

e-Business Frameworks based on MDA

Haeng-Kon Kim

Abstract—In this paper, we survey and analyze the actual conditions of EDI system for B2B business of transport companies in Korea. As the result of our analyses, it comes an old fashioned EDI system at harbor and logistics industry, and the VAN based systems are still widely used in Korea. In conclusion, the next generation EDI, XML/EDI, is very effective to solve these kinds of problems. So, we suggest and implement a scheme of XML/EDI as a substitute for the traditional one. We design and implement the XML/EDI system on B2B of *Shipping Request* to show the effectiveness and strength of XML/EDI over the traditional EDI. At first, we analyze the standard items of shipping request EDI, and define the document by the DTD of shipping request. And we implement the document creation module in order to generate the document without user's knowledge of XML, and also implement XML storage module to store the generated XML document.

Index Terms—XML/EDI, Frameworks, Component Based Development, Repository, Software Process Improvement

I. INTRODUCTION

Recently, it comes the prominent tendency in Korea that various types of EDI(Electronic Data Interchange) systems[1] are being applied and operated on almost every fields in Harbor and Logistics industry[5],[10]. The main concerns of academic and business are focused on researches and application of Internet based EDI systems, but it comes an old fashioned EDI system, and VAN based system are still widely used at Harbor and Logistics[4],[7].

In this regards, we survey the current situations of running information systems related to EDI system of 10 middle- and large-sized transport companies who play major roles at Harbor and Logistics Industry in Korea. And we also analyze the conditions and status of running EDI systems with partners at every step of work procedures. As the result of our analyses, it comes an old fashioned EDI system at harbor and logistics industry, and the VAN based system are still widely used in Korea. In conclusion, the EDI of next generation, XML/EDI[3],[8], which is very effective to solve these kinds of problems, is now replacing the traditional EDI and the HTML in Internet and is influencing on e-Business.

So, we suggest and implement an approach of XML/EDI as a substitute for the traditional one. So, we suggest and implement an approach of XML/EDI as a substitute for the traditional one. First, we analyze and organize the structure of XML/EDI

system. Next, we design and implement the XML/EDI System using XML on B2B of Web Shipping Request to show the effectiveness and strength of XML/EDI over the traditional EDI. At first, we analyze the standard items of shipping request EDI, and define the document by the DTD of shipping request. And we implement the document creation module in order to generate the document without user's knowledge of XML, and also implement XML storage module to store the generated XML document.

The rest of this paper is organized as follows. In section2, we describe the architecture and transport model of XML/EDI system. A survey on actual EDI system of import/export transport companies in Korea is presented in section 3. The Shipping Request XML/EDI system, which is the new approach of EDI system of Korean transport companies, is suggested in section 4 and section 5. In section 4, the design of Shipping Request system is suggested, and the implementation details are presented in section 5. Finally, we conclude in Section 6.

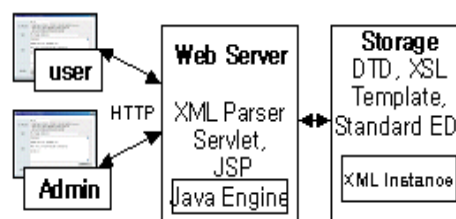


Fig 1. Web-based XML/EDI system architecture

II. OVERVIEW OF XML/EDI SYSTEM

A. Architecture of XML/EDI System

The architecture of XML/EDI system is depicted in Fig 1. It consists of Web server which performs the functionality of interchanges of documents based on Web, and Database server which undertakes the Global Repository[9].

B. Transport Model of XML/EDI System

The Transport model of Web-based XML/EDI system is depicted in Fig 2[12]. In the XML/EDI transport architecture between sender and receiver, the documents such as DTD, XSL, template are stored in the Global Repository, and are shared between them. The sender transmits the documents with respect to DTDs which define the document between partners, XSLs which define the business rules and document styles, and templates which contain the transmitted contents of data. And,

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the receiver displays the transmitted documents on Web browser by the use of user interface.

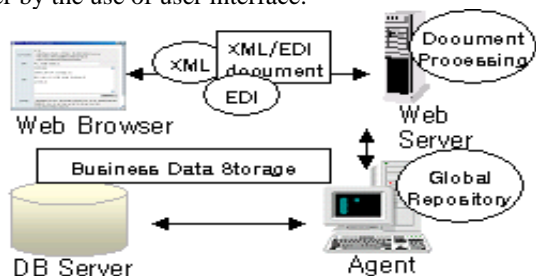


Fig 2. Web-based XML/EDI transport model

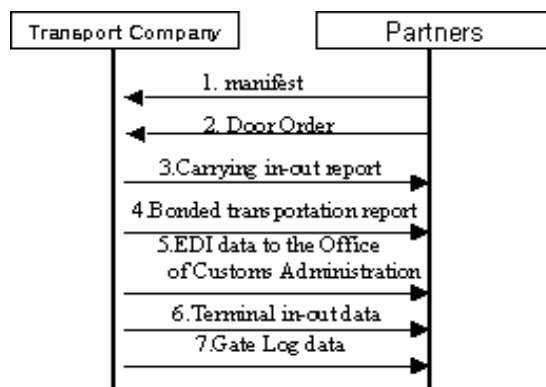


Fig 4. EDI business scenario

III. SURVEY OF ACTUAL EDI OF TRANSPORT COMPANIES IN KOREA

We survey the current situations of running IT systems related to EDI system of 10 middle- and large- sized transport companies that play major roles at harbor and logistics industry in Korea. And, we also analyze the items of partners, data send/receive method, cycle, and interchange documents with respect to B2B business of individual company.

A. EDI System Types of the Associated Organizations

The B2B EDI-associated organizations and partners of Korean domestic transportation of import/ export cargo are the Office of Customs Administration, the Consignor, the Shipping Company, the Harbor Terminal, the Office of Korean National Railroads. It is depicted in Fig 3.

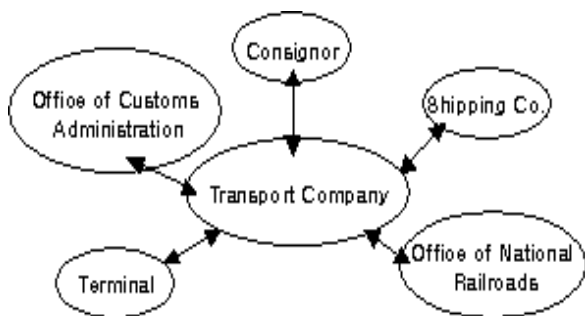


Fig 3. Related partners of EDI

The scenario of EDI business among the transport company and its partners is described in Fig 4. The transport company receives the manifest and door order data from the Office of Customs Administration and the shipping company, and sends import freight carrying in-out report and bonded transportation report as EDI data to the Office of Customs Administration. And it sends the terminal in-out data and gate log to the consignor, the shipping company, and the harbor terminal.

B. Interchange Types of EDI Data

The interchange types of EDI data among the transport company and its partners are described in Table I. The various types of EDI by VAN, data interchange using FTP, EDI by on-line terminal, data interchange by E-mail, and XML/EDI are configured and operated in Korea.

Table I. Types of EDI data interchanges

EDI Types	Documents	Partners
EDI by VAN	Manifest Imported freight carrying in-out report Bonded transportation report Document of Office of National Railroads Container in-out report	Office of Customs Administration Consignor Shipping Company Harbor Terminal Office of Korean National Railroads
Data interchange using FTP	Door order, Gate log	Consignor, Shipping Company
EDI by on-line terminal	Gate log	Consignor, Shipping Company
Data interchange by E-mail	Door order, Gate log	Consignor, Shipping Company
XML/EDI	Door order, Gate-log	Consignor, Shipping Company

C. EDI Problems of Korean Transport Companies

The EDI problems of Korean transport companies are as follows. First, Most of the styles of data interchanges in the actual business are operated by telephone, FAX, postal mail and not applied by EDI system yet. Second, Most of Korean domestic import/export transport companies operate the EDI business by VAN as the document interchange method. This incurs the VAN company with monopolistic, so the cost of EDI by VAN becomes expensive. Third, Web-based data transmission, XML/EDI, and FTP transmission are utilized along to the advancement of Internet technology, but the introduction and application of these new typed EDI systems

are still insufficient.

IV. DESIGN OF SHIPPING REQUEST XML/EDI SYSTEM

A. Design of Shipping Request EDI Document

The Shipping Request EDI document is organized by referencing the structure of IFTMBF(Provisional booking message) electronic document[2]. It is used in the transport EDI service part of import/export trade business of which the exporter makes the shipping company or shipping agency a request to make a shipment and receives the response report. The shipping request EDI document is exemplified in Table II. It complies with the shipping request regulation of UN/EDIFACT[6],[11].

Table II. Items of Shipping Request EDI document

Begin part	UNH(Message Header) BGM(Beginning of Message) COM(Communication contact) DTM(Date/Time/Period) FTX(Free Text) RFF(Reference)	
Transmission items	SG1	TDT(Details of Transport) DTM(Date/Time/Period) LOC(Place/location identification)
	SG2	NAD(Name and address) CPI(Charge payment instruction)
	SG3	GID(Goods item details) HAN(Handling instructions) TMP(Temperature) FTX(Free Text)
	SG4	IMD(Item description) FTX(Free Text) MEA(Measurements) PCI(Package indication)
End part	RFF(Reference) DGS(Dangerous goods) UNT(Message trailer)	

B. Architecture and Scenario of Shipping Request XML/EDI System

The architecture of Shipping Request XML/EDI system is depicted in Fig 5. When the sender connects to Web site, the user interface for input data of the shipping request is displayed on Web browser. Then, the sender inputs data of the shipping request in the user interface.

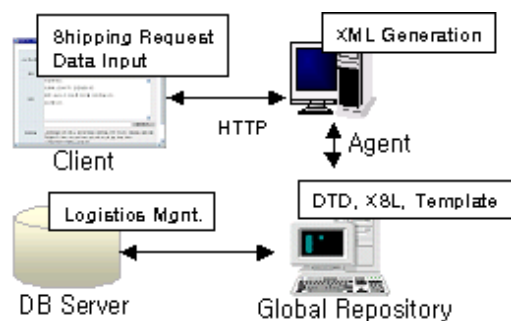


Fig 5. Architecture of shipping request XML/EDI system

At next step, the input data are loaded on Web server which acts as Agent, and the shipping request DTD in Global Repository is referred, XML parser parses and proves the data. If the error is happened while XML parser is checking, the error message is displayed on Web browser of the sender. If the shipping request is to be verified by the DTD and XML parser, then the input data is transformed into XML element and the XML instance is generated. Finally, the generated XML instance is stored into Global Repository. The scenario of Shipping Request XML/EDI system using XML is described in Fig 6.

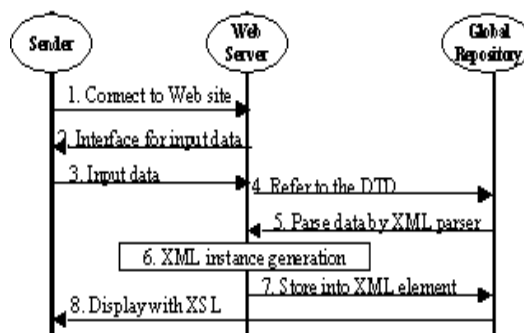


Fig 6. Scenario of shipping request XML/EDI system

C. Work Procedure of Shipping Request XML/EDI System

The work procedure to generate and store the shipping request XML instance is as follows.

(1) Definition of shipping request

At first, we analyze the EDI standard items of shipping request, and write the shipping request DTD.

(2) Supply of HTML form

The user interface of HTML form is supplied to the sender on Web browser.

(3) Generation of shipping request XML document

After the input data is supplied on the user interface, the shipping XML document is generated by JSP program.

(4) Storing of shipping request XML document

The generated shipping request XML document is stored in element unit at database by the servlet program.

V. IMPLEMENTATION OF SHIPPING REQUEST XML/EDI SYSTEM

A. Definition of Shipping Request DTD

We define the Shipping Request DTD which complies with the structure of Shipping Request. We have analyzed the standard items of shipping request EDI in section 4. The Shipping Request document is described in Fig 7.

```

<!-- ===== SHPREQ.dtd ===== -->
<!-- ===== Start Element Declaration ===== -->
<!ELEMENT SHPREQ (Info,SG1,SG2,SG3,SG4)>
<!ELEMENT Info (COM,DTM,REF)>
<!ELEMENT COM (#PCDATA)>
<!ELEMENT DTM (#PCDATA)>
<!ELEMENT REF (#PCDATA)>
<!ELEMENT SG1 (TDT,SDTM,LOC)
  <!ELEMENT TDT (#PCDATA)>
<!ELEMENT SDTM (#PCDATA)>
<!ELEMENT LOC (#PCDATA)
  <!ELEMENT SG2 (NAD,CPI)
    <!ELEMENT NAD (#PCDATA)>
    <!ELEMENT CPI (#PCDATA)>
  <!ELEMENT SG3 (GID,HAN,TMP)
    <!ELEMENT GID (#PCDATA)>
  <!ELEMENT HAN (#PCDATA)>
  <!ELEMENT TMP (#PCDATA)
    <!ELEMENT SG4 (IMD,MEA,PCI)
      <!ELEMENT IMD (#PCDATA)>
      <!ELEMENT MEA (#PCDATA)>
      <!ELEMENT PCI (#PCDATA)>
<!-- ===== End Element Declaration ===== -->
    
```

Fig 7. Shipping Request DTD

B. User Interface for Shipping Request Data Input

After 22 standard items of the shipping request EDI are analyzed and 13 primary transmitted items are extracted, the user interface for data input of sender is displayed on Web browser as depicted in Fig 8.

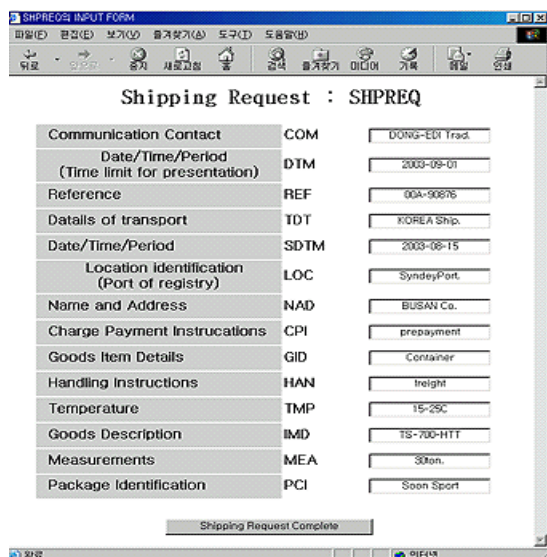


Fig 8. User interface for Shipping Request

C. Generation of Shipping Request XML Document

As it is defined in Shipping Request DTD, the data supplied by sender are positioned into individual tag, and then the Shipping Request XML document is generated in the unit of element starting <SHPREQTOP> tag as depicted in Fig 9.

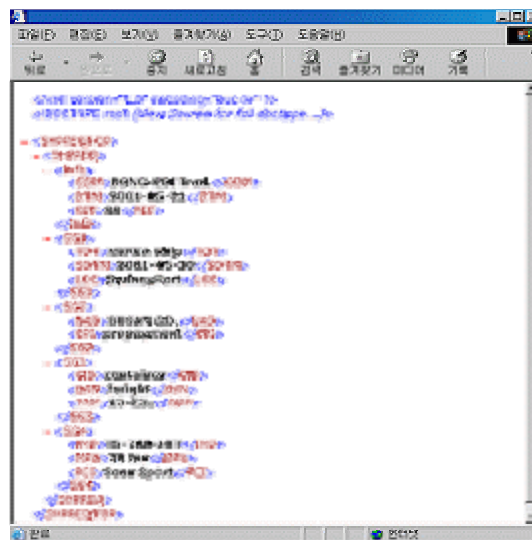


Fig 9. Shipping Request XML document

VI. CONCLUSION

In this paper, we survey and analyze the actual conditions of EDI system for B2B business of transport companies in Korea, and propose and implement new EDI system based on XML linked by Internet. At first, we survey the current situations of running IT systems related to EDI system of 10 middle- and large-sized transport companies that play major roles at harbor and logistics industry in Korea. And we also examine the conditions and status of current running EDI systems with partners at every step of work procedures. As the result of our analyses, it comes an old fashioned EDI system at harbor and logistics industry, and the VAN based system are still widely used in Korea. In conclusion, the EDI of next generation, XML/EDI, is very effective to solve these kinds of problems.

So, we suggest and implement an approach of XML/EDI as a substitute for the traditional one. First, we analyze and organize the structure of XML/EDI system. Next, we design and implement the XML/EDI System using XML on B2B of Shipping Request to show the effectiveness and strength of XML/EDI over the traditional EDI. At first, we analyze the standard items of shipping request EDI, and define the document by the DTD of shipping request. And we implement the document creation module to generate the document, and also implement XML storage module to store the generated XML document.

By the use of new XML/EDI system, we could settle the problems of traditional EDI document format, the lack of VAN conversion and the subordinated use of software, besides that could be used on documentation between company and its partners. First, it is possible to generate the XML document only by the use of Web browser in the conventional Web environment without additional exclusive EDI software. Second, it decreases the communication cost of transport companies not by use of the VAN. Last, it is utilized as EDI system coupled with IT infrastructure in which is installed and operated within the company.

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