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Auto-Selection Of Package Delivery Location Based On Estimated Time Of Delivery

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AUTO-SELECTION OF PACKAGE DELIVERY LOCATION BASED ON ESTIMATED TIME OF DELIVERY

Abstract

A delivery location for a specific package delivery is chosen based on an estimated order fulfillment time, an estimated shipping time to each of several possible locations, and history of successful deliveries (or a user preference) during various time windows.

Keywords

Package delivery, delivery location, delivery time estimate, estimated delivery window, package delivery history.

Description

The top three package delivery services in the U.S. are expected to deliver over 1 billion packages in November 2016 – an 8% increase over the number of packages delivered by those delivery services in November 2015. A significant portion of that volume is driven by e-commerce.

Typical package delivery services restrict the delivery of some packages under some conditions. For example, a delivery service may require that someone sign for a package (for example, to assure delivery). As another example, a delivery service may require a delivery location where the package can be secured (for example, to mitigate the risk of theft), or may require a delivery location where the package can be protected from the elements (for example, for packages that are susceptible to damage by being left outdoors). In some cases, if the delivery conditions are not met, the delivery service will delay delivery of the package.

Further, some delivery locations, such as a home or an office, may be more or less convenient to the package recipient based on the day and time of the expected delivery. For example, a recipient's work location may be a more convenient for the recipient between 9:00 a.m. and 5:00 p.m. weekdays, while the recipient's home location may be more convenient on the weekends.

The present technology can select a package delivery location based on an estimated package delivery time and historical data associated with package deliveries to the particular recipient at various delivery locations. Some implementations of the present technology use a classification algorithm to process recipient delivery historical data to establish package delivery time windows for each location.

Referring to Figure 1, some implementations of the technology establish at least one package delivery time window for each delivery location for each of multiple recipients. For example, a first recipient selects Monday – Friday from 9:30 a.m. – 12:00 p.m. and from 1:00 p.m. – 5:00 p.m. at the first recipient's office location as two time window/location pairs. The first recipient also selects Monday – Friday from 7:00 p.m. – 10:00 p.m. at the first recipient's home as a time window/location pair. A second recipient selects Monday – Friday from 10:00 a.m. – 12:00 p.m. at the second recipient's office location (different than the first recipient's office location) as a time window/location pair. The second recipient also selects Monday – Friday from 7:30 p.m. – 9:00 p.m. at the second recipient's home as a time window/location pair.

In some implementations of the technology, time window/location pairs are selected for each recipient based on a history of delivery attempts to the particular recipient at each delivery location associated with the particular recipient. For example, a predetermined threshold number (or threshold percentage) of successful delivery attempts to a given recipient at a particular

location X within a time window $Y - Z$ will establish $\{Y - Z, X\}$ as a time window/location pair for that particular recipient.

In some implementations of the technology, a default approach is used for each recipient with a known or determinable business address and a known or determinable residence address. For example, weekdays 9:00 a.m. – 5:00 p.m. can be used as a default delivery time window for business delivery locations, and 7:00 p.m. – 9:00 p.m. weekdays can be used as a default delivery time window for residential delivery locations.

For a particular order deliverable to a particular recipient, systems of the technology determine an estimated order fulfillment time. Typical fulfillment entities can estimate the time required to make a package available for shipment. For example, for a given order placed Saturday at noon that typically takes twenty fours hours prepare for shipment, the fulfillment entity estimates 12:00 p.m. Sunday as the estimated fulfillment time.

Systems of the present technology use the estimated fulfillment time (or related times, such as the next pickup time of the package delivery service after the estimated fulfillment time) as the shipping time to estimate the package delivery time to the recipient. In some implementations of the present technology, the technology determines an estimated package delivery time for each package delivery location established for the particular recipient using the estimated fulfillment time as the shipping time.

For example, most package delivery services (including each of the three largest) expose an Internet-accessible application programming interface (API) or offer an Internet-accessible graphical user interface (GUI) that estimates delivery time given a pickup location, package characteristics, delivery location, and price.

Continuing with the example given above for the first recipient, an implementation of the technology queries a package delivery service API exposed on the Internet and determines two estimated package delivery times for the first recipient's office location: 12:15 p.m. – 12:45 p.m. Tuesday and 10:00 – 10:30 Wednesday; and one estimated delivery time for the first recipient's home location: 7:30 p.m. Tuesday.

Implementations of the present technology choose a package delivery location corresponding to an established delivery time window having a determined estimated package delivery time therein. For example, if the particular user is associated with two addresses, the technology determines if the estimated delivery time falls within an established package delivery time window for each of those addresses. In the example given above, the first recipient is associated with two addresses – an office between 9:30 a.m. – 12:00 p.m. Monday -- Friday and between 1:00 pm. – 5:00 p.m. Monday – Friday; and a residence with one time window between 7:00 p.m. – 10:00 p.m. Monday – Friday. Comparing these windows to the three estimated delivery times for the first recipient shows that {12:15 p.m. – 12:45 p.m. Tuesday, office} will not work, but {10:00 – 10:30 Wednesday, office} and {7:30 p.m. Tuesday, home} will each work. The technology can implement a rule-based approach considering cost, schedule, and performance to select between the office delivery on Wednesday morning and a home delivery on Tuesday evening.

In some implementations a probabilistic classifier based on a recipient's historical delivery data (or the historical delivery data of a class of recipients) to predict, given the historical data, a probability distribution for each delivery location associated with a given delivery. The delivery location/time window with the most favorable probability distribution can be used.

As depicted in the Fig. 2, an architecture for the present technology includes network devices; each of which may be configured to communicate with one another via a communications network, such as the Internet. A user associated with a device may have to install an application and/or make a feature selection to obtain the benefits of the technology described herein.

In situations in which the technology discussed herein collects personal information about users, or may make use of personal information, the users may be provided with an opportunity or option to control whether programs or features collect user information (e.g., information about a user's social network, social actions or activities, profession, a user's preferences, or a user's current location), or to control whether and/or how to receive content from the content server that may be more relevant to the user. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that personally identifiable information cannot be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over how the technology collects and uses information about the user.

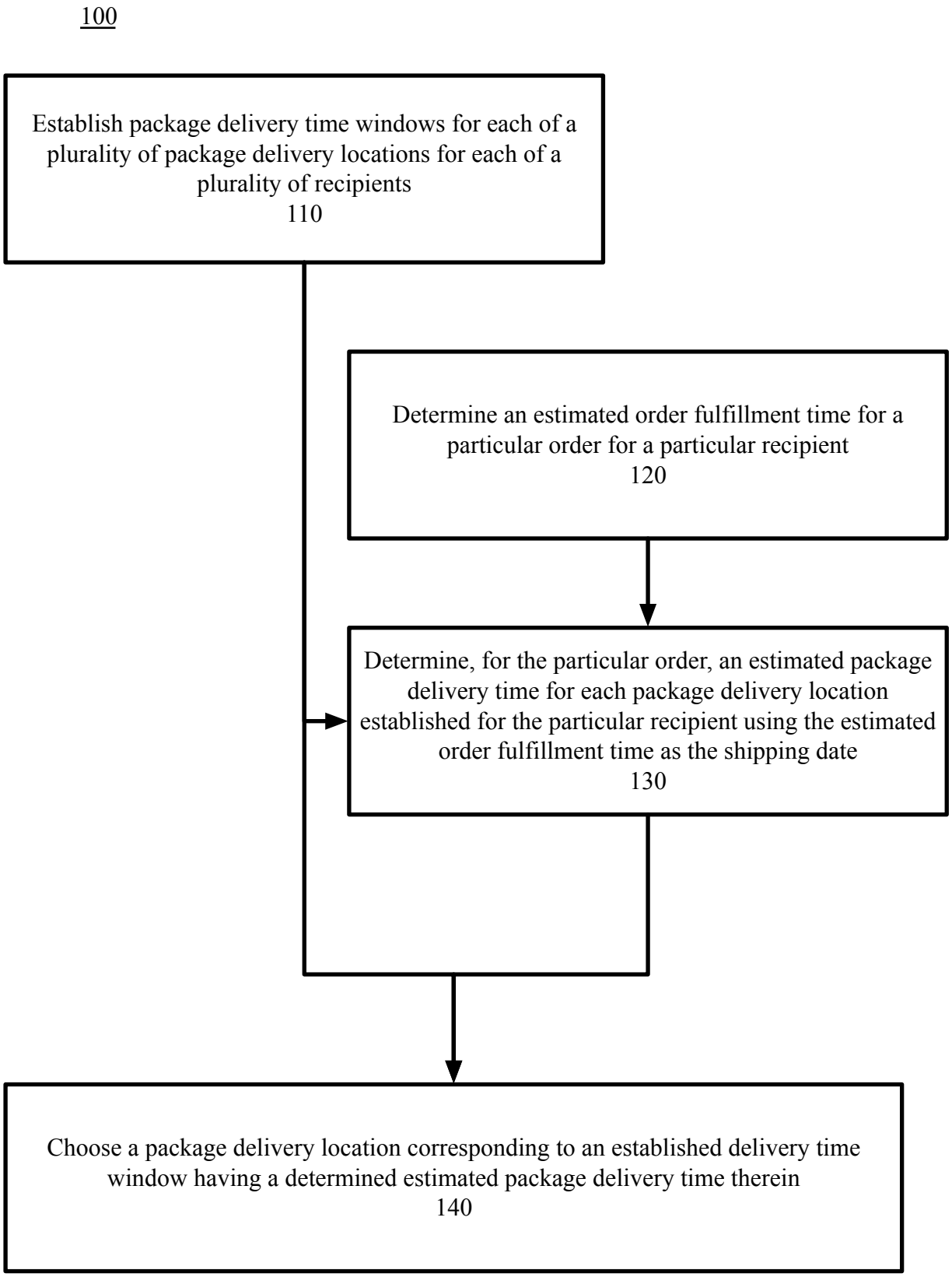
100
Establish package delivery time windows for each of a plurality of package delivery locations for each of a plurality of recipients
110
Determine an estimated order fulfillment time for a particular order for a particular recipient
120
Determine, for the particular order, an estimated package delivery time for each package delivery location established for the particular recipient using the estimated order fulfillment time as the shipping date
130
Choose a package delivery location corresponding to an established delivery time window having a determined estimated package delivery time therein
140

FIG. 1

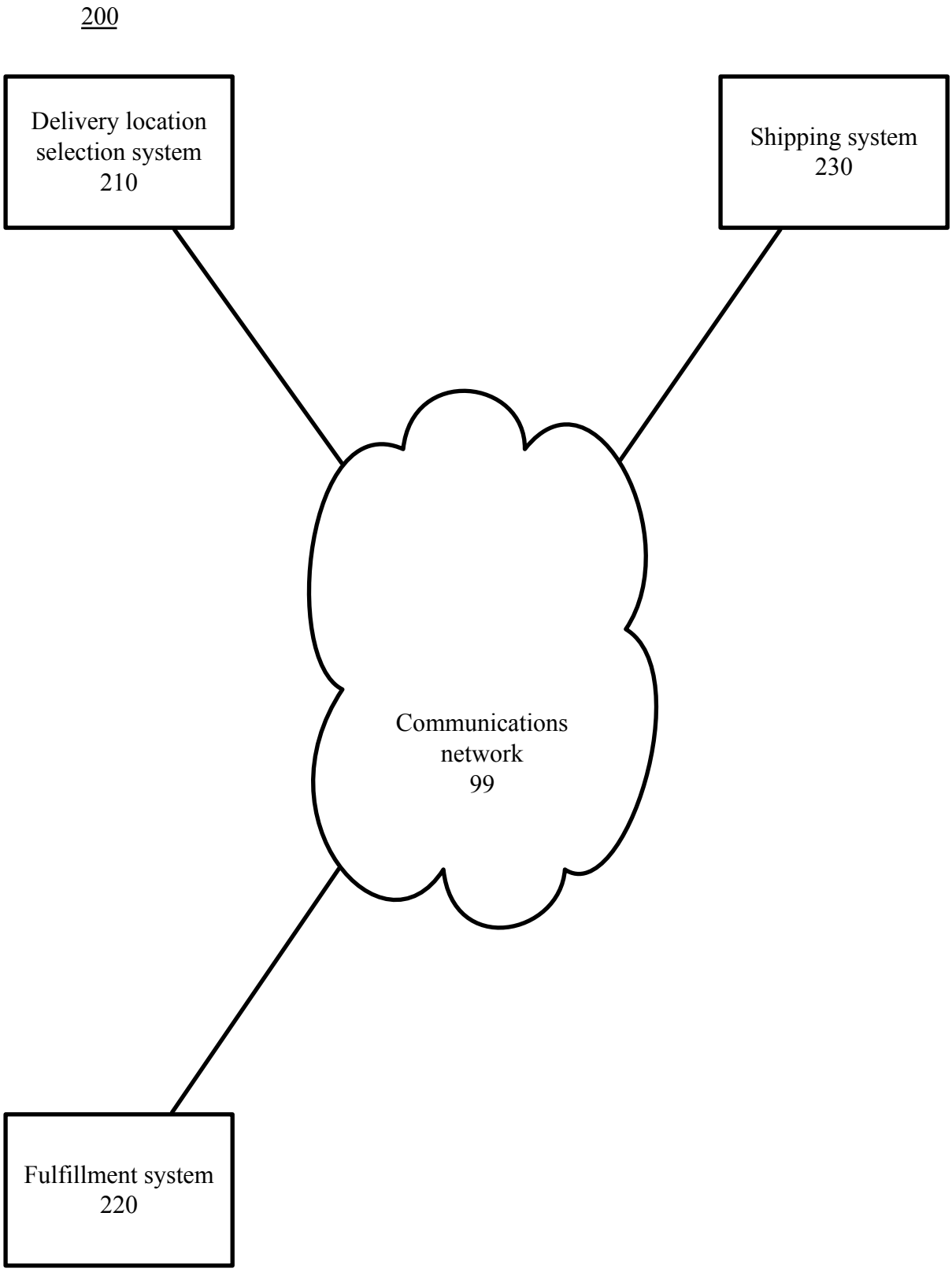
200
Delivery location selection system 210
Shipping system 230
Communications network 99
Fulfillment system 220

FIG. 2