

# Improve Courier deliver Services Using OR Techniques

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## Abstract

Digital world has grown exponentially over the years. The world is changing to adopt the digital processes over the all required day to day activities. One of the courier service's vital and most crucial business process. This is where an efficient delivery service will be of utmost importance. An efficient system needs to be developed in order to facilitate the interaction between the courier service provider and consumer to precisely determine the optimal route for the parcel delivery. In this paper, an Android-based application system for courier service management with minimal required distance from source to destination for the delivery is developed. It is a mobile application that eases the courier delivery personnel in finding their way to deliver the parcels to the customer's doorstep. The application will guide the courier personnel to get a list of courier data such as address and contact information and then navigate them to the selected customers' addresses based on traffic data retrieved from Google Maps API. It will choose the best route to the address and notify the customers before arriving so that the customers are ready to receive the parcel. This last mile route tracking for courier delivery will provide the basis for an efficient courier service system.

**Keywords:** Routing, Routing protocols, shortest path, Packet Tracing.

## INTRODUCTION

The individual sorting and handling systems of small parcel carriers can put severe stress on the packages and contents. Packaging needs to be designed for the potential hazards which may be encountered in parcel delivery systems. The major carriers have a packaging\_engineering staff which provides packaging guidelines and sometimes package design and package\_testing services. Many e-retailers have specific packaging requirements for their suppliers and also offer assistance in package design.

When shopping retail order from a warehouse, such as for online\_shopping, multiple items are often placed in a single box (secondary packaging) for cheaper and easier transportation and tracking. This creates waste when there is only a single item that could be transported without an outer box (for example something that already has durable retail primary packaging). To avoid this problem, some items are designated in the industry as ships in own container (SIOC) and will receive only a shipping label. Some products are specifically designed as SIOC for environmental or cost reasons.

A courier is a person or company that delivers parcels or consignments from one place to another, whereas a delivery service is a broad term that encompasses all types of companies that deliver different types of goods.

Routing information protocol is a network routing protocol base on the Bellman-Ford (or distance vector) algorithm. According to the RIP, a router will recode the connected routers in its routing table. When the destination of the packet is not in routing table, the router will deliver it to neighbour routers. In order to reduce the transmission cost, the router would periodically interchange routing table with other routers. The proposed mechanism is based on the concept of RIP to reduce the transmission overhead

and request of server. The proposed mechanism is to let every entity maintain its own tables. These entities would interchange tables with other entities periodically. In this way, entities can deliver data to other entities without via server. RIP uses numerous timers to regulate its performance. These include a routing-update

timer, a route-timeout timer, and a route-flush timer. The routing-update timer clocks the interval between periodic routing updates. Generally, it is set to 30 seconds, with a small random amount of time added whenever the timer is reset. This is done to help prevent congestion, which could result from all routers simultaneously attempting to update their neighbours. Each routing table entry has a route-timeout timer associated with it. When the route-timeout timer expires, the route is marked invalid but is retained in the table until the route-flush timer expires.

## REVIEW TABLE

Sr No	Title	Abstract	Techniques	Future scope	Conclusion
1	A Survey of Shortest-Path Algorithms	A shortest-path algorithm finds a path containing the minimal cost between two vertices in a graph. A plethora of shortest-path algorithms is studied in the literature that span across multiple disciplines. This paper presents a survey of shortest-path algorithms based on a taxonomy that is introduced in the paper. One dimension of this taxonomy is the various flavours of the shortest-path problem. There is no one general algorithm that is capable of solving all variants of the shortest-path problem due to the space and time complexities associated with each algorithm. Other important dimensions of the taxonomy include whether the shortest-path algorithm operates over a static or a dynamic graph, whether the shortest-path algorithm produces exact or approximate answers, and whether the objective of the shortest-path algorithm is to achieve time-dependence or is to only be goal directed. This survey studies and classifies shortest-path algorithms according to the proposed taxonomy. The survey also presents the challenges and proposed solutions associated with each category in the taxonomy	<ul style="list-style-type: none"> <li>- Single-Source Shortest-Path (SSSP)</li> <li>- All-Pairs Shortest-Path (APSP)</li> <li>- Dynamic Shortest-Path Algorithms</li> <li>- Time-Dependent Shortest-Path Algorithms</li> <li>- Stochastic Shortest-Path Algorithms</li> <li>- Parametric Shortest-Path Algorithms</li> <li>- Replacement Shortest-Path Algorithms</li> <li>- Alternative Shortest-Path Algorithms</li> <li>- Weighted Region Shortest-Path Algorithms</li> <li>-</li> </ul>	-	In this paper, we devise a taxonomy for the shortest-path problem. For each branch of the taxonomy, we illustrate the discriminating features and highlight the state-of-the-art research. The taxonomy provides investigators of the shortest-path problem with a guideline on where a required problem definition maps within the current related work.
2	A TWO-STEP ALGORITHM FOR A COMPLEX PROBLEM OF SHORTEST PATHS ON WEIGHTED GRAPHS AND 0-1 KNAPSACK	- two problems that are often studied and researched in computer science algorithms are the knapsack problem and the shortest paths on weighted graphs problem. Their combination is often addressed by dynamic programming solutions for the knapsack problem, using shortest path problem, with the creation of a knapsack graph. But these researches consider only two aspects of weight and value for an item/vertex, and here we address a different kind of problem in which we are taking into consideration three properties: item weight, item value and edge weight (that connects two items, but its weight is not depended on its vertices). The complex problem that combines these two, as a two-step problem on the same entities and a two-step algorithm for solving it, are the main ideas and subjects of this paper, in which this combination will be presented, along with several examples for it.	- A TWO-STEP ALGORITHM	-	-

3	An Efficient Algorithm for the Fast Delivery Problem	We study a problem where $k$ autonomous mobile agents are initially located on distinct nodes of a weighted graph (with $n$ nodes and $m$ edges). Each autonomous mobile agent has a predefined velocity and is only allowed to move along the edges of the graph. We are interested in delivering a package, initially positioned in a source node $s$ , to a destination node $y$ . The delivery is achieved by the collective effort of the autonomous mobile agents, which can carry and exchange the package among them. The objective is to compute a delivery schedule that minimizes the delivery time of the package. In this paper, we propose an $O(kn \log(kn) + km)$ time algorithm for this problem. This improves the previous state-of-the-art $O(k^2m + kn^2 + APSP)$ time algorithm for this problem, where APSP stands for the running-time of an algorithm for the All-Pairs Shortest Paths problem.	<ul style="list-style-type: none"> <li>- An Algorithm for Fast Line Delivery</li> <li>- Algorithm Pre-process Receiver(<math>v</math>)</li> <li>- Algorithm Pre-process Sender(<math>u, t</math>)</li> <li>-</li> </ul>	-	-
4	ANALYSIS OF SHORTEST PATH PACKET TRACING OF ROUTERS	In this paper, the shortest path in a packet switched network has been analysed. A router receives a packet from a network and passes it to another network calculating the shortest path. However, the packets of a network use different routing protocols. A routing protocol is a combination of rules and procedures that lets routers inform each other of changes. It allows routers to share whatever they know about their neighbourhood. Routing protocols are used to continuously update the routing tables that are consulted for forwarding and routing. The primary contribution of this paper is a simulation method of displaying the packet traces which finds the shortest path to route the packet through its destination. The simulation has been done by using Packet Tracer 4.01 software that allows us to stop time in our network and examine traffic in detail	<ul style="list-style-type: none"> <li>- Address Resolution Protocol (ARP)</li> <li>- Routing Information Protocol (RIP)</li> <li>- Internet Control Message Protocol (ICMP)</li> </ul>	-	The analysis of shortest path in a packet tracing mechanism is the common thread running through this paper. With a packet trace system, we have monitored and displayed packet transferring in a telecommunication network, especially so that faults or errors in the network can be detected quickly and easily. It also allows us to find the shortest path for the router to transfer packet. In this paper, the routing protocols that have been analysed are the formulas used by routers to determine the appropriate path onto which packet should be forwarded. The routing protocol also specifies how routers report changes and share information with the other routers in the network that they can reach. The changing conditions of the network can be dynamically adjusted by the routing protocols, otherwise all routing decisions have to be predetermined and remain static. Critical terms have been proved by using simulation software in this paper. A user interface has been used to input acceptable packet transfer characteristics. Packet transfer from network to network has been monitored at each step in the simulation which allows us to understand the trace route and find the shortest path in transmission.

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