EDI format is represented by XML using the facilities that XML can define new tag and structure of items and manipulate data items in a document.

A Maritime Export Customs Clearance XML/EDI System

We have developed an XML/EDI system for maritime export clearance. The current export clearance process in Korea is: First, the one who will export submits his documents for export to a certified customs broker. Then the customs broker sends an Export Declaration via EDI to customs service. If those documents do not have errors, customs service notify receipt message to that broker, and then the certified customs broker issues Export Declaration Report to the client.

List of System Functions

The functions of our system are listed up as in Table 1.

Table 1 – Definition of functions of XML/EDI system for export customs clearance

Function	Details
User Management	<ul style="list-style-type: none"> -User registration -User registration release -User information update -Set trading partner -Assign documents for sending, receiving -Make user working log
Schema/Style/Template Management	<ul style="list-style-type: none"> -Register, Deletion, Update
XML/EDI Document Management	<ul style="list-style-type: none"> -Transmission and reception of XML/EDI document -Store and update XML/EDI document -Validate XML/EDI document (applying schema) -Apply XSL to XML/EDI document -Inquiry of XML/EDI document status
XML/EDI transformation	<ul style="list-style-type: none"> -Transform from XML/EDI to EDIFACT document -Transform from EDIFACT document to XML/EDI -Transform from flat file to XML/EDI
EDI Transmission/Reception	<ul style="list-style-type: none"> -EDIFACT message transmission -EDIFACT message reception
Authentication	<ul style="list-style-type: none"> -Transmission/reception with SSL protocol -Encryption when XML document is created at client site -Decryption when XML document is arrived at server site
Log Management	<ul style="list-style-type: none"> -User log management -Document log management -Document status tracing

Currently, XML/EDI standards are not determined. Therefore, the transforming functions from EDIFACT EDI file to XML/EDI file and from XML/EDI file to EDIFACT EDI file are necessary.

Implementation Model

Figure 1 shows the implementation model of XML/EDI system. The IVANS operates XML/EDI server receiving XML/EDI document from users who only have a web browser that enable XML. In the client site, the XML schema and XSL compose templates that add user's keyed-in data. The generated XML/EDI document is transmitted to IVANS through the Internet.

The IVANS can transmit the received XML/EDI to existing VAN/EDI service provider (KT-NET) after transforming to traditional EDI message through private network. Currently Korean customs service only receives KEDIFACT EDI message through the monopolistic VAN, so IVANS must transmit EDI message to the VAN after transforming XML/EDI to EDI message.

In this model, even though it reflects current system of EDI in Korea, the XML/EDI is not playing so important role because the XML/EDI should be transformed into KEDIFACT EDI message.

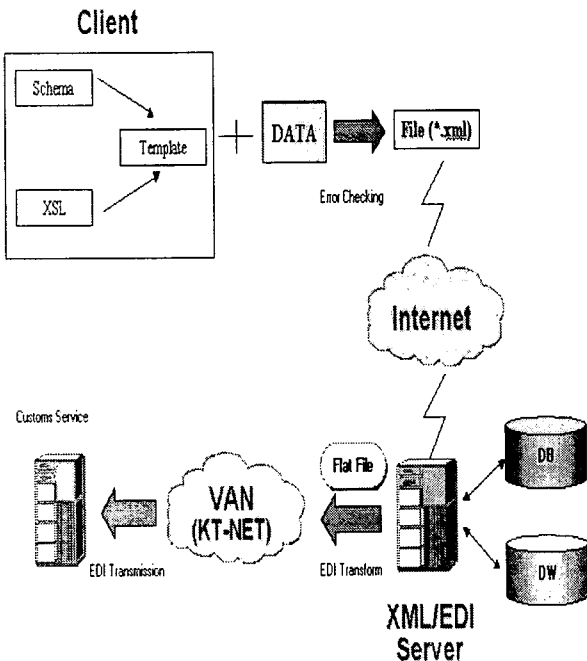


Figure 1 – Implementation model of the system

Overall Architecture of the System

The overall architecture is shown in Figure 2. Users access the IVANS' web server. Users fill in EDI data using XML template on the client site. The XML/EDI document is stored at server site, and the XML/EDI can be transformed into KEDIFACT EDI message and vice versa. The server program has functions such as user management, log management, authentication management and schema/style/template management. The XML/EDI

document is stored on database.

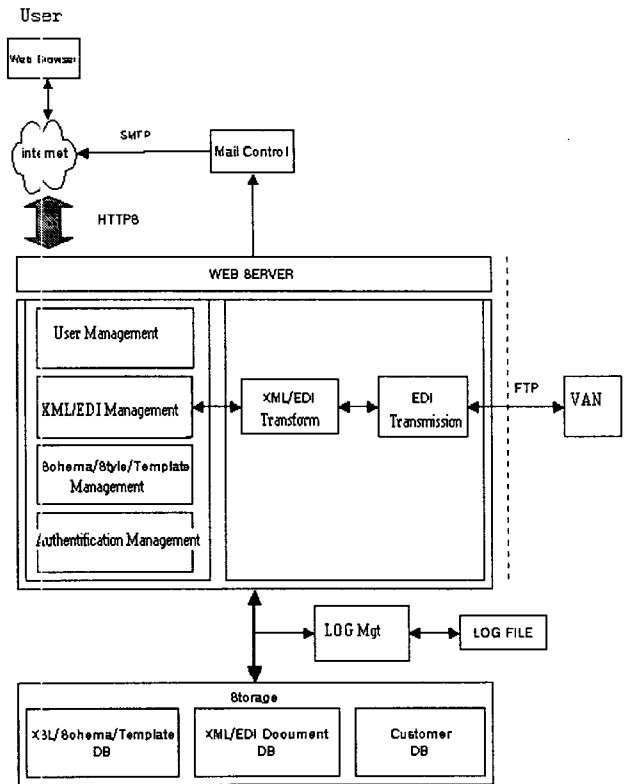


Figure 2 – Overall Architecture of the XML/EDI system

Template/Schema/XSL

The user site's input screen is shown in Figure 3. That is the template composed of XML schema and XSL to represent the schema in the screen. Explorer that is Microsoft's Web browser can enable XSL and XML schema processing on the browser.

We have designed the schema for export declaration document and also developed XSL to represent and manipulate the data in the XML document. Figure 3 shows template of export customs clearance XML/EDI in Korean version on the Web.

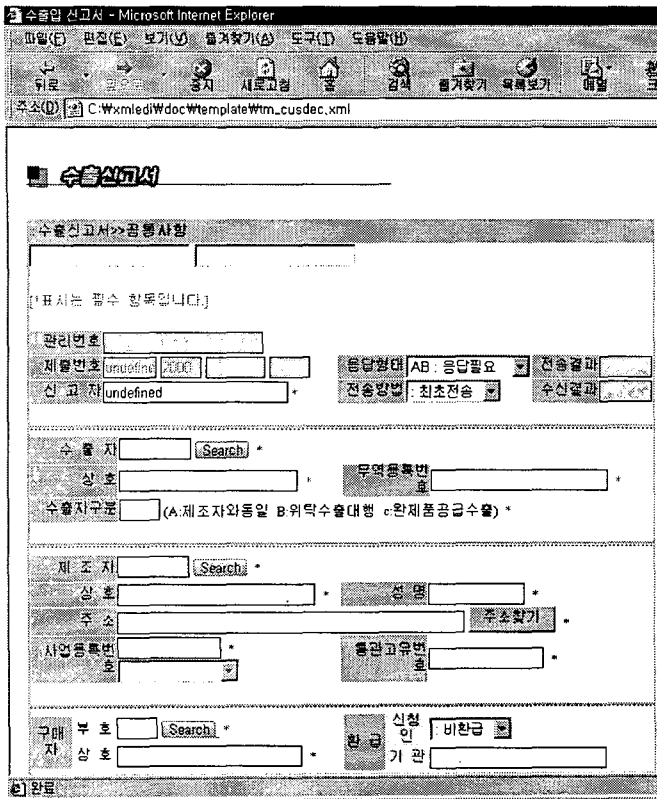


Figure 3 – Template of Export Customs Clearance XML/EDI in Korean Version

Discussion and Conclusion

We have developed an XML/EDI system for export clearance. Our research was neither intended to be a theoretical paper nor system development manual. We intended to find and discuss that whether a new technology such as XML/EDI for Internet EDI can be a solution of the future EDI system.

As affirmative point of view that, the XML can be a solution of EDI system and we can comment as followings.

First, obviously XML has greater advantages than HTML or UN/EDIFACT flat file structure. We can't avoid the Internet based open technology. XML can manipulate data and make new tags in document.

Second, the greatest virtue of XML based Internet EDI is the cost for using EDI. It is potentially cheaper than the cost of current VAN/EDI system because XML/EDI system users don't need to use expensive client software and privately leased network.

However, cautious points can be found after developing and operating the XML/EDI system.

First, until now, XML is not so easy technology as HTML. Developers have to deal with complex JAVA program and XSL.

Second, the standard of XML/EDI is not yet determined. Therefore, The XML schema we have developed for export

customs clearance system in this research is a proprietary one. Others can make other schema for it. The lack of standard is now very critical shortage of XML/EDI.

Third, the XML document downloading speed is slower than that of HTML document at client site, because the Web browser has to process XSL and XML schema that are not necessary in HTML document.

Fourth, in view of users, the presentation layer is the same or even worse than HTML. HTML is excellent for presentation, but current XSL is not so powerful comparing HTML. Therefore, users may be unsatisfied with the XML/EDI if he/she is very familiar with EDI client software which can let users do sophisticated work and allow speedy manipulation than Web.

Fifth, the current Korean customs service system only receives KEDIFACT EDI messages from a VAN/EDI company, so the XML/EDI system cannot demonstrate its big advantages because the XML/EDI message should be transformed again to KEDIFACT EDI message.

Sixth, owing to the monopolistic situation of VAN/EDI industry, our business model of IVANS is still unable to be implemented.

However, the development of this system will be a leading study for export customs clearance XML/EDI.

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