

A Study on the Track & Trace System for e-Logistics

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Abstract: The consumer in the 21st century e-business era is developing a taste for greater professionalism, diversity, internationalism and large-scale integration of his or her demands. With these changes in the consumers preferences in mind, e-businesses need to develop a real time track and trace system to accommodate their logistical and consumer service operations. This research paper discusses the development of a object-oriented logistics tracking database system and a web service tracking component necessary to efficiently store and manage the movements of postal goods and provide real time information on logistics trading.

1. Introduction

The Internet is the driving force behind 21st century industrial development. In the history of mankind, the Internet has become the fastest growing medium for communication, currently playing a major role in e-business in the form of distribution, finance, stock exchange, auctions and other service industries.

Fueled by a constant change in the economic environment new e business models are being developed as a solution to those models that are showing signs of age and are on the verge of extinction. These new models are a result of a thorough revision of a single conventional model or a combination of various models. Of the numerous models, that of the electronic business transactions, or electronic commerce is no longer a neophyte technology, but a necessary element in our business environment.

E-commerce was created as a means of moving an offline merchant system online. Currently many companies are realizing the importance of e-commerce. All logistics transactions are taken care of online, reaping maximum benefits from minimal costs: a typical approach in e-business. E-business when applied to such business operations no longer becomes a sufficient solution but rather a necessary one. [1]

A strategy employed by most enterprises target the Business to Business (B2B) market as opposed to the Business to Customer (B2C) market. In the case of a B2C where a company sells its product directly to the customer, after subtracting the cost of shipping and logistics, it is difficult to have produced a significant profit margin. Thus, the general intent of enterprises is to provide a solution in the B2B market and producing value added good. [2]

In relation to such changes, the demand for general postal delivery services through email, mail order etc is

increasing steadily. This is bringing about a need for a technology that will efficiently manage and provide in real time information concerning the transaction and delivery of postal goods to the satisfaction of the ever-growing demands of the consumer.

Korea's postal service through the two mail centers in Seoul and in the countryside including each province's mail centers areas does not support tracking of mail and packages. Productivity and service quality is not near its potential maximum due to the current postal system's reliance on manual labor. Furthermore, MIC(Ministry of Information and Communication) lacks a proper response to the increasing competitiveness and growing market share of private sector delivery companies.

An efficient and effective delivery system requires the management of delivery network between mail centers areas, automatic handling of packages, real time provision of delivery data through a network and other services. Such a system will allow for real time calculation of the amount of postal goods transported and a means of outsourcing at a reasonable price. Furthermore, it will allow for a better understanding and prediction of the flow of postal goods, not to mention the plethora of customer services that will be available to clients.

Typically, it is important that current needs, as seen in existing business practices, are taken into account. However, although existing practices provide a starting point, gaining the full benefit of new technology often depends on its more radical application.

Track and Trace system is meant to address the aforementioned needs of B2B transactions, between suppliers and mail centers where demand is the highest.

2. Related Research

2.1 EbXML

The development of E-Business extensible Markup Language (ebXML) was headed by the UN/CEFACT and OASIS as part of their search for an international EDI standard. For 18 months, beginning in January 1999, they used XML to produce an e-business environment that is dynamic and flexible to accommodate varying parties' business models, large or small.

ebXML does not impose a new standard over the existing one. Rather it is meant to assimilate the positives of the other standards and fill any negatives and voids left by the

other standards. Figure 1 depicts the e-commerce process between two companies.[3,4]

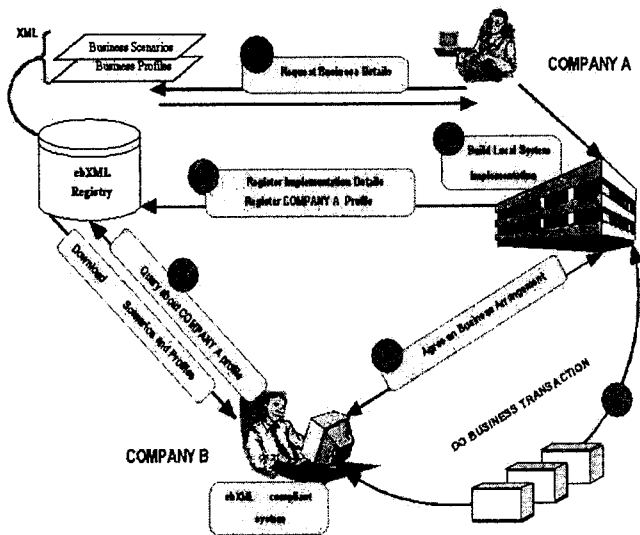


Figure 1 The Flow of an ebXML Transaction

At a nearby registry, Company A examines the content of ebXML and decides to implement and develop its applications in ebXML format. Company A submits to the registry its business data scenarios and profile in XML format. Company B, which already implements an ebXML system discovers Company A's business scenario and makes a request to do business with Company A. Ideally then Company A will accept Company B's invitation, all of this culminating in a business transaction.

Regardless of the company's location and nature of business, for the above scenario to become a reality, there needs to be a common place for storing, and a common means of message and presenting each individual business.

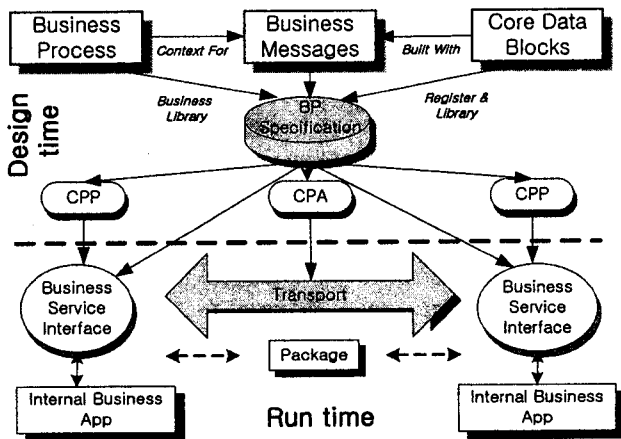


Figure 2 The Technological Flow of ebXML

Figure 2 focuses on the technological side of ebXML, largely divided into the Design Time and Run Time. In regards to Design Time, each business should be able to have access to a reuse common, core and domain component as well as documentation necessary for presenting the business and the business process. A medium

for such an exchange of components requires a CPP (Collaboration Protocol Profiles) system and for the documentations a CPA (Collaboration Protocol Agreements). Both systems need to be constructed during the time of design and implementation. During the actual implementation, business will be conducted over a messaging system based on the particulars of business, CPP, CPA defined above.[4]

2.2 e-Logistics

The most prominent United States Council of Logistics Management defined logistics as a part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements.[5]

Logistics is all about providing better logistical service to its valued customers. The flow of sale pursues a partial optimization on the goods movement, but in comparison, logistics is about providing a total quality service by overseeing the entire process from initial supply, production and retail allowing for a better movement of goods throughout. Furthermore, the goal of logistics is not only to conserve the important resources of time while upholding to a high standards of logistics service quality in transported goods, an equilibrium stock of goods (no overstocking), product information, arrival time and others, but also to create large cost benefits to the company and increasing its profitability in the end.[6]

3. System Configuration

3.1 System Configuration of Mail Logistics.

The configuration of the mail delivery system set forth by the MIC around a mail delivery center which connects to each mail centers, which in turn connect to direct delivered post offices. Foreign countries have adopted a mail delivery management system and a track and trace system that strive for optimality and superior customer service.

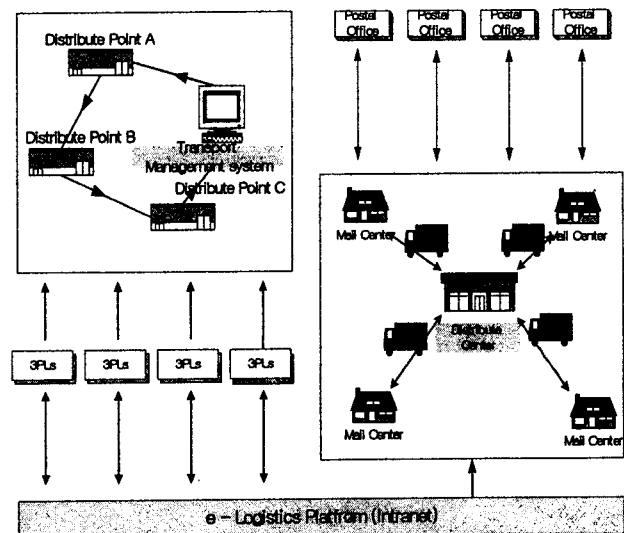


Figure 3 The Flow of Delivered Mail

There is a need for a B2B based technology that will allow those who deliver the postal goods to communicate securely, precisely in a standardized format with the mail center. The system will register, reference and allow for the retrieval of the meta-information. For this purpose, there is a need for a Message Transport System, B2B business server (compatible with legacy systems such as EDI, ERP, CRM), repository (database for meta data used in the process of business communications), registry(web directory service to aid business transactions).

3.2 Track and Trace Concept

Transport and logistics today have evolved into a high-technology industry. Distribution is no longer about moving cargo over road or via air from A to B, but is a complex process based on intelligent systems for sorting, planning, routing, and consolidation that supports faster transportation, different transportation modes, fallback scenarios in case of failures, value added services such as time sensitive deliveries and tracing of products throughout the supply chain or transport network. Many large logistics companies have developed solutions for delivering these services in order to meet the requirements of their customers and to improve their services. Smaller companies, however, cannot afford these investments and are mainly active in the 'old' point-to-point transportation market, or co-operate with the larger companies, using their respective systems.[8]

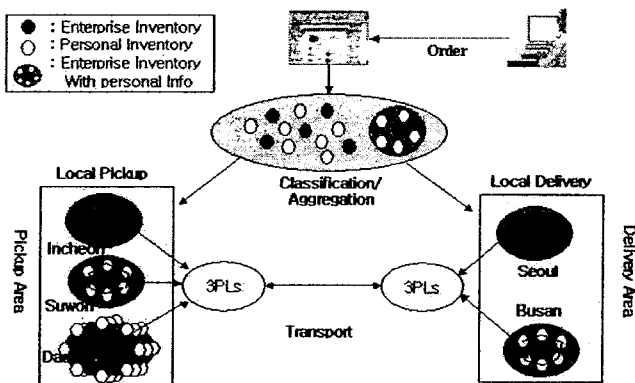


Figure 4 in T&T Model for Pick and Delivery

The Track and Trace model is intended to increase the efficiency, precision and overall customer satisfaction through an automated process that monitors the delivery process of the postal goods from beginning to end. The rise in performance will foster greater long-term relationships with the customers. Individual receivers want to know when a parcel will arrive so that they can ensure that someone is there to receive it. Internet/WAP access and email messages can provide an attractive customer service.

Tracking & tracing systems need to address the requirements of two main types of transportation: business-to-business and business-to-consumer. While the former increasingly hinges on efficient logistics management, a key issue for the latter, especially as regards the growth of e-commerce, is customer satisfaction.

Those who will most utilize the Track and Trace system will be general user using Internet shopping malls, third-party companies doing pick up and delivery businesses, and transporters serving transportation vehicles, and retailer and wholesaler based Internet. The e-Logistics platform system such as a Workflow, MOM (Moving Object Management Server), MTA (Message Transport Agent), Adapter, Alert and others will also be one of users.[9]

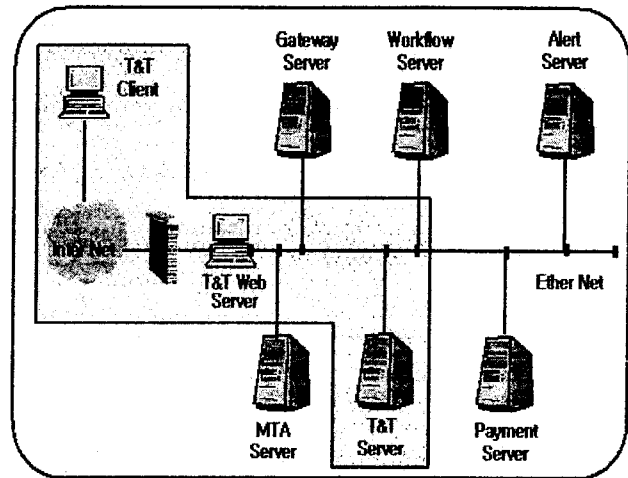


Figure 5 Concept Outline of Track and Trace

The Track and Trace system is interactive in that the user is given an order number and another unique identification number in order to track the progress of a particular commodity. Furthermore, with the order number the user can search and retrieve detailed information concerning the name, price, transaction date and other product specific information. A user can access the services through a web browser. The input output will be translated into XML format. Also, each system's subsystem user can use an API to register, search, modify and delete transaction accounts and personnel information.

3.3 Track and Trace System Configuration

Generally, the requirements of company senders will vary according to their business practices, and companies that are applying goods to individuals may have similar requirements to individual senders. They will want to receive as much status information as possible because this can then be provided to their customers, providing value added to their service. Likewise, reliability in delivery times (or flexibility in rearranging them) is important, as would be the ability to confirm that the product has been received by the appropriate individual.[7]

The Track and Trace system will effectively store and manage information generates through an e-Logistics trade.

After constructing a DTD(Document Type Definition)/schema for delivery documents and B2B process analysis, the T&T system defines each company profile registration, management procedures, transaction procedures among companies in order to connect to an e-Logistics Platform by third party delivery companies. The model design is considered with the expected traffic quantities of posted goods, delivery distances and other

factors in mind between the mail center and delivery service company, and among the mail centers. The Track and Trace system configuration is as follows.[10]

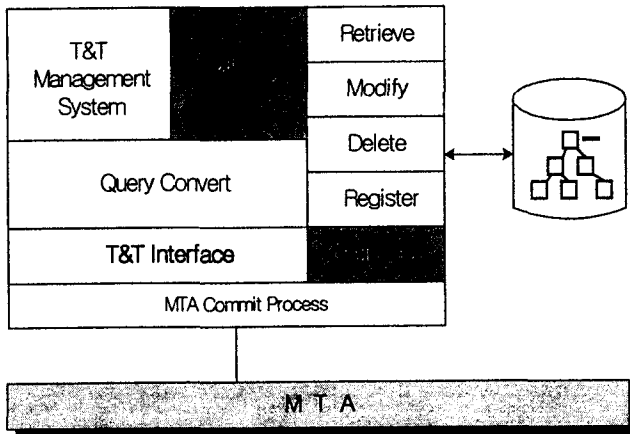


Figure 6 Track and Trace System Configuration

The Track and Trace system utilizes an effective database search structure, providing a clustering of information such as phone numbers, product numbers and means of delivery. Each user will not only be able to use an API to register, search, modify and delete transaction accounts and personnel information, but also utilize a rollback function to cancel a database transaction.

Furthermore, there will be functions that will allow effective management of the Track and Trace system itself, a query and convert function and an interface that will allow communication with other system's servers. The system's navigation is as follows.

- 1) Each subsystem user can access the services of the system through a web browser.
- 2) T&T system dynamically provides service on the web.
- 3) A transaction number will serve as the key for the product type and its most current status.
- 4) A delivery container ID provides a product reference.
- 5) A user ID is used to display the particular and total transaction number.
- 6) Inquiries of transactions based on the user ID and a calendar date are provided.
- 7) Postal goods inquiries are provided by date.
- 8) Product ID based delivery status display is provided.

A real time tracking system will increase the transparency of the supply chain. With such a systems there is a potential for large gains in profits, efficient allocation of resources, precision and accuracy of order, time management, customer satisfaction and other intangible benefits.

4. Conclusion and Future Research

This paper outlined a B2B based real time Track and Trace system. With the system in place, one can access information concerning the flow of postal goods in real time, allowing for greater success in response to any

unforeseen fluctuations in the traffic of a commodity. The system allows for an efficient allocation of resources to a dedicated task, and a dynamic real time monitoring of the actual shipment process of the postal goods.

Future research will focus on developing a Track and Trace model applied to a unified overall supply network of postal services, not only available to businesses but also the actual consumers. The research will further develop into the actual database model necessary for managing the tracking data, and an effective means of standardizing that information.

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