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Dynamic Pickup Window To Encounter A Fluctuating Parcel Volume

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DYNAMIC PICKUP WINDOW TO ENCOUNTER A FLUCTUATING PARCEL

VOLUME

ABSTRACT

A system and method are disclosed that enable dynamic pickup to encounter fluctuating parcel volume. The pickup is scheduled based on considering current time (a), current packed volume (x), maximum capacity of the vehicle to carry parcels (z), scheduled pickup time (b), and historical throughput per hour (j), used to predict the forecasted pickup volume (y), expected delivery date, location etc. The system uses an algorithm to effectively utilize combinations of scheduled or on-demand pickups based on orders received and other input variables. The dynamic pickup window may feed into the routing systems of the carriers. The method reduces the risk of a flexible pickup being executed too early or parcel volume exceeding the vehicle capacity of the scheduled pickup. The method further eliminates the risk of the parcels being left behind, thereby ensuring on-time delivery.

BACKGROUND

In general, e-commerce delivery service firms partner with delivery retailers to provide overnight or same-day delivery. A pickup may take place only when a carrier arrives at a fulfillment location to retrieve parcels for delivery. There are two types of pickup services provided by the carrier. A scheduled pickup and a flexible pickup. In a scheduled pick up the carrier arrives at a scheduled daily time to retrieve parcels. In a flexible pickup, it may be made based on an ad hoc request. The flex pickups are utilized to pick up parcels, when volume is expected to be abnormally high (due to holidays or marketing promotion) and when the vehicle capacity of scheduled pickup to retrieve all of the parcels is low. Flexible pickups are requested and executed over a 4-hour time window by carriers. The carrier may arrive at any time during

this time window to execute the pickup. Sometimes these pickups happen too early in the window, before a significant amount of volume is packed and ready for handoff. As a result, insufficient parcels are picked up by the flexible pickup and the scheduled pickup is still not able to retrieve all parcels at a fulfillment location.

The problem is illustrated by the following example: A flexible pickup service provided by a carrier is requested at a target location to pick up an expected volume of 300 parcels. The pickup is scheduled to arrive between 12-4PM, before the scheduled pickup at 4PM. The pickup arrives at 1PM, only 50 parcels are packed and ready so he takes the 50 parcels and leaves. The scheduled pickup arrives at 4PM with 250 parcels to pick up. The maximum vehicle capacity of a truck is 200 parcels. As a result, 50 parcels are left behind and these orders are not delivered on-time.

DESCRIPTION

A system and a method are disclosed to enable a dynamic pickup window to encounter a fluctuation in parcel volume. The system includes one or more users interacting with an e-com server to place orders, another server to compute an algorithm and to execute the pickup as shown in FIG. 1. The variables may be current time (a), current packed volume (x), maximum capacity of the vehicle to carry parcels (z), scheduled pickup time (b), and historical throughput per hour (j), used to predict the forecasted pickup volume (y). The system is configured to implement an algorithm to determine a suitable pickup window.

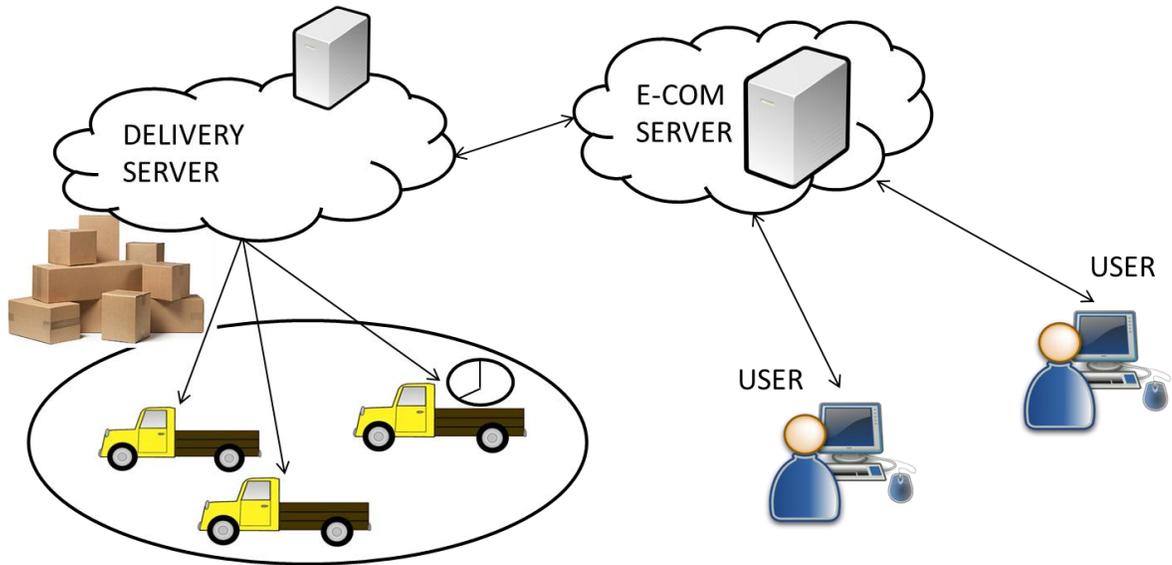


FIG. 1: System for dynamic parcel pickup to encounter fluctuating parcel volume

A method to schedule a dynamic pickup window is shown schematically in FIG. 2. The method uses an algorithm to schedule a dynamic pickup window based on fluctuations in parcel volume and fulfillment productivity as illustrated in steps **101** to **117**. In step **101**, the method involves receiving a customer order with the preferred day of delivery such as same day, next day or a preferred date. The algorithm may prioritize delivery based on the user's day of delivery request for the parcel and the location to which the shipping is to be made. In step **103**, the method involves determining $y =$ forecasted total (parcels) to be picked up, using the maximum capacity of the vehicle to carry parcels (z) from carrier data, received customer orders, day of delivery, and shipping location. In step **105**, the method involves determining if the forecasted pickup volume y is greater than the parcel holding capacity of the carrier's vehicle z . If $z > y$, in step **107**, the system utilizes scheduled pickup. If $y > z$, in step **109**, the method then involves determining current time (a), scheduled pickup time (b), historical throughput per hour (j), and current packed volume (x). In step **111**, the system determines if $y - z > x + j (b - a)$. If YES, the front end of the flex pickup window is locked at time b in step **113**. If NO, in step **115**, the system

locks in front-end of flex pickup window at time $[a + (y - z - x)/j]$. In the final step **117**, if any more parcels are to be picked up, additional pickup requests may be issued. Upon additional request the process may get directed to step **101** and the process as illustrated in FIG. 2 may repeat.

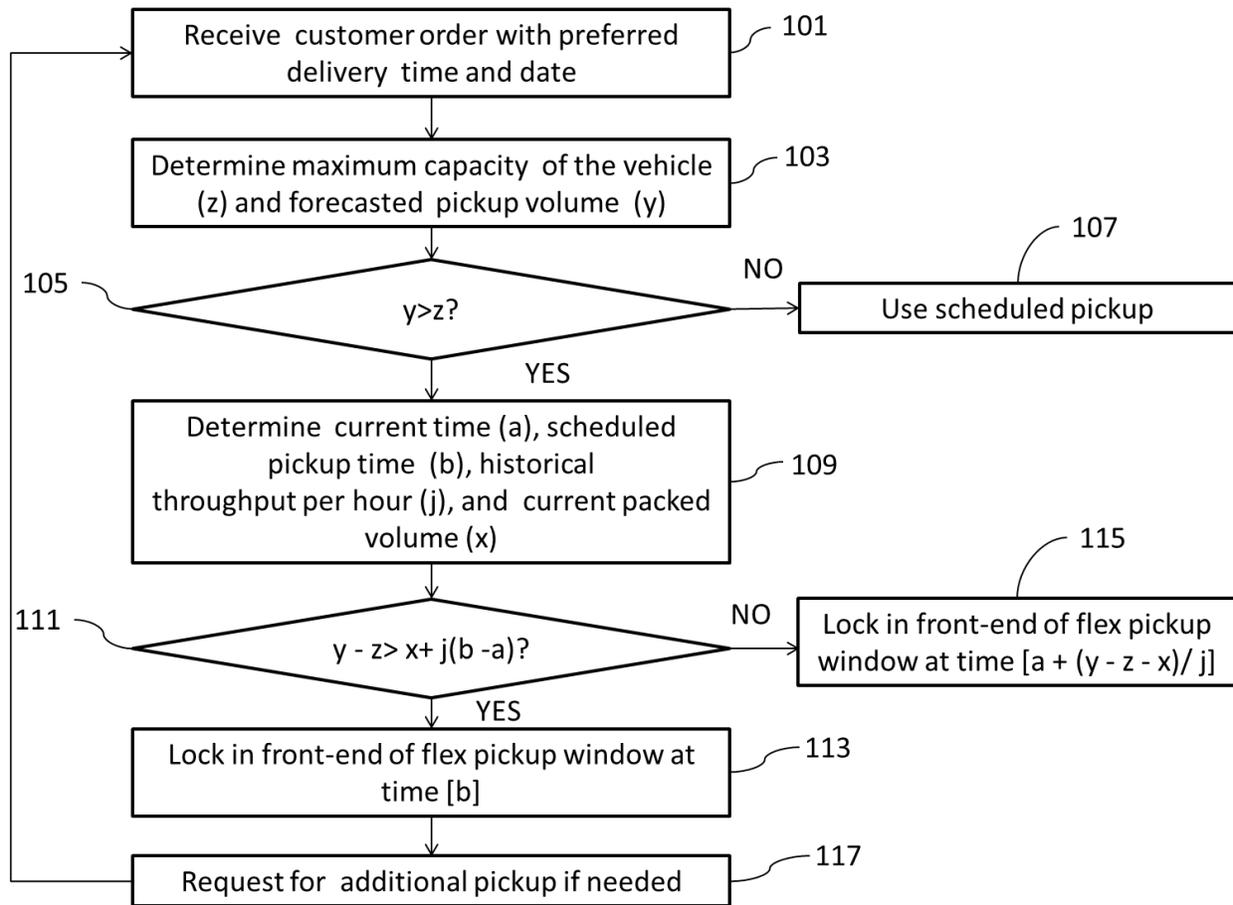


FIG. 2: A method for dynamic parcel pickup to encounter fluctuating parcel volume

The method is further illustrated with an example in which historical throughput per hour (j) = 40 parcels, Current time (a) = 12:00PM, Scheduled pickup time (b) = 8:00PM, Current packed volume (x) = 20 parcels, forecasted pickup volume (y) = 340 parcels, maximum parcel accommodation capacity of the vehicle (z) = 200 parcels. Here, y exceeds z by 140 parcels. With

the current volume (x) and historical throughput per hour (j), the flex pickup may not be executed earlier than 3:00PM and the front-end of the pickup window may be set at 3:00PM.

The system and the method disclosed, provides a dynamic pickup window for the carriers instead of a static pickup window. The dynamic pickup window may then feed into the routing systems of the carriers. The method thus reduces the risk of a flexible pickup being executed too early or parcel volume exceeding the vehicle capacity of the scheduled pickup. The method further eliminates the risk of the parcels being left behind, thereby ensuring on-time delivery.

An alternative implementation may involve changing other variables such as, using vehicles of varying capacity in order to accommodate high volume for a scheduled pickup.