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(54) **Title:** INTEGRATED GLOBAL TRACKING AND VIRTUAL INVENTORY SYSTEM

(57) **Abstract:** Disclosed is an integrated global shipment system that provides end-to-end visibility of the movement of a package. The integrated global shipment system employs a shipment consolidating application for integrating one or more freight tracking systems with one or more end-delivery systems. As a result, shippers are provided with complete visibility of the movement of their shipments of goods from an origin country to a destination country and till the final consignees. In addition, the integrated shipment system significantly decreases the cost of managing inventories by providing a virtual inventory solution. Under this virtual inventory solution, suppliers are able to bypass distribution centers and delay allocation of goods until after the importation of goods into a destination country.

INTEGRATED GLOBAL TRACKING AND VIRTUAL INVENTORY SYSTEM

FIELD OF THE INVENTION

The present invention relates generally to an integrated tracking system that provides enhanced visibility of the movement of goods being shipped worldwide, and, as a result, enables a virtual inventory system.

BACKGROUND OF THE INVENTION

Globalization has introduced additional partners into the supply chain, thus creating new challenges of distant vendors and wide variances in the sophistication of systems. At the same time, the ever-increasing cost pressures are forcing companies to do a better job of managing expensive inventories. Under the macro-trend of operating logistics worldwide, there are some specific problems, as addressed below, which give rise to a need for an integrated global shipment system that may avoid distribution center delays and provide enhanced visibility in the movement of goods.

First of all, the current process for international shipments involves numerous entities including carriers, brokers, warehousemen and local cartage firms. As various components of goods are sourced throughout various regions and buyers are scattered around the globe, supply chains are far stretched and growing extremely complex, thus extremely complicating the efforts to provide accurate and timely data to customers. Such "piecemeal" logistics invites a number of problems, such as lack of visibility, absence of cost transparency, security concerns and unreliable service. As opposed to the prior "piecemeal" approach, therefore, a need exists for an "integrated" logistics solution from a single source that allows one specialist to synchronize the end-to-end supply-chain efforts and ensure the supply chain runs in a uniform, seamless fashion.

Another problem is the delays and high costs associated with distribution centers. Distribution centers have traditionally been considered an essential component of a consumer goods supply chain, and the reliance on distribution centers has increased in recent years as companies have moved their manufacturing facilities to overseas locations. In a traditional supply chain, distribution centers

serve as warehouses where companies store large inventories of consumer goods as a safety stock cushion. Distribution centers are preferably, but not always, centrally located in a geographic region to allow the company to distribute the goods on an as-needed basis to a plurality of retail outlets disposed throughout the region. Depending on the size of the region and the immediacy of a retailer's need for a good, a company can have one or many distribution centers spread across a given geographic region. But distribution centers are expensive to operate. In addition to the cost of owning or leasing the space required to store goods, companies that rely on distribution centers invest substantial amounts of money on inventoried goods that just sit in one or more warehouses.

In an effort to lower the expense associated with operating multiple distribution centers, some companies have moved toward the nationwide distribution center model. But the single distribution center approach has its drawbacks, one of which is the inefficiencies in the transport process. For example, a company that uses a nationwide distribution center for its U.S. retailers may receive a shipment of internationally manufactured goods on the west coast. Once the goods clear customs, the goods are placed on a transportation vehicle and transported across country to the nationwide distribution center. At the distribution center, the goods are labeled with store-ready labels and with package shipment labels and the packages are picked up by a carrier such as the United Parcel Service (UPS). If the importing company is, in fact, a national chain, at least some of the imported goods are likely destined for retail outlets on the west coast. In many cases, companies will incur the time and expense to transport recently-imported goods to a distribution center, and then immediately turn-around and pay a package carrier to ship the packages back to a retail outlet on the west cost. Given the dynamic retail market, a distribution center bypass model shortens product delivery cycle and keeps inventories in motion. A recognized need therefore exists in the industry for a supply chain system that bypasses the need for distribution centers.

In addition, the need to keep track of products and information, from procurement through delivery to customers, has never been greater. Therefore, there is a trend among logistics service providers such as UPS to offer detailed status information on shipments in transit. For example, UPS customers can go to

the UPS.com website and use package tracking numbers to track the status of their items in shipment. As a result, advance notification of incoming shipments can be provided to the intended recipients. However, current business trends drive the need for even heightened visibility. It relates not just to tracking shipments on the ground, water, rail or in the air, but also to how much inventory is on hand in a warehouse, where it is stored, and when it has been allocated to fulfill an order – in other words, all the activities involved in moving goods from maker to seller to buyer. This type of insight is especially desirable in the global supply chain where a company needs to respond quickly to unforeseen circumstances, cut costs and speed delivery.

BRIEF SUMMARY OF THE INVENTION

The present invention seeks to provide an integrated global shipment system that can provide end-to-end visibility of the movement of goods. To that end, the present invention integrates one or more freight shipping and tracking systems with one or more end-delivery and tracking systems. Toward that goal, the present invention enables various individual shipments to be consolidated into a consolidated shipment so as to facilitate the movement of goods during international shipment. Moreover, the present invention seeks to provide a virtual inventory system for enhanced inventory management. Specifically, such a virtual inventory system allows suppliers to bypass distribution centers and delay allocation or distribution of goods until after importation of goods into a destination country or region.

In accordance with the present invention, the above objects and other objects, features, and advantages will be carried out by systems and methods for providing integrated global shipment and virtual inventory.

According to one embodiment of the present invention, a system for efficiently handling global shipments is provided. The system comprises: (1) a receiving facility at which a carrier receives multiple child shipments comprising: (a) a code reading device configured to read destination country information from said multiple child shipments and to store such information as electronic data in a code reading device memory; (b) a handling facility at which a subset of child shipments are combined into a consolidated shipment and marked with a code

containing a consolidated shipment tracking number; (2) a computer configured to receive said destination information from said code reading device memory, to store said destination information in a computer memory, to identify said subset of child shipments having an identical destination country from said multiple child shipments, to link electronically in said computer memory said subset of child shipments to said consolidated shipment by assigning and storing said consolidated shipment tracking number; and (3) an import receiving facility at which said consolidated shipment is received in said destination country after processing of said consolidated shipment through export and import customs for custom clearance, and is separated into said child shipments of said subset of child shipments for delivery to a respective consignee location.

In a preferred embodiment, the code reading device is configured to read child shipment tracking numbers from said multiple child shipments and store such information as part of said electronic data in said code reading device memory, and the computer is further configured to retrieve shipment detail information for said child shipments from said memory or from a previously stored data file, and further configured to: (1) process each of said plurality of child shipments through the steps of: (a) determining from said data whether said child shipment is a LTL (Less-than-Truckload) child shipment; (b) responsive to the determination that said child shipment is a LTL child shipment, (i) identifying from said shipping data a LTL shipment reference number that identifies said child shipment; and (ii) associating said LTL shipment reference number with said consolidated shipment reference number; and (c) responsive to the determination that said child shipment is not a LTL child shipment, (i) identifying from said shipping data one or more package reference numbers that respectively identify each package associated with said child shipment; and (ii) associating each of said one or more package reference numbers with said consolidated shipment reference number; and (d) storing the associations in step (b)(ii) or (c)(ii) in an association data file in said computer memory; and (2) generate a consolidated shipment output based in part upon said association data file.

Another embodiment of the present invention provides an integrated global shipment system providing end-to-end visibility of movement of goods in shipment. Specifically, the system comprises: a first shipment visibility system for

tracking movement of a consolidated shipment from an origin country to a destination country, the consolidated shipment comprising one or more child shipments that need to be shipped to the destination country, wherein at least one of the one or more child shipment consists of multiple small packages; and a second shipment visibility system for tracking movement of each of the multiple small packages within said destination country; wherein, the first shipment visibility system is associated with said second shipment visibility system so as to provide an integrated visibility interface for tracking movement of each of the multiple small packages from the origin country to the destination country and within the destination country.

In a preferred embodiment, the first shipment visibility system comprises one or more databases accessible to a processor that is configured for: receiving shipping data associated with the one or more child shipments, the shipping data comprising at least one or more child shipment reference numbers corresponding to the one or more child shipments; generating a consolidated shipment reference number for identifying the consolidated shipment; associating the consolidated shipment reference number with each one of the one or more child shipment reference numbers; creating a data file to include the associations and the shipping data associated with the one or more child shipments; and storing the data file in the one or more databases. The processor is further configured for: obtaining the consolidated shipment reference number identifying the consolidated shipment; using the consolidated shipment reference number to retrieve shipping data associated with the one or more child shipments from the one or more databases; using the consolidated shipment reference number to retrieve movement data associated with the consolidated shipment from a transportation management database; using the consolidated shipment reference number to retrieve customs clearance data associated with the consolidated shipment from a customs management database; displaying the shipping data, the movement data, and the customs clearance data to a user; and receiving input from the user to update the one or more databases, the transportation management database and the customs management database.

In another preferred embodiment, the second shipment visibility system comprises one or more databases accessible to a processor that is configured for: obtaining a package tracking number identifying a small package; using the package tracking number to retrieve package data associated with said small package from a package database, said package data comprising information of each item of goods enclosed in the small package; using the package tracking number to retrieve movement data associated with the small package from a transportation management database; displaying the package data and said movement data to a user; and receiving input from the user to update the package database and the transportation management database.

Yet another preferred embodiment of the present invention provides that the first shipment visibility system is associated with the second shipment visibility system through: a repository unit storing package data associated with the multiple packages, the repository accessible to the first shipment visibility system and said second shipment visibility system; and a server computer having access to said repository unit, the server computer configured for: using a consolidated shipment reference number to identify multiple package reference numbers, each of the multiple package numbers identifying one of the multiple packages; searching a package database in said second shipment visibility system to retrieve the package data associated with said multiple packages; and loading the package data into the repository unit.

In accordance with an additional embodiment of the present invention, an integrated global shipment system providing visibility of movement of goods in shipment comprises one or more databases accessible to at least a server computer. The one or more databases stores shipping data for multiple shipments of goods, wherein the shipping data is received from a carrier-customized client shipping system or a web-based client shipping application. The server computer is configured for: receiving, from a warehouse management system, shipper-to-consignee transaction data associated with a shipment of goods; receiving, from a transportation management system, movement data associated with the shipment of goods; receiving, from a customs management system, customs clearance data associated with said shipment of goods; retrieving, from the one or more databases, particular shipping data associated with the shipment of goods; and generating a

shipment output data file based in part upon the shipper-to-consignee transaction data, the movement data, the customs clearance data, and the particular shipping data associated with the shipment of goods.

An alternative embodiment of the present invention provides an integrated global shipment system providing end-to-end visibility of movement of goods in shipment. The system comprises a client interface for receiving a user query directed to one or more specified shipments using specified criteria; a carrier's shipping system comprising one or more mainframe servers, said one or more mainframe servers having access to a shipment database that stores shipping data associated with multiple shipments, said one or more mainframe servers being configured to communicate with said one or more application servers; and a visibility system in electronic communication with said client interface and said carrier's shipping system, said visibility system comprising: one or more web servers capable of communicating with said client interface over a communications network, one or more application servers capable of communicating with said one or more web servers, said one or more application servers having access to one or more application server databases, and configured to process a user query received from said client interface, and one or more database servers configured for loading said shipping data from said shipment database of said carrier's shipping system into said one or more application server databases.

In another embodiment of the present invention, an integrated global shipment system providing visibility of movement of goods in shipment comprises one or more shipment databases and a web portal that is configured for: (1) providing a web interface to the web portal through which a user is enabled to enter criteria defining a group of consolidated shipments; (2) in response to the criteria entered by the user, identifying, from the one or more shipment databases, shipping data associated with the group of consolidated shipments; (3) displaying to the user the shipping data associated with the group of consolidated shipments; (4) receiving a first input from the user to select a particular consolidated shipment from the group of consolidated shipments; (5) in response to the selection in (4), retrieving, from the one or more shipment databases, first-level shipment details associated with the particular consolidated shipment and a list of child shipments that are combined in the particular consolidated shipment, the first-level shipment

details including movement data of the particular consolidated shipment; (6) displaying to the user the first-level shipment details associated with the particular consolidated shipment and the list of child shipments that are combined in the particular consolidated shipment; (7) receiving a second input from the user to further select a particular child shipment from the list of child shipments; (8) in response to the selection in (7), retrieving, from the one or more shipment databases, second-level shipment details associated with the particular child shipments and a list of packages in the particular child shipment, the second-level shipment details including movement data of the particular child shipment; (9) displaying to the user the second-level shipment details associated with the particular child shipments and the list of packages in said particular child shipment; (10) receiving a third input from the user to further select a particular package from the list of packages; and (11) in response to the selection in (10), retrieving, from the one or more shipment databases a movement status of the particular package; and (12) displaying the movement status of the particular package to said user.

In accordance with an alternative embodiment of the present invention, there is an integrated global shipment system providing visibility of movement of goods in shipment. The system comprises one or more shipment databases and a web portal that is configured for: (1) providing a web interface to said web portal through which a user is enabled to query for a specific shipment or a specific package by entering a particular identifier; (2) in response to receiving said particular shipment identifier, determining whether said particular identifier is a consolidated shipment reference number; (3) in response to the determination that said particular identifier is a consolidated shipment reference number, identifying, from said one or more shipment databases, shipping data associated with said specific shipment, and displaying said shipping data to said user, said shipping data including at least said consolidated shipment reference number; (4) in response to the determination that said particular identifier is not a consolidated shipment reference number, determining whether said particular identifier is an LTL shipment reference number or a package tracking number, (a) in response to the determination that said particular identifier is an LTL shipment reference number, (i) identifying, from said one or more shipment databases, shipping data associated

with a consolidated shipment in which said specific shipment is included; (ii) identifying, from said one or more shipment databases, shipping data associated with said specific shipment; and (iii) displaying to said user said shipping data in (i) if said specific shipment has not reached a destination country, or said shipping data in (ii) if said specific shipment is in delivery within said destination country; and (b) in response to the determination that said particular identifier is a package tracking number, (i) identifying, from said one or more shipment databases, shipping data associated with a consolidated shipment in which said specific package is included; (ii) identifying, from said one or more shipment databases, shipping data associated with said specific package; and (iii) displaying to said user said shipping data in (i) if said specific package has not reached a destination country, or said shipping data in (ii) if said specific package is in delivery within said destination country.

According to another embodiment of the present invention, a virtual inventory management system comprises: a shipment entry system configured for a carrier to receive a request from a shipper for a shipment of goods, said request identifying at least a destination country where said goods need to be shipped; a shipment consolidating system configured to receive and process shipping data associated with said goods, and to generate data of a consolidated shipment, said consolidated shipment comprising said shipment of goods from said shipper with one or more shipments to be shipped to said destination country; and a shipment transportation system configured to transport said consolidated shipment to said destination country; a shipment de-consolidating system configured to separate said shipment of goods from said consolidated shipment after said consolidated shipment is transported to said destination country; and an end-delivery system configured to deliver said shipment of goods to one or more specific consignee locations within said destination country, wherein said one or more specific consignee locations are subject to any re-direction made by said shipper after said consolidated shipment is transported to said destination country.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

Fig. 1 is a pictorial view of an integrated global shipment system that illustrates how a good moves from an origin shipper to a consignee in accordance with an embodiment of the present invention;

Fig. 2 is a high-level block diagram of a process flow for shipping goods through the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Fig. 3A-B illustrate different shipment levels as applied in the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Figs. 4A-C are exemplary illustrations of different types of shipping labels used in the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Figs. 5A-B are a flow diagram that illustrates how shipments are processed within the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Fig. 6 illustrates data outputs regarding shipments processed by the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Fig. 7 illustrates the shippers' allocation flexibility provided by the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Figs. 8A-C provide an overview of the end-to-end visibility and various visibility events in the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Fig. 9 is a detailed view of the end-to-end visibility and various sub-systems involved in the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention;

Fig. 10 is a high-level architecture of the integrated global shipment system of Fig. 1 that provides end-to-end visibility in accordance with an embodiment of the present invention;

Fig. 11 is a detailed system structure of the integrated global shipment system of Fig. 1 that provides end-to-end visibility in accordance with an embodiment of the present invention;

Fig. 12 illustrates exemplary data structures of the integrated global shipment system of Fig. 1 that provides end-to-end visibility in accordance with an embodiment of the present invention;

Fig. 13 illustrates one type of data flow between two sub-systems of the integrated global shipment system in accordance with an embodiment of the present invention;

Fig. 14 is a process flow block diagram that illustrates how the integrated global shipment system of the present invention provides end-to-end visibility of goods in transit;

Fig. 15 is a screen flow illustrating the end-to-end visibility as viewed by a user of the integrated global shipment system in accordance with an embodiment of the present invention;

Figs. 16-20 are exemplary screen displays as viewed by a user of the integrated global shipment system in accordance with an embodiment of the present invention.

Figs. 21A-B show the computer hardware architecture that implements the integrated global shipment system of Fig. 1 in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present inventions now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the inventions are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

For the purpose of describing the present invention in detail, certain terms used hereinafter are defined as follows:

"Carrier" – An individual, partnership or corporation engaged in the business of transporting goods or persons.

"Consignee" – The person or organization to whom freight is shipped.

"Shipper" – A company or individual who initiates the transport of goods.

"Shipment" – One or more packages or pieces of freight being transported together.

"Consolidation" – The combining of two or more items or groups of items and transporting them as a single shipment.

"Consolidated Shipment" – The result of consolidation of shipments.

"Child Shipment" – Any shipment that is part of the consolidated shipment.

"LTL (Less-than-Truckload)" – A quantity of freight less than that is required for the application of truckload rate.

"Cross-dock" – A carrier's terminal that is configured to handle the consolidation or transfer of freight. This type of facility provides the ability to unload on one side of the facility and reload to the other side of the facility.

"Container Freight Station (CFS)" – An operation facility where freight shipments are cross-docked and staged between transport legs, sometimes referring to a facility used by ocean carriers to load/unload cargo to and from containers.

"Line haul" – The movement of freight between cities or carrier facilities, excluding pickup and delivery service.

"PRO" – A number issued to each shipment of freight by a carrier and used for tracking or tracing of the shipment to its destination.

Integrated Global Shipment

1. Consolidated Shipment Movement v. Child Shipment Movement

Fig. 1 is a supply chain flow that illustrates how goods move from an origin shipper to a consignee in accordance with one embodiment of the present invention. As seen in Fig. 1, such movement of goods is comprised of two parts: (1) movement of a consolidated freight shipment from an origin location to a destination country and/or region and (2) movement of multiple child shipments within the destination country and/or region till reaching final consignees. In the

case of a shipper who is shipping manufactured goods from a factory to respective destination consignees, the process typically begins when a manufacturer receives a purchase order for a certain amount of products or goods. In the illustrated supply chain **10**, goods are picked up from an origin shipper **12** by an origin pickup vehicle **14**. In a typical scenario, the manufacturer of the goods serves as the origin shipper 12 and the origin pickup vehicle **14** is a freight forwarding service that handles the transportation of the goods from the manufacturing facility to the next stop in the supply chain **10**. Depending on the requirements of the purchase order, the freight forwarding service may be selected by the manufacturer or by the entity that is importing the goods. One of ordinary skill will recognize that multiple, sometimes competing freight forwarding service providers may be used to transport the manufactured goods and, in fact, multiple origin shippers **12** may be used to manufacture the goods that are being imported. Thus, while a single origin shipper **12** and a single origin pickup vehicle **14** are illustrated in Fig. 1, the present invention is not limited to this embodiment.

Returning to the supply chain **10** illustrated in Fig. 1, the origin pickup vehicle **14** transports the goods to an origin container freight station (CFS) **16**. As described in greater detail below, a number of activities may occur at the origin container freight station **16**. One of these activities is to consolidate the goods into a consolidated freight shipment. As one of ordinary skill in the art will recognize, the consolidation process may be a simple consolidation of pre-packaged goods into a container, or may include a pick-and-pack process in which multiple goods are picked, packaged and weighed in accordance with instructions from an importer or a purchase order. In some cases, goods bound for a single consignee arrive at the origin container freight station **16** from multiple origin shippers **12**. An aspect of the present invention is to achieve new levels of consolidation efficiencies for these shipments at the point of the origin container freight station **16**. Thus, goods received from different origin shippers **12** may be consolidated in a single freight container bound for one or more consignees in the same destination country or region.

Another activity that may occur at the origin container freight station **16** is the labeling of packages or containers containing goods for shipment. If the allocation is known at the point that the goods are at the origin container freight station **16**, then the goods may be labeled as part of the consolidation process. In a preferred embodiment, the labeling processes that occur at the origin and destination container freight stations include the affixing of shipping labels used by the package delivery company that transports the packages to the final consignee, such as UPS, Federal Express and United States Postal Services. Preferably, a single package delivery company such as UPS handles the transportation of all packages in the supply chain **10**. But one of ordinary skill in the art will recognize that multiple package delivery companies may be used. As a result, the labeling processes can involve the generation and application shipping labels for multiple package carriers. Other types of labels that may be added at this stage include store-ready labels (e.g., stock or pricing information). As described in detail below, an advantage of the present invention is the ability to delay the allocation, that is, the determination of the ultimate destination for the goods, until a later stage in the transportation process and thereby allow greater management of the importers' inventory. Therefore, in still another embodiment of the present invention, some or all of the package labeling processes described above can occur at the sortation hub **32** of the package delivery company.

The next steps illustrated in the supply chain **10** are to process the goods through export customs **18** and to manage an origin drayage **20** of the goods to an ocean vessel **22** docked in a shipyard. As can be readily appreciated by a skilled artisan, alternative transportation means including air or ground transportation can be used to ship goods cross international boundaries. Typically, the step of processing the goods for customs clearance at export customs **18** occurs at the location of the origin container freight station **16**. During the consolidation and labeling processes, the paperwork necessary to move the freight container through customs is prepared. But one of ordinary skill will recognize that these steps can occur at separate locations. Once the necessary paperwork has been completed and the freight containers have satisfied the customs requirements, the freight container containing the goods is drayed through the origin drayage **20** to the ocean vessel **22**.

When the ocean vessel **22** carrying the freight container reaches the destination port, the original carrier arranges, or, if necessary, a separate carrier is engaged to arrange to have the freight container offloaded to the destination port, processed through import customs **26** and drayed via a destination drayage **24** to a destination container freight station **28**.

A deconsolidation process typically occurs at the container freight station **28**. In the deconsolidation process, goods that were consolidated into one shipment would then be separated into multiple child shipments, each of which is to be delivered to respective consignee locations. One of ordinary skill in the art will recognize that goods can be allocated in a variety of ways. For example, in the case of small packages, the goods may be transported via line haul **30** to any of several sortation hubs **32** operated by companies such as UPS, Federal Express or the United States Postal Services. When the packages arrive in the sortation hubs **32**, they enter into the postal or package delivery networks and are delivered by the transportation company to the consignee **36**. The alternatives known in the art include transporting goods by trucks **34** as truckload (TL) or less-than-truckload (LTL) shipments. As will be apparent to one of ordinary skill, these and other transportation alternatives can be combined for transporting goods to a variety of consignee locations. Thus, for example, a given allocation may require that half of the goods received at a destination container freight station **28** be shipped to a UPS sortation hub **32** for delivery to a first consignee, while some other portion of the goods are moving by TL to a second consignee and the balance of the goods are transported to a third consignee via LTL movement.

In a preferred embodiment, a single entity, such as UPS, controls the movement of the goods in each step of the supply chain **10**. In some cases, this controlling entity (sometimes referred to herein as the supply chain carrier) itself (or via a subsidiary company) handles the movement of the goods such as, for example, the movement of the goods from the origin shipper **12** to the ocean vessel **22**. In other steps in the supply chain **10**, the supply chain carrier does not itself move the goods and instead engages a third-party to move the goods, and in so doing retains control of the movement of the goods. Thus, for example, in one embodiment the supply chain carrier is a non-vessel operating carrier and uses a third-party to handle the movement of goods via ocean vessel **22**. In such an

embodiment, the supply chain carrier will use known tracking systems to obtain periodic updates about the movement and anticipated arrival of the goods at various ports or waypoints in the ocean movement.

To summarize the above-described movement of goods in the supply chain **10**, Fig. 2 shows a simplified process flow. In this process flow, a carrier such as UPS would typically carry out or engage other carriers to carry out the following steps in shipping goods into various destination countries or regions:

Step **1**: pick up or receives shipments from different shippers;

Step **2**: arrange a direct consolidation of different shipments;

Step **3**: transport the consolidated shipment across an international boundary to the destination country or region;

Step **4**: process the consolidated shipment through the export and import customs to obtain necessary customs clearance paperwork in coordination with Step **3**;

Step **5**: de-consolidate the consolidated shipment into individual child shipments;

Step **6**: put each child shipment into its small package delivery network or LTL shipment network for final deliveries to respective consignee locations.

As one of ordinary skill can appreciate, there are a number of advantages of consolidating individual shipments in international shipments. It significantly reduces the required paperwork and time in customs processing. Furthermore, it lowers individual shipment costs by decreasing brokerage fees, transportation costs, taxes, duties and additional service fees. As a result of the consolidation process, movement of goods in the supply chain **10** is comprised of two levels of movements: a consolidated freight movement that crossed the international boundary and a child movement within the destination country or region. These two movements are described in detail with reference to Figs. 3A-B.

Fig. 3A shows the relationship between a consolidated freight shipment and child shipments. In general, a consolidated freight shipment (parent shipment) **100** consists of one or many child shipments **110**. Such consolidated freight shipment (parent shipment) **100** is represented by a unique shipment identifier, i.e., a consolidated shipment reference number **102**, which can be a Bill of Lading (BOL) number or a Pro number as widely used in the transportation industry. By

virtue of the consolidated shipment reference number **102**, the movement of consolidated shipment **100** can be linked to movements of each of the individual child shipments **110** consolidated therein. Each child shipment **110** can be a shipment comprising multiple small packages **110a** or a LTL (Less-than Truckload) shipment **110b** or a TL (Truckload) shipment **110c**. Each small package **110a** is identified by a package tracking number **112** as the lowest unit. The package tracking number **112** may be a lead shipment number (for a defined shipment), or an individual carton number. Each LTL shipment **110b** or TL shipment **110c** is represented by a Sub-Pro number **114** as the lowest unit. In operation, the consolidated shipment reference number **102** identifies the first movement leg of the consolidated shipment, and is included in all subsequent child transport legs that are each identified by a Sub-Pro number **114** or a package tracking number **112**. From customers' perspective, the consolidated shipment reference number **102** and child movement identifiers, namely, Sub-Pro numbers **114** or package tracking Numbers **112**, are used in combination for tracking the entire movement of goods, end-to-end.

To further illustrate the relationship between a consolidated freight shipment (parent shipment) **100** and multiple child shipments **110**, Fig. 3B provides a specific example. In this example, a freight order is identified by the consolidated shipment reference number **102**, i.e., a Pro number, that will be used as referring to the entire consolidated shipment movement. The LTL/TL child shipments are represented by Sub-Pro numbers **114** that associate the LTL/TL child shipment movement to a specific receiver. Each small package is represented by a package Tracking Number **112**. As illustrated in Fig. 3B, the origin of the consolidated movement is Canada, and the destination is the U.S. The destination container freight station (CFS) is located in Buffalo, U.S., and the ultimate US consignees are located respectively in Texas, New York, California and Arizona. The consolidated shipment consists of 32 packages and 3 pallets, and more specifically, the consolidated shipment movement is made up of the following child shipment movements:

- Sub-Pro 1 is a LTL child shipment consisting of 10 Pkgs/1 Pallet – Buffalo to Texas (Ultimate Consignee)
- Sub-Pro 2 is a TL child shipment consisting of 20 Pkgs/2 Pallets – Buffalo to New York (Ultimate Consignee)
- 1 UPS Small Package with a package Tracking Number – Buffalo (UPS Hub) to California (Ultimate Consignee)
- 1 UPS Small Package with a package Tracking Number– Buffalo (UPS Hub) to Arizona (Ultimate Consignee)

In operation, the shipment identifier (e.g., consolidated shipment reference number **102**, Sub-Pro numbers **114**, and package tracking numbers **112**) can be obtained by scanning a shipping label that, pursuant to the above-described labeling process, is affixed onto a package, a carton or a container, and thus identifies a shipment of goods. Figs. 4A-C show such exemplary shipping labels. Specifically, Fig. 4A shows an exemplary shipping label for a LTL shipment **110b** that is printed with a Sub-Pro number **114**. Fig. 4B shows an exemplary pallet shipping label printed with a Pro number **102**. Fig. 4C shows a small package shipping label printed with a package tracking number **112**. As shown in Figs. 4A-C, a shipping label is typically printed with one of the above-explained the consolidated shipment reference number **102**, a Sub-Pro number **114**, or a package Tracking Number **112**. These numbers are usually printed in both a machine-readable code for scanning purposes and a human-readable text format.

Relating back to Fig. 2, the Step **2** of consolidation is further illustrated in Figs. 5A-B that show a process flow **500** of an application for consolidating individual child shipments (LTL/TL shipments and/or small packages). The process **500** starts with Step **501** when shippers request shipment of goods from a carrier such as UPS. Step **501** requires a shipper to supply a shipping account number established with the carrier. Typically, a carrier establishes and maintains a client database that includes account information of various shippers, especially its long-term customers with large volume shipments and/or revolving needs for shipment of goods. By means of such established accounts, the carrier can save a lot of time in collecting customer information and shorten the processes of receiving and authorizing shipment requests, preparing and arranging for shipments and generating shipping bills for customers. Especially, in accordance

with one embodiment of the present invention, the use of known customer information can be maximized in the consolidated shipping process. For each established customer, the carrier can consolidate multiple bills including brokerage, transportation, duties, taxes, and additional services. As can be appreciated by one of ordinary skill, a consolidated bill or invoice would enhance the financial visibility and management of a shipper-customer, particularly in the field of shipping cost control.

Turning back to Fig. 5A, after a shipper's account information is verified in Step **501**, a shipper is provided with an option whether to consolidate its shipments with other individual shipments in Step **502**. Sometimes a shipper may choose not to consolidate its shipments with other shipments. This typically occurs to shippers whose daily shipping volumes are so huge as to render consolidation unnecessary or impractical. If consolidation is not requested in Step **502**, then the received shipments will be processed separately as shown in Step **503**. Otherwise, the received shipments will be labeled for consolidation in Step **504**. Depending upon the destination country or region of received shipments, a particular consolidated shipment reference number **102** will be located from a database **550** that stores shipping data associated with a number of consolidated shipments. Such shipping data includes, but not limited to, a particular shipping lane (origin country – destination country), a particular transportation means (air, ocean, ground) and a particular shipment date. In the database 550, each consolidated shipment is identified by a consolidated shipment reference number **102**, and in particular, one consolidated shipment that is identified by the located particular shipment reference number **102** will be shipped to the same destination country or region of received shipments. With this particular shipment reference number **102**, Steps **506-509** will process data of each received child shipment to be consolidated.

In processing a particular child shipment, Step **506** first determines whether such child shipment is a LTL child shipment. If so, Step **507** processes data of the particular child shipment under LTL-shipment-specific rules. For example, Step **507** first identifies a Sub-Pro number **114** as identifier of the LTL shipment, establishes a reference record including both the Sub-Pro number **114** and the particular consolidated shipment reference number **102**, and save the reference record into the database **550** that stores the data of the particular child shipment

and the data of the consolidated shipment. If the particular child shipment is not a LTL shipment, Step **508** applies small-package-specific rules to that child shipment. More specifically, each package of multiple packages within the child shipment is identified by a package tracking number **112**. Thus, Step **508** obtains each package tracking number **112** and associates it with the particular consolidated shipment reference number **102** by establishing data records including each pair of a package tracking number **112** and the particular consolidated shipment reference number **102**. Such data records will be stored into the above-mentioned database **550** as well. Step **509** queries whether there are additional child shipments to be consolidated, and if so, it repeats the process from Step **506** to Step **507** or **508**. In Step **510**, determination is made whether there are any additional shipments to process until the entire daily volume of shipments are exhausted at the end of a day in Step **511**.

After all shipments are processed at the end of a day in Step **511**, some necessary actions will be taken as shown in Fig. 5B, such as generating shipment outputs and, based upon the shipment outputs, updating relevant information stored in various system databases in accordance with one embodiment of the present invention. Corresponding to the different processing steps as applied to different types of shipments in Fig. 5B, the generated shipment outputs include outputs for consolidated shipments as well as outputs for non-consolidated shipments. Thus, at Step **512**, the process first determines whether an output for the consolidated shipment is required. For non-consolidated shipment outputs, Step **513** generates a small package manifest. Based on this small package manifest, Step **514** will update a carrier's small package shipment management system. Meanwhile, outputs for the consolidated shipment can be generated as at Step **515**. Such outputs for the consolidated shipment will be described in detail below with reference to Fig. 6. Step **516** will update a carrier's backend shipping system for managing consolidated shipments. Because each consolidated shipment can comprise multiple child shipments including LTL/TL shipments or small packages, further steps are taken to update the carrier's LTL shipment management system and small package management system respectively. These steps include: Step **517** that determines whether an individual child shipment is a LTL shipment, and if so, Step **518** that updates the LTL shipment management system, otherwise, Step **519**

that determines whether the child shipment is a shipment comprising multiple packages, and if so, Step **520** that updates the small package management system accordingly, which more specifically refers to a temporary PLD (Package Level Detail) repository as will be described in detail below with reference to Fig. 9.

Referring to Fig. 6, shipping system outputs will be described. Again, what shipment outputs should be generated depends on the determination in Step **601**, i.e., whether the shipment for which output is requested is a consolidated shipment. If so, Step **602** will first process the consolidated shipment records stored in a database to obtain a consolidated manifest or House Bill of Lading (HBOL) as shown in Step **603**. An electronic form of the consolidated manifest or a House Bill of Lading is generated in Step **604**. Then an electronic form of the invoice regarding the consolidated shipment movement is generated in Step **605**. Such electronic manifest/HBOL and invoice will be emailed to the original shippers for their reference, or optionally to a customs agent, as shown in Step **606**. Because the shipment reference number **102** is part of the consolidated shipment records, each individual shipper will be provided with the consolidated shipment reference number **102** that enables them to track their own individual shipments that have been combined into this consolidated shipment. In the prior art, a shipper would likely lose track of his shipment of packages during the movement of consolidated shipments across an international boundary. This is because the first-level of movement is represented by consolidated shipments or parent shipments and thus shippers' child shipments that are merged into a consolidated shipment can no longer be tracked by what shippers are provided with, namely, child shipment reference numbers (Sub-Pro numbers **114** or package numbers **112**). In accordance with the present invention, however, shippers are provided with a consolidated shipment reference number **102** to track a particular consolidated shipment in the first-level movement. Alternatively, given the association between such consolidated shipment reference number **102** and individual child shipment reference numbers (Sub-Pro numbers **114** or package numbers **112**) stored in a system database, shippers can also use their child shipment reference numbers to obtain consolidated shipment reference number **102** for tracking their own child shipments.

When consolidated shipments reach the destination country, the deconsolidation process in Step **5** as seen in Fig. 2 will be performed. As a result of the deconsolidating process, each child shipment can be identified and thus further shipment outputs can be generated for each child shipment. For example, as the items of the consolidated shipment are de-consolidated, the codes on their labels can be scanned and decoded so that the resulting sub-pro numbers or package tracking numbers are identified and transmitted to a system database as described in detail below. As seen in Fig. 6, Step **607** processes data of a LTL child shipment and Step **608** generates an electronic document containing LTL PLD. Step **609** represents the time at which such LTL child shipment enters into the carrier's end-delivery network, which means it will be delivered to the ultimate consignee in the destination country. The relevant entities (shipper, consignee) will be notified of the arrival of such shipment via emails, faxes, phone calls, or any other equivalent means as shown in Step **610**. By analogy, a shipment comprising multiple packages will be processed in Step **611** to generate an electronic small package PLD document in Step **612**. After the Step **609** as explained above, the relevant entities (shipper, consignees) will be notified of the arrival of packages via emails, faxes, phone calls, or in any other equivalent manner as shown in Step **613**.

2. Virtual Inventory: Distribution Center (DC) Bypass and Allocation Delay

As described in detail below, an advantage of the present invention is the ability to delay the allocation, that is, the determination of the ultimate destination for the goods, until a later stage in the transportation process and thereby allow improved management of the importers' inventory. Sometimes when a manufacturer or supplier receives a purchase order for goods or products, the purchase order may not identify the allocation for the manufactured goods, that is, the manufacturer may not know where the goods will ultimately be shipped. In that case, the ability to delay allocation allows shippers to avoid delaying shipments until being certain about the ultimate consignee locations. Even if the allocation is known initially, destinations may be subject to re-direction depending upon the real-time market demands. For example, a purchase order may be sent to

one or more international vendors requesting the production and shipment of an amount of goods to the United States. At the time that the purchase order is sent, the importer does not have to know how it will allocate the goods among its various consignee locations (e.g. retail outlets). Instead, the importer needs only to estimate its anticipated need for the entire region using one of several demand planning systems that are known in the art, and the importer can wait until the goods arrive at the destination container freight station **28**, as seen in Fig. 7, before determining how to allocate the goods between the various consignees. This wait may preferably be a short time (e.g., 4-5 days) prior to, or even immediately after the goods arrive at the destination container freight station. In some cases, especially when the goods are moved by ocean vessel, this means that importers may have an additional two or three weeks before they have to determine the allocation. As will be apparent to one of ordinary skill in the art, the ability to delay the allocation gives the importer greater ability to respond to changing supply and demand conditions and offers a degree of flexibility not present in supply chain systems that are known in the art.

Fig. 7 illustrates the advantage of providing such flexibility in terms of specific timelines. For instance, if the labeling and allocation activities did not occur at the origin container freight station **16**, these activities are performed at the destination container freight station **28**. That gives a manufacturer or a supplier a grace period of typically at least 18 days to delay final determination how to distribute goods. As can be readily appreciated by a person of ordinary skill, such grace period may vary in a wide range, depending on different origins and destinations.

In addition, another advantage of the present invention is to provide an integrated shipment solution that allows shippers (i.e., goods suppliers, manufacturers, vendors, individual customers, etc.) to bypass distribution centers by shipping packages or goods across borders and directly to final consignees (i.e., retail stores, individual customers, etc.) within the destination country. As seen in Fig. 7, there is no need for suppliers or manufacturers to maintain distribution centers in the supply chain **10** because allocation of goods can be determined and timely updated at any point from the origin container freight station **16** to the destination container freight station **28**. Both stations are a carrier's operating

facilities. In other words, by using the transportation containers (e.g., ocean vessels, ground trucks) as virtual inventory warehouses, the present invention allows suppliers to bypass distribution centers used to be necessary for storing goods awaiting final allocation in the supply chain.

Enhanced End-to-End Visibility

1. Overview of the End-to-End Visibility Concept

Another aspect of a preferred embodiment of the supply chain system **10** of the present invention is an ability to deliver end-to-end visibility. At present, the supply chains that are known in the art are dominated by small freight forwarding companies that have limited freight tracking capabilities and, typically, the freight tracking that is presently available is most often reliant on manual information transmitted via telephone, facsimile and paper documents. And whatever limited tracking is available on the freight or consolidated shipment movement leg of the supply chain ends when the shipment leaves the destination container freight facility **28** and enters the end-delivery systems (or child shipment movement leg). In other words, prior attempts to provide end-to-end visibility for shipping customers have been "piecemeal" combinations of limited tracking information without an automated integrated interface that provides all tracking information. A benefit of an embodiment of the present invention is the ability to track the shipment through both the consolidated shipment movement leg and child shipment movement leg(s), and, moreover, to provide this end-to-end tracking via a single interface.

As illustrated in Figs. 8A-C, the movement of goods from the origin to the destination country or region is governed by a freight tracking system (including a system for tracking consolidated shipments), and the movement within the destination country or region till each respective consignee location is governed by an end-delivery system (including a system for tracking child shipments). A link between the freight tracking system and the end-delivery system preferably occurs at the point when the end-delivery package labels are added to the packages or goods, which occurs after the allocation is determined either at the origin or destination container freight stations. As part of the integration of the various tracking systems, an end-delivery tracking number (e.g., Sub-Pro number **114** or package tracking number **112**) is linked to a freight tracking reference number

(e.g., consolidated shipment reference number **102**) such as a house bill of lading or a pro bill. Thus, when a user accesses the freight tracking database with a freight tracking reference number, the freight tracking system uses this link to access the end-delivery tracking numbers that are associated with the shipment being tracked. In the case of small goods, multiple end-delivery tracking numbers, such as the package tracking number used by UPS to track packages in its network, are typically associated with a single freight tracking reference number. But one of ordinary skill will recognize that the supply chain system **10** described herein is not limited to small package movement and in the case of larger goods, such as white goods, a single end-delivery tracking number may be associated with a freight tracking reference number.

As shown in Figs. 8A-C, this type of integration of the freight tracking and end-delivery tracking systems provides the user with end-to-end visibility through both a consolidated freight movement leg and a child shipment leg of the supply chain **10**. Thus, when a shipment is in transit from the origin shipper **12** to the destination container freight station **28**, i.e., the consolidated freight movement leg, the freight tracking system provides the tracking data for the consolidated containers. When the shipment reaches the destination container freight station **28** and the packages are deconsolidated, the individual packages leave the control of the freight companies, and the final movement from the destination container freight station **28** to the ultimate consignee(s), i.e., the child shipment leg, is tracked by the end-delivery system (or systems).

In an alternative embodiment, the end-to-end visibility is provided to the user through recording and reporting various visibility events. These visibility events correspond to various occurrences during the movement of goods in the consolidated shipment as well as child shipments. In other words, the visibility events altogether reflect the end-to-end visibility in terms of a shipment timeline. In the case of a shipper who is shipping manufactured goods from a factory to destination consignees (e.g., retail stores), there are a number of consolidated shipment events **710**, including receiving purchaser order information of goods, requesting for a pickup or notifying of a drop-off of shipments of goods, arrival of shipment of goods at the origin container freight station (CFS) **16**, departure of shipment of goods from the origin container freight station (CFS) **16**, export

clearance of shipment of goods, departure of shipment of goods from the origin country, arrival of shipment of goods in the destination country, import clearance of shipment of goods, and arrival of shipment of goods at the destination container freight station (CFS) **28**. The child shipment events **720** include uploading Package Level Data (PLD) or LTL shipment data at the origin container freight station (CFS) **16** and the destination container freight station (CFS) **28** respectively, LTL shipment pickup, tender of goods to end-delivery carriers such as UPS, and tracking movement of shipment within an end-delivery network. In a preferred embodiment, the present invention provides an ability to facilitate return of ordered goods or products from a consignee in the destination country to the origin country. The resulting child shipment return events **730** may include, but not limited to, receiving returns for consolidation, receiving returns for deposition, notification of returns, and awaiting disposition. There are also exception events **740** that govern exceptional instances during the movement of goods, such as data file exception (e.g. data file not received), pickup exception, change in estimated date of departure, change in estimated data of arrival, general exceptions (e.g., damages, fallout, hold, delay), hold at export customs or import customs. All these exception events **740** can occur during either consolidated shipment movement, or child shipment movement or both movements, and need to be notified to shippers in a timely manner. Thus, shipment notifications **750** include consolidated shipment exception notifications, LTL shipment exception notifications and small package exception notifications. In addition, the shipment notifications **750** include consolidated shipment ship notification, tender to LTL shipment notification, tender to a third party for delivery notification, and tender to end-delivery of small packages notification. From the standpoint of information management, each visibility triggers a corresponding data update and/or data report.

In a preferred embodiment, the tracking of the shipment through the freight movement leg and the child shipment leg occurs via a single web browser interface. A number of software applications are known in the art for tracking shipments through the freight movement leg of the supply chain, and one of these applications is known as Flex Global View (FGV). As described in detail with reference to Figs. 9-11, in a preferred embodiment, the FGV interface is adapted to

allow users to drill down and obtain child shipment data, which allows the user to track the various packages in a shipment through the child shipment leg of the supply chain.

In a preferred embodiment, the end-delivery tracking system communicates via a network, such as the Internet, to update the freight tracking system with updates about the movement of child shipments in the end-delivery system or systems. In a preferred embodiment, these updates occur at predetermined intervals, such as, for example, once an hour. In an alternative embodiment, a link is established on a transaction-by-transaction basis between the freight tracking system and the end-delivery tracking system to obtain a status update about one or more of the child shipments whenever requested by a user. Or, in still another alternative embodiment, the freight tracking system is updated on a predetermined interval, but the user has the option of requesting an immediate update for a selected package or child shipment. This data loading process will be described in detail below with reference to Fig. 13.

The diagram in Fig. 9 illustrates an implementation of an integrated system **800** for providing end-to-end visibility of movement of goods in international shipments. As aforementioned, such movement is comprised of two levels: movement of a consolidated freight shipment and movement of individual child shipments. Typically, separate systems are employed to provide visibility into different movements. For example, users can access a freight movement visibility system that allows user to enter a freight tracking number and view generic tracking events and generic data elements specific to the tracking number that was entered. This system does not provide PLD information of each individual package or LTL shipment within a child shipment. In addition, when a consolidated freight shipment is de-consolidated, the tracking events of each individual child shipments, especially each small package, are invisible to users in this system. The child shipments may be performed by different carriers and as a result, users have to access different systems for viewing the movement of child shipments. The present invention provides an integrated system **800** combining all these existing or non-existing systems so that users have a single interface from which to view the full life cycle of their shipments, including detailed tracking

events and data elements, from a shipping origin to a destination country and to the ultimate consignees within the destination country.

As seen in Fig. 9, to implement the end-to-end visibility concept, the integrated system **800** requires operations and communications of a number of sub-systems. These sub-systems include, but not limited to, a visibility interface system **810**, a client shipping system **840**, a small package visibility system **850**, a warehouse management system **860**, a LTL shipment visibility system **870**, a transportation management system **880**, a customs management system **890**. While each of the above-listed systems may include one or more databases for storing data, as can be readily appreciated by a person of ordinary skill, the integrated system **800** utilizes additional databases for facilitating transfer and frequent use of certain types of data. Such databases include a PLD database **830**, a PLD extract database **820** and a customer shipment detail database **900**.

Functionalities of each above-identified system components and their contributions to the operation of the integrated system **800** are described in the following processes:

Process 1 – Creating Shipping labels

Depending on the country of origin, a shipper may have access to use the client shipping system **840** to produce a label. Such client shipping system **840** can be customized by the carrier and, as part of a programmable service application, integrated into a shipper's internal system. Alternatively, the client shipping system **840** can be hosted in an ASP (Application Service Provider) environment, and thus can be accessible to any users over a communications network, preferably the Internet. For any shipments that are intended to be consolidated into a consolidated shipment, the client shipping system **840** will assign to the corresponding shipment data records stored in the database **830** an additional reference field that will be used to store the House Bill of Lading or the master PRO number. Meanwhile, an indication flag is set in the database **830** for the data records of each small package within a received shipment in the small package visibility system **850**. At the end of day processing, the small package visibility system **850** loads package information to the PLD database **830**.

Process 2 – Downloading Small Package data from the PLD database **830**

On a regular basis, the package information loaded into the PLD database **830** is parsed and a subset of this data is extracted and made available to the visibility tool(s). As seen in Fig. 9, this subset of package data is stored in a PLD extract database **820**. This process creates the link between the package identifiers, i.e., package tracking numbers **112**, and the consolidated freight shipment identifier, i.e., consolidated shipment reference number **102**, which is also stored in the database **820** as described below.

Process 3 – Warehousing of Shipments

Typically, the CFS/Cross Dock locations (See **16**, **28** in Fig. 1) will use a warehouse management system **860** (e.g. Exceed, PKMS MEPAW, etc). An interface between the warehouse management system **860** and the visibility interface system **810** (Flex Global View) has been deployed. This will allow for visibility events to be captured for inbound cross dock, outbound cross dock, and returns processing for shipments. The warehouse management system **860** has the capability to print packing lists. As can be readily appreciated to one of ordinary skill, the warehouse management system **860** also allows for shipment records to be loaded to the client shipping system **840** for labeling of the individual packages as defined in Process 1.

Process 4 – Customs Brokerage

Shippers may submit a data file **900** with the shipment details for customs brokerage. A shipment identifier (HBL or PRO number) is supplied with the data file **900** to identify the shipment when it arrives at the border. This data file **900** also includes type of materials, destination, harmonized codes, and weight of shipment. This file **900** is submitted to the customs management system **890**, which can be any off the shelf system (e.g., VASTERA, Theta, or Main brokerage system). The customs management system **890** uses the API interface to collect brokerage events from the customs. In the meantime, customs uses the file **900** to clear the cargo upon entry into the destination country.

Process 5 – Transportation Management (TM)

The origin CFS/Cross Dock locations **16** have access to a transportation management system **880**. This system is used to collect and track the movement of a shipment after it leaves the origin CFS/Cross Dock location **16**. The events captured in the transportation management system **880** are loaded into the visibility interface system **810** (Flex Global View). The transportation management system **880** can be GBS-TM that is typically used in ocean and air transportation, or AlphaTruck that is typical of ground transportation. When the customer is ready to have a shipment transported, it either uses the client shipping system **840** or a web portal connected to the transportation management system **880** to prepare the shipment. A shipment identifier (HBL or PRO number) is assigned to the shipment and tracked in the transportation management system **880**. When the shipment arrives at a CFS/Cross Dock location, the arrival event is manually entered into the transportation management system **880**. When a shipment is ready to leave the destination CFS/Cross Dock for either Small package or LTL/FTL distribution, the departure (tendered to) event is manually entered into the transportation management system **880**.

Process 6 – Visibility

All CFS/Cross Dock locations use the visibility interface system **810** (such as Flex Global View) as the visibility tool. The visibility interface system **810** allows a user to view visibility events about a shipment or part of a shipment in one of the following methods:

a. All Shipments for a Customer

A user is able to query for all shipments within a specified date range by entering their customer shipper number and the desired date range. The query will return a list of all shipments for the customer that were picked up between the specified date ranges. The user will then be able to select a specific shipment to view visibility events related to that shipment.

b. Entire Shipment Query

A user is able to query for an entire shipment by entering a PRO number **102** or a House Bill of Lading number **102**. The query will return the shipment level summary events. The events will stop at the identification of any split in the shipment. This normally occurs when the shipment arrives at and then departs

from the destination CFS/Cross Dock **28**. The user will be able to select any of the splits of the original shipment to drill down to the next level when package detail data is uploaded at the destination CFS/Cross Dock **28**.

c. Shipment Split Query

A user is able to query for a specific child shipment of the original consolidated shipment. The user will enter a Sub-Pro number **114**. The search will return the child shipment level information. These events will show all movements from the time the original consolidated shipment was split until the child shipment is delivered, or is again split into smaller shipments. If the split shipment is delivered as comprising only small packages, the user will be able to select any of the package tracking numbers **112** to drill down to the next level. This functions the same as the individual package tracking.

d. Individual Package Search

A user is able to query for a specific package or a group of packages being shipped to the same location. This query can only be performed for small package shipments. The user will enter either the package tracking number **112** of a specific package or the reference field identifier, such as store number, purchase order number, or HBL number. The query will pull data from the small package visibility system **850** for matching records for the package or reference field supplied.

2. Specific Implementation of the End-to-End Visibility Concept

With reference to Figs. 10-21A-B, a specific web-based application system providing end-to-end visibility will be described.

a. System Architecture

Fig. 10 shows a high-level diagram of the architecture of the visibility interface system **810** in accordance with one embodiment of the present invention. The architecture is comprised of three layers: a client interface **1010**, a middle-ware application **1000** and a backend system server **1020**. Typically, the client interface **1010** comprises a web browser **1012** as a user-friendly interface. The middle-ware application **1000** comprises one or more web servers **1002** that process user requests received from the web browser **1012** and one or more application servers **1004** that execute specific programmable instructions in response to receiving data processed by the web servers **1002**. To make data easily

accessible to the application servers **1004**, the middle-ware application **1000** preferably comprises a database for direct data access and retrieval. In Fig. 10, the database is represented by the PLD extract database **820** as explained above. The backend system server **1020** refers to all of the backend systems that communicate with and support the middle-ware application **1000**. As can be appreciated by one of ordinary skill, this backend system server **1020** can comprise a number of servers and databases. For illustration purposes, Fig. 10 shows that in the level of the backend system server **1020** there are at least a central server **1022** and a database, i.e., the PLD database **830**.

Fig. 11 provides a detailed view of the system architecture presented in Fig. 10 and how data flows between different servers and databases of the visibility interface system **810** in operation. The client interface **1010** (i.e., the web browser **1012**) receives user queries which are to be communicated to at least one of the web servers **1002**. The web server **1002** will process the user queries to generate query data that triggers execution of certain programmable instructions by at least one of the application servers **1004**. In executing the programmable instructions, the application server **1004** will determine from which database to retrieve response data. As seen in Fig. 11, the application server **1004** can access the PLD extract database **820** that stores a subset of package data. Such subset of package data is updated by loading information automatically from the PLD database **830** on an hourly basis or daily basis. In a preferred embodiment, such data loading can be performed by a FTP server **1028** that comprises a host server **1024** having access to the PLD database **830** and communicating with an agent application server **1026**. The agent application server **1026** transfers package data received from the host sever **1024** to a database server **1006** that resides in the middle-ware application **1000**. Then, the database server **1006** executes a load-script application **1008** for storing loaded package data into the PLD extract database **820**. This loading process is further illustrated in Fig. 13 as described below. If the PLD extract database **820** does not contain the requested package data, the application server **1004** will generate a data request, which is preferably in the format of a XML document, to the backend system server **1020**. The XML Tools **1021** installed in the backend system server **1020** interprets the XML data request

so that the requested package data will be retrieved from the PLD database **830** and transferred to the application server **1004**.

b. Hardware Requirements

Turning to Figure 21A, one embodiment of a computer is illustrated that can be used to practice aspects of the present invention. In Figure 21A, a processor **901**, such as a microprocessor, is used to execute software instructions for carrying out the defined steps. The processor receives power from a power supply **917** that also provide power to the other components as necessary. The processor **901** communicates using a data bus **905** that is typically 16 or 32 bits wide (e.g., in parallel). The data bus **905** is used to convey data and program instructions, typically, between the processor and memory. In the present embodiment, memory can be considered primary memory **902** that is RAM or other forms which retain the contents only during operation, or it may be non-volatile **903**, such as ROM, EPROM, EEPROM, FLASH, or other types of memory that retain the memory contents at all times. The memory could also be secondary memory **904**, such as disk storage, that stores large amount of data. In some embodiments, the disk storage may communicate with the processor using an I/O bus **906** instead or a dedicated bus (not shown). The secondary memory may be a floppy disk, hard disk, compact disk, DVD, or any other type of mass storage type known to those skilled in the computer arts.

The processor **901** also communicates with various peripherals or external devices using an I/O bus **906**. In the present embodiment, a peripheral I/O controller **907** is used to provide standard interfaces, such as RS-232, RS422, DIN, USB, or other interfaces as appropriate to interface various input/output devices. Typical input/output devices include local printers **918**, a monitor **908**, a keyboard **909**, and a mouse **910** or other typical pointing devices (e.g., rollerball, trackpad, joystick, etc.).

The processor **901** typically also communicates using a communications I/O controller **911** with external communication networks, and may use a variety of interfaces such as data communication oriented protocols **912** such as X.25, ISDN, DSL, cable modems, etc. The communications controller **911** may also incorporate a modem (not shown) for interfacing and communicating with a standard telephone line **913**. Finally, the communications I/O controller **911** may

incorporate an Ethernet interface **914** for communicating over a LAN. Any of these interfaces may be used to access the Internet, intranets, LANs, or other data communication facilitites.

Finally, the processor **901** may communicate with a wireless interface **916** that is operatively connected to an antenna **915** for communicating wirelessly with another devices, using for example, one of the IEEE 802.11 protocols, 802.15.4 protocol, or a standard 3G wireless telecommunications protocols, such as CDMA2000 1x EV-DO, GPRS, W-CDMA, or other protocol.

An alternative embodiment of a processing system than may be used is shown in Figure 21B. In this embodiment, a distributed communication and processing architecture is shown involving a server **920** communicating with either a local client computer **926a** or a remote client computer **926b**. The server **920** typically comprises a processor **921** that communicates with a database **922**, which can be viewed as a form of secondary memory, as well as primary memory **924**. The processor also communicates with external devices using an I/O controller **923** that typically interfaces with a LAN **925**. The LAN may provide local connectivity to a networked printer **928** and the local client computer **926a**. These may be located in the same facility as the server, though not necessarily in the same room. Communication with remote devices typically is accomplished by routing data from the LAN **925** over a communications facility to the Internet **927**. A remote client computer **926b** may execute a web browser, so that the remote client **926b** may interact with the server as required by transmitted data through the Internet **927**, over the LAN **925**, and to the server **920**.

Those skilled in the art of data networking will realize that many other alternatives and architectures are possible and can be used to practice the principles of the present invention. The embodiments illustrated in Figures 21A and 21B can be modified in different ways and be within the scope of the present invention as claimed.

c. Data Structures

As can be appreciated by a person of ordinary skill, the visibility interface system **810** according to one embodiment of the present invention involves all kinds of data, such as the above-mentioned PLD data. To illustrate the data structures **1200** of the system **810**, Fig. 12 provides a set of data tables containing

various data elements. As shown in Fig. 12, each data record in the table of Package **1210** is represented by a tracking number **1211**, referenced by a shipment number **1231**, and described by the data fields of a description **1212**, a weight **1213** and a COD amount **1214**. Each data record in the table of Shipment **1230** is identified by the shipment number **1231**, and comprises data fields: Pickup_Date **1232**, Service_Level **1241**, Consignee_Name **1251**, Consignee_Attention Name **1252** and Shipper_Name **1261**. The table of Service_Level **1240** includes different transportation means such as air, ocean, ground, etc. The Consignee table **1250**, identified by Consignee_Name **1251** and Consignee_Attention Name **1252**, comprises data profiles of different consignees. A consignee data profile includes information such as Consignee_Address **1253**, Consignee_City **1254**, Consignee_State **1255**, Consignee_Country **1256** and Consignee_Postal_Code **1257**. Similarly, the Shipper table **1260**, identified by Shipper _Name **1261**, comprises data profiles of different shippers. A shipper data profile includes information such as Shipper_Address **1262**, Shipper_City **1263**, Shipper_State **1264**, Shipper_Country **1265** and Shipper_Postal_Code **1266**. The Package_Reference table **1220** reflects the links between packages and shipments. Besides the data fields of tracking number **1211** and shipment number **1231**, a data record of the Package_Reference table **1220** also includes a Reference_Sequence field **1221** and a Reference field **1222**.

The relations between these data tables are explained below:

R1: Package **1210** v. Shipment **1230**

Because a shipment may comprise multiple packages, the relation between Shipment **1230** and Package **1210** is 1:N.

R2: Package **1210** v. Package_Reference **1220**

To facilitate information retrieval, the relations between Shipment **1230** and Package **1210** are stored in a separate table, namely, Package_Reference **1220**. This table is identified by a combination of the tracking number **1211** and shipment number **1231**. For each package, it can be associated with one child shipment or one consolidated freight shipment. Therefore, the relation between Package **1210** and Package_Reference **1220** is 1:N.

R3: Shipment **1230** v. Service-Level **1240**

Each shipment may be transported via more than one transportation means. For example, a consolidated shipment can be shipped across the ocean before it is deconsolidated and the enclosed child shipments enter into the ground transportation network. Thus, the relation between Shipment **1230** and Service-Level **1240** is N:N.

R4: Shipment **1230** v. Consignee **1250**

A shipment can comprise multiple packages, each intended to be delivered to a different consignee. In turn, a consignee may receive more than one shipment. As a result, the relation between Shipment **1230** and Consignee **1250** is N:N.

R5: Shipment **1230** v. Shipper **1260**

A shipment can comprise multiple packages, each received from a different shipper. In turn, a shipper may request for more than one shipment. Thus, the relation between Shipment **1230** and Shipper **1260** is N:N.

d. Process Flow

Fig. 14 is a process flow block diagram that illustrates how the present invention provides end-to-end visibility of the movement of the goods from the origin shipper **12** to consignee **36** as illustrated in the supply chain **10**. Again, in one embodiment, each step in the movement of the goods is preferably controlled by a single entity referred to herein as a supply chain carrier. While the present invention is not limited to this embodiment, an advantage of having one supply chain carrier, such as UPS, is the presentation of an end-to-end delivery solution with a one point of contact for visibility and, preferably, a consolidated invoice (as produced by Step **605** in Fig. 5B) that has one delivery price (in one currency) that reflects the accumulated cost of each stage of the delivery process (even if several of the movements in the delivery process were performed by third-party entities and even if several of these entities required payment in one or more different currencies). Thus, an aspect of the present invention is the combination of freight movement with end delivery processes and the control and management of these systems by a single supply chain carrier.

With reference to Fig. 14, the process flow is described involving a user using the client interface **1010**, middle-ware application **1000** (represented in the figure as FGV) and backend system server **1020** (represented in the figure as UPS.com).

The user logs on to the freight tracking system in Step **1402** and selects Track Shipment from a menu of options in Step **1404**. At Step **1406**, the user enters an identifier that is used to query specific shipment information stored in a database accessible to the middle-ware application **1000**. The identifier is preferably a date or some other type of reference information. A number of data filters can be used in this step and will be described below with reference to the exemplary screen displays in Figs. 16-20.

At Step **1408**, the middle-ware application **1000** returns a list of shipments that match the query criteria. The list of shipments may take the form of a list of House Bills of Lading, a list of Pro bills, or some other reference identifier that is known or commonly-used in the freight forwarding industry.

At Step **1410**, the user clicks on one of elements in the list of shipments (e.g., clicks on one of the listed house bills of lading or pro bills) to drill down into a screen that allows the user to access request shipment details for goods associated with the shipment.

At Step **1412**, the middle-ware application **1000** returns and displays the list of end-delivery shipments (e.g., UPS shipments) that correspond to the shipment (house bill of lading/pro bill) selected by the user. In a preferred embodiment, the end-delivery shipment information is made available to the user at the point that the packages are labeled for end-delivery, which, as indicated above, preferably occurs at either the origin or destination carrier freight stations.

At Step **1414**, the user clicks on one of the child shipments. At Step **1416**, the middle-ware application **1000** returns and displays a list of the packages associated with the selected shipment. In a preferred embodiment, this information includes some or all of the following: end-delivery tracking number, merchandise description, service type, package weight, freight reference number (e.g., house bill/pro bill number), additional reference fields and consignee shipping information (name, address, city, state, zip, country) and COD amount.

As explained above, such package data displayed in Step **1416** is stored in the PLD extract database **820** as a result of periodic loading from the PLD database **830**. Fig. 13 illustrates the loading process as comprising Step **1301** that the backend system server **1020** sends PLD data to the middle-ware application **1000** on an hourly basis, and Step **1302** that the middle-ware application **1000** receives the PLD data into a server database, i.e., the PLD extract database **820**. As seen below, the FGV communicates with the backend system by use of XML requests. However, the existing XML interface for retrieving PLD data is limited by the fact that it can only return a maximum of 64kb amount of data. To overcome this limitation to data retrieval, using hourly data loading would facilitate transferring of data over the amount of 64kb.

Turning back to Fig. 14, at Step **1418**, the user attempts to drill down further into the end-delivery information by clicking on a hypertext link that is associated with the end-delivery tracking number. At Step **1420**, the FGV receives this user request and converts the request into an XML request to the backend system server **1020** (end-delivery tracking system) for an updated status of the requested package. At Step **1422**, the backend system server **1020** (end-delivery tracking system) receives the XML tracking request and returns the package status information for the requested package. At Step **1424**, the middle-ware application **1000** receives the updated status from the end-delivery tracking system and displays the updated status to the user. Finally, at Step **1426**, the user views the most recent status of the end-delivery shipping process using the freight tracking system interface.

e. Exemplary Screens

Figs. 15-20 illustrate the user interface designs in accordance with one embodiment of the present invention. Fig. 15 shows a screen flow that corresponds to the above-described process flow in Fig. 14. This screen flow comprises a track shipments query page **1510**, a customize output page **1520**, a track shipments result list page **1530**, a track shipment details page **1540**, a shipment details page **1550** and a package detail (XML) page **1560**. Exemplary screen displays corresponding to this screen flow are illustrated in Figs. 16-20 respectively.

Starting with Fig. 16, after a user logs on the web-based browser interface, the track shipments query page **1510** will be displayed. In this screen display, the user is allowed to enter one or more criteria to query specific shipments. For example, in a drop-down list **1600**, a user can select what information to "Search For". The user can choose, for example, to view all House Bills associated with consolidated shipments. Other criteria include a reference field of "Transportation" **1602** in which the user can select to search for air, ocean or ground transportation, a reference field of "Reference" **1604** in which the user can type in a reference number such as House Air Waybills, a reference field of "Date" **1606** by which the user can select a time period or a fixed time point, a reference field of "Origin" **1608** and a reference field of "Destination" **1610**.

In response to the user query, the track shipments result list page **1530** as exemplified in Fig. 17 returns and displays a list of searched shipment results. Each shipment is represented by a shipment reference number (**102** as aforementioned), i.e., Housebill/Truckbill **1701** in Fig. 17. Each reference number is provided with a hyperlink that allows the user to click on in order to get more shipment details as shown in Fig. 18.

Fig. 18 shows shipment details regarding a consolidated shipment identified by a house bill number (here referred as "ACME-SURF-DEMO1"). The display is comprised of several detail sections. Section **1801** shows general information of a consolidated shipment such as the origin and destination. Section **1802** shows routing information of the consolidated shipment. Section **1803** shows a list of LTL child shipments associated with the consolidated shipment. Each LTL child shipment is identified by a child shipment reference number **114** (Sub-Pro number) which is provided with a hyperlink that allows the user to click on and drill down for more details of a particular LTL child shipment. Section **1804** shows a child shipment comprising a list of small packages associated with the consolidated shipment. Similarly, each package number **112** identifying each package is provided with a hyperlink that allows the user to click on and drill down for more details of a particular package. Section **1805** shows significant tracking events of the movement of the consolidated shipment.

Fig. 19 provides a summary list of multiple small packages contained by a child shipment. Each listed package is identified by a package tracking number that is provided with a hyperlink allowing the user to click on and drill down for more details of a particular package.

When a user clicks on one particular package tracking number in Fig. 19, the screen display in Fig. 20 will be shown to present detailed moving status of the package identified by that particular package tracking number.

Based on the above-explained system architecture, hardware requirements, data structures, process flow and exemplary screen displays, it will be readily appreciated by a person of ordinary skill that the present invention provides end-to-end visibility for any entity involved in shipment of goods. Specifically, shippers or consignees are able to use an integrated interface to track status of both freight shipments that include their individual child shipments and their own shipment down to the package detail level. Furthermore, by means of well-known user identity verifications, such as verifying user names and user passwords, the present invention allows for different levels of visibility available to different users. For example, a consignee may be allowed to view further details of his child shipments within a consolidated shipment, but not details of other child shipments within the same consolidated shipment.

As described above, the present invention provides end-to-end visibility in the movement of a package. In addition, by consolidating child shipments, the present invention allows for shippers' flexibility in distributing goods in shipment. The combination of end-to-end visibility and the ability to delay a determination of the ultimate destination for goods in transit provides a degree of flexibility in inventory management that is not known in the art. As an example, goods that are moved by ocean vessel often spend two or more weeks traveling in the cargo hold of the vessel. Using the global visibility tracking system described above, an importer can determine the arrival date of the ocean vessel, commodity information, and in a preferred embodiment, information describing the content of the packages in the cargo hold of that vessel. This knowledge allows the ocean vessel to serve as a de facto distribution center in that it provides the importer with an inventory of goods that the importer can direct to any number of different

locations. In view of this example, a virtual inventory system can be accomplished in accordance with one embodiment of the present invention.

In concluding the detailed description, it should be noted that it will be obvious to those skilled in the art that many variations and modifications can be made to the preferred embodiment without substantially departing from the principles of the present invention. Also, such variations and modifications are intended to be included herein within the scope of the present invention as set forth in the appended claims. Further, in the claims hereafter, the structures, materials, acts and equivalents of all means or step-plus function elements are intended to include any structure, materials or acts for performing their cited functions.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

THAT WHICH IS CLAIMED:

1. A system for efficiently handling global shipments, comprising:

(1) a receiving facility at which a carrier receives multiple child shipments comprising:

a. a code reading device configured to read destination country information from said multiple child shipments and to store such information as electronic data in a code reading device memory;

b. a handling facility at which a subset of child shipments are combined into a consolidated shipment and marked with a code containing a consolidated shipment tracking number;

(2) a computer configured to receive said destination information from said code reading device memory, to store said destination information in a computer memory, to identify said subset of child shipments having an identical destination country from said multiple child shipments, to link electronically in said computer memory said subset of child shipments to said consolidated shipment by assigning and storing said consolidated shipment tracking number;

(3) an import receiving facility at which said consolidated shipment is received in said destination country after processing of said consolidated shipment through export and import customs for custom clearance, and is separated into said child shipments of said subset of child shipments for delivery to a respective consignee location.

2. The system of Claim 1, wherein one of said multiple child shipments comprises a LTL (Less-than-Truckload) shipment or a TL (Truckload) shipment, said LTL or TL shipment identified by a child shipment tracking number.

3. The system of Claim 1, wherein one of said multiple child shipments comprises one or more small packages, each of said one or more small packages identified by a child shipment tracking number.

4. The system of Claim 2 or 3, wherein said code reading device is configured to read said child shipment tracking numbers; and said computer is configured to receive and store said child shipment tracking numbers and to link in a data file of said computer memory said child shipment tracking numbers of said subset of child shipments with said consolidated shipment tracking number, and to provide a consolidated shipment output based in part upon said data file.

5. The system of Claim 4, wherein one or more shipping labels are generated and printed from a carrier-provided shipping label application accessible to said multiple shippers via a communications network, said carrier-provided shipping label application receiving child shipment data from said multiple shippers, said shipment data comprising package detail data, a ship-from address, a ship-to address, a delivery date and a service level, each of said one or more shipping labels being printed with one of said child shipment tracking numbers.

6. The system of Claim 1, further comprising a message generating and transmitting device configured to send messages containing said consolidated shipment tracking number to entities associated with any one of said subset of child shipments, said entities including at least a shipper and a consignee, wherein said entities are enabled to use said consolidated shipment tracking number to track status of said consolidated shipment, and further to view a display of said subset of child shipments.

7. The system of Claim 1, further comprising one or more instruction devices configured to allow a shipper of one or more of said child shipments within said subset of child shipments, to change a respective consignee destination location in said destination country by sending a message to said carrier via a communications network.

8. The system of Claim 1, wherein said code reading device is configured to read child shipment tracking numbers from said multiple child shipments and store such information as part of said electronic data in said code reading device memory, and wherein said computer is further configured to retrieve shipment detail information for said child shipments from said memory or from a previously stored data file, and further configured to:

(1) process each of said plurality of child shipments through the steps of:

(a) determining from said data whether said child shipment is a LTL (Less-than-Truckload) child shipment;

(b) responsive to the determination that said child shipment is a LTL child shipment,

(i) identifying from said shipping data a LTL shipment reference number that identifies said child shipment; and

(ii) associating said LTL shipment reference number with said consolidated shipment reference number; and

(c) responsive to the determination that said child shipment is not a LTL child shipment,

(i) identifying from said shipping data one or more package reference numbers that respectively identify each package associated with said child shipment; and

(ii) associating each of said one or more package reference numbers with said consolidated shipment reference number; and

(d) storing the associations in step (b)(ii) or (c)(ii) in an association data file in said computer memory; and

(2) generate a consolidated shipment output based in part upon said association data file.

9. The system of Claim 8, wherein said consolidated shipment output comprises said consolidated shipment reference number, one or more LTL shipment reference numbers, a shipment date, a manifest including shipping data associated with each of said plurality of child shipments, a shipment log including at least a shipping status of said consolidated shipment, and one or more package reference numbers.

10. The system of Claim 9, wherein said previously stored data file is located in one or more databases of a carrier's backend shipping system, and further comprising an updating device configured to receive said consolidated shipment output from said computer and to update said one or more databases of said carrier's backend shipping system.

11. An integrated global shipment system providing end-to-end visibility of movement of goods in shipment, said system comprising:

a first shipment visibility system for tracking movement of a consolidated shipment from an origin country to a destination country, said consolidated shipment comprising one or more child shipments that need to be shipped to said destination country; and

a second shipment visibility system for tracking movement of each of said one or more child shipments within said destination country;

wherein,

said first shipment visibility system is associated with said second shipment visibility system so as to provide an integrated visibility interface for tracking movement of each of said one or more child shipments from said origin country to said destination country and within said destination country.

12. The system of Claim 11, wherein said first shipment visibility system comprises one or more databases accessible to a processor, said processor configured for:

receiving shipping data associated with said one or more child shipments, said shipping data comprising at least one or more child shipment reference numbers corresponding to said one or more child shipments;

generating a consolidated shipment reference number for identifying said consolidated shipment;

associating said consolidated shipment reference number with each one of said one or more child shipment reference numbers;

creating a data file to include said associations and said shipping data associated with said one or more child shipments; and

storing said data file in said one or more databases.

13. The system of Claim 12, wherein said processor is further configured for:

obtaining said consolidated shipment reference number identifying said consolidated shipment;

using said consolidated shipment reference number to retrieve shipping data associated with said one or more child shipments from said one or more databases;

using said consolidated shipment reference number to retrieve movement data associated with said consolidated shipment from a transportation management database;

using said consolidated shipment reference number to retrieve customs clearance data associated with said consolidated shipment from a customs management database;

displaying said shipping data, said movement data, and said customs clearance data to a user; and

receiving input from said user to update said one or more databases, said transportation management database and said customs management database.

14. The system of Claim 11, wherein at least one of said one or more child shipments consists of multiple small packages, and wherein said second shipment visibility system comprises one or more databases accessible to a processor, said processor configured for:

obtaining a package tracking number identifying a small package from said multiple small packages, said package tracking number obtained by scanning a shipping label affixed on said small package or receiving a key-entry input;

using said package tracking number to retrieve package data associated with said small package from a package database, said package data comprising information of each item of goods enclosed in said small package;

using said package tracking number to retrieve movement data associated with said small package from a transportation management database;

displaying said package data and said movement data to a user; and

receiving input from said user to update said package database and said transportation management database.

15. The system of Claim 11, wherein said first shipment visibility system is associated with said second shipment visibility system through:

a repository unit storing package data associated with said one or more child shipments, said repository unit accessible to said first shipment visibility system and said second shipment visibility system; and

a server computer having access to said repository unit, said server computer configured for:

using a consolidated shipment reference number to identify one or more child shipment reference numbers corresponding to said one or more child shipments;

searching a package database in said second shipment visibility system to retrieve said package data associated with said one or more child shipments; and

loading said package data into said repository unit.

16. The system of Claim 15, wherein said server computer is further configured for detecting changes in said package data associated with said one or more child shipments in said package database in said second shipment visibility system; and responsive to the detection, updating said repository unit.

17. The system of Claim 11, wherein said integrated visibility interface is further configured for:

receiving a user input of a particular child shipment reference number for querying movement of a particular child shipment of said one or more child shipments; and

in response to the input of said particular child shipment reference number, displaying movement data of said consolidation shipment if said consolidated shipment has not arrived in said destination country, and further displaying movement data of said child shipment if said consolidated shipment has arrived in said destination country and said child shipment is in delivery within said destination country.

18. The system of Claim 17, wherein said movement data of said consolidation shipment is retrieved from a database based upon a consolidation shipment reference number, said consolidation shipment reference number associated with said particular child shipment reference number.

19. An integrated global shipment system providing visibility of movement of goods in shipment, said system comprising one or more databases accessible to at least a server computer,

said one or more databases storing shipping data for multiple shipments of goods, wherein said shipping data is received from a carrier-customized client shipping system or a web-based client shipping application; and

said server computer configured for:

receiving, from a warehouse management system, shipper-to-consignee transaction data associated with a shipment of goods;

receiving, from a transportation management system, movement data associated with said shipment of goods;

receiving, from a customs management system, customs clearance data associated with said shipment of goods;

retrieving, from said one or more databases, particular shipping data associated with said shipment of goods; and

generating a shipment output data file based in part upon said shipper-to-consignee transaction data, said movement data, said customs clearance data, and said particular shipping data associated with said shipment of goods.

20. The system of Claim 19, wherein said carrier-customized client shipping system is configured for processing shipment requests to generate LTL shipment data for said shipment requests, and further configured for generating shipping labels based upon said LTL shipment data.

21. The system of Claim 19, wherein said web-based client shipping application is configured for processing shipment requests to generate small package shipping data for said shipment requests, and further configured for generating shipping labels based upon said small package shipping data.

22. The system of Claim 19, wherein said movement data comprises first movement data from an origin country to a destination country and second movement data associated with different locations within said destination country.

23. An integrated global shipment system providing end-to-end visibility of movement of goods in shipment, said system comprising:

a client interface for receiving a user query directed to one or more specified shipments using specified criteria;

a carrier's shipping system comprising one or more mainframe servers, said one or more mainframe servers having access to a shipment database that stores shipping data associated with multiple shipments, said one or more mainframe servers being configured to communicate with said one or more application servers; and

a visibility system in electronic communication with said client interface and said carrier's shipping system, said visibility system comprising:

one or more web servers capable of communicating with said client interface over a communications network,

one or more application servers capable of communicating with said one or more web servers, said one or more application servers having access to one or more application server databases, and configured to process a user query received from said client interface, and

one or more database servers configured for loading said shipping data from said shipment database of said carrier's shipping system into said one or more application server databases.

24. An integrated global shipment system providing visibility of movement of goods in shipment, said system comprising one or more shipment databases and a web portal that is configured for:

(1) providing a web interface to said web portal through which a user is enabled to enter criteria defining a group of consolidated shipments;

(2) in response to said criteria entered by said user, identifying, from said one or more shipment databases, shipping data associated with said group of consolidated shipments;

(3) displaying to said user said shipping data associated with said group of consolidated shipments;

(4) receiving a first input from said user to select a particular consolidated shipment from said group of consolidated shipments;

(5) in response to said selection in (4), retrieving, from said one or more shipment databases, first-level shipment details associated with said particular consolidated shipment and a list of child shipments that are combined in said particular consolidated shipment, said first-level shipment details including movement data of said particular consolidated shipment;

(6) displaying to said user said first-level shipment details associated with said particular consolidated shipment and said list of child shipments that are combined in said particular consolidated shipment;

(7) receiving a second input from said user to further select a particular child shipment from said list of child shipments;

(8) in response to said selection in (7), retrieving, from said one or more shipment databases, second-level shipment details associated with said particular child shipments and a list of packages in said particular child shipment, said second-level shipment details including movement data of said particular child shipment;

(9) displaying to said user said second-level shipment details associated with said particular child shipments and said list of packages in said particular child shipment;

(10) receiving a third input from said user to further select a particular package from said list of packages; and

(11) in response to said selection in (10), retrieving, from said one or more shipment databases a movement status of said particular package; and

(12) displaying said movement status of said particular package to said user.

25. The system of Claim 24, wherein each of said group of consolidated shipments is represented in said one or more shipment databases by a shipment reference number that is associated with one or more child shipment reference numbers or package tracking numbers.

26. The system of Claim 24, wherein said criteria in Step (1) comprise an input of a particular shipment date, or a particular shipment period, or a particular destination country.

27. The system of Claim 24, wherein said web portal is further configured for verifying, prior to allowing access to said web interface at (1), a user's identity and for selectively permitting access as far as inputs at (1), (4), (7), or (10) based on said identity.

28. An integrated global shipment system providing visibility of movement of goods in shipment, said system comprising one or more shipment databases and a web portal that is configured for:

(1) providing a web interface to said web portal through which a user is enabled to query for a specific shipment or a specific package by entering a particular identifier;

(2) in response to receiving said particular shipment identifier, determining whether said particular identifier is a consolidated shipment reference number;

(3) in response to the determination that said particular identifier is a consolidated shipment reference number, identifying, from said one or more shipment databases, shipping data associated with said specific shipment, and displaying said shipping data to said user, said shipping data including at least said consolidated shipment reference number;

(4) in response to the determination that said particular identifier is not a consolidated shipment reference number, determining whether said particular identifier is an LTL shipment reference number or a package tracking number,

a. in response to the determination that said particular identifier is an LTL shipment reference number,

i. identifying, from said one or more shipment databases, shipping data associated with a consolidated shipment in which said specific shipment is included;

ii. identifying, from said one or more shipment databases, shipping data associated with said specific shipment; and

iii. displaying to said user said shipping data in (i) if said specific shipment has not reached a destination country, or said shipping data in (ii) if said specific shipment is in delivery within said destination country; and

b. in response to the determination that said particular identifier is a package tracking number,

i. identifying, from said one or more shipment databases, shipping data associated with a consolidated shipment in which said specific package is included;

ii. identifying, from said one or more shipment databases, shipping data associated with said specific package; and

iii. displaying to said user said shipping data in (i) if said specific package has not reached a destination country, or said shipping data in (ii) if said specific package is in delivery within said destination country.

29. The system of Claim 28, wherein said shipping data in Step (3) further comprises a list of child shipments included in said specific shipment, and wherein said web portal is further configured for:

receiving from said user a selection of a particular child shipment from said list of child shipments;

retrieving, from said one or more shipment databases, shipping data associated with said particular child shipment; and

displaying to said user said shipping data associated with said particular child shipment.

30. The system of Claim 28, wherein said shipping data in Step (3) further comprises a list of packages included in said specific shipment, and wherein said web portal is further configured for:

receiving from said user a selection of a particular package from said list of packages;

retrieving, from said one or more shipment databases, shipping data associated with said particular package; and

displaying to said user said shipping data associated with said particular package.

31. A virtual inventory management system comprising:

a shipment entry system configured for a carrier to receive a request from a shipper for a shipment of goods, said request identifying at least a destination country where said goods need to be shipped;

a shipment consolidating system configured to receive and process shipping data associated with said goods, and to generate data of a consolidated shipment, said consolidated shipment comprising said shipment of goods from said shipper with one or more shipments to be shipped to said destination country;

a shipment transportation system configured to transport said consolidated shipment to said destination country;

an instruction system configured for said carrier to receive one or more initial or updated specific consignee locations from said shipper after said consolidated shipment begins transport to said destination country via said shipment transportation system;

a shipment de-consolidating system configured to separate said shipment of goods from said consolidated shipment after said consolidated shipment is transported to said destination country; and

an end-delivery system configured to deliver said shipment of goods to said one or more specific consignee locations within said destination country.

32. The system of Claim 31, further comprising an integrated interface for said shipper to track status of said shipment of goods within said shipment transportation system as well as said end-delivery system.

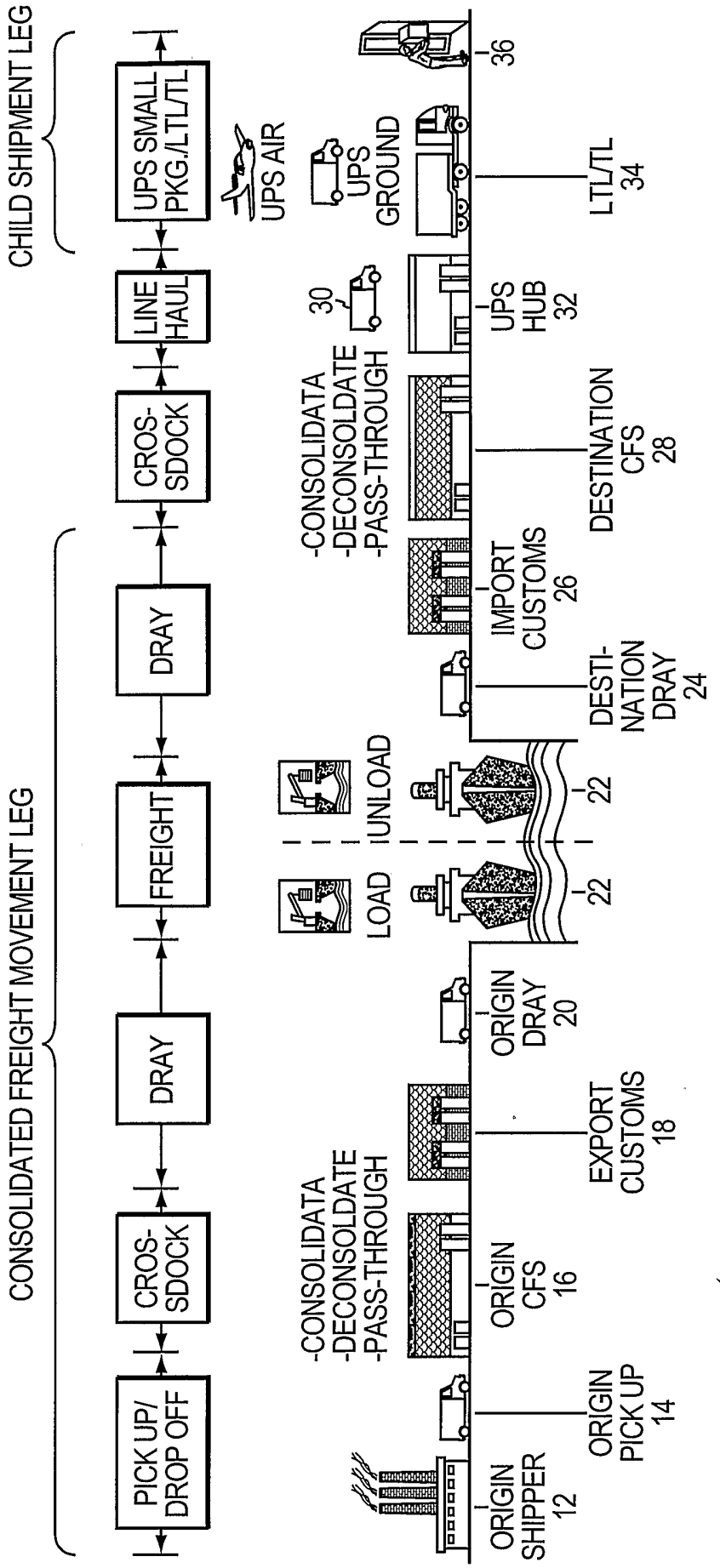
CHILD SHIPMENT LEG
CONSOLIDATED FREIGHT MOVEMENT LEG
PICK UP/ DROP OFF
CROS-SDOCK
DRAY
FREIGHT
DRAY
CROS-SDOCK
LINE HAUL
UPS SMALL PKG./LTL/TL
UPS AIR
UPS GROUND
LTL/TL 34
36
30
UPS HUB 32
-CONSOLIDATA -DECONSOLDATE -PASS-THROUGH
DESTINATION CFS 28
IMPORT CUSTOMS 26
DESTI-NATION DRAY 24
UNLOAD
LOAD
22
22
ORIGIN DRAY 20
EXPORT CUSTOMS 18
-CONSOLIDATA -DECONSOLDATE -PASS-THROUGH
ORIGIN CFS 16
ORIGIN PICK UP 14
ORIGIN SHIPPER 12
10

FIG. 1

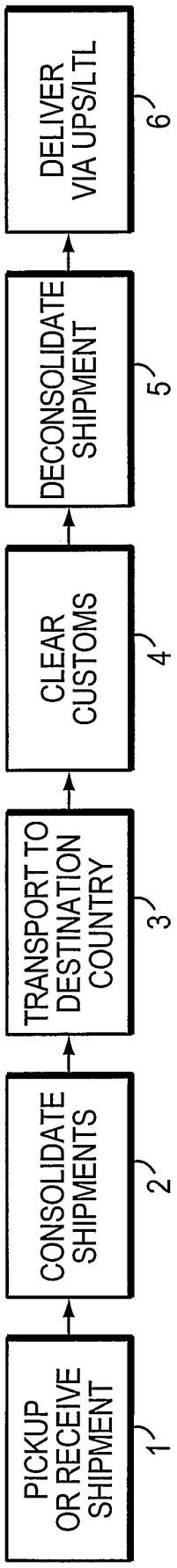
PICKUP OR RECEIVE SHIPMENT
1
CONSOLIDATE SHIPMENTS
2
TRANSPORT TO DESTINATION COUNTRY
3
CLEAR CUSTOMS
4
DECONSOLIDATE SHIPMENT
5
DELIVER VIA UPS/LTL
6

FIG. 2

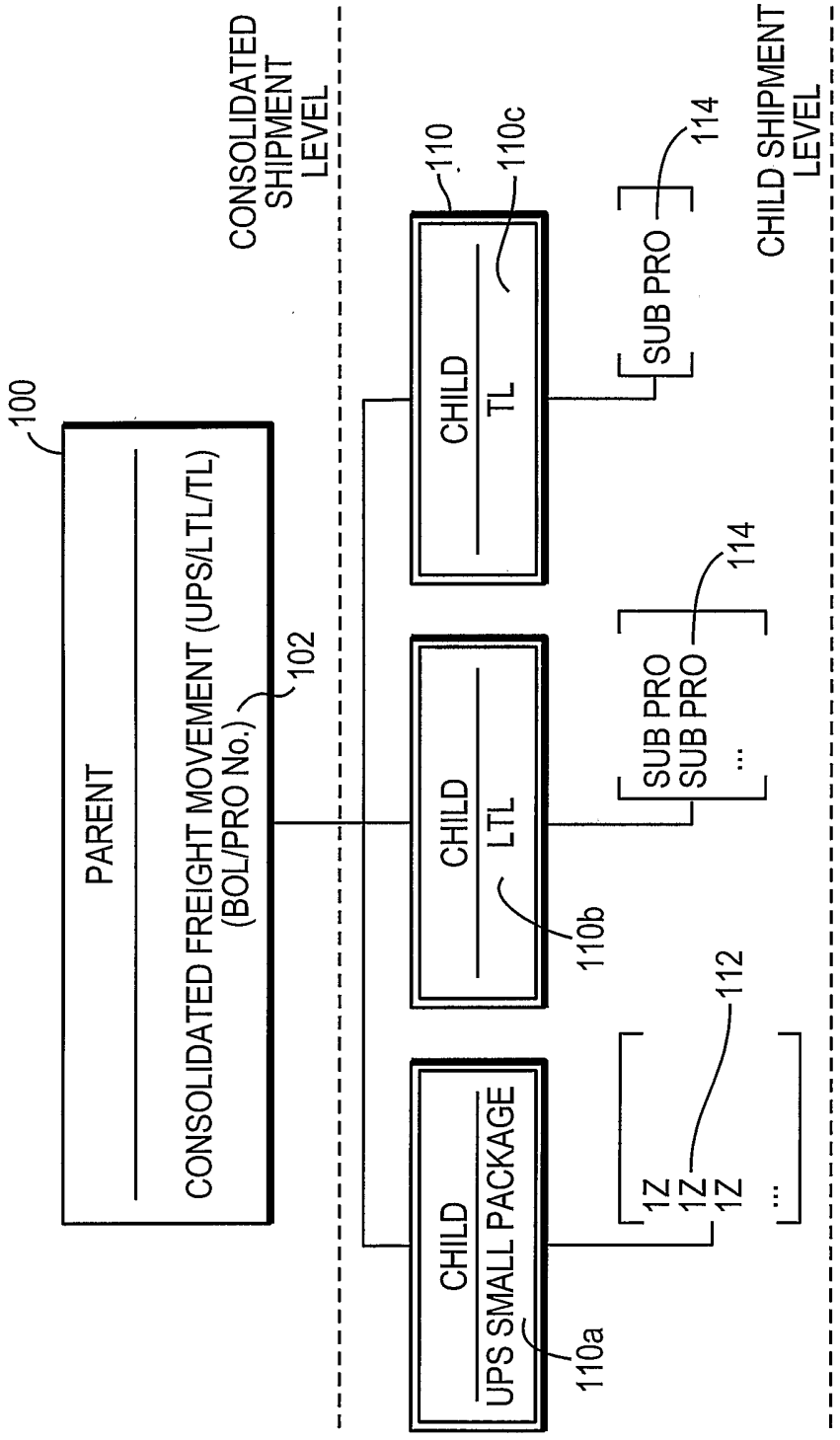
100
PARENT
CONSOLIDATED FREIGHT MOVEMENT (UPS/LTL/TL)
(BOL/PRO No.)
102
CONSOLIDATED SHIPMENT LEVEL
CHILD SHIPMENT LEVEL
CHILD
UPS SMALL PACKAGE
110a
1Z
1Z
1Z
...
112
CHILD
LTL
110b
SUB PRO
SUB PRO
...
114
CHILD
TL
110c
110
SUB PRO
114

FIG. 3A

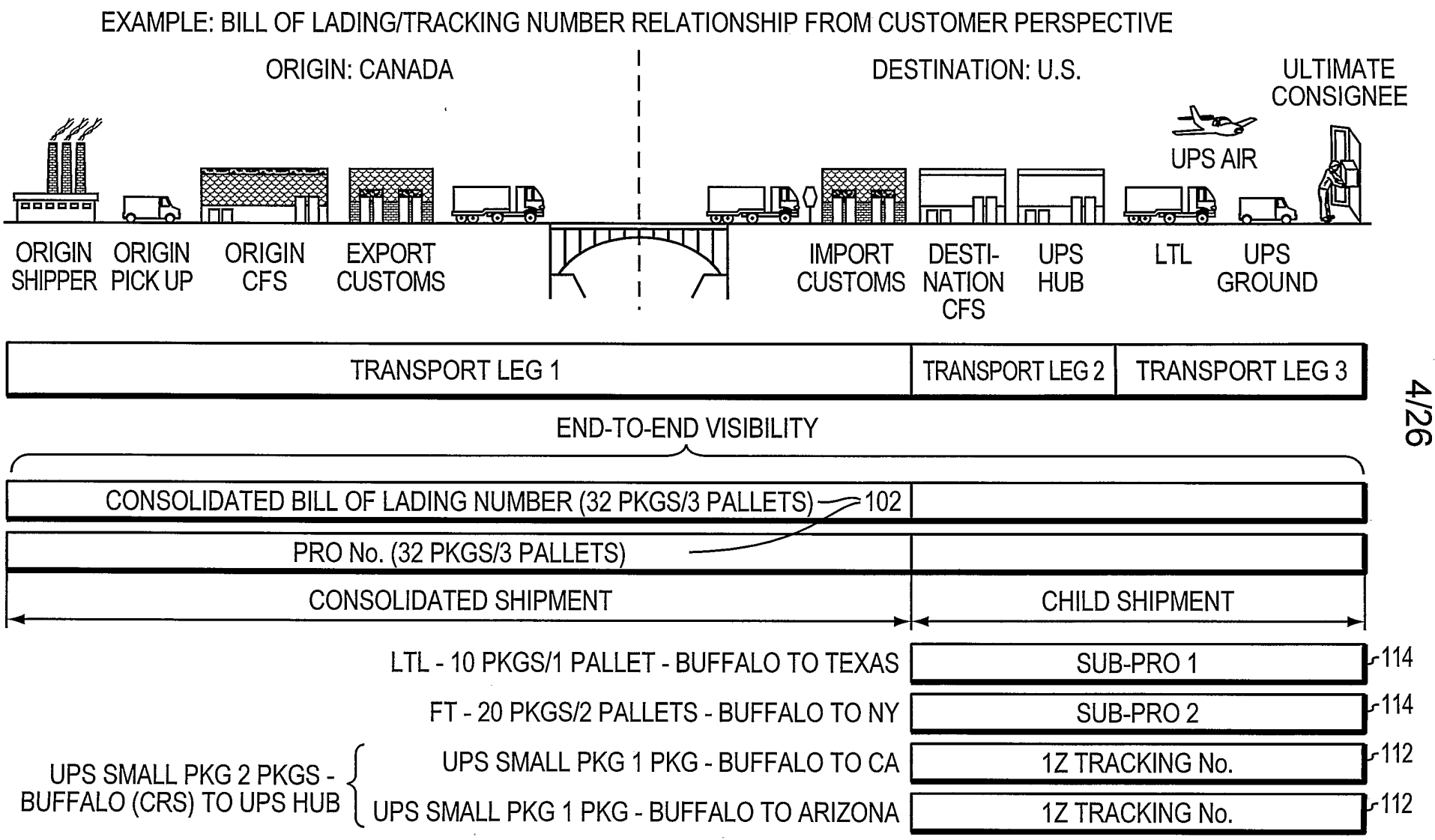
EXAMPLE: BILL OF LADING/TRACKING NUMBER RELATIONSHIP FROM CUSTOMER PERSPECTIVE
ORIGIN: CANADA
DESTINATION: U.S.
ULTIMATE CONSIGNEE
UPS AIR
ORIGIN SHIPPER
ORIGIN PICK UP
ORIGIN CFS
EXPORT CUSTOMS
IMPORT CUSTOMS
DESTI-NATION CFS
UPS HUB
LTL
UPS GROUND
TRANSPORT LEG 1
TRANSPORT LEG 2
TRANSPORT LEG 3
END-TO-END VISIBILITY
CONSOLIDATED BILL OF LADING NUMBER (32 PKGS/3 PALLETS)
102
PRO No. (32 PKGS/3 PALLETS)
CONSOLIDATED SHIPMENT
CHILD SHIPMENT
LTL - 10 PKGS/1 PALLET - BUFFALO TO TEXAS
SUB-PRO 1
114
FT - 20 PKGS/2 PALLETS - BUFFALO TO NY
SUB-PRO 2
114
UPS SMALL PKG 2 PKGS - BUFFALO (CRS) TO UPS HUB
UPS SMALL PKG 1 PKG - BUFFALO TO CA
1Z TRACKING No.
112
UPS SMALL PKG 1 PKG - BUFFALO TO ARIZONA
1Z TRACKING No.
112

FIG. 3B

STU 1 LBS 1 OF 1
CROSS BORDER
PHONE: TEL 123457
66 GLENLAKE PKWY NE
XXXX 3 FLOOR 5
ATLANTA CA 90378

SHIP TO GEORGE WASHINGTON
ABC COMPANY
404-555-1212
123 CHERRY TREE LANE
BROOKLYN NY 11236

Number of Cartons:

LTL
RGS REFERENCE N 1234567890 COG

114

BILLING: P/P
XXX. XXXX: 200

XXXXXXX - GROSS BORDER
XXX X X X X XXXXX XX XX XXXXXXX

FIG. 4A

PALLET SHIPPING LABEL
UPS Freight Services

Master Pro: 97 MZ 5 102

Mexican Broker:

Pallet Description:

LTL ☐ Pieces ___ Destination ___
UPS Air ☐ Pieces ___ Sub-Pro ___
UPS Ground ☐ Pieces ___
Afixed ☐

Please attach one label per pallet.

FIG. 4B

SARAH JONES 2 LBS 1 OF 2
XXXXXXX XXXXX XXXXX XX-XX. 12345E7R COG
(123) 458-2860 XXXXX.XX .XX
XX XXX XXX XXXXXX. XXXXX
XXXXX XXXXXXX STREET DATE: 10 JUL07
ATLANTA CA 90378
XXXXX-XXXXX

SHIP TO: JOHN REINHARDT
ABC COMPANY
PHONE: 49 224-149-1424
CUSTOMER RELATIONS
2ND FLOOR
FREIGHTHALL 2
51147 COLOGNE
GERMANY

(421) SHIP TO POSTAL CODE
(421) 276 51147

UPS EXPRESS PLUS 1+
TRACKING # 1Z 123 45C 54 1234 5674

112

BILLING: FOR 1234567890
DESC.BO_IS
XXX XX INS1 XXXXXXX
REF#1: 12345678901234567890123456789012345
REF#2: 12345678901234567890123456789012345

FIG. 4C

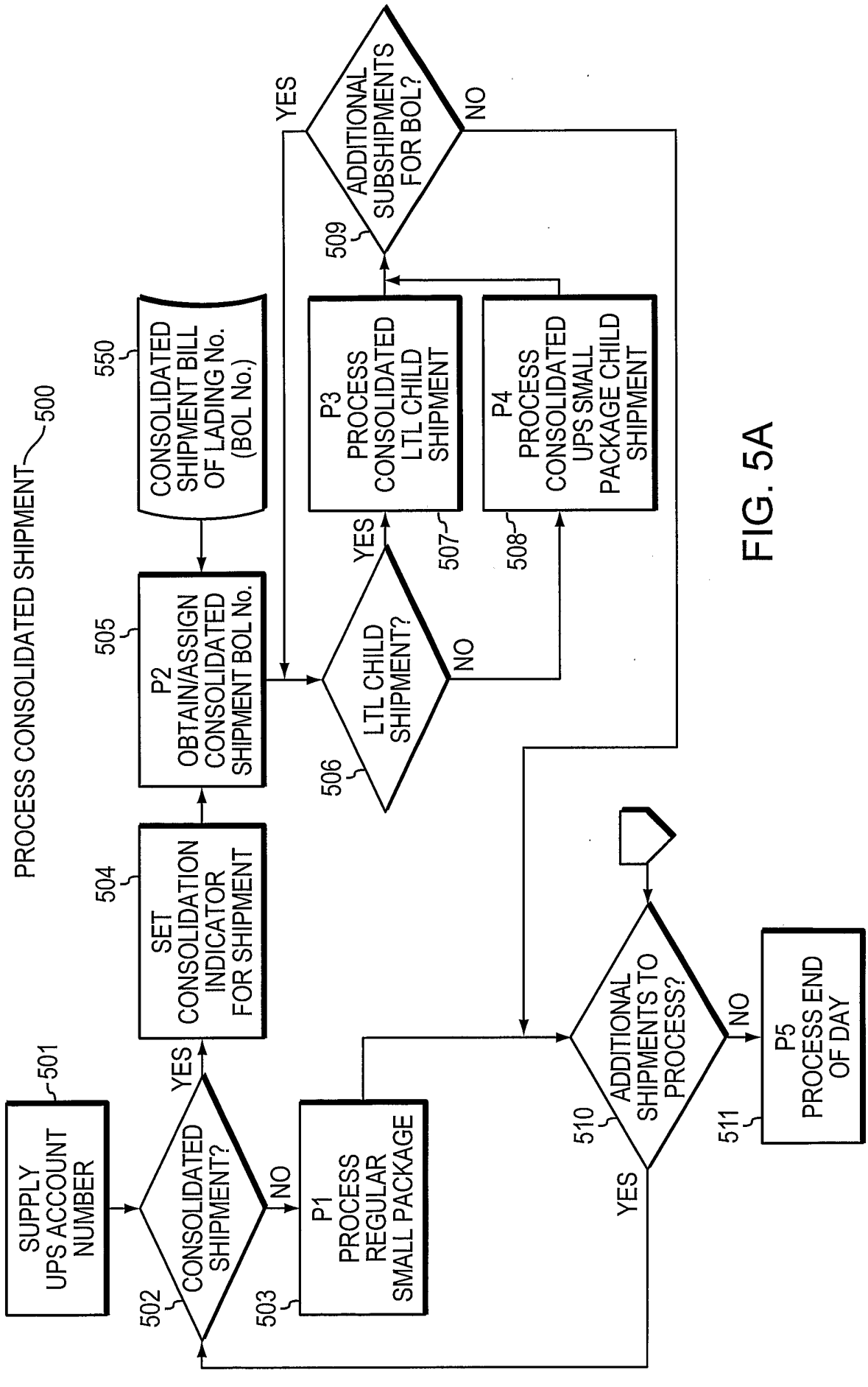
PROCESS CONSOLIDATED SHIPMENT
500
SUPPLY UPS ACCOUNT NUMBER
501
CONSOLIDATED SHIPMENT?
502
YES
NO
P1 PROCESS REGULAR SMALL PACKAGE
503
SET CONSOLIDATION INDICATOR FOR SHIPMENT
504
P2 OBTAIN/ASSIGN CONSOLIDATED SHIPMENT BOL No.
505
CONSOLIDATED SHIPMENT BILL OF LADING No. (BOL No.)
550
LTL CHILD SHIPMENT?
506
YES
NO
P3 PROCESS CONSOLIDATED LTL CHILD SHIPMENT
507
P4 PROCESS CONSOLIDATED UPS SMALL PACKAGE CHILD SHIPMENT
508
ADDITIONAL SUBSHIPMENTS FOR BOL?
509
YES
NO
ADDITIONAL SHIPMENTS TO PROCESS?
510
YES
NO
P5 PROCESS END OF DAY
511

FIG. 5A

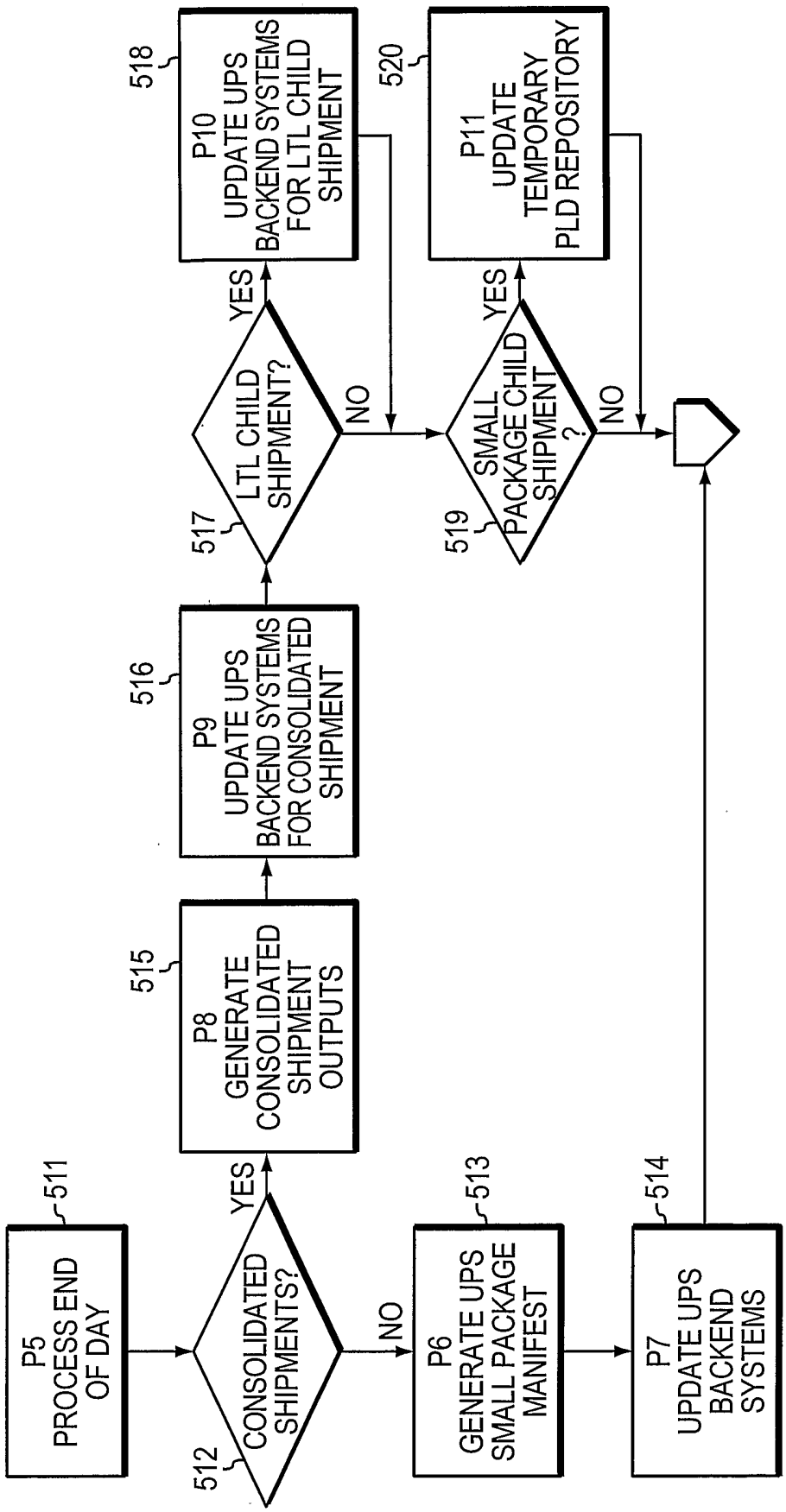
P5
PROCESS END
OF DAY
511
CONSOLIDATED
SHIPMENTS?
512
YES
NO
P8
GENERATE
CONSOLIDATED
SHIPMENT
OUTPUTS
515
P9
UPDATE UPS
BACKEND SYSTEMS
FOR CONSOLIDATED
SHIPMENT
516
LTL CHILD
SHIPMENT?
517
YES
NO
P10
UPDATE UPS
BACKEND SYSTEMS
FOR LTL CHILD
SHIPMENT
518
SMALL
PACKAGE CHILD
SHIPMENT
?
519
YES
NO
P11
UPDATE
TEMPORARY
PLD REPOSITORY
520
P6
GENERATE UPS
SMALL PACKAGE
MANIFEST
513
P7
UPDATE UPS
BACKEND
SYSTEMS
514

FIG. 5B

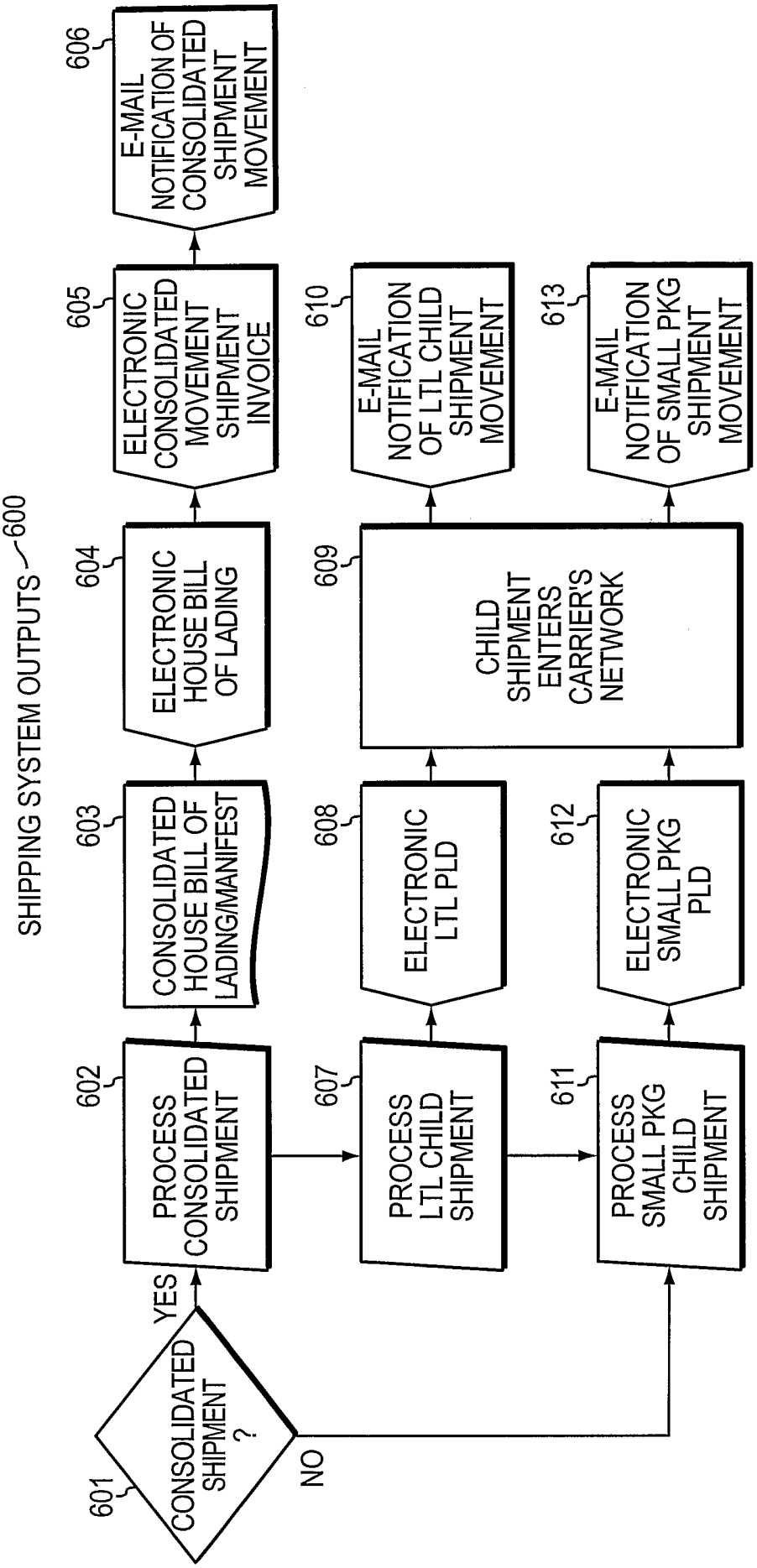
SHIPPING SYSTEM OUTPUTS
600
601
CONSOLIDATED SHIPMENT ?
YES
NO
602
PROCESS CONSOLIDATED SHIPMENT
603
CONSOLIDATED HOUSE BILL OF LADING/MANIFEST
604
ELECTRONIC HOUSE BILL OF LADING
605
ELECTRONIC CONSOLIDATED MOVEMENT SHIPMENT INVOICE
606
E-MAIL NOTIFICATION OF CONSOLIDATED SHIPMENT MOVEMENT
607
PROCESS LTL CHILD SHIPMENT
608
ELECTRONIC LTL PLD
609
CHILD SHIPMENT ENTERS CARRIER'S NETWORK
610
E-MAIL NOTIFICATION OF LTL CHILD SHIPMENT MOVEMENT
611
PROCESS SMALL PKG CHILD SHIPMENT
612
ELECTRONIC SMALL PKG PLD
613
E-MAIL NOTIFICATION OF SMALL PKG SHIPMENT MOVEMENT

FIG. 6

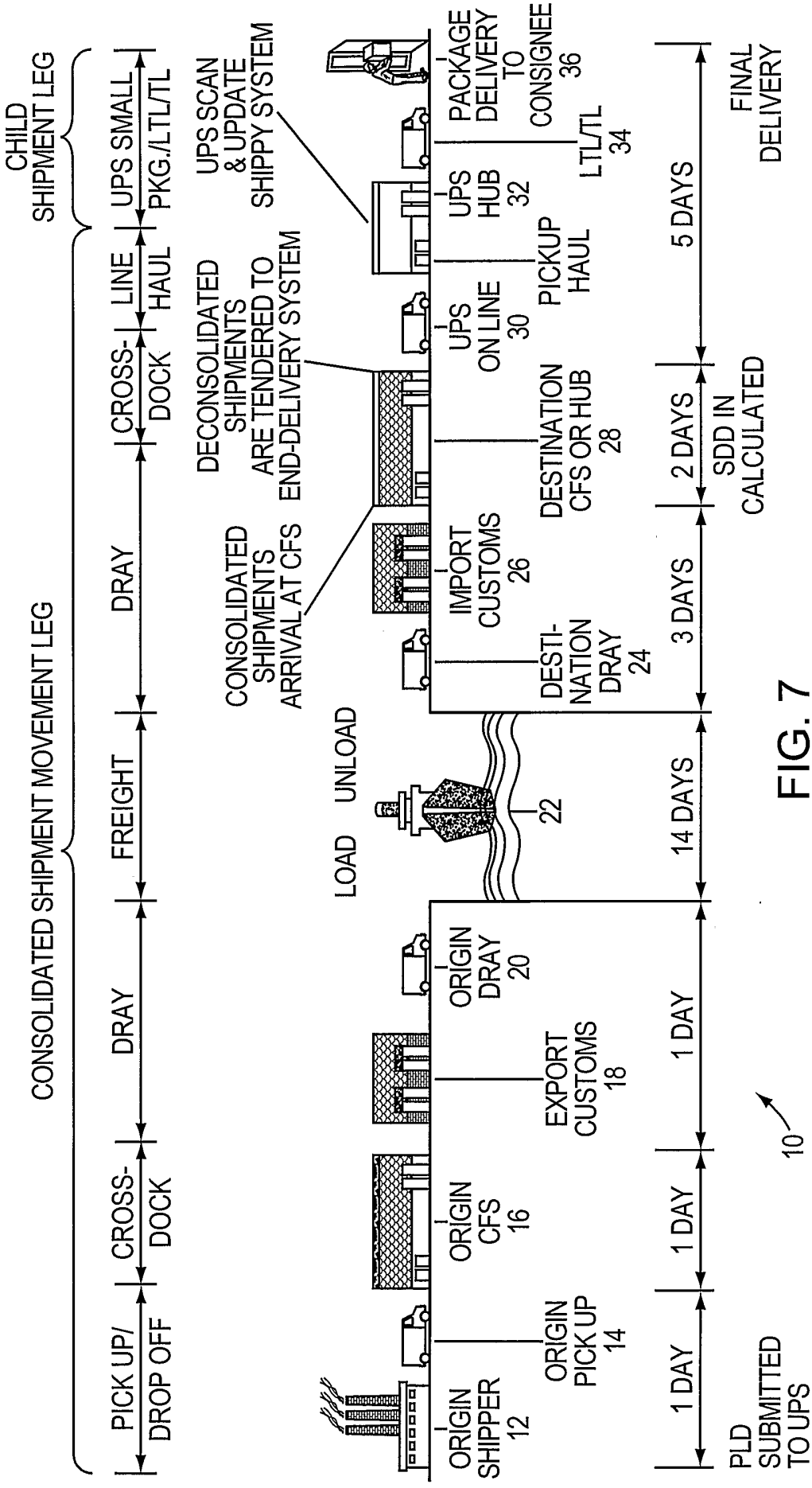
CONSOLIDATED SHIPMENT MOVEMENT LEG
CHILD SHIPMENT LEG
PICK UP/ DROP OFF
CROSS-DOCK
DRAY
FREIGHT
DRAY
CROSS-DOCK
LINE HAUL
UPS SMALL PKG./LTL/TL
ORIGIN SHIPPER 12
ORIGIN PICK UP 14
ORIGIN CFS 16
EXPORT CUSTOMS 18
ORIGIN DRAY 20
LOAD
UNLOAD
22
CONSOLIDATED SHIPMENTS ARRIVAL AT CFS
DECONSOLIDATED SHIPMENTS ARE TENDERED TO END-DELIVERY SYSTEM
UPS SCAN & UPDATE SHIPPY SYSTEM
DESTI-NATION DRAY 24
IMPORT CUSTOMS 26
DESTINATION CFS OR HUB 28
UPS ON LINE 30
PICKUP HAUL
UPS HUB 32
LTL/TL 34
PACKAGE DELIVERY TO CONSIGNEE 36
1 DAY
1 DAY
1 DAY
14 DAYS
3 DAYS
2 DAYS
5 DAYS
SDD IN CALCULATED
PLD SUBMITTED TO UPS
FINAL DELIVERY
10

FIG. 7

FIG.8A | FIG.8B | FIG.8C } FIG.8A

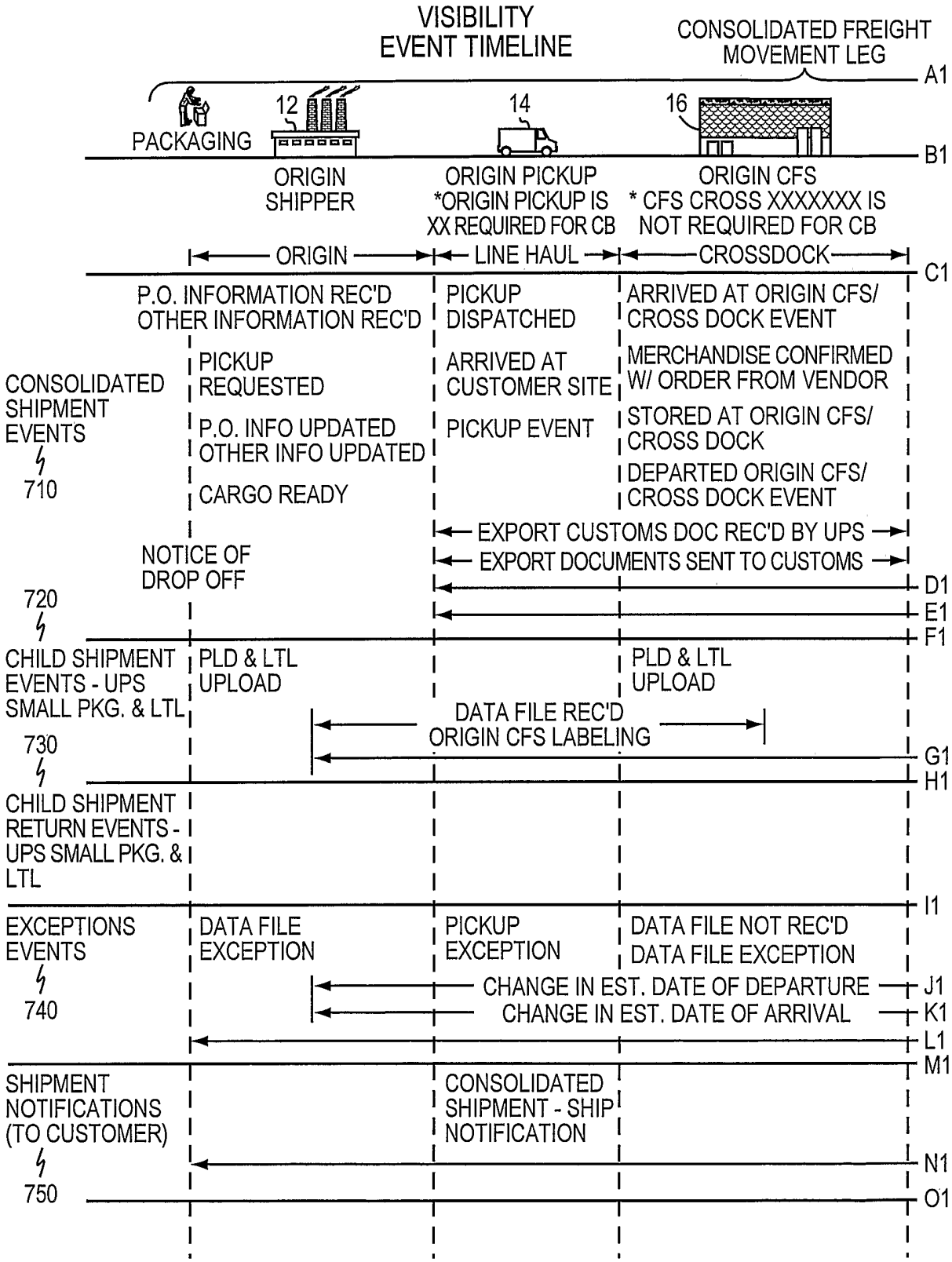

FIG. 8A

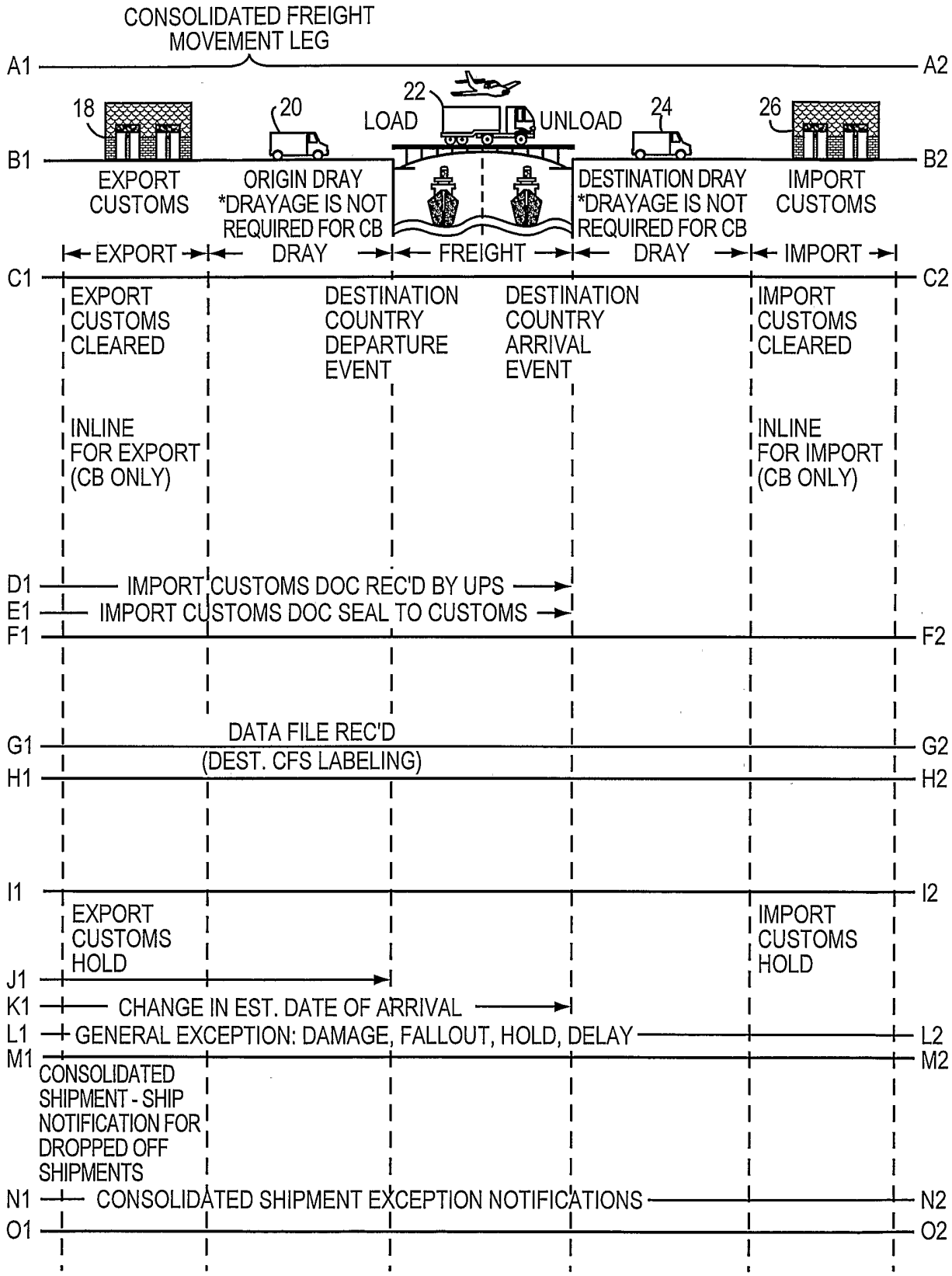
CONSOLIDATED FREIGHT MOVEMENT LEG
A1
A2
18
20
22
LOAD
UNLOAD
24
26
B1
B2
EXPORT CUSTOMS
ORIGIN DRAY *DRAYAGE IS NOT REQUIRED FOR CB
DESTINATION DRAY *DRAYAGE IS NOT REQUIRED FOR CB
IMPORT CUSTOMS
EXPORT
DRAY
FREIGHT
DRAY
IMPORT
C1
C2
EXPORT CUSTOMS CLEARED
DESTINATION COUNTRY DEPARTURE EVENT
DESTINATION COUNTRY ARRIVAL EVENT
IMPORT CUSTOMS CLEARED
INLINE FOR EXPORT (CB ONLY)
INLINE FOR IMPORT (CB ONLY)
D1
IMPORT CUSTOMS DOC REC'D BY UPS
E1
IMPORT CUSTOMS DOC SEAL TO CUSTOMS
F1
F2
G1
DATA FILE REC'D
(DEST. CFS LABELING)
G2
H1
H2
I1
I2
EXPORT CUSTOMS HOLD
IMPORT CUSTOMS HOLD
J1
K1
CHANGE IN EST. DATE OF ARRIVAL
L1
GENERAL EXCEPTION: DAMAGE, FALLOUT, HOLD, DELAY
L2
M1
M2
CONSOLIDATED SHIPMENT - SHIP NOTIFICATION FOR DROPPED OFF SHIPMENTS
N1
CONSOLIDATED SHIPMENT EXCEPTION NOTIFICATIONS
N2
O1
O2

FIG. 8B

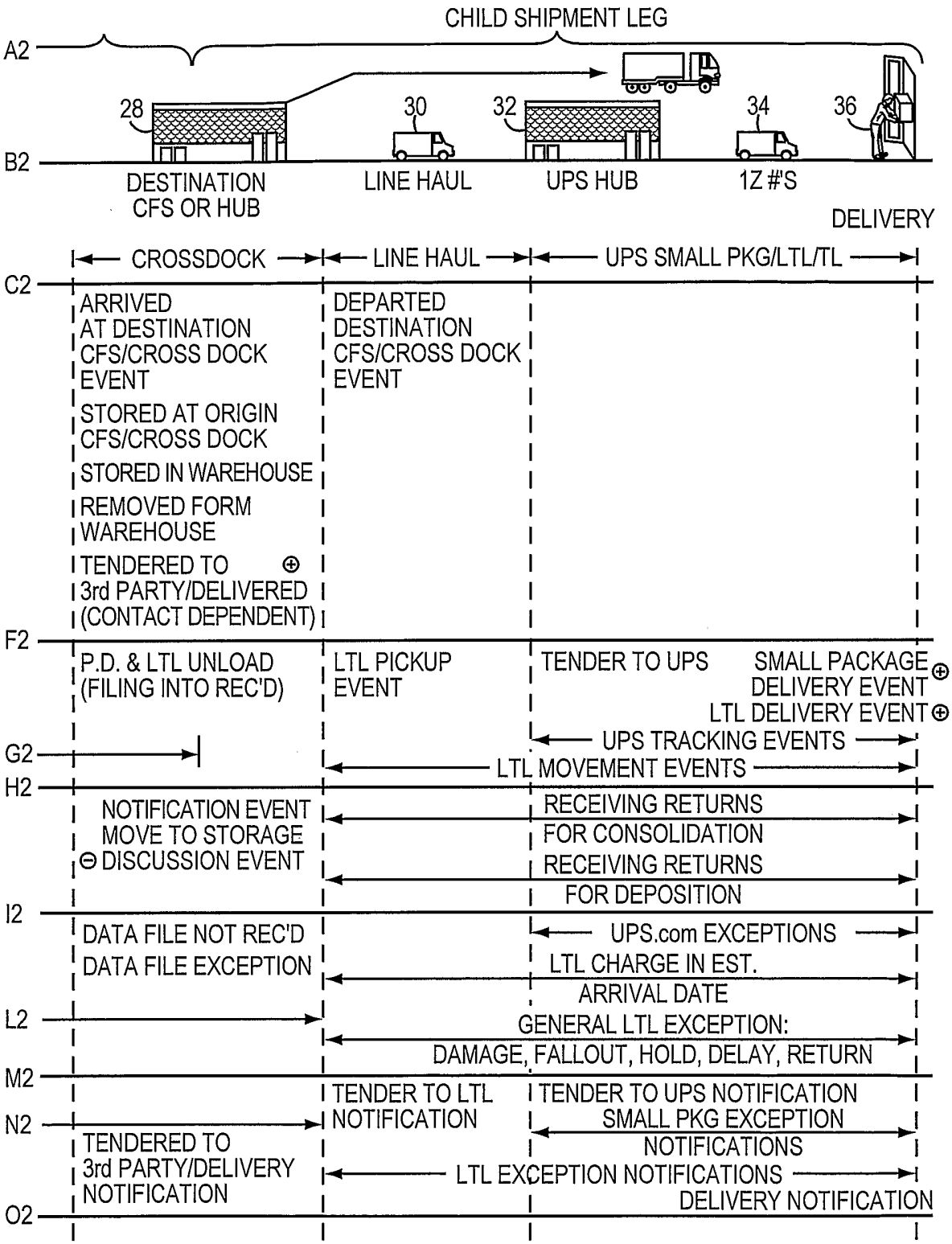
CHILD SHIPMENT LEG
A2
28
30
32
34
36
B2
DESTINATION CFS OR HUB
LINE HAUL
UPS HUB
1Z #'S
DELIVERY
CROSSDOCK
LINE HAUL
UPS SMALL PKG/LTL/TL
C2
ARRIVED AT DESTINATION CFS/CROSS DOCK EVENT
STORED AT ORIGIN CFS/CROSS DOCK
STORED IN WAREHOUSE
REMOVED FORM WAREHOUSE
TENDERED TO 3rd PARTY/DELIVERED (CONTACT DEPENDENT)
DEPARTED DESTINATION CFS/CROSS DOCK EVENT
F2
P.D. & LTL UNLOAD (FILING INTO REC'D)
LTL PICKUP EVENT
TENDER TO UPS
SMALL PACKAGE DELIVERY EVENT
LTL DELIVERY EVENT
G2
UPS TRACKING EVENTS
LTL MOVEMENT EVENTS
H2
NOTIFICATION EVENT MOVE TO STORAGE DISCUSSION EVENT
RECEIVING RETURNS FOR CONSOLIDATION
RECEIVING RETURNS FOR DEPOSITION
I2
DATA FILE NOT REC'D
DATA FILE EXCEPTION
UPS.com EXCEPTIONS
LTL CHARGE IN EST. ARRIVAL DATE
L2
GENERAL LTL EXCEPTION: DAMAGE, FALLOUT, HOLD, DELAY, RETURN
M2
TENDER TO LTL NOTIFICATION
TENDER TO UPS NOTIFICATION SMALL PKG EXCEPTION NOTIFICATIONS
N2
TENDERED TO 3rd PARTY/DELIVERY NOTIFICATION
LTL EXCEPTION NOTIFICATIONS
DELIVERY NOTIFICATION
O2

FIG. 8C

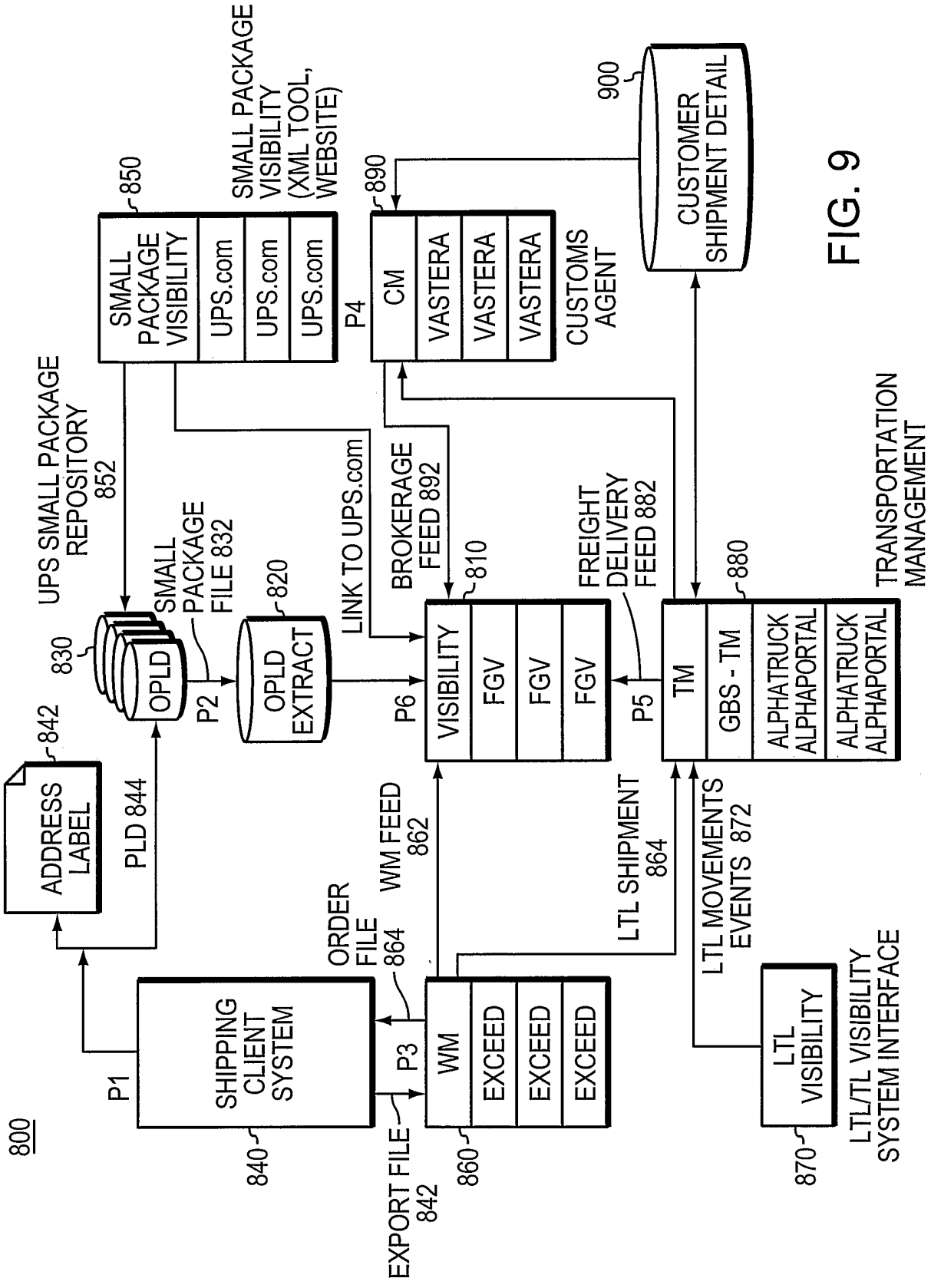
800
SHIPPING CLIENT SYSTEM
840
P1
ADDRESS LABEL
842
PLD 844
OPLD
830
SMALL PACKAGE FILE 832
P2
OPLD EXTRACT
820
UPS SMALL PACKAGE REPOSITORY 852
SMALL PACKAGE VISIBILITY
UPS.com
UPS.com
UPS.com
850
SMALL PACKAGE VISIBILITY (XML TOOL, WEBSITE)
LINK TO UPS.com
P4
CM
VASTERA
VASTERA
VASTERA
890
CUSTOMS AGENT
900
CUSTOMER SHIPMENT DETAIL
BROKERAGE FEED 892
VISIBILITY
FGV
FGV
FGV
810
P6
FREIGHT DELIVERY FEED 882
P5
TM
GBS - TM
ALPHATRUCK ALPHAPORTAL
ALPHATRUCK ALPHAPORTAL
880
TRANSPORTATION MANAGEMENT
ORDER FILE 864
WM FEED 862
LTL SHIPMENT 864
LTL MOVEMENTS EVENTS 872
P3
WM
EXCEED
EXCEED
EXCEED
860
EXPORT FILE 842
LTL VISIBILITY
870
LTL/TL VISIBILITY SYSTEM INTERFACE

FIG. 9

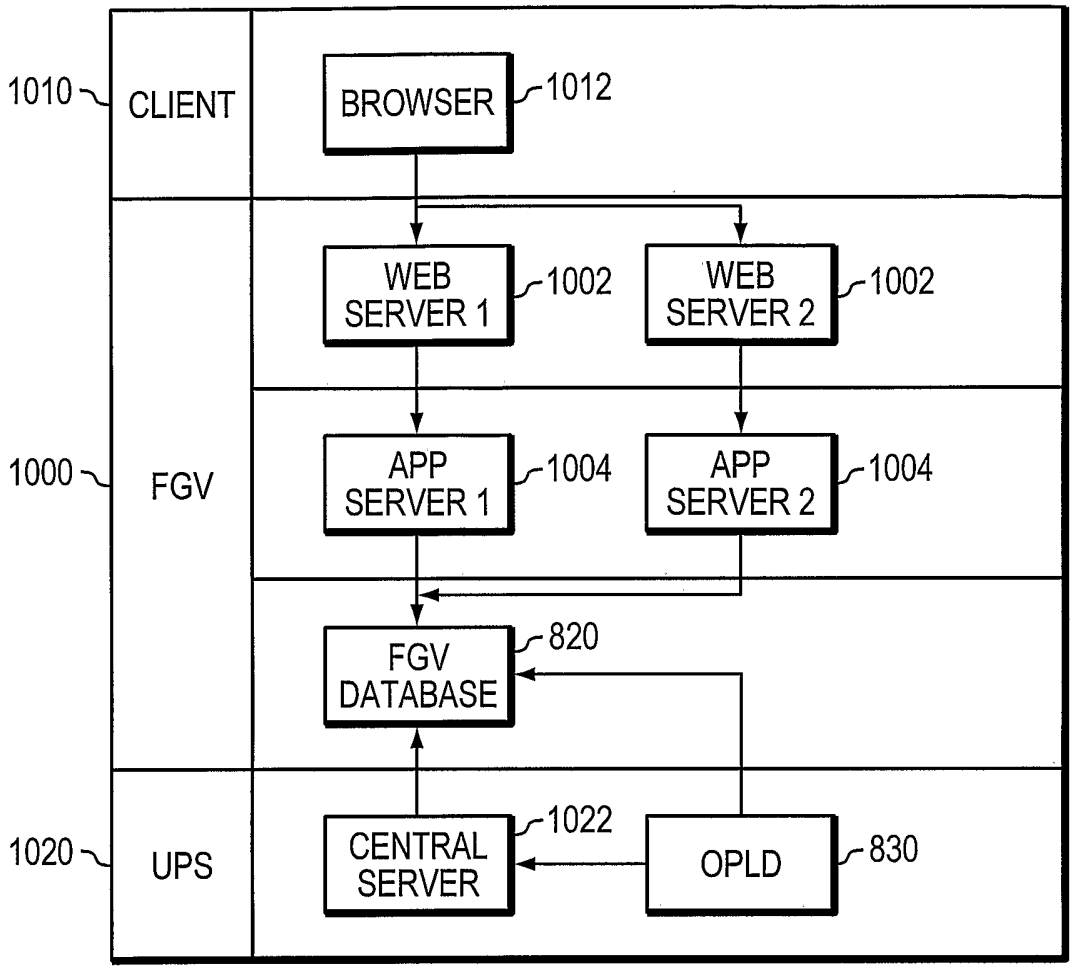
1010
CLIENT
BROWSER
1012
WEB SERVER 1
1002
WEB SERVER 2
1002
1000
FGV
APP SERVER 1
1004
APP SERVER 2
1004
FGV DATABASE
820
1020
UPS
CENTRAL SERVER
1022
OPLD
830

FIG. 10

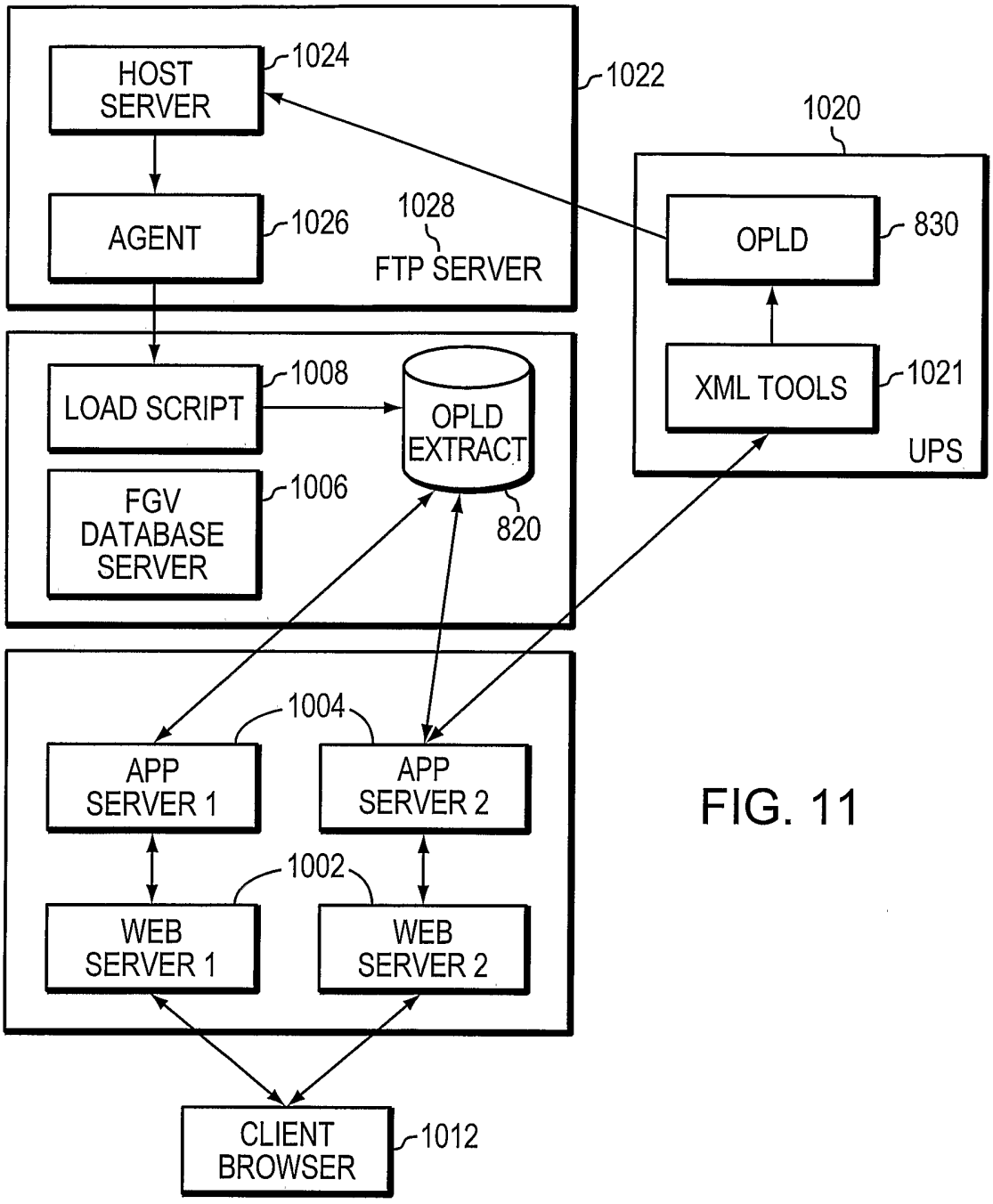
HOST SERVER
1024
1022
1020
AGENT
1026
1028
FTP SERVER
OPLD
830
LOAD SCRIPT
1008
OPLD EXTRACT
XML TOOLS
1021
UPS
FGV DATABASE SERVER
1006
820
1004
APP SERVER 1
APP SERVER 2
1002
WEB SERVER 1
WEB SERVER 2
CLIENT BROWSER
1012

FIG. 11

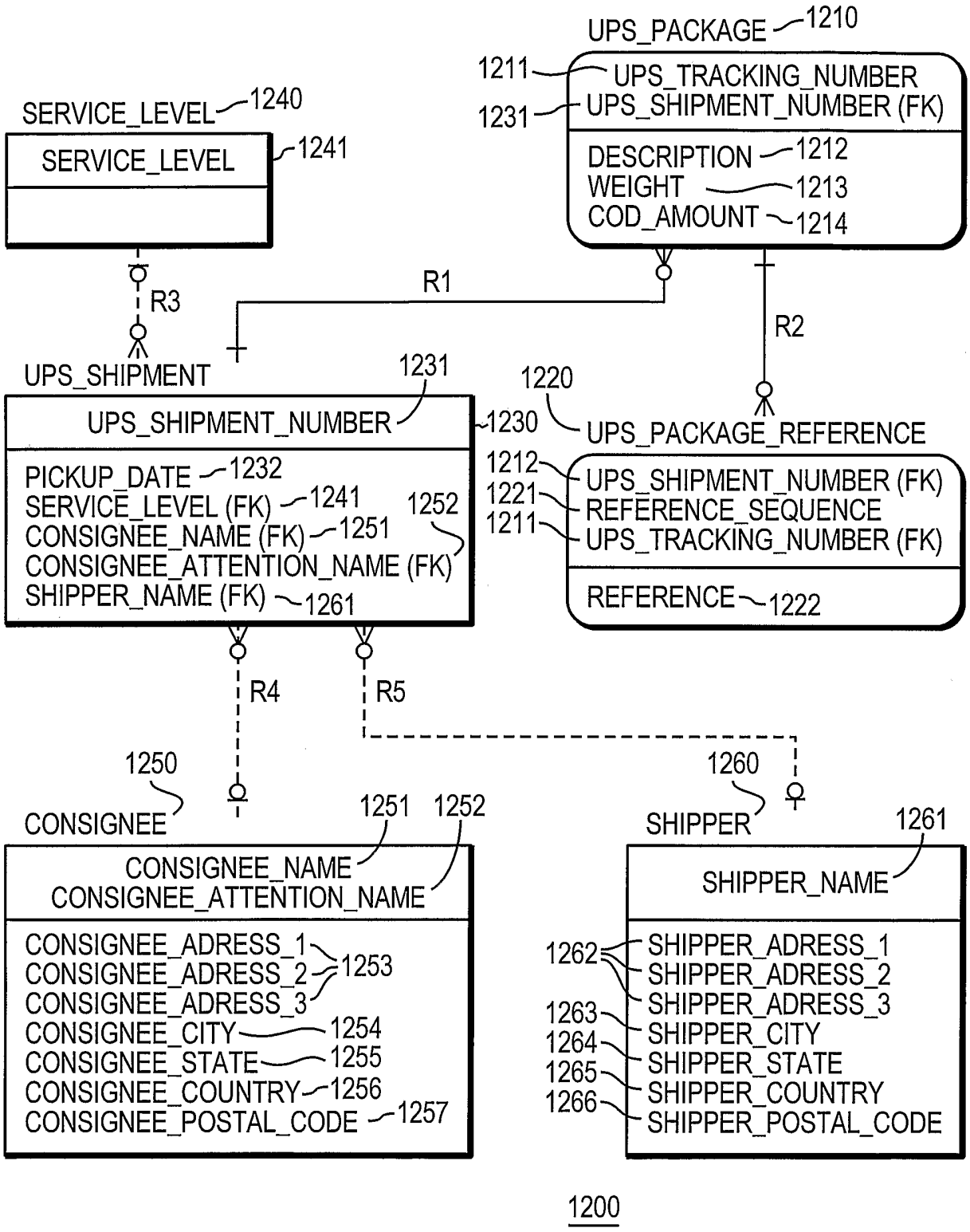
UPS_PACKAGE
1210
1211
UPS_TRACKING_NUMBER
1231
UPS_SHIPMENT_NUMBER (FK)
DESCRIPTION
1212
WEIGHT
1213
COD_AMOUNT
1214
SERVICE_LEVEL
1240
SERVICE_LEVEL
1241
R1
R2
R3
UPS_SHIPMENT
1231
1220
UPS_SHIPMENT_NUMBER
1230
UPS_PACKAGE_REFERENCE
PICKUP_DATE
1232
SERVICE_LEVEL (FK)
1241
1252
CONSIGNEE_NAME (FK)
1251
CONSIGNEE_ATTENTION_NAME (FK)
SHIPPER_NAME (FK)
1261
1212
UPS_SHIPMENT_NUMBER (FK)
1221
REFERENCE_SEQUENCE
1211
UPS_TRACKING_NUMBER (FK)
REFERENCE
1222
R4
R5
1250
1260
CONSIGNEE
1251
1252
SHIPPER
1261
CONSIGNEE_NAME
CONSIGNEE_ATTENTION_NAME
SHIPPER_NAME
CONSIGNEE_ADRESS_1
CONSIGNEE_ADRESS_2
1253
CONSIGNEE_ADRESS_3
1262
SHIPPER_ADRESS_1
SHIPPER_ADRESS_2
SHIPPER_ADRESS_3
CONSIGNEE_CITY
1254
1263
SHIPPER_CITY
CONSIGNEE_STATE
1255
1264
SHIPPER_STATE
CONSIGNEE_COUNTRY
1256
1265
SHIPPER_COUNTRY
CONSIGNEE_POSTAL_CODE
1257
1266
SHIPPER_POSTAL_CODE
1200

FIG. 12

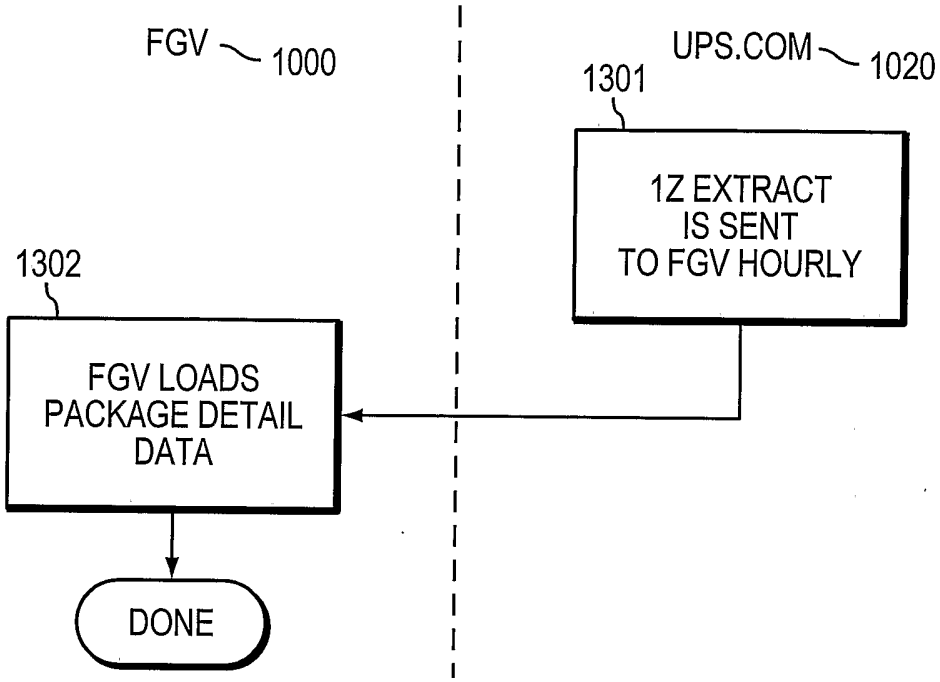
FGV
1000
UPS.COM
1020
1301
1Z EXTRACT
IS SENT
TO FGV HOURLY
1302
FGV LOADS
PACKAGE DETAIL
DATA
DONE

FIG. 13

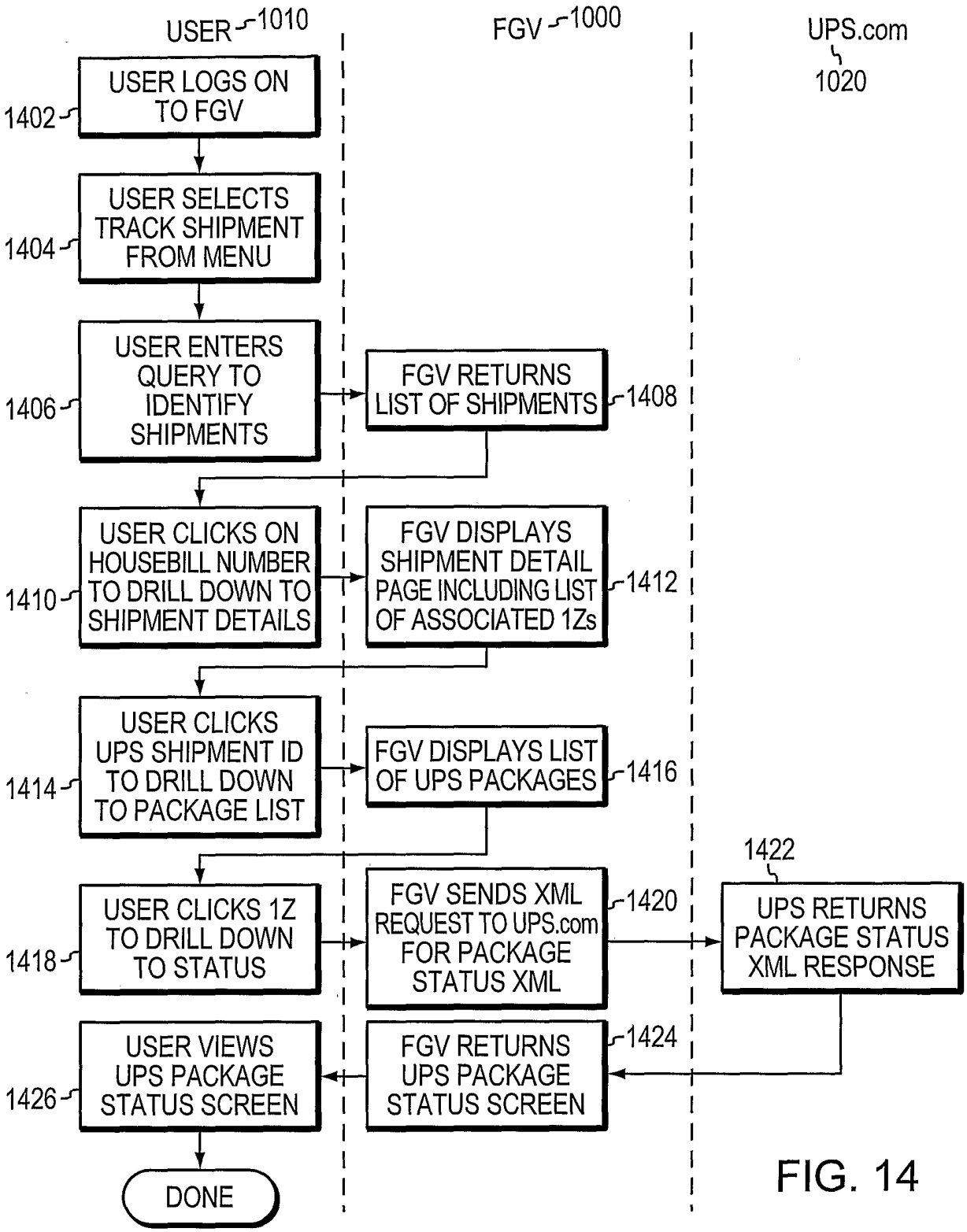
USER 1010
FGV 1000
UPS.com
1020
USER LOGS ON TO FGV
1402
USER SELECTS TRACK SHIPMENT FROM MENU
1404
USER ENTERS QUERY TO IDENTIFY SHIPMENTS
1406
FGV RETURNS LIST OF SHIPMENTS
1408
USER CLICKS ON HOUSEBILL NUMBER TO DRILL DOWN TO SHIPMENT DETAILS
1410
FGV DISPLAYS SHIPMENT DETAIL PAGE INCLUDING LIST OF ASSOCIATED 1Zs
1412
USER CLICKS UPS SHIPMENT ID TO DRILL DOWN TO PACKAGE LIST
1414
FGV DISPLAYS LIST OF UPS PACKAGES
1416
1422
USER CLICKS 1Z TO DRILL DOWN TO STATUS
1418
FGV SENDS XML REQUEST TO UPS.com FOR PACKAGE STATUS XML
1420
UPS RETURNS PACKAGE STATUS XML RESPONSE
USER VIEWS UPS PACKAGE STATUS SCREEN
1426
FGV RETURNS UPS PACKAGE STATUS SCREEN
1424
DONE

FIG. 14

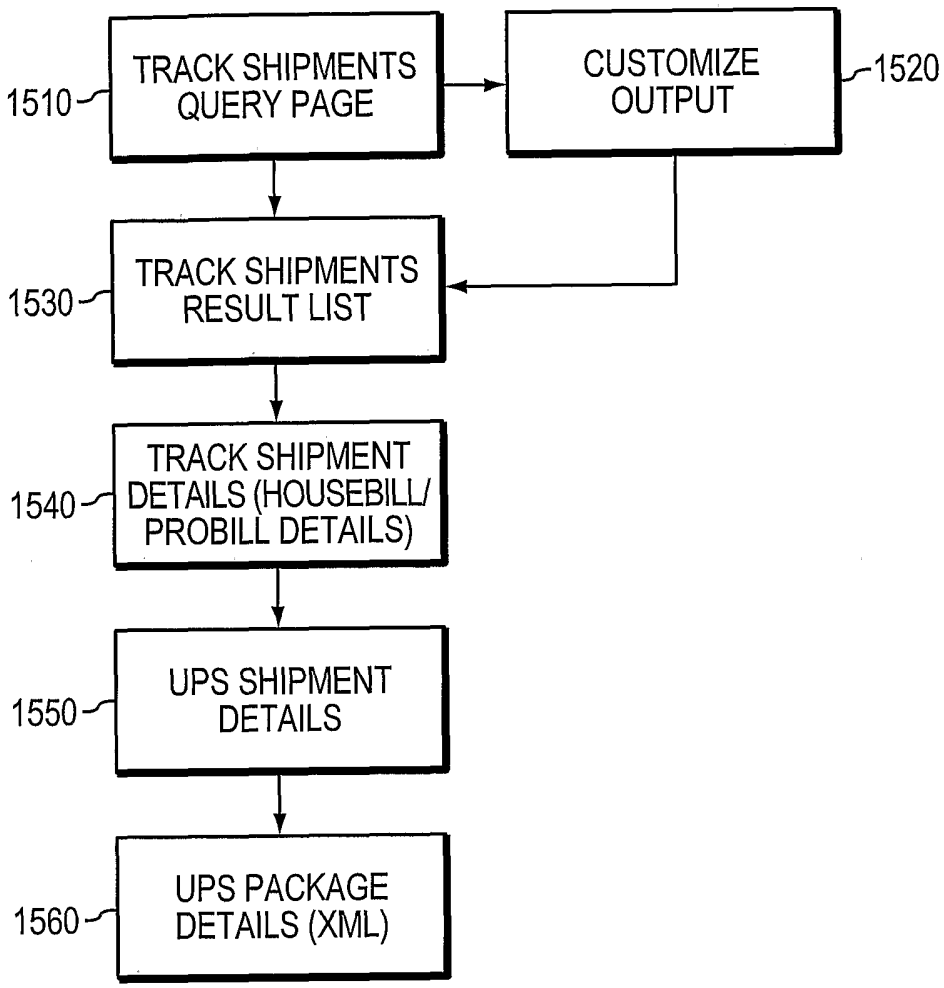
TRACK SHIPMENTS QUERY PAGE
1510
CUSTOMIZE OUTPUT
1520
TRACK SHIPMENTS RESULT LIST
1530
TRACK SHIPMENT DETAILS (HOUSEBILL/ PROBILL DETAILS)
1540
UPS SHIPMENT DETAILS
1550
UPS PACKAGE DETAILS (XML)
1560

FIG. 15

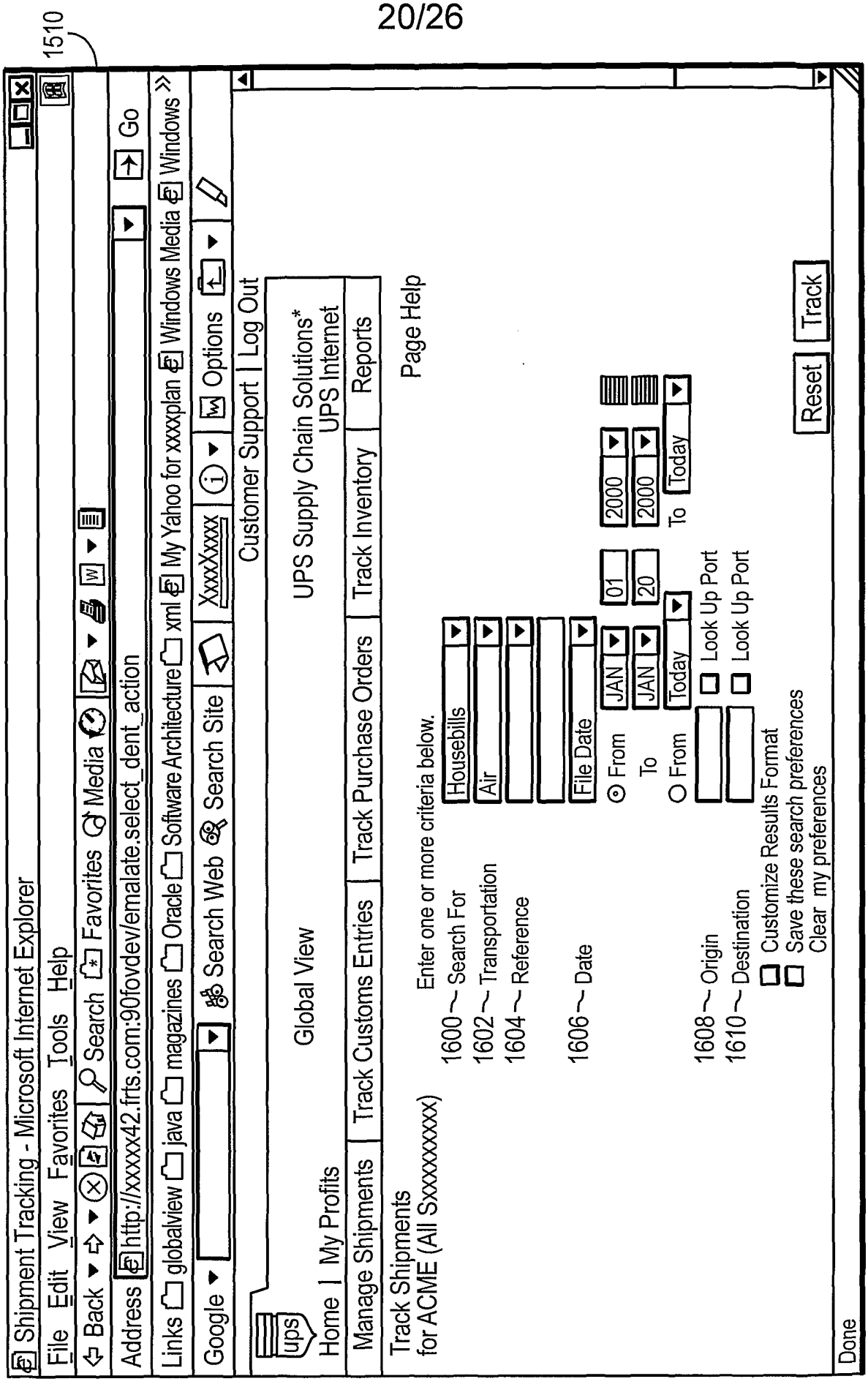
1510
Shipment Tracking - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media Go
Address http://xxxxx42.frts.com:90fovdev/emalate.select_dent_action
Links globalview java magazines Oracle Software Architecture xml My Yahoo for xxxxplan Windows Media Windows
Google Search Web Search Site XxxxXxxxx Options
Customer Support | Log Out
UPS Supply Chain Solutions*
UPS Internet
Global View
Home | My Profits
Manage Shipments | Track Customs Entries | Track Purchase Orders | Track Inventory | Reports
Page Help
Track Shipments
for ACME (All Sxxxxxxxxx)
Enter one or more criteria below.
1600 ~ Search For
Housebills
1602 ~ Transportation
Air
1604 ~ Reference
1606 ~ Date
File Date
From JAN 01 2000
To JAN 20 2000
From Today
To Today
1608 ~ Origin
Look Up Port
1610 ~ Destination
Look Up Port
Customize Results Format
Save these search preferences
Clear my preferences
Reset
Track
Done

FIG. 16

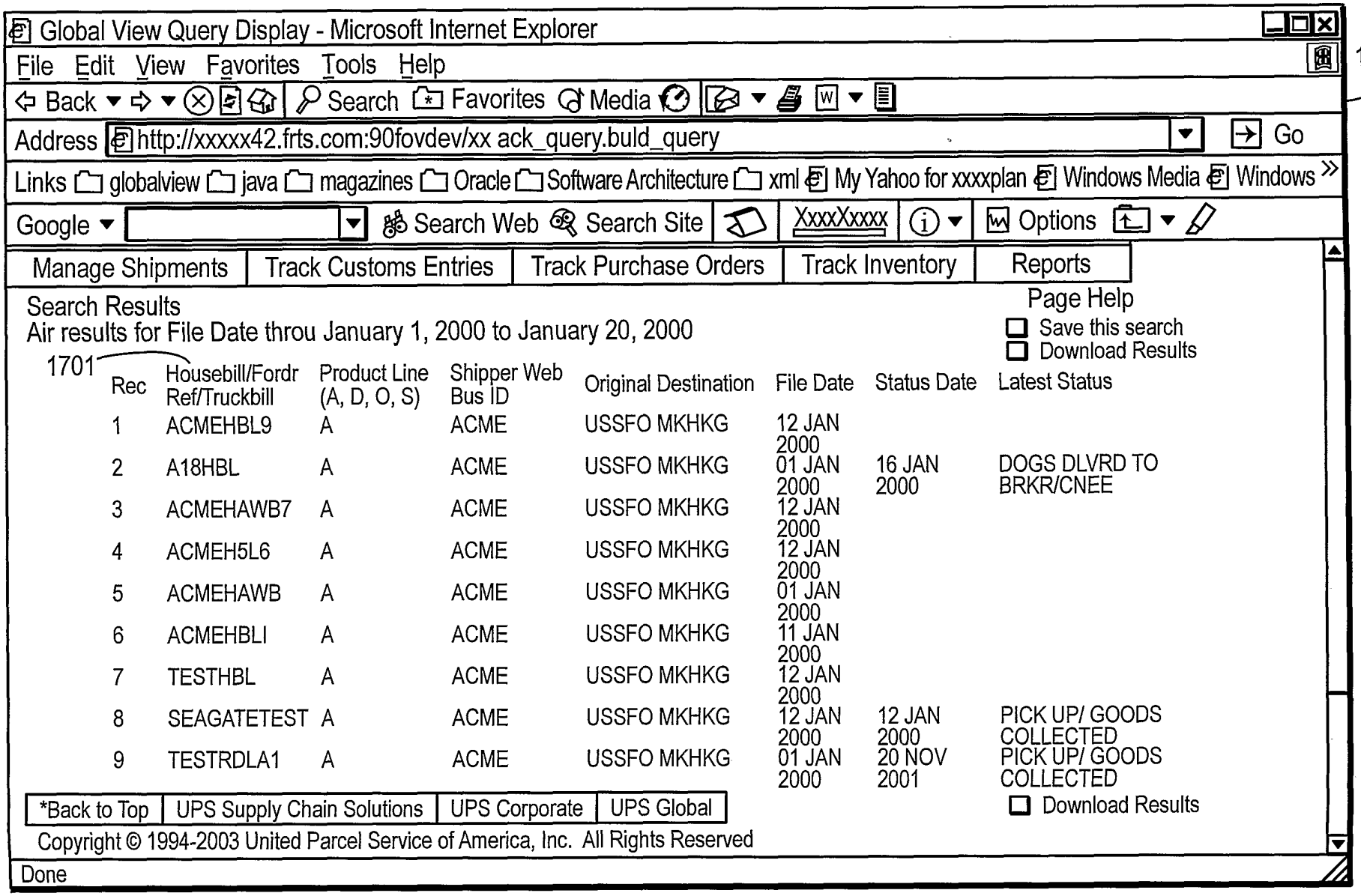
Global View Query Display - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://xxxxx42.frts.com:90fovdev/xx ack_query.buld_query
Go
Links globalview java magazines Oracle Software Architecture xml My Yahoo for xxxxplan Windows Media Windows
Google Search Web Search Site XxxxXxxxx Options
Manage Shipments
Track Customs Entries
Track Purchase Orders
Track Inventory
Reports
Search Results
Air results for File Date throu January 1, 2000 to January 20, 2000
Page Help
Save this search
Download Results
1701
Rec
Housebill/Fordr Ref/Truckbill
Product Line (A, D, O, S)
Shipper Web Bus ID
Original Destination
File Date
Status Date
Latest Status
1 ACMEHBL9 A ACME USSFO MKHKG 12 JAN 2000
2 A18HBL A ACME USSFO MKHKG 01 JAN 2000 16 JAN 2000 DOGS DLVRD TO BRKR/CNEE
3 ACMEHAWB7 A ACME USSFO MKHKG 12 JAN 2000
4 ACMEH5L6 A ACME USSFO MKHKG 12 JAN 2000
5 ACMEHAWB A ACME USSFO MKHKG 01 JAN 2000
6 ACMEHBLI A ACME USSFO MKHKG 11 JAN 2000
7 TESTHBL A ACME USSFO MKHKG 12 JAN 2000
8 SEAGATETEST A ACME USSFO MKHKG 12 JAN 2000 12 JAN 2000 PICK UP/ GOODS COLLECTED
9 TESTRDLA1 A ACME USSFO MKHKG 01 JAN 2000 20 NOV 2001 PICK UP/ GOODS COLLECTED
Download Results
*Back to Top
UPS Supply Chain Solutions
UPS Corporate
UPS Global
Copyright © 1994-2003 United Parcel Service of America, Inc. All Rights Reserved
Done
1530

FIG. 17

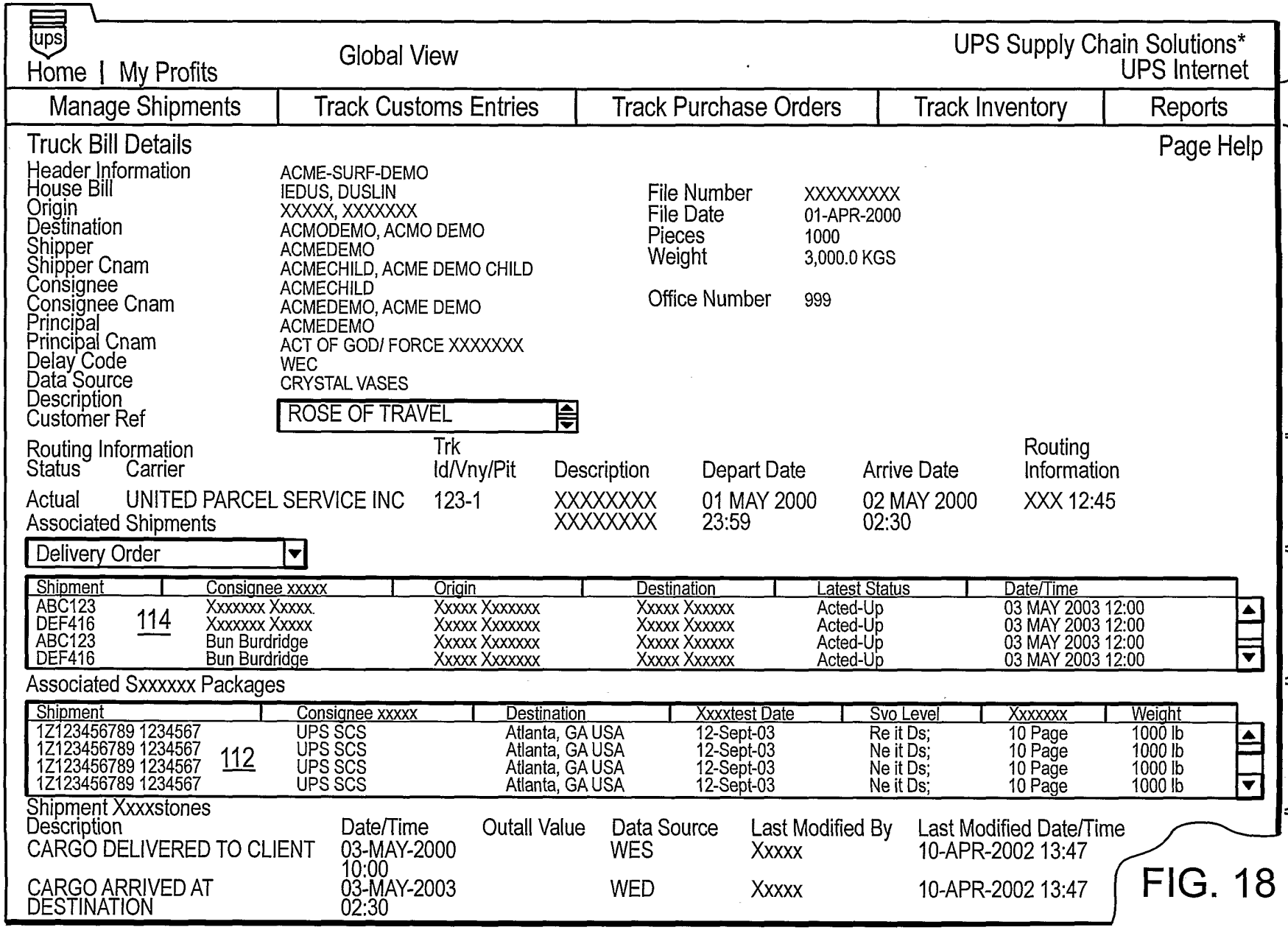
ups
Home | My Profits
Global View
UPS Supply Chain Solutions*
UPS Internet
1540
Manage Shipments
Track Customs Entries
Track Purchase Orders
Track Inventory
Reports
Truck Bill Details
Page Help
Header Information ACME-SURF-DEMO
House Bill IEDUS, DUSLIN
Origin XXXXX, XXXXXXX
Destination ACMODEMO, ACMO DEMO
Shipper ACMEDEMO
Shipper Cnam ACMECHILD, ACME DEMO CHILD
Consignee ACMECHILD
Consignee Cnam ACMEDEMO, ACME DEMO
Principal ACMEDEMO
Principal Cnam ACT OF GOD/ FORCE XXXXXXX
Delay Code WEC
Data Source CRYSTAL VASES
Description ROSE OF TRAVEL
Customer Ref
File Number XXXXXXXXX
File Date 01-APR-2000
Pieces 1000
Weight 3,000.0 KGS
Office Number 999
1801
Routing Information
Status Carrier Trk Id/Vny/Pit Description Depart Date Arrive Date Routing Information
Actual UNITED PARCEL SERVICE INC 123-1 XXXXXXXX XXXXXXXX 01 MAY 2000 23:59 02 MAY 2000 02:30 XXX 12:45
1802
Associated Shipments
Delivery Order
Shipment Consignee xxxxx Origin Destination Latest Status Date/Time
ABC123 Xxxxxx Xxxxx Xxxxx Xxxxxx Xxxxx Xxxxx Acted-Up 03 MAY 2003 12:00
DEF416 Xxxxxx Xxxxx Xxxxx Xxxxxx Xxxxx Xxxxx Acted-Up 03 MAY 2003 12:00
ABC123 Bun Burdridge Xxxxx Xxxxxx Xxxxx Xxxxx Acted-Up 03 MAY 2003 12:00
DEF416 Bun Burdridge Xxxxx Xxxxxx Xxxxx Xxxxx Acted-Up 03 MAY 2003 12:00
114
1803
Associated Sxxxxxx Packages
Shipment Consignee xxxxx Destination Xxxxtest Date Svo Level Xxxxxxx Weight
1Z123456789 1234567 UPS SCS Atlanta, GA USA 12-Sept-03 Re it Ds; 10 Page 1000 lb
1Z123456789 1234567 UPS SCS Atlanta, GA USA 12-Sept-03 Ne it Ds; 10 Page 1000 lb
1Z123456789 1234567 UPS SCS Atlanta, GA USA 12-Sept-03 Ne it Ds; 10 Page 1000 lb
1Z123456789 1234567 UPS SCS Atlanta, GA USA 12-Sept-03 Ne it Ds; 10 Page 1000 lb
112
1804
Shipment Xxxxstones
Description Date/Time Outall Value Data Source Last Modified By Last Modified Date/Time
CARGO DELIVERED TO CLIENT 03-MAY-2000 10:00 WES Xxxxx 10-APR-2002 13:47
CARGO ARRIVED AT DESTINATION 03-MAY-2003 02:30 WED Xxxxx 10-APR-2002 13:47
1805

FIG. 18

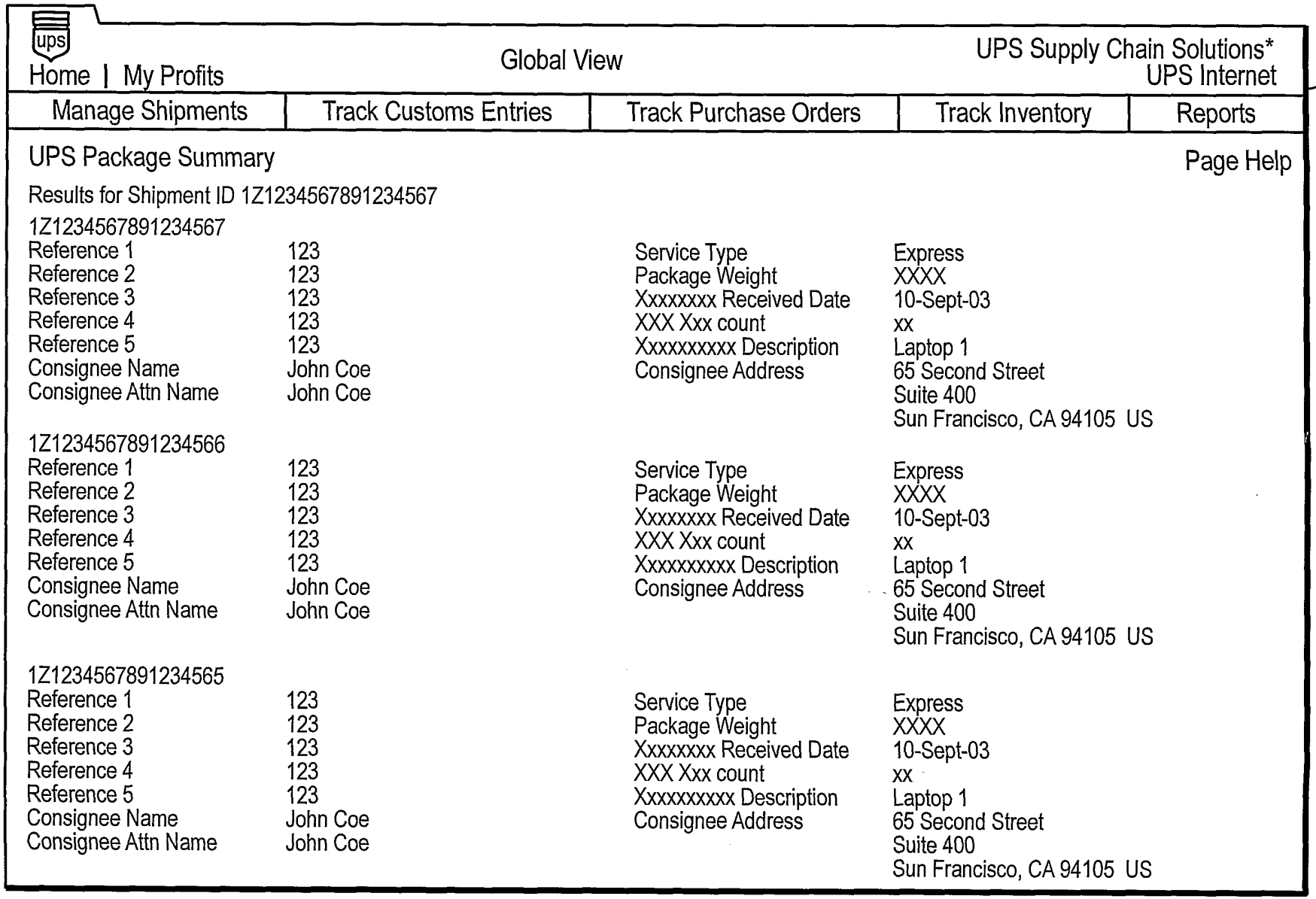
ups
Home | My Profits
Global View
UPS Supply Chain Solutions*
UPS Internet
1550
Manage Shipments
Track Customs Entries
Track Purchase Orders
Track Inventory
Reports
UPS Package Summary
Page Help
Results for Shipment ID 1Z1234567891234567
1Z1234567891234567
Reference 1 123
Reference 2 123
Reference 3 123
Reference 4 123
Reference 5 123
Consignee Name John Coe
Consignee Attn Name John Coe
Service Type Express
Package Weight XXXX
Xxxxxxxx Received Date 10-Sept-03
XXX Xxx count xx
Xxxxxxxxxx Description Laptop 1
Consignee Address 65 Second Street
Suite 400
Sun Francisco, CA 94105 US
1Z1234567891234566
Reference 1 123
Reference 2 123
Reference 3 123
Reference 4 123
Reference 5 123
Consignee Name John Coe
Consignee Attn Name John Coe
Service Type Express
Package Weight XXXX
Xxxxxxxx Received Date 10-Sept-03
XXX Xxx count xx
Xxxxxxxxxx Description Laptop 1
Consignee Address 65 Second Street
Suite 400
Sun Francisco, CA 94105 US
1Z1234567891234565
Reference 1 123
Reference 2 123
Reference 3 123
Reference 4 123
Reference 5 123
Consignee Name John Coe
Consignee Attn Name John Coe
Service Type Express
Package Weight XXXX
Xxxxxxxx Received Date 10-Sept-03
XXX Xxx count xx
Xxxxxxxxxx Description Laptop 1
Consignee Address 65 Second Street
Suite 400
Sun Francisco, CA 94105 US

FIG. 19

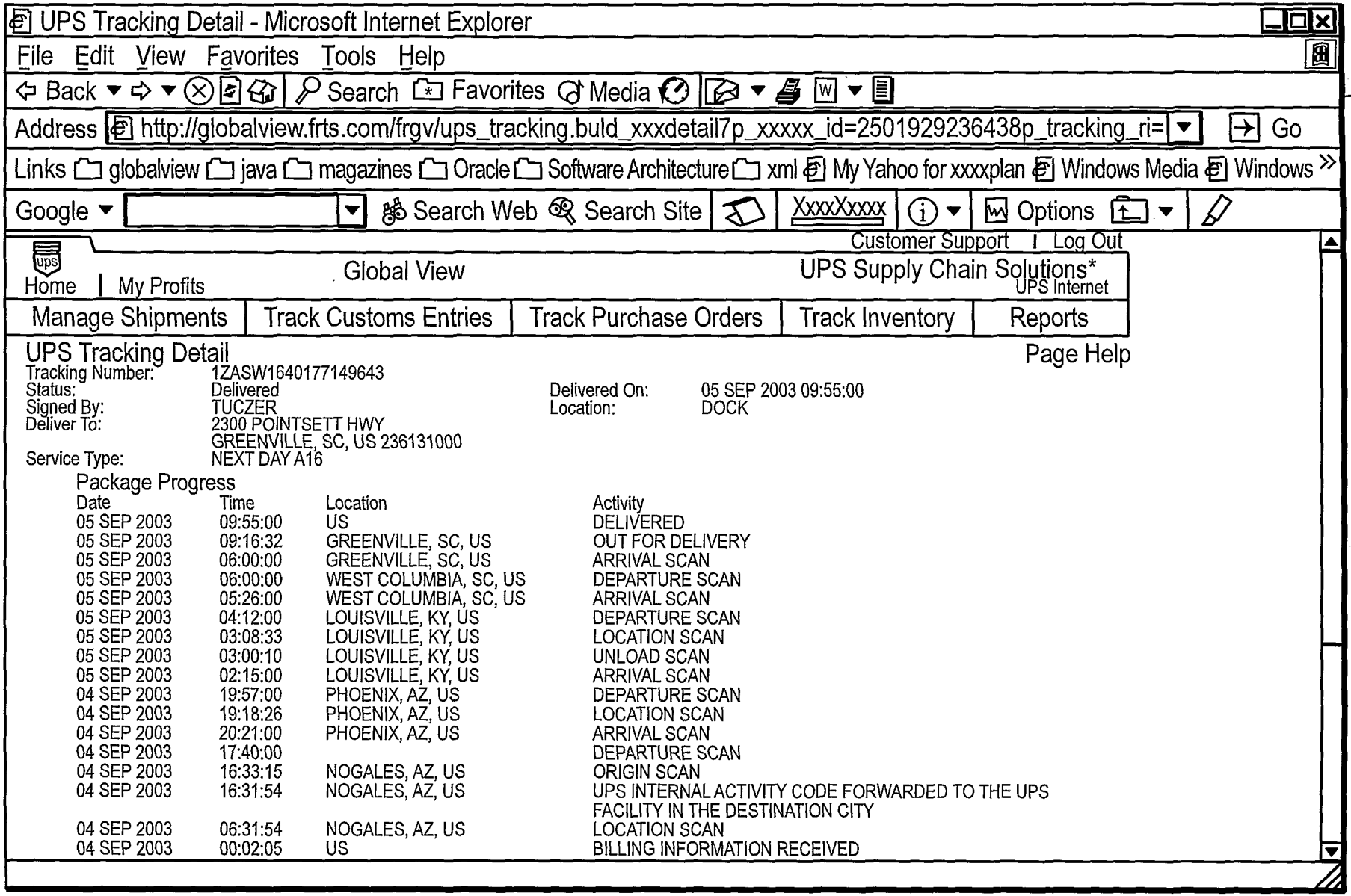
UPS Tracking Detail - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://globalview.frts.com/frgv/ups_tracking.buld_xxxdetail7p_xxxxx_id=2501929236438p_tracking_ri=
Go
Links globalview java magazines Oracle Software Architecture xml My Yahoo for xxxxplan Windows Media Windows
Google Search Web Search Site XxxxXxxxx Options
Customer Support | Log Out
Home | My Profits
Global View
UPS Supply Chain Solutions*
UPS Internet
Manage Shipments
Track Customs Entries
Track Purchase Orders
Track Inventory
Reports
UPS Tracking Detail
Page Help
Tracking Number: 1ZASW1640177149643
Status: Delivered
Signed By: TUCZER
Deliver To: 2300 POINTSETT HWY
GREENVILLE, SC, US 236131000
Service Type: NEXT DAY A16
Delivered On: 05 SEP 2003 09:55:00
Location: DOCK
Package Progress
Date Time Location Activity
05 SEP 2003 09:55:00 US DELIVERED
05 SEP 2003 09:16:32 GREENVILLE, SC, US OUT FOR DELIVERY
05 SEP 2003 06:00:00 GREENVILLE, SC, US ARRIVAL SCAN
05 SEP 2003 06:00:00 WEST COLUMBIA, SC, US DEPARTURE SCAN
05 SEP 2003 05:26:00 WEST COLUMBIA, SC, US ARRIVAL SCAN
05 SEP 2003 04:12:00 LOUISVILLE, KY, US DEPARTURE SCAN
05 SEP 2003 03:08:33 LOUISVILLE, KY, US LOCATION SCAN
05 SEP 2003 03:00:10 LOUISVILLE, KY, US UNLOAD SCAN
05 SEP 2003 02:15:00 LOUISVILLE, KY, US ARRIVAL SCAN
04 SEP 2003 19:57:00 PHOENIX, AZ, US DEPARTURE SCAN
04 SEP 2003 19:18:26 PHOENIX, AZ, US LOCATION SCAN
04 SEP 2003 20:21:00 PHOENIX, AZ, US ARRIVAL SCAN
04 SEP 2003 17:40:00 DEPARTURE SCAN
04 SEP 2003 16:33:15 NOGALES, AZ, US ORIGIN SCAN
04 SEP 2003 16:31:54 NOGALES, AZ, US UPS INTERNAL ACTIVITY CODE FORWARDED TO THE UPS FACILITY IN THE DESTINATION CITY
04 SEP 2003 06:31:54 NOGALES, AZ, US LOCATION SCAN
04 SEP 2003 00:02:05 US BILLING INFORMATION RECEIVED
1560

FIG. 20

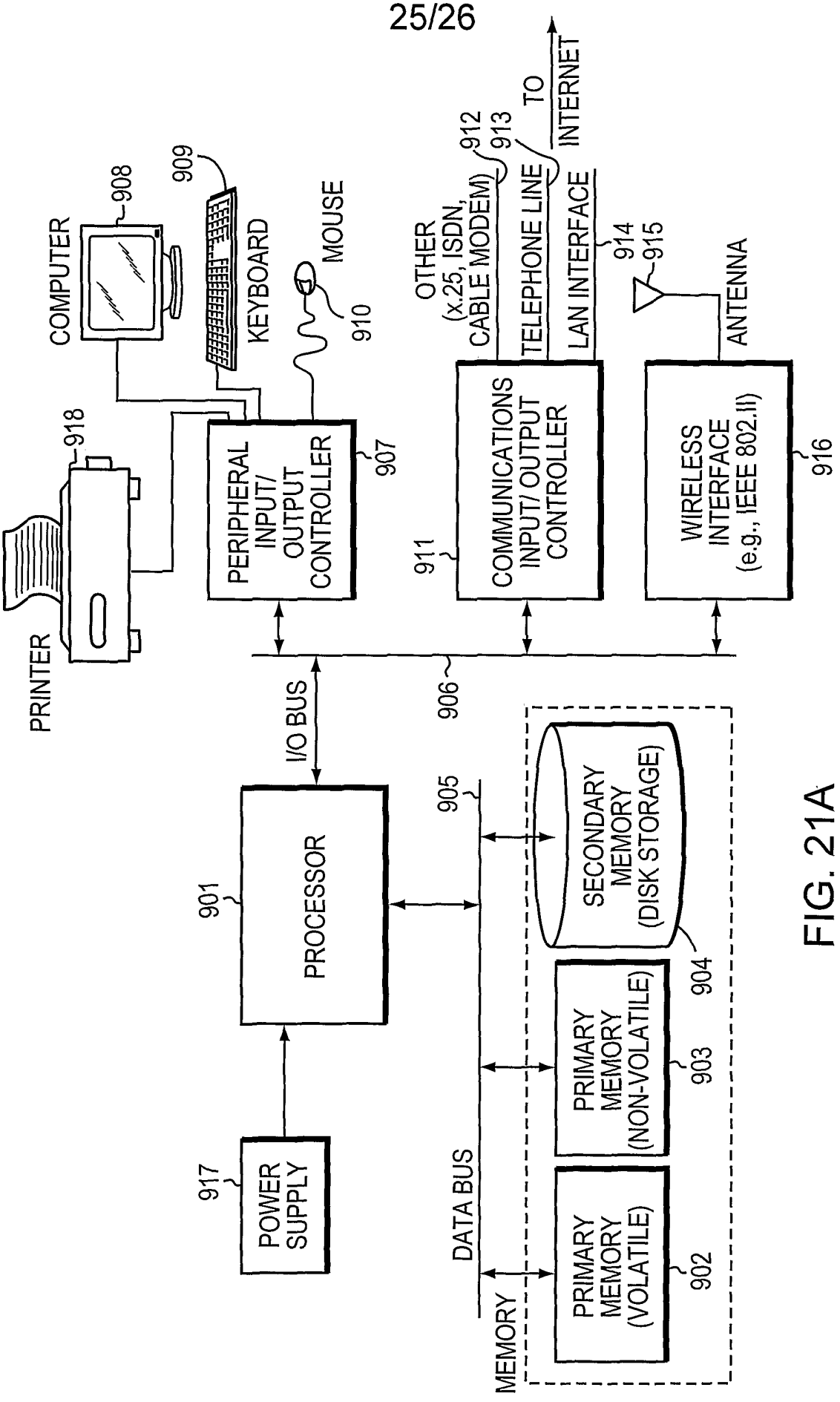
MEMORY
DATA BUS
905
I/O BUS
906
PROCESSOR
901
POWER SUPPLY
917
PRIMARY MEMORY (VOLATILE)
902
PRIMARY MEMORY (NON-VOLATILE)
903
SECONDARY MEMORY (DISK STORAGE)
904
PERIPHERAL INPUT/ OUTPUT CONTROLLER
907
COMMUNICATIONS INPUT/ OUTPUT CONTROLLER
911
WIRELESS INTERFACE (e.g., IEEE 802.11)
916
ANTENNA
915
LAN INTERFACE
914
TELEPHONE LINE
913
OTHER (x.25, ISDN, CABLE MODEM)
912
TO INTERNET
MOUSE
910
KEYBOARD
909
COMPUTER
908
PRINTER
918

FIG. 21A

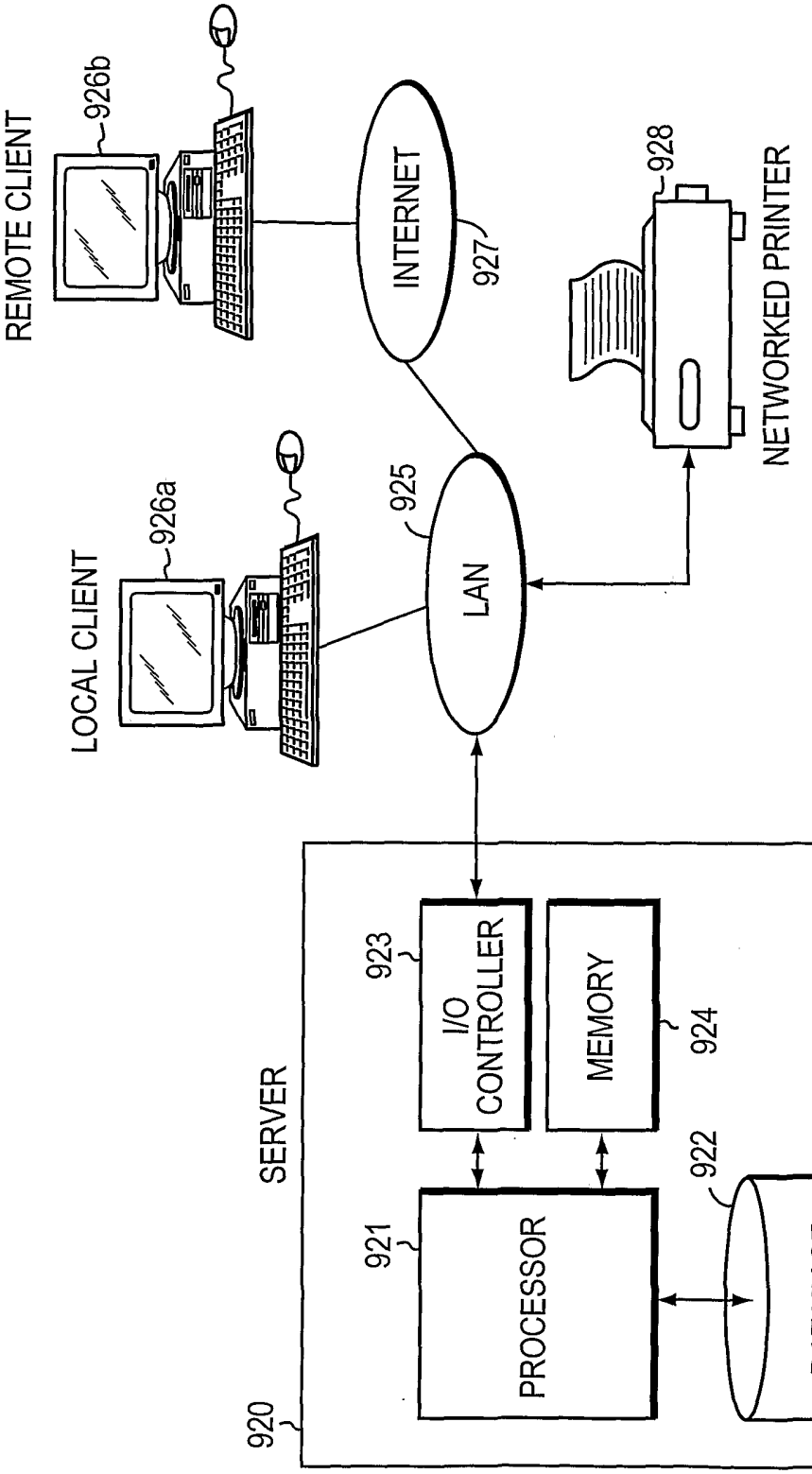
REMOTE CLIENT
926b
INTERNET
927
928
NETWORKED PRINTER
LOCAL CLIENT
926a
925
LAN
SERVER
923
I/O CONTROLLER
MEMORY
924
921
PROCESSOR
922
DATABASE
920

FIG. 21B