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A Survey on Optimal Distribution System for GPS and GEO based Shipment and Tracking in Wireless Sensor Networks

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ABSTRACT: In this paper, the characteristics of the cargo mix and shipment schedule problem with uncertainty in a differ-period planning horizon has been described, and introduce a two-stage stochastic mixed integer programming model for the problem with the Wireless Sensor Networks. The main objective of this introduced model is maximizing the expected profit. A heuristic method is proposed to obtain an exact optimal solution for the problem. Finally, the numerical experiments will be demonstrating the efficiency of this system. Tracking and tracing services are great importance for the transportation services like shipping in an ocean and multinational logistics services, because these services are captured and monitoring with GPS and WSNs. Here, Global Positioning System were used to tracking the services which will we be provided in the current trends as well as Wireless Sensor Networks were used to sensing the devices (like Shipping and Logistics Services). Since, such services will become standard services for a most logistics providers. From senders and consignees, by using this service which can be order to align their business and manufacturing processes with the respective forwarding activities, Within this field of parcel and logistics service, the use of standard parcel sizes enables a comparatively very simple technical implementation of tracking and tracing by using the GPS systems. Separate alerting systems, each are using different altering system to present organizing the information to reduce the demands on starter attention and information processing. In a response, the framework that can be integrated, organized, prioritized, and displayed information from new deck alerting systems was developed. The framework by integrating information from independent alerting systems to enable different alerts message system to be prioritized and de-conflicted, in order to support prompted an appropriate responses to adverse conditions based on good situation awareness. Consider a two-echelon chain system with one sender, and one receiver, which deliver the customers with a kind of short life cycle product. This can be established delivery time and quantity decision models separately in decentralized decision mode and centralized decision mode when the receiver's delivery time are random, and it also analyses the optimal decisions under these two modes.

KEYWORDS: Shipment, Tracking, GPS, delivery time, alerting system

I. INTRODUCTION

To remain competitive in today's business, a company needs to be efficient in all parts of its organization. This means costs in the processing by using advanced production technologies here we were going to bring a change in the shipping industry. Normally there is no solution for this industry in routing their vehicles so we are going to use the routing algorithms and make their work simpler. The change will be highly effective, resulting in a lower cost for chartering carriers on the spot. The shipping routing problems is well recognized than other routing and scheduling problems. One reason for this might be traditions and resistance towards changes in the shipping industry. Where there might be sudden change in their routes before the journey at that instant due to very minimal time we can't provide a multi-modal plan. But while using this routing algorithm we get rid out of this problem [1]. For our application which require real time location information of the vehicle. To achieve Automatic Vehicle Location system that can transmit the location information in real time, Active systems are developed. Real time vehicular tracking system incorporates a

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device installed in the vehicle and a remote Tracking server. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or using direct TCP/IP connection with Tracking server through GPRS. By means of knowing the exact position of the vehicle we can speed up the alerting system of the design using WSN's. Since the customers may or may not locate at the discharge point, the model also incorporates the distribution planning from the discharge point to the customers.

When large fleet of vehicles were spread out over the vast expanses of ocean, the owners often found it difficult to keep track of what was happening. They required some sort of system to determine where each vehicle was at any given time and for how long it travelled. Initially vehicle tracking systems developed for ship management were passive tracking system. In passive tracking system a hardware device installed in the vehicle it stores location. Passive systems also included auto download type that transfer data via wireless download but the system was not real time. Passive systems weren't useful to track the vehicle at an instant moment. Real time tracking system was required that can transmit the collected information about the vehicle after regular intervals or at least could transmit the information when required by monitoring station [2]. Active systems were developed that transmit vehicle's data in real time via cellular or satellite networks to a remote computer or data centre. Many vehicle systems that are in use now days are some form of Automatic Vehicle Location (AVL). It is a concept for determining the geographic location of a vehicle and transmitting this information to a remotely located server. The location is determined using GPS and transmission mechanism could be a satellite, terrestrial radio or cellular connection from the vehicle to a radio receiver, satellite or nearby cell tower. Other options for determining actual location after capture, the tracking data can be transmitted using any choice of telemetry or wireless communications systems. GSM is the most common used service for this purpose.

II. LITERATURE SURVEY

In this literature review paper, analysing that the logistics shipment processes within organizations. The characteristic of logistics processes has been identified and logistics processes of international multimodal transport companies in tracking system are specifically explored. This paper offers unique insights into the logistics processes in service-based firms and explores the nuances of logistics in the setting of a developing country. Additionally, to providing a useful tracking shipment system for practitioners and scholars to consider logistics functions we can use more standard services which are most helpful for tracking an exact information through capturing through sensing GPS, the paper draws upon case analysis to operational monitoring station as well as real time tracking system was required that can be transmit the collected information about the ship vehicle moment after regular intervals or at least a received full information's that could be transmitted when the monitoring station were depend using GPS [2]. Obviously, Active systems were developed that transmit vehicle's data in real time via GPS satellite networks to a remote computer or data centre.

III. OBJECTIVE OF THIS PAPER

The primary objective of this project is to provide information for the planning of navigation for ships, and logistics. Here, we are using the Distance Vector Algorithm and Link State Routing algorithm because it can help us by means of providing a multi- model path. Then tracking it periodically; along with this an alerting system is done. Using the individual subsystem models and the GPS transmitting method we perform this design.

IV. EXISTING SYSTEM

The existing system of the shipping is to provide high-data telemetry transmission. The system uses solid-state transmitters and comprises a high-gain off-set parabolic reflector antenna (which receives and transmits in the X-band frequency) and four low gain conical horn antennae (which receive and transmit in the S-band frequency). The trades for the Telecommunications subsystem included high-gain antenna size, low-gain antenna size, and the frequency bands that the satellite communicates in with the ground stations [3]. For the high-gain antenna trade, a centre-feed parabolic reflector, a case grain parabolic reflector, and an off-set feed parabolic reflector were considered. The low-gain antenna trade considered a helix antenna, a conical horn antenna, and a bi-conical horn antenna. The two options for the high-gain antenna frequency are X-band and Ku-band. Specific studies are done to consider the antenna materials used and to account for the atmospheric loss and also rain attenuation using the "Crane Global Attenuation Model. The AIS receiver and the multispectral camera were used in providing a functional satellite payload. Additionally, the final STEPS design was for the objectives of ship navigation, maritime security and environmental

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protection. The other satellite alternatives as well as the UAS option can be used in further developed as the benefits of an aerospace solution.

A. *Drawbacks:*

- Aim The vehicles are not done easily, without any routing algorithm and only by the use of the maps and paths it is done. If it is used it leads to complex form.
- Additionally to that is the tracking system where it uses the satellite and it needs a more amount of investment or they have to use the end to end point track system only if the vehicles reach from one point to another point we can know the exact position of it.
- Due to this delay it affects the alerting system of the design [6].

V. PROPOSED METHODOLOGY

We are using the routing algorithms because it can help us by means of providing a multi- modal path and increase the business. For our application which require real time location information of the vehicle. To achieve Automatic Vehicle Location system that can transmit the location information in real time, Active systems are developed. Real time vehicular tracking system incorporates a device installed in the vehicle and a remote Tracking server. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or using direct TCP/IP connection with Tracking server through GPRS. By means of knowing the exact position of the vehicle we can speed up the alerting system of the design [7]. The, I-claims used here is to speed up the process of claiming and the customer can accomplish their task soon.

VI. IMPLEMENTATION MODULES AND DESCRIPTIONS

1. Shipment planning and optimization
2. Shipment Tracking
3. Shipment Alerting and Notification
4. Proof of Delivery (POD) and Claims

A. *Shipment Planning and Optimization:*

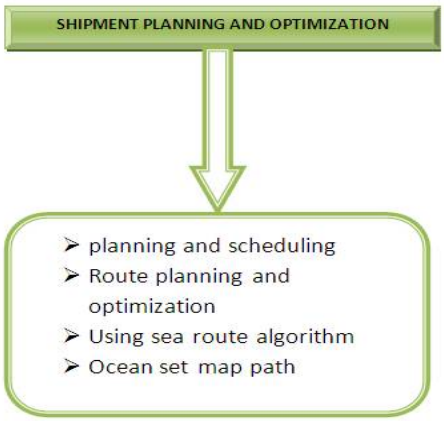

Fig. 1 Shipment Planning and optimization

Fig. 1 shows that the shipment planning and optimization it shows transport system performance is often evaluated based on travel speed and distance, which favours faster mode and quantitative improvements over slower modes and qualitative improvements. The benefits from increased vehicle traffic volumes and speeds are recognized, but reductions in walk ability and land use accessibility are often overlooked. Such planning practices can result in decisions that increase mobility but reduce overall accessibility. Prioritization increases transport system efficiency by giving priority to higher value trips and more efficient modes:

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- Load Your Own Shipments
- Optimize Shipments Yourself
- Conduct WHAT-IF Analysis
- Develop Optimal Routing Scenarios
- Identify Profitable Carrier Options
- Increase Supply Chain Visibility
- Inbound, Outbound, Consolidated, and Pooled
- Multi-Modal, Multi-Stop, Multi -Origin, and Multi-Destination Routing

B. Shipment Tracking

Tracking is the ability to trace goods, their containers, and their conveyances from the point of origin to their destination. Tracking is increasingly associated with information transfer using smarter tools such as radio frequency identification devices and global positioning systems.

Fig. 2 shows a GPS tracker essentially contains GPS module to receive the GPS signal and calculate the coordinates. For data loggers it contains large memory to store the coordinates, data pushers additionally contains the GSM/GPRS modem to transmit this information to a central computer either via SMS or via GPRS in form of IP packets. The diagram depicts hardware architecture of an advanced GPS tracker.

Tracking Using GPS

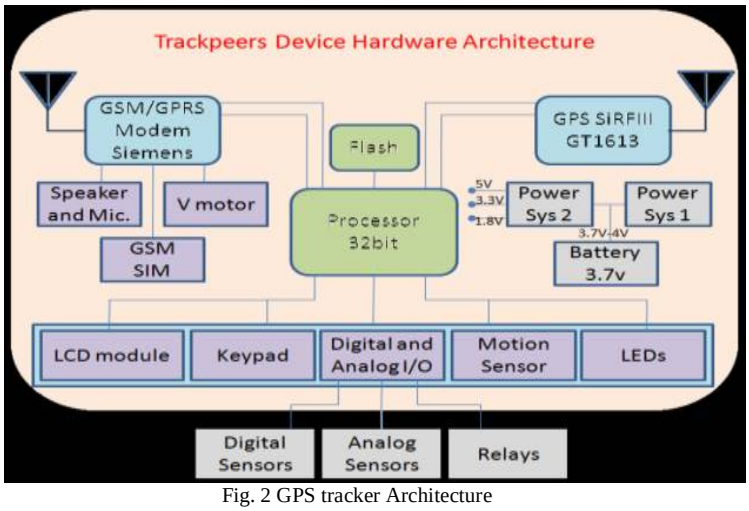

Fig. 2 GPS tracker Architecture

Global Positioning System (GPS) tracking utilizes satellites to monitor fleets of vehicles or cargo containers, thereby ensuring there are no unplanned stops and that a pre-planned route is followed. Geostationary Earth Orbit (GEO) satellite systems use satellites that orbit the earth at the same speed of the earth's rotation, in order to continuously monitor a particular area continuously. These satellite mapping areas can be as large as North America or Australia, yet can identify individual containers and vehicles. Networks of multiple satellites that sweep the globe and monitor activity all over the world comprise Low Earth Orbit (LEO) systems. This category includes voice-capable "big LEO's" and lower cost, data-only systems dubbed "little LEO's." Satellite systems are only viable options for tracking when the transmitter located on the vehicle or cargo has a direct line of sight to the satellite. They are consequently impractical when utilized on double-stacked railcars, in the holds of vessels, and in the stacks at container yards. Despite some benefits of satellite tracking, the GPS signals emitted from most transmitters used by private industry and most federal governments are not secure and are easily counterfeited. Thus, they create problems for precise tracking. A false GPS signal can be replicated and transmitted to the receiver, masking the true location of the cargo or vehicle, which allows for theft of cargo or the introduction of an undesired element into a container or vehicle [8].

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C. Shipment Alerting and Notification

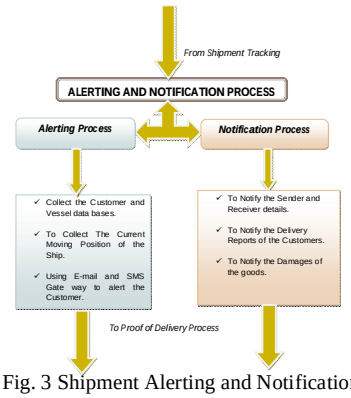

Fig. 3 Shipment Alerting and Notification

Fig. 3 shows that Shipment alerting and notification module reports problems and process interruptions before they happen to its Freight Logic web-based transportation management system. The new module features proactive monitoring, giving the users the ability to identify potential shipment problems or interruptions in advance of occurrence. System users can then make the necessary adjustments and corrections, thus avoiding major disruptions to shipment deliveries. Freight Logic provides a flexible web interface allowing users to track one or many shipments and communicate specific events to one or more users. Events include alerts when something happens and/or when something doesn't happen.

For example, Freight Logic can alert users when a must-go order is received, when a shipment is picked up from distribution facility, when a delivery appointment is made, when a carrier exception is noted, when a shipment is delivered and when any carrier shipment status is updated. The alert and notification module allows users to create alerts for single shipments, for all shipments to a particular customer, for all shipments via a particular carrier or for all shipments processed by Freight Logic.

An advanced shipment notification (ASN) is a document alerting a customer that a product has been shipped from the warehouse. Advanced shipment notification systems can be used in conjunction with the gateway methodology where the E-Mail gateway and SMS gateway is implemented. GPS systems to receive the shipment into inventory, used to update transactional purchasing documents such as scheduling agreements and stock transfer orders, based on the latest information received from vendors or other business partners.

D. Proof of Delivery (POD) and Claims

Proof of delivery includes that the letter of credit has been cleared and then only receiver might get the delivery. If there is any unclear in the loc it must be notified to the customer regarding it and make clear about it. After providing a signature should be got from them for the proof of delivery

and they have to check whether the product has been received without any damage. If there is any damage in it they can claim if only insured by any company [9]. It is of three types, freight insurance which is done for the damages in the product, overcharge if the customer has overpaid they can claim for the return and finally I-claim which provides the customer benefit just to upload their documents through web so that the process gets quicker and completed soon. Along with the certificate of insurance coverage they have to provide the additional requirements such as amendments, estimate of repair and replacement cost estimates [10].

VII. CONCLUSION AND FUTURE WORK

The results presented in this project contain execution of the shipping globally over the network. The routing algorithm has been implemented to route the path of the vehicles efficiently along with the multi-modal path. Tracking is done by locating the vehicle using the real time location; a tracking server has to be used at the live period for getting the current position. Alerting process is advanced here by means of using the gateways such as the SMS gateway and e-mail gateway. Proof of delivery is given to the customer immediately by means of the gateway and they can claim over the internet for i-claims which is the advancement in the shipping integration across the globe.

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