DESIGN AND IMPLEMENTATION OF A REAL-TIME GOODS TRACING SYSTEM

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Abstract: Rapid development of modern information technology and wide use of logistics technology such as EDI, RFID, GIS, GPS and GSM make real-time goods tracing possible. According to the characteristics of the third party logistics in our country, this paper introduces the design and implementation of a GPS real-time goods tracing system based on the technology of GPS, GIS and GSM short message service system. Topo-structure and the software architecture analyzes the key technique of the implementation of various subsystem with the system that customers could inquire the location, the status and the appropriate arrival time of goods on the web. The moving target can be monitored, scheduled, navigated and altered on real time.

Key words: Third party logistics (TPL), SMSC, Real-time tracing system

1. INTRODUCTION

The essence of logistics management is the implementation of saving cost and improving service level through the whole process of logistics management. The right and suitable cost and condition to guarantee the right time, place and products are the highest standard that all the enterprises pursue. In order to achieve such standard, the quantity of stored goods, accurate information during transportation and the information flow in logistics process become the key content of enterprise logistics management. There are not professional third party logistics enterprises in real sense in China. Most of third party logistics enterprises are transformed from the traditional memory or transportation companies, which must face the tough competition with the foreign counterparts with China entering WTO. The paper designs and implements a real-time goods tracing system base on GPS, GIS and GSM short message service system. The customers can inquire about the position and condition information
through internet. While the enterprises can monitor, schedule, navigate and alter the moving target on real time.

2. SYSTEM DESCRIPTION

2.1 System Topological Structure

GPS refers to the system which can measure accurately in order to locate and guide by means of many satellites. It is made up of the space part of twenty four satellites separated on six paths with equal intervals, and the master control station and monitor station on the earth. During the logistics goods tracing management, the functions of GPS can be viewed as position and tracing of transportation vehicles, the economic navigation of ship, the measurement of safe navigation, real tracing of navigation direction and railway transportation management.

GPS system can be divided as three parts: vehicle intelligent terminal, communication system and operation service center. The vehicle intelligent terminal is installed on the cargo vehicle, combined with GPS receiver, intelligent control circuit and communication. It is used to receive the GPS signal sent by satellites and analyze its own position information with encryption. And then it is sent to the public GSM network with the form of short message. It can receive all the orders sent by the service center. Furthermore, during the process of using this system, the users can alarm to the service center in emergence and set the terminal relative parameter. The vehicle terminal can also show the position time and speed of customer in terminal screen, and the navigation information sent by service center, whose structure can be seen as follows:

![Intelligent terminal structure graph](image)

The short message sent by vehicle terminal enters the communication network through the GSM network of short message service center by means of DDM special line.
2.2 System Software Structure and Function

The whole system software is made up of four subsystems: they are GPS communication network subsystem, work station show subsystem, operation work station subsystem and WEB GIS subsystem.

Functions of communication network include digital receiving, digital sending, coding and decoding. Digital receiving means receiving the vehicle terminal information from DDN special line as well as control information of vehicle terminal sent from show work place. Then, the received vehicle terminal information is sent to the data base server to be stored and shown in work place. The information sent by vehicle terminal should be decoded and the control order should be coded to be sent to vehicle terminal.

Main function of show work place is GIS function, which shows the dynamic position and condition of moving target on the electrical map in direct form with GPS space information through communication network including map shown, vehicle shown, information inquiry and historical playback. At the same time, control order can also be sent to the moving target through show work station.

Operation work station is the foreground procedure of GPS enterprise service system, which functions as customer management, GPS accounts management, work station management, data base management, vehicle management and ship management.

WEB GIS mainly functions as internet inquiry including graph show, inquiry, open and close control of graph as well as digital operation and output result.

3. SYSTEM IMPLEMENTATION AND KEY TECHNOLOGY

3.1 System Structure

The system includes logistics information real-time collection, information transportation, and information processing and information distribution subsystems according to the functions of the system. The anticipated aim of the system is to collect all the technical achievements of the above subsystems. The general solution will be achieved under the guidance of system general design to provide efficient solution to the modern logistics real-time tracing system.

Browser is on line with internet and the cargo inquiry information including the cargo number and the entitled passport is sent. Then, the server inquires from data base. Finally, different information processing mode is chosen according to different inquiry result. Such is the operation process of system.

The structure model graph of system platform can be seen as follows:
3.2 GPS Communication Network Subsystem

The essence of GPS communication network implementation is to process the vehicle terminal information. First, a cycle queue digital structure with length more than position information or short message length. Decide toe and tail according to communication protocol to separate the whole data packet. And then decide the data to make sure whether the information is the position information or other information. If the information belongs to the position information, such information should be separated as the concrete and useful information according to communication protocol such as longitude, latitude, speed and sending time. Also, the whole information content should be transformed to string form and recorded in data base to make convenient of data playback. Then, send the information such as longitude, latitude, speed and time to the show work place. If the information is other information, analyze the position information part and other information part according to communication protocol. The processing method to the position information is the same as above. For the other information, decide whether it is the condition information or alarming information or store the information in data base. If it is the condition information, transform the information to string form and show the information in work place by means of socket. If the information is alarming information, show the alarming content in the alarming information box and open alarm by means of socket.

3.3 Show Work Place Subsystem
The essence of show work place is to develop the MapObjects (MO) in order to implement the function of GIS. MO packages the geographical information system into every object. The users can choose the objects according to their own built system. As a kind of non-terminal software, MO can embed into other systems. Also, it can be integrated with graph, multi-media and data base development technology to build professional practical system. There are some functions of MO used in show work place. It builds the connection by means of Dataconnection and Maplayer. The map can be increased and reduced with the method of rectangle. Scalerecangle. Ramble of map can also be done by means of Pan. The users can add, edit or delete one map characteristics through searchshop to implement space characteristics inquiry.

3.4 Operation Work Place Subsystem

Operation work place subsystem is implemented in Delphi 6 environment by means of three-layer C/S form. Delphi 6 supports both the internet Windows DNA and CORBA. Also, Delphi is useful of data base program. MIDAS (Multi-tier Distributed Application Services) is key to multi-layer structure. The structure graph is as follows:

![Figure 3: Three-layer Structure Implementation](image)

The customer program implements the user interface by means of TclientDataSet control parts as well as TsocketConnection communication parts to get the Iprovider interface of application program server.

3.5 WEB GIS Subsystem

WEB GIS Subsystem mainly provides service through internet inquiry. There are two service processes WEB SERVER (IIS 6.0) and GIS SERVER operated in the server, which are combined with ICP/IP. Therefore, they can be separated in two machines. In the GIS Server Part, Web Link can get strong map function by means of map objects control parts. The allocation is as follows:
4. CONCLUSION

The third party logistics has drawn more and more attention. However, the third party logistics enterprises transformed from traditional storage and transportation enterprises face the problem of original information system. Therefore, building high efficient and practical goods tracing system has become the problem emergent to be solved. The paper designs and implements a real-time goods tracing system. After system implementation, it shows that the system is practical, suitable and convenient to meet the need of requirement of real-time goods tracing from the third party logistics enterprises, which plays a great role in improving the market competition..

REFERENCE