HAND-HELD INVENTORY TRACKING AND AUTOMATED ORDER TRANSMISSION SYSTEM

Field of the Invention

The present invention relates to inventory tracking systems and methods for products and particularly, to a method and system for simplifying the tracking and control of optical lens products, particularly, revenue and diagnostic contact lenses, maintained in inventory at an eye care professional's office, and for automating the lens product ordering process for eye care professionals and their customers.

Discussion of the Prior Art

.The advent of new manufacturing technologies has allowed new contact lens designs and materials to be offered by manufacturers. For example, manufacturers can now introduce contact lenses which designs provide correction for myopia, hyperopia, astigmatism and presbyopia as well as vision enhancement features such UV protection, tinted lenses and others. This proliferation of designs and features translate to an exponential growth on stock keeping units ("SKU's"). For example, for spherical lenses (correction for myopia) a single design parameter is specified. For bifocal contact lenses (presbyopia) two design parameters are specified. Each one of these parameters can vary according to the user. Thus, a spherical patient could have a –2.5 diopter correction while another one might need a –9 diopter correction. The incremental diopters could be in half diopters or quarter diopter. If there are 9 diopters offered in quarter increments then there are 36 SKU's to keep in inventory. With the advent of astigmatic correction (toric lenses) there are 3 design parameters specified. These are a spherical power correction, a cylindrical power correction, and an axis correction. The combinations of spherical powers, cylindrical and axis degrees for the toric lens exponentially multiplies the SKU's in the thousands of numbers. Once tinted lenses are added to the SKU's the reader can appreciate the proliferation of SKU and the associated logistics to keep inventory. Presently, many thousands of lens products are available and are now being introduced by ECP's to their customers for diagnostic

purposes (hereinafter "diagnostic" lens products) and prescriptive purposes (hereinafter "revenue" lens products).

For example, ECPs are expected to fit their patients with diagnostic lenses to assure a highly successful fitting rate. These diagnostic lenses are stored in the ECP's office or wherever the ECP's lens product inventory is located. Typically, the diagnostic lens products are either in a single package or in the form of a package strip comprising three or more primary packages connected by a lidstock. Other diagnostic lenses are stored in their revenue package but dispensed as diagnostic.

Revenue lenses products, on the other hand, are filled by prescription only. Typically, revenue lens products are ordered by phone by the office of an optometrist or other licensed ECP who performs eye exams and patient fittings. Most ECPs are expected to initiate orders for the specific product SKUs whenever the patient needs them. Some offices may choose to keep a small inventory, stock inventory, for high demand SKUs and replenish them periodically by placing a stock order.

The current practice is to offer only a portion of the total number of SKU's for diagnostic purposes. Whether diagnostic or revenue the lenses are typically packaged in primary packages, blisters, which in turn are packaged in multiples in a secondary package, paperboard cartons. Each carton might include multiples of 6, 12, 30 or 90 lenses, for example, individually packaged in their primary packages. Whether diagnostic or revenue the primary packages are labeled with their printed lens parameters, product name, expiration date, and lot number as well as the lens brand. This printed information can be found on a per blister basis or across predetermined number of blisters. Similarly, the secondary package includes the above information as well as FDA regulated content statements, international symbols for recycling and UV protection, as well as the product code (UPC-A type) and the lot number. Currently, only the secondary package contains barcodes for the product code and the lot number. Some primary packages might contain a barcode but it is not common practice across all products. The lens parameters might encompass any combination of spherical, cylindrical and add power as well as the axis according to the prescribed product..

Currently, the ECP office maintains an inventory of revenue lens product for those SKUs used by ECP's customers and periodically will receive and maintain in

inventory an amount of diagnostic lenses. However, there is currently no systematic or efficient way to control the amount of lenses maintained in inventory, much less track the usage of inventoried revenue or diagnostic lenses. For instance, the task of inventory management is typically performed by the ECP or a contact lens technician, who, on an ad-hoc basis, assesses the inventory levels across products, brands and companies. Inventory level requirements on a new product are determined with the help of a sales representative at the time of the first order, but ongoing levels are determined based on the contact lens technician's or ECP staffer's judgment, i.e., ECP staff may haphazardly perform a manual count of the packages and/or blister packs for specific SKUs maintained in inventory for data processing and internal tracking purposes. An inventory log, however, is not routinely kept. The tracking and maintenance of revenue and diagnostic lens product inventories and any associated data is a difficult task, especially given the proliferation of new lens SKUs. Vistakon, a division of Johnson & Johnson, Inc., and current assignee of the present invention, offers a customer service program where the conflicting goals of minimal inventory and constant availability of product to fulfill patient orders are balanced with the aid of Doctor Controlled Patient Delivery ("DCPD") if the ECP office happens to run out of stock. It is estimated that the technician spends a minimum of four to six hours a week on the tasks of inventory management and order placement.

With specific regard to order placement, the re-ordering of revenue lenses from the manufacturer by the ECP for a specific customer, for example, requires a verbal description of the lens product to be ordered or manual order entry of the patient information including the lens product order information. This process is tedious and subject to human error. With the proliferation of SKU's the order process is lengthened to specify more parameters. This information has to be manually entered for transmission to the order entry system of the manufacturer with increased likelihood of error as the number of parameters per SKU increase. Further, since the diagnostic lenses are provided to the ECP free of charge to fit new patients, their quantity are limited by the accumulated revenue lenses ordered by the ECP account.

Currently, there is a need for a uniform system that enables manufacturers to efficiently track contact lens products disseminated to the ECPs and, enable ECPs to simplify their inventory control procedures for the myriad of diagnostic and revenue

lenses, thus, facilitating the determination of lens availability for dispensation to patients. Furthermore, there is a need for a uniform system that enables ECPs to efficiently order lens products and reduce the occurrence of errors that would be prevalent by manual order entry processes.

It would thus be highly desirable to provide an efficient inventory tracking system of revenue and diagnostic lens products for ECPs.

It would be highly desirable to provide an inventory tracking system that enables manufacturers to track contact lens products disseminated to the ECPs and, enable ECPs to maintain an inventory and simplify their inventory control procedures for the myriad of diagnostic and revenue generating lens products available for dispensation to patients.

It would additionally be highly desirable to provide an efficient lens product order entry system that simplifies and streamlines the customer service order entry process by automatically generating orders for diagnostic lenses and provide a user option for receiving a low inventory warning on revenue lenses or an automatic order generation based on a predetermined patient usage function.

It would additionally be desirable to provide a system an efficient lens product order entry system that simplifies and streamlines the customer service order entry process and enables the generation of lens product orders so that inventory levels of lens products may be automatically maintained and optimized.

It would be further highly desirable to provide ECPs with an intelligent portable or handheld PDA device capable of scanning unique bar-code identifiers provided on lens packages for use in the above desired inventory tracking system and lens product order entry system.

It would moreover be highly desirable to provide the above desired inventory tracking system and automated lens product order entry system for ECPs that utilizes an intelligent portable or handheld bar-code scanning system in conjunction with a modem transmission device that interfaces with existing telephonic and networked communication infrastructures.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a dynamic and automated inventory tracking system of revenue and diagnostic contact lenses that is designed to streamline the inventory tracking process.

It is another object of the present invention to provide an efficient lens product order entry system that simplifies and streamlines the customer service order entry process by automatically generating orders for revenue and diagnostic lenses so that inventory levels of lens products maintained by the local ECP may be automatically maintained and optimized.

It is a further object of the present invention to provide a system and method for dynamic inventory tracking of revenue product inventory levels including a customer service feature that automatically warns ECPs of low inventory levels and expediting initiation of a product re-order process by offering the user a feature to cancel or approve an order based on low inventory levels.

It is yet another object of the present invention to provide a system and method for dynamic inventory tracking of diagnostic product inventory which provides a customer service feature to automatically replenish/ship new diagnostic product to local ECP premises and effectively control the product diversion to unauthorized usage.

It is yet another object of the present invention to provide a system and method for dynamic inventory tracking of diagnostic product inventory which provides a customer service feature to automatically replenish/ship new diagnostic products to local ECP premises and effectively control the product diversion to unauthorized usage.

It is yet a further object of the present invention to provide a web-enabled dynamic and automated inventory tracking system of revenue and diagnostic contact lenses that is designed to streamline the inventory tracking and inventory product ordering process.

It is still another object of the present invention to provide an efficient lens product order entry system that simplifies and streamlines the customer service order entry process by providing users with the option to receive either of: 1) a warning when revenue lens products in inventory are below a pre-defined threshold, and/or 2) an auto replenishment of a patient order based on lens usage, and/or 3) a pre-formatted order

for low inventory SKU's ready for customer approval or cancellation so that inventory levels of lens products maintained by the ECP may be automatically maintained and optimized.

It is yet still another object of the present invention to provide an inventory tracking system that enables efficiency and improvement for tracking and documentation of product information (after manufacturing) through its distribution and shipping logistics cycle, e.g., from the point of manufacturing lens transfer to the ECP or dispensing revenue and diagnostic lenses.

It is yet still a further object of the present invention to provide an automated order transmission system and methodology that is capable of assisting the customer in placing refill orders for lens products and to provide an automatic reordering system to replenish diagnostic products and provide a user feature to receive either of: 1) a low inventory warning of revenue lens products, and/or 2) an auto replenishment of a patient order based on lens usage, and/or 3) an already set up order of low inventory SKU's ready for customer approval or cancellation by the ECP.

Thus, according to at least one embodiment of the invention, there is provided a dynamic inventory tracking and management system comprising: a server device for enabling access to a database for storing lens product information, the lens product information including inventory data comprising types (diagnostic or revenue) and amounts of lens products maintained in inventory at various locations responsible for dispensing lenses to customers, the manufactured lens products comprising packages having readable indicia for directly indicating the lens product information or providing reference to associated lens product information included in the database;

a device provided at each location for scanning indications provided on packages of lens products dispensed to customers at the respective location and obtaining inventory tracking information including a lens product type identifier and a quantity dispensed for each lens product type associated with a location;

a mechanism for enabling direct communication of scanned inventory tracking information obtained at each location to the database server over a communication network; and,

a mechanism for tracking each inventory maintained at the various locations based on the scanned inventory tracking information, said tracking mechanism

updating quantities of lens products dispensed at each location for each lens product type with quantities maintained in said inventory levels for each location, and reporting updated inventory lens product inventory level information for use at each location.

Further implemented is a mechanism for authenticating the location prior to receiving directly communicated inventory tracking information from the device at each location. Additionally, a mechanism is implemented for confirming inventory received or shipped at the various locations based on the scanned inventory tracking information, the tracking mechanism updating quantities of lens products received at or shipped from each location for each lens product type with quantities maintained in said inventory levels for each location, and reporting updated inventory lens product inventory level information for use at each location.

Preferably, the contact lens products include revenue and diagnostic lenses provided in packages of the following types: a primary package, a blister pack, vial, a secondary package, carton, tray, or plastic bag. The readable indicia provided on the package may comprise a unique barcode identifier indicating and/or electronically referencing in the database the lens product, its lens parameters, package quantity, lot number and SKU and product code. Preferably, the device provided at each location for scanning indications provided on packages of revenue and diagnostic lens products dispensed in the system is accomplished by means of a hand-held PC or PDA device equipped with scanner. Besides obtaining inventory tracking information including a lens product type and a quantity dispensed for each lens product type, the PDA device is enabled to track information including a reason for dispensing the product.

Advantageously, the automated order transmission system reduces the customer's ECP office labor and provides better order accuracy than the current process of verbally describing the lens product SKU's and its parameters to the manufacturer's customer service representatives. Furthermore, the automated system and method for dynamic inventory tracking of inventory optimizes human labor in counting and tracking product, reconciling inventory physical inventory with logical inventory, streamlines documentation product information to a one time 'point of entry', and minimizes human error during electronic documentation of inventory, lens information and FDA regulated information.

BRIEF DESCRIPTION OF THE DRAWINGS

Details of the invention disclosed herein shall be described below, with the aid of the figures listed below, in which:

Figure 1 is an example system architecture underlying the dynamic inventory and tracking and management system of the invention;

Figure 2 is a more detailed view of the order entry processing component including the re-ordering process steps in response to selection of a "Place New Order" button depicted in Figures 5(b) and 5(c) according to the invention;

Figures 3(a)-3(d) depict the process steps for inventory tracking and management according to the principles of the invention including the process flow for an ECP Office dispensing lenses and, the system algorithms for inventory update, inventory management, processing of ECP's ordering preferences, and processing of orders and order fulfillment;

Figure 4 depicts the initial system setup and product storage occurring after manufacturing of the lens product;

Figure 5(a) is an exemplary diagram depicting the GUI interface provided by the PDA equipped with bar code scanner enabling an ECP personnel to select the reason for dispensing lenses; diagnostic or revenue lenses;

Figure 5(b) is an exemplary diagram depicting the GUI interface provided by the PDA equipped with bar code scanner for displaying tracked inventory levels for product types and enabling ECP personnel to review low inventory warning levels;

Figure 5(c) is an exemplary diagram depicting the GUI interface provided by the PDA equipped with bar code scanner for displaying tracked inventory levels for product types and enabling ECP personnel to initiate re-orders or place new orders;

Figure 6 is a detailed block diagram depicting an example process 160 for inventory tracking and automated order entry according to the principles of the invention after the user selects the "Place New Order" button depicted in Figures 5(b) and 5(c) according to the invention;

Figures 7(a) through 7(d) depict the various message formats with Figures 7(a) and 7(b) depicting example inventory order entry records for respective stock order entry transaction (Figure 7(a)) and DCPD order entry transaction (Figure 7(b)), respectively, Figure 7(c) depicting an example inventory usage reporting transaction, and Figure 7(d) depicting an example format for an invoice summary request message;

Figure 8 is a block diagram depicting the dynamic inventory tracking process 300 according to the invention for orders that are placed automatically by the system and to display warnings for the user on low inventory as indicated in Figures 3(c) and 3(d); and,

Figure 9 is a block diagram depicting one embodiment of the dynamic inventory tracking process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a dynamic inventory tracking system and method that enables ECP's to manage their diagnostic and revenue lens product inventories. The system is coupled with an electronic order entry system enabling ECPs to efficiently order lens products for their customers and to order lenses for inventory maintenance purposes so that a proper level of diagnostic and revenue lenses in the ECP's inventory may be maintained. This system provides an automated order generation feature that is enabled to automatically generate replenishment orders and automatically initiate the

processing and fulfillment of generated diagnostic and revenue (when preferred) orders at the lens product manufacturer site, e.g., the assignee Vistakon, a division of Johnson & Johnson, Inc. To accomplish this, in the preferred embodiment, the inventory management system implements a hand-held computer or Personal Digital Assistance (PDA) equipped with barcode scanning capability that may read and store the unique product identifying information, e.g., UPC, SKU, lot numbers, etc., provided as a bar code on the lens package label. Advantageously, the information gathered by the PDA is efficiently transmitted over existing telephonic communication infrastructures, e.g., wired telephony networks, directly to the lens product manufacturers order entry system where they may be expediently processed. According to the invention, the dynamic inventory tracking and management system implements the PDA equipped with a barcode scanner to dynamically track lens product usage, i.e., digitally establish every time a lens product is dispensed for: 1) diagnostic or 2) revenue reasons.

Figure 1 is an example system architecture underlying the dynamic inventory and tracking and management system of the invention. As shown in Figure 1, the Inventory Tracking and Management System 10 of the invention comprises three components: 1) a lens tracking infrastructure 20 located at the local ECP office 12 which includes implementation of a computer or Personal Digital Assistance (PDA) equipped with a hand-held barcode scanner that may read and store information associated with unique bar-codes provided on the primary or secondary lens package labels, for instance, for the purposes of dynamic inventory tracking and order entry; 2) a lens dynamic tracking and inventory management system 30 including at least a master engine server 26 and database server 27 implementing software for enabling logical inventory management and lens re-ordering functions as will be described in greater detail herein; and, 3) an enterprise customer service order entry and web server infrastructure 50 including one or more enterprise servers which may be existing enterprise order entry servers 58 and web-order servers 59 which receive, maintain and process all the information for re-ordering lens products out of a Distribution system 51 such as implemented by the assignee, Vistakon, which currently maintains a product Distribution tracking infrastructure including a distribution database server element 57. As shown in Figure 1, the lens tracking infrastructure 20 includes a component located at the product manufacturing site 13 which likes implements a computer or Personal

Digital Assistance (PDA) equipped with a hand-held barcode scanner that may read and store information associated with unique bar-codes provided on the primary or secondary lens package labels, for instance, for the purposes of dynamic inventory tracking and order entry. According to the invention the existing web ordering, order entry 50 and distribution tracking infrastructures systems include a communications infrastructure represented by a network element 25, for example, an intranet or Internet, enabling communication of order-entry and account information among the various enterprise servers. As shown, the components of the dynamic inventory tracking system 30 in addition to the lens tracking infrastructure 20 located at the local ECP office 12 and the manufacturing site 13 are likewise interfaced for communication across network element 25.

More particularly, as shown in Figure 1, to enable lens tracking functionality according to the invention, the lens tracking infrastructure 20 at each ECP office 12 and manufacturing site 13 preferably implements a hand-held PC or Personal Digital Assistant device (PDA) equipped with a bar code scanner device 16 such as may be implemented in conjunction with a personal computer (PC) 14. Preferably, the PDA equipped with a barcode scanner device 16 includes an operating system, touch screen interface or GUI display, and, may be equipped with custom software to facilitate data entry, storage and communication to and from the Dynamic Inventory Tracking and Management System 30. For example, a hand-held scanner such as a Denso BHT-600 series or, like equivalent such as the SPT 1500 model manufactured by Symbol Technologies, Inc. may be provided with TCP/IP and FTP stacks firmware including software and entire scanner application for guaranteeing FTP functionality for communicating with manufacturer/enterprise routers. It should be understood that, according to conventional techniques, the hand-held bar-code scanner 16 is enabled to communicate with server devices in the Dynamic Inventory Tracking and Management System 30 in either of two ways: 1) in real time through wireless connection to an access point within the local vicinity where the access point comprises a server (not shown) which is hard-wired to a communications network 25 such as the Internet, for example, via a 10/100 Base-T Ethernet (in the case that a LAN connection is available) or, an analog phone line (via a Public Switched Telephone Network); and, 2) via a batch-mode cradle connection to a modem (not shown) for interfacing with the

communication network 25 such as a wired telephony system for example, via a RJ-11 standard telephone line connection. The communication between the hand-held units 16 and the Dynamic Inventory Tracking and Management System infrastructure servers 26, 27 may be modem direct dial or though a communication network 25 application, wireline or wireless data transfer.

Figure 2 illustrates an underlying architecture of the enterprise Order Entry processing and inventory tracking infrastructure 50 according to the invention. As shown in Figure 2, the enterprise Order Entry and inventory tracking infrastructure 50 includes a first File Transfer Protocol (FTP) server device 56 for initially receiving lens product order entries communicated from ECP clients 12 via the PDA equipped with a barcode scanner device through the Dynamic Inventory Tracking and Management System 30, and, in turn, formats the order entry requests for receipt by and transfers the requests to the enterprise Order Entry server device 58, such as an IBM AS/400. Preferably, secure communications to a proxy and order entry servers are enabled via a secure communications protocol. The secure servers 56, 58 incorporate defined business rules and procedures into a customized Internet accessible database system and are designed with a set of dedicated computers which provide firewall, application serving, and database management functions. It should be understood that the client portion of the system (PDA, desktop PC or laptop) may equally communicate to the Dynamic Inventory Tracking and Management System server via Hypertext Transmission Protocol (HTTP) and Open Secure Socket Layer (OpenSSL) on either the Worldwide Web or TCP/IP.

As further shown in Figure 2, central to the enterprise Order Entry and order processing infrastructure 50 is a business document processing and electronic data interchange ("EDI") processing facilitator 35. Preferably, the EDI processing facilitator includes an EXTOL Integrator device 35 that provides data exchanges and transaction at greater speeds and high volumes, and implements software enabling communication, translation and document management facilities to/from EDI driven platforms, e.g., the IBM AS/400. The Integrator device 35 provides tremendous flexibility in organizing and retrieving data and integrates seamlessly with any EDI user application software, regardless of platform, and may take data from any system, in any standard, and process it automatically in real time. The Integrator EXTOL integrator

particularly interfaces with an enterprise order processing facility 45 including server/database systems 47 and 49 for holding orders, generating orders and invoices, and providing EDI order processing. As will be explained in greater detail, the order entry system further interfaces with the Dynamic Inventory Tracking and Management System 30 including server/database systems 27 for updating and tracking inventory usage for the particular ECP and manufacturer, and maintaining a master inventory for the ECP office.

Figures 3(a) through 3(d) are conceptual block diagrams depicting the process for inventory tracking and management according to the principles of the invention. Figure 3(a) particularly depicts the Process Flow 100 for an ECP, and the system algorithms for inventory update, inventory management, processing of ECP's ordering preferences, processing of order and order fulfillment. As shown in Figure 3(a), a first step 101 depicts an ECP representative scanning each product received from the manufacturing distribution center, e.g., in fulfillment of an order for stock lens products, and, at step 102, storing the products in inventory maintained by the local office. Particularly, as shown in Figure 3(a), at step 101a, personnel at the ECP office utilizes the PDA equipped with the bar code scanner 16 to scan the product into the Dynamic Inventory Tracking and Management System 30 to update the logical inventory for that ECP. In response to the scanning, at step 105, an algorithm 115 is implemented in the Dynamic Inventory Tracking and Management System 30 servers 26, 27 for updating and tracking the logical inventory for that ECP. Particularly, the algorithm 115 as shown in Figure 3(a) is invoked to increment the existing amount of product for a particular SKU associated with the inventory of the local ECP with the quantity of product scanned by the ECP.

Subsequently, as shown at step 103 in Figure 3(a), the ECP office 12 will dispense product in any one of three ways: 1) for diagnostic purposes, e.g. for fitting a particular patient, as indicated at step 104a; and 2) for revenue purposes, i.e., for filling a patients prescription for a particular SKU (lens product) as indicated at step 104b. In each of the three ECP product dispensation scenarios, the ECP office utilizes the PDA equipped with the bar code scanner 16 to scan the product package to be dispensed so that the product information may be used by Dynamic Inventory Tracking and Management System 30 to update the logical inventory for that ECP. Figure 5(a)

particularly exemplifies the use of the PDA 16 equipped with bar code scanner providing a display 150 including a lens dispensing option 152 selectable by the ECP personnel that enables the ECP to select the reason for dispensing lenses, i.e., for diagnostic or revenue purposes. For purposes of explanation, the diagnostic lenses are to be dispensed as shown by the highlighted radio button 154. Referring back to Figure 3(a), in response to the scanning for diagnostic lenses dispensed, at step 104a, an algorithm 116 is implemented in the Dynamic Inventory Tracking and Management System 30 servers 26, 27 for updating and tracking the logical inventory of diagnostic lens products for that ECP. Particularly, the algorithm 116 as shown in Figure 3(a) is invoked to decrement the existing amount of diagnostic lens product for a particular SKU maintained in the inventory of the local ECP with the quantity of product dispensed as scanned by the ECP. Likewise, in response to the scanning for revenue lenses dispensed, at step 104b, an algorithm 117 is implemented in the Dynamic Inventory Tracking and Management System 30 servers 26, 27 for updating and tracking the logical inventory of revenue lens products for that ECP. Particularly, the algorithm 117 as shown in Figure 3(a) is invoked to decrement the existing amount of revenue lens product for a particular SKU maintained in the inventory of the local ECP with the quantity of product dispensed as scanned by the ECP.

Preferably, as will be described in greater detail, from the standpoint of inventory tracking as enabled by the EDI inventory management and order entry functionality, a "flat file" format has been defined comprising a multiple of non-delimited segments or record formats including, but not limited to: a record indicating a transaction start, a header record, one or more inventory management detail records, and a transaction end record. Thus, with more particularity as illustrated in Figure 7(c) there is depicted an example EDI formatted inventory usage transaction reporting record 275 illustrating the minimum data supplied to the Dynamic Inventory Tracking and Management System server 26 for inventory management/update purposes including: an (EDI) Interchange Start segment 277 including an (EDI) Interchange Start segment identifier @VKS, for example; an EDI Message ID ("VKN852"), a Data Origin which includes the sender ID or the unique id of the PDA, an optional message sequence number (a sequentially assigned Control number) and a transaction date representing the date of the inventory control transmission, e.g., in YYYYMMDD

format; an Inventory Management Header segment 279, including text 'HDR' indicating the start of a header record, a transaction type, e.g., a 'V' for indicating a Vendor Inventory, an optional PO number, a Ship-to account number and location indicating the account number and location associated with the inventory management information being submitted; and, one or more Inventory Management Detail records 280, each of which includes data indicating: a 'PRD' field indicating the start of a detail line item, an optional Trading Partner Number, a Transaction Date, the manufactured lens UPC, a Transaction Quantity, an account location from where the Transfer/Sold/Received From/To, a unit of measure, an activity code, and a unique manufactured lens identification code, e.g., a product identifier code 281. The inventory management transaction end record or Interchange End segment 285 includes an @VKE wrapper indication indicating the interchange end and the total number of detailed records provided.

Figure 3(b) depicts the management and lens product re-order functionality provided by the Dynamic Inventory Tracking and Management System 30 of the invention. Particularly, after updating the inventory levels in the Dynamic Inventory Tracking and Management System 30 servers 26, 27 for any of the respective types of lenses dispensed at the local ECP office 12 in accordance with Figure 3(a), a step 106 is further implemented for managing and optimizing the physical versus logical inventory maintained for the respective lens type. For instance, after algorithm 115 is invoked for updating stock lens products received, a further algorithm 125 is invoked for determining if the number of lenses in inventory decremented by the amount of lenses dispensed is lens than a threshold stock inventory level limit. If the amount of lenses dispensed is lower than a threshold stock inventory level, then a responsive action is taken at step 107. For the case of stock lenses, a new order for stock lenses may be generated as indicated at step 135. Likewise, after the algorithm 116 is invoked for updating the amount of diagnostic lens products in inventory after dispensation of diagnostic lenses, a further algorithm 126 is invoked for determining if the number of diagnostic lenses in inventory decremented by the amount of diagnostic lenses dispensed is lens than a threshold diagnostic lens inventory level limit. If the amount of lenses dispensed is lower than a threshold diagnostic lens inventory level, then a responsive action is taken at step 107, in this case, an automatic generation of an order

for diagnostic lenses as indicated at step 136. Furthermore, as shown in Figure 3(b), after the algorithm 117 is invoked for updating the amount of revenue lens products in inventory after dispensation of revenue lenses, a further algorithm 127 is invoked for determining if the number of revenue lenses in inventory decremented by the amount of revenue lenses dispensed is lens than a threshold revenue lens inventory level. If the amount of lenses dispensed is lower than a threshold revenue lens inventory level, then a responsive action is taken at step 107, in this case, action taken in accordance with preferences previously indicated by the ECP office as indicated at step 137 as will explained in further detail with respect to Figure 3(c).

Figure 3(c) indicates in further detail how the orders are processed in response to actions 135-137 taken in response to management and optimization of inventories via the Dynamic Inventory Tracking and Management System 30. For example, in response to generating a new order for stock lenses as indicated at step 135, the ECP PDA device 16 will receive a confirmation from the Dynamic Inventory Tracking and Management System 30 that the order for stock lenses has been placed as indicated at step 145. Likewise, in response to the automatic generation of a new order for diagnostic lenses as indicated at step 136, the ECP PDA device will receive a confirmation from the Dynamic Inventory Tracking and Management System 30 that the order for diagnostic lenses has been placed as indicated at step 146. As previously mentioned, the action taken by the Dynamic Inventory Tracking and Management System 30 with respect to new revenue lenses is dictated preferences previously communicated by the ECP. As shown in Figure 3(c), these preferences include actions indicated at step 108 including: an option 137a for the Dynamic Inventory Tracking and Management System 30 to generate a Low Inventory Warning message to be communicated to the ECP PDA that the inventory for revenue lenses is below the threshold limit; an option 137b for the Dynamic Inventory Tracking and Management System 30 to generate a Low Inventory Warning message to be communicated to the ECP PDA that the inventory for revenue lenses is below the threshold limit and, further to automatically initiate the setting up of an order for the ECP to either approve, disapprove or specify new particulars such as quantity ordered; or, an option 137c for the Dynamic Inventory Tracking and Management System 30 to generate a Low Inventory Warning message to be communicated to the ECP PDA that the inventory for

revenue lenses is below the threshold limit and, further to automatically generate a revenue lens re-order to be fulfilled by manufacturing and distribution without further ECP involvement. In response to action taken by the Dynamic Inventory Tracking and Management System 30 in accordance with the options 137a-137c, the ECP will respectively 1) receive a low inventory warning only for display in the ECP's PDA device as indicated at step 147a; 2) receive a low inventory warning for display in the ECP's PDA device and be prompted to review an order setup for either approval or cancellation as indicated at step 147b; or, 3) receive a low inventory warning for display in the ECP's PDA device and additionally, receive a confirmation that the order for new revenue lenses has been placed as indicated at step 147c..

Figure 3(d) depicts the order fulfillment processes and functionality provided by the Dynamic Inventory Tracking and Management System 30 of the invention. As shown in Figure 3(d), step 109 depicts the order process functionality performed by the master engine server 26 of the Dynamic Inventory Tracking and Management System 30. Thus, for orders placed for stock SKUs, diagnostic SKUs, and those revenue lens re-orders generated automatically in accordance with ECP preference at step 147c, the master engine server 26 initiates order fulfillment particularly by bundling all records electronically (received by ECPs over the network) according to the ECPs and sends them to the web ordering server 59 where the fulfillment order process step 110 commences. To fulfill the lens orders for these types of lenses, the bundled lens orders lenses are received by web ordering server 59 and transmitted to the order entry server 58 which currently receives orders for lenses received via the telephone, for example. All of these lens orders are bundled according to the ordering ECP, and a "pick" ticket is generated which encompasses all of the orders. The pick ticket is processed by a distribution server 57, which identifies the type of products and locates in the inventory maintained at the distribution center 60 how the order is to be processed at the actual inventory racks. For instance, the pick ticket may identify certain lens orders, e.g., a lens of power –9.0 diopters with a gray tint, as being special orders that have to be manually retrieved, for instance, while other more common prescriptive lenses, e.g., a lens of power –2.5 may be retrieved automatically for placement in a bin prior for ease of distribution. These lenses are finally gathered for the particular order and shipped as indicated at step 112 where they are received by the ECP representative back at step

101 (See Figure 3(a)) and scanned in the system to increment the inventory level maintained for that ECP office. Referring back to Figure 3(c), in accordance with ECP preferences at step 147a and 147b, the master engine server 26 will invoke a process for generating the "Low Inventory" warning message for receipt by the PDA 16 located at the ECP office.

Figure 4 depicts a process 200 for setting up the system and storing the lens products after manufacturing in the distribution center 60. As shown in Figure 4, a first step 201 involves actually inputting the initial order information into the Inventory Tracking system including the lens type and parameters, quantities, etc. These products may be manufactured in anticipation of receipt of orders generated for any of the purposes described herein. After the information is entered into the system, the products are manufactured, as indicated at step 202. Then, the lenses are packaged at step 203 with the barcode 64 or other identifying indicia placed on the package as indicated at step 204. Then, at step 205, prior to placement in the inventory maintained at the distribution center 60, the PDA equipped with the bar code scanner is used to update the data associated with that product in the inventory tracking system 30 servers. Finally, at step 206, the package containing new manufactured lenses is physically transferred to the inventory racks located at the distribution center 60.

Other functionality provided by the Dynamic Inventory Tracking and Management System 30 includes the automatic processing of invoice summary requests from ECPs. The dynamic inventory tracking and order entry system of the invention is provided with functionality for enabling an ECP to request an invoice summary using the hand held PDA. Particularly, in the manner described herein, the PDA operator may be instructed to enter the date from which the invoice will start. In response, the system will build a file in a pre-specified EDI file format referred to as "VKNISR". Utilizing a default of the current date, the operator may quickly request a confirmation of the most recently sent orders of the day. Confirmation will start from the current date and will continue until one of the following is reached: a default of current date (current days transmissions) or an operator entered date (e.g., maximum of 30 days).

Figure 7(d) depicts an example format for an invoice summary request message 290 generated by the PDA. Generally, the exemplary invoice summary request message format includes: an (EDI) Interchange Start segment 292 which includes the

Interchange start identifier @VKS; an EDI Message ID ("VKNISR"), a Data Origin which includes the sender ID or the unique id of the PDA, an optional message sequence number (or sequentially assigned Control number) and, a transaction date representing the date of the inventory control transmission, e.g., in YYYYMMDD format; an Invoice summary request Header segment 294, including text indicating the start of a header record, a transaction type, e.g., a 'F' for indicating a facsimile invoice request, an optional PO number, a Ship-to account number and location indicating the account number and location associated with the invoice being requested, and the text "PDA" indicating the requesting party; and, one or more Fax Request Detail records 295, each of which includes data indicating: a FAX field indicating the start of a detail line item, a "From Date" indicating the From date of the request and the "To Date" indicating the To date of the request, the area code of the ECP location and the ECP fax number to whom the request is being sent. The invoice summary request transaction end record or Interchange End segment 298 includes @VKE wrapper indication indicating the interchange end and the total number of detailed records provided.

The process 160 for automated order entry according to the principles of the invention, is now described in further detail with respect to Figure 6. Figure 6 depicts example menu choices presented to the user via the ECP's Personal Digital Assistant (PDA) 16 screen display. These menu choices include: an option 162 for reading and entering order data for storage therein; an option 164 for transmitting stored order and/or inventory management data to the manufacturer order entry system; an option 166 for requesting facsimile confirmation of orders received; utilities options for setting up a user 167, or a system setup option 168; and, an I.D. information option 169. With respect to the option 162 for reading and entering order data, Figure 6 generally depicts a first step 170 of instructing the ECP or operator to scan a bar code of the particular lens product to be ordered. It should be understood that users of the PDA device may include: internal Eye Care Professionals (ECP's) or their agents performing optical duties within the ECP's premises; external ECP's requiring revenue product or diagnostic product. Generally, when ordering revenue lenses according to the invention, the ECP or office staff preferably scans UPC barcodes on packages or cartons, or scans them from a product barcode book. It is understood that lens products are arrayed in different quantities when packaged, and their packaging characteristics

vary. Preferably, the system is enabled to track products packaged in cases, secondary packages ('cartons' or 'packs'), primary packages (single 'blisters', 'vials'), or plastic bags, e.g., when provided for diagnostic purposes. Additionally, bar codes may be of the one dimensional and/or two-dimensional types. Briefly, all lens order and dispensing data entered during the course of a day is stored in the PDA and, on a periodic basis, e.g., daily or upon request by user, all of the order data is communicated to the manufacturer/enterprise Dynamic Inventory Tracking and Management System infrastructure 30 (Figure 1). For the case of diagnostic lenses to be ordered for specific customers, a peelable label may be provided on a primary package with a bar code representing the SKU. The ECP may peel and place the label on a patient form after fitting and patient forms may be gathered and each of the bar-codes labels may be scanned. As in the case of revenue lenses, all diagnostic lens order and dispensing data entered during the course of a day is stored in the PDA and, on a periodic basis, e.g., daily or upon request by the user, all of the order data is communicated to the manufacturer/enterprise order entry infrastructure for fulfillment. It should be further understood that besides utilizing the PDA equipped with a bar code scanner as the vehicle to generate lens product "stock" orders for inventory level maintenance, the PDA equipped with a bar code scanner may be used to generate lens product re-orders for specific customers, i.e., so-called doctor controlled patient delivery or "DCPD" orders. For instance, there may be a bar-code identifier associated with a specific patient or customer, and this bar code may be scanned during the order generation process for initiating orders for customers to be directly communicated from the Dynamic Inventory Tracking and Management System 30 to the order entry infrastructure 50. As a result of this order processing, lens products supplies may replenished for specific customers or patients.

Figure 5(c) particularly exemplifies the use of the PDA 16 equipped with bar code scanner providing a display 450 including functionality for placing product orders including: an option 453 for specifying the type of lens product to be ordered, and an option 456 for specifying a specific SKU of a lens product to be ordered. After entering this information, the user may select the place order option 458 or, edit an existing order stored in the PDA device as indicated as option 460. Further, the user may select an option 465 to view a summary of those inventory levels having an

amount below a warning threshold as determined by the Dynamic Inventory Tracking and Management System 30. Once an inventory level is determined to be low according to the low inventory count sheet, the user may select option 462 for initiating a re-order for those lenses.

Referring back to Figure 6, at step 172, a determination is made as to whether the scanned bar code is for diagnostic or revenue via a customer selectable screen 150 as depicted in Figure 5(a). Further the user is allowed to enter the quantity if a one dimensional barcode, if the barcode is two dimensional it is assumed that the quantity is included in the scanned data. Further, step 172 includes the step of validating the scanned (if two dimensional) code against a Diagnostic Product Table (not shown) which includes data such as Sub-Pack ID, Sub-Pack UOM , Sub-Pack Description (e.g., 00033P TA 8.7 0.00 -0.75 +70 D) and will initiate display of an error message if not found. Otherwise, the scanned code may be further validated against a Revenue Product Table (not shown) which includes data such as the Product SKU, Product Code UOM and a Product Code Description (e.g., 73390550790 12P TA 8.7 0.00 -0.75 +10). Preferably, an error message is displayed if not found. Next, at step 176, a determination is made as to whether the scanned bar code is UPC-A. Particularly, to identify a valid manufacturer, a table of manufacturer ID's is checked. If UPC-A is that of an invalid manufacturer, then the PDA will display "Invalid Manufacturer", for example, otherwise, the PDA equipped with a barcode scanner will verify that the UPC-A is that of a valid manufacturer. As a result of validating the scanned code and verifying the manufacturer, a data file is built in a format detailing the specifics of the order and as indicated at step 180 will prompt the user to enter the quantity of revenue lenses desired to be ordered. It is understood that the operator has the ability to change the quantity at any time before submitting the order. The above scanned bar codes, description, and associated quantities ordered, will be displayed in a scrolling list format located on the screen (not shown) that instructs the operator to scan the bar code. It should be understood that the operator will additionally have the ability to delete entire records from the list as well as the ability to change quantities on order for the UPC-A scanned bar codes.

The option available to the ECP for sending the order and inventory tracking data utilizing the hand held PDA as indicated as option 164 in Figure 6 is now

described. Preferably, the PDA device first instructs the operator to place the PDA device 16 on the base unit and press enter to start transmission. This will initiate the following sequence of events: Initially, the PDA will automatically dial the location of the lens manufacturer as indicated at step 174, and transmit a verification of information including the account number and password, for verification by the manufacturer. If the account information is valid, then the manufacturer will send an "OK to transmit" the information. Otherwise, the manufacturer will transmit that the account was invalid. It is understood that the PDA may display a message for the user indicating an "Invalid account information". If the PDA receives a message from the manufacturer that it is OK to transmit the information to the manufacturer, i.e., there was a successful connection, then the PDA will transmit all data located in the scanned barcode list. In one embodiment, the data is transferred by FTP from the Dynamic Inventory Tracking and Management System 30 to the FTP server 56 (Figure 2). If the transmission is successful, then manufacturer will transmit a "Successful Transmission Confirmation Number: xxxxxx" message with xxxxxx being a transmission confirmation number. That is, as each transmitted file includes a unique name and unique message sequence number, this file will be used as the confirmation number displayed to the user. After PDA display of the Successful Transmission message, a transmission confirmation number and an instruction for the operator to press "enter" to return to the main menu. The transmission number will, at that point, be deleted from the PDA. It should be understood that possible errors that may be encountered during the transmission include: a failure to authenticate to the dial-up router/PPP in which case a "Failed to connect to Comm. server" user message will be displayed; and, a Failure to authenticate to the FTP server in which case a "Failed to connect to the FTP server" user message will be displayed. If connected successfully, the PDA FTPs the data to the FTP server(s) with detail data for each type of file format consolidated with the appropriate Start, Header, and End segments as will be described in greater detail herein. It should be understood that if the FTP fails a "Data did not transfer successfully" user message will be displayed. Preferably, a sequence number is generated for each segment that is sent. Also, as will be explained in greater detail, each document (e.g., all the segments) are "packaged" at transmission time with @VKS and @VKE wrappers. In the event of a failed transmission, the "package" generated is

kept as a unique "package" with it's own sequence number and subsequent scans should not be appended to the "package" that failed. The next time a transmission is attempted a new "package" should be generated. Both "packages" may be sent together. The scrolling list of scanned bar codes will be deleted from the list after a successful transmission. The invoice summary request dates should also be cleared. The packaged file will also be removed. In one embodiment, the PDA equipped with a bar code scanner will store information associated with each package scan whether it be for inventory tracking or ordering purposes and accumulate and delimit all of the information for later transmission as a single file to the order entry/inventory tracking infrastructure. Preferably, the transmission is performed periodically, e.g., several times per day as specified by the ECP office or, at the end of a business day or upon user request.

Returning to Figure 6, the option 166 available to the ECP for requesting confirmation of orders by fax utilizing the hand held PDA is now described with respect to step 186. In this step, the PDA device instructs the operator to enter the date from which the confirmation will start. Preferably, a default of the current date will be utilized so that the operator may quickly request a confirmation of the most recently sent orders of the day. Typically, the confirmation will commence from the current date and continues until one of the following is reached: a default of current date (current days transmissions) or, an operator entered date (maximum of 30 days, for example). In response, the PDA device will display a message requiring the user to place the hand held PDA in its cradle and press "Enter" to request a faxed confirmation. In response to user entry of the request, the following sequence will occur for transmission: The PDA will automatically dial the location of the lens manufacturer, and transmit a verification of information including the account number and password, for verification by the manufacturer. If the account information is valid, then the manufacturer will send an "OK to transmit" the information. Otherwise, the manufacturer will transmit that the account was invalid. It is understood that the PDA may display a message for the user indicating an "Invalid account information". If the PDA receives a message from the manufacturer that it is OK to transmit the information to the manufacturer, i.e., there was a successful connection, then the PDA will transmit the request for a fax confirmation for the entered dates. If the

transmission is successful, then the manufacturer/enterprise will transmit a transmission confirmation number and display a "Successful Transmission" message including the transmission confirmation number, and instruct the operator to press "Enter" to return to the main menu. At that point, the transmission number will be deleted from the PDA.

The inventory tracking and order entry system of the invention is provided with the ability to automatically upgrade the operating system and application software. Particularly, the PDA device is enabled to check for the existence of new application or operating system software. These files reside on a remote location in the enterprise network and if present, will be downloaded accordingly. Thus, returning to Figure 6, the option 168 available to the ECP for enabling system set-up utilizing the PDA equipped with a barcode scanner is now described with respect to step 187. In step 187, the menu selection enables the user to view the current version of software loaded on the PDA and also enable the operator to upgrade to the latest software version. The following sequence will occur if the operator request upgrade: Initially, the PDA instructs the operator to place the PDA in a cradle and press "enter" to begin upgrade. The PDA will automatically dial the location of the lens manufacturer, and transmit a verification of information including the account number and password, for verification by the manufacturer. If the account information is valid, then the manufacturer will send an "OK to transmit" the information. Otherwise, the manufacturer will transmit that the account was invalid. It is understood that the PDA may display a message for the user indicating an "Invalid account information". If the PDA receives a message from the manufacturer that it is OK to transmit the information to the manufacturer, i.e., there was a successful connection, then the PDA will transmit the request for a software version upgrade. In response, the manufacturer/enterprise will transmit the latest software version. After the PDA receives the upgrade, it will indicate to the manufacturer/enterprise that the upgrade was successful. If the transmission of the upgrade is not successful, the PDA will be required to revert back to its previous version of software and display to the operator that the upgrade was unsuccessful. In a preferred embodiment, the manufacturer includes the ability to automatically upgrade the software during the electronic ordering process.

Returning to Figure 6, the option 169 available to the ECP for enabling system entry of I.D. information utilizing the PDA equipped with a barcode scanner is now described with respect to step 189. In step 189, a menu item is provided which requires the user to enter a password or provide a PDA key sequence to begin entry of ECP identification information for enabling PDA access to the manufacturer order entry system. It is understood that information located in this area may be changed from a remote location via modem, e.g., for purposes of changing an ECP's account number during order transmission. At step 190, the identification information to be entered includes: an ID number or account number unique to the manufacturer; a password enabling access to the AS/400; and, a phone number for dialing the manufacturer.

According to the invention, from the standpoint of automated order entry functionality, a "flat file" format may be defined for electronic stock and doctor controlled patient delivery ("DCPD") orders which comprises a multiple of non-delimited segments or record formats including, but not limited to: a record indicating a transaction start; a header record; an optional order comment ("COM") record; a patient information
("PAT") segment which is optional for stock orders but required for DCPD orders only; an optional address information segment ("ADD") including city state and zip code information which is optional for stock orders but required for DCPD orders only; one or more order entry Detail line item segments ("DET"); and, a transaction end record. It should be understood that there may only be one patient per DCPD order.Figures 7(a) and 7(b) depict example inventory order entry records 250, 260 each respectively illustrating the minimum data supplied for a respective stock order entry transaction 250 (Figure 7(a)) and DCPD order entry transaction 260 (Figure 7(b)) including: respective (EDI) Interchange Start segment 252, 262 which includes the EDI Interchange start identifier @VKS, for example, EDI Message ID ("VKN850"), a Data Origin which includes the sender ID (e.g., "PDA) or other unique id of the bar code PDA, an optional message sequence number (a sequentially assigned Control number 254, 264) and, a transaction date representing the date of the inventory control transmission, e.g., in YYYYMMDD format; respective Order Header segment 255, 265 including the text 'HDR' indicating the start of a header record, a transaction type, e.g., an 'S' for indicating a stock replenishment order as shown in segment 255 (Figure

7(a)), or, a D for indicating a DCPD order type as shown in segment 265 (Figure 7(b)), an optional purchase order number ("PO"), a Ship-to account number and location indicating the account number and location associated with the order information being submitted, and a "PDA/FAX" field indicating that the order was placed by a "PDA" either with a fax order confirmation request (as shown in Figure 7(a)) or without a fax order confirmation request (as shown in Figure 7(b)), and, optional fields specifying information including credit card number, diagnostic lens account number, diagnostic lens account location, a requested ship method and a requested future ship date; and, respective one or more Inventory Management Detail record segments 256, 266, each of which includes data indicating: a PRD field indicating the start of a detail line item, an optional Trading Partner Number, a Transaction Date, the manufactured lens UPC or unique manufactured lens identification code (product identifier code 257, 267), a Transaction Quantity, an account location from where the Transfer/Sold/Received From/To, a unit of measure, and an activity code.

As shown in Figure 7(b), the DCPD order (Figure 7(b)) transaction further includes a patient segment 268 including a "PAT" field indicating the start of a patient record, an optional field indicating the number of wear days, e.g., 1 -7 days (not shown), an optional Postcard message id including a code "A" for initiating generation of a message to contact the ECP office for re-ordering, or "B" for initiating generation of a message to call the office to set up an appointment; an optional Packing slip message id including codes for initiating generation of one or more messages including a code "A" for generating a message for announcing the importance of contacting the office at least one week before these lenses run out so that user wear will not be interrupted, a code "B" for generating a message indicating that the ordered lenses should be worn only in accordance with the wear regimen prescribed for that user, but not to exceed one day, a code "C" for generating a message indicating that compliance with the prescribed wear regimen is essential to maintaining proper eye health for the user, a code "D" for generating a message indicating that the lenses are for daily wear single use only and are to be never re-used, a code "E" for generating a message serving as a reminder that the user is wearing 1-day lenses and that these lenses are intended to be disposed of after no more than one day's usage, and a code "F" for generating an advertisement message indicating the health benefits of 1-day lenses; a Patient id , e.g.,

if the patient is a current patient or otherwise a new Vistakon patient ID or -1 if new patient and, the Patient's last name, Patient first name, and a Patient middle initial.

As further shown in Figure 7(b), the DCPD order (Figure 7(b)) transaction further includes an address segment 268 including an "ADD" field indicating the start of a patient address record and one or more fields for the address information, and, an city/zip code/state segment 269 including the "CSZ" field indicating the start of the city/zip code/state record and including one or more fields for indicating the City, State, 5 digit zip code and optional 4 digit zip code extension, an area code and 7 digit phone number, and optional 5 digit phone number extension.

The example order entry records 250, 260 each illustrating the minimum data supplied for a respective stock order entry transaction (Figure 7(a)) and DCPD order (Figure 7(b)) each further includes a detail line item segment comprising: a DET field indicating the start of detail line item; a PO line number field for setting forth a sequential line item number; a quantity, i.e., an order quantity; a Unit of measure; a product identifier code; a product usage including R (right eye) or L (left eye) lens product required for DCPD order; and an optional order detail line. Each of the respective stock order entry transaction (Figure 7(a)) and DCPD order (Figure 7(b)) transactions further include a respective stock 259 or DCPD order 270 transaction end record (Interchange End segment) each of which includes the EDI Interchange end identifier @VKE and the total number of detailed records (DET) provided.

Figure 8 is a general block diagram depicting an example methodology 300 for providing dynamic inventory management and tracking of revenue and/or diagnostic lenses in the system 10 of the invention. With regard to inventory usage and inventory update, as shown with respect to Figure 2, and in detail in the block diagram of Figure 8, a first step 302 involves receiving the data transmitted over the communication network from the PDA device 16. As mentioned, the data sent from the PDA may comprise either inventory usage data, or alternately, order request data. Particularly, data is sent from PDA via FTP from the Dynamic Inventory Tracking and Management System 10 to the first FTP server 56 (e.g., a Sun 2000) as shown in Figure 2. The FTP Sun 2000 server in response, executes a script that will bundle the PDA data along with any orders from lens products obtained via the Internet or via phone into a pre-specified file format, which file is sent via FTP to the AS/400 system 58 as shown in Figure 2. A

program is executed that processes the EDF013 using the Extol EDI translator 35 (Figure 2). In response to importing the file EDF013 into the Extol translator as indicated at step 304 in Figure 8, the data input is placed in an unwrapped connection and the data is translated by message class. That is, as shown in Figure 8 at step 306, data provided in the VKN850 pre-specified message format as described herein with respect to Figure 7(a), is translated, i.e., mapped into EDI order detail formats referred to as EDF001, EDF002 file formats (Figure 2). Likewise, using the Extol translator, data included in the VKN852 message format described herein with respect to Figure 7(c), is mapped into inventory update file formats referred to as VMF001 470, as will be explained with respect to one embodiment of the dynamic inventory tracking process described with respect to Figure 9, and data included in the VKNISR message format described herein is mapped into Invoice request file format referred to as VMF004 (as shown in Figure 2). Referring back to Figure 8, the next step 308 is to verify that the fields in the translated EDF001A, EDF002A, VMF001, VMF004 formats are populated with valid data, i.e., EDF001, EDF002 includes accurate order header fields, VMF001 includes accurate inventory usage fields, and/or VMF004 includes accurate Invoice request fields. For purposes of discussion, assuming inventory update data is received, the next step is to update the inventory associated with the ECP with usage values. That is, as indicated at step 309, a program is called to read usage data reported by the PDA and provided in the input VMF001 inventory update file and, at step 310, to update an inventory master file VMF002 which tracks the individual ECP account's inventory count values. The algorithms invoked are described herein with respect to Figure 3(b) at steps 115-118. To map into the VMF002 master inventory file, the VMF001 includes a 4-byte sub-pack identifier which is used to chain to a product usage database GBF 472 (shown in Figure 9) to obtain the UPC. Using the account number, location, UPC, and unit of measure as a key, the data may be chained to the VMF002 master inventory file. Initially, all of the individual ECP user inventory counts maintained in the inventory master file VMF002 476 (as shown in Figure 9) for tracking start with an amount of lenses "On-hand" inventory level = XX lenses; a "Usage" amount = YY; and "Re-order point" threshold (e.g., low limit threshold = ZZ lenses for each respective lens product (diagnostic or revenue). As information is received from the ECP PDAs, these accounts are updated

with the lens product usage reported from the file VMF001. Particularly, accounts with activity from VMF001 will have on-hand decremented by the amount reported used from VMF001 while a "Used" quantity will be incremented by the amount reported used. For instance, the usage quantity provided in the VMF001 file is subtracted from the on-hand quantity in databaseVMF002 476. If on-hand < 0 then on-hand value is set to 0. Once verification is completed and no errors are reported, the process continues to call a program VMR002 which evaluates inventory and either initiates the generation of warnings or orders for accounts with on-hand inventory levels less than or equal to the re-order point, i.e., XX<=ZZ, according to ECP preferences, or automatically generates re-orders, e.g., for diagnostic lenses. That is, as shown in Figure 9, the program VMR002 478 is invoked to analyze VMF002 and tracked inventory levels for each ECP. As a result of this process, the automatic order generating process is performed, which as shown in Figure 2 invokes steps of: generating one or more files EDF001A which is the order header holding file for PDA ordering for each ECP and verifying that it has been written correctly only for those ECP accounts with on-hand inventory level less than or equal to the re-order point threshold (i.e., XX <= ZZ); generating a file EDF002A which is the order detail holding file for PDA ordering and verifying that the EDF002A detail has been written correctly for only accounts with on-hand inventory level <= re-order point threshold.

More particularly, referring to Figure 9, a program VMR002 478 reads the VMF002 until end of file (EOF) and determines if the on-hand inventory level <= re-order point threshold as shown in Figure 8 at step 312. If this criterion is met, then the process chains to the EDF001A file (Figure 2) with the account number and location. If the EDF001A file is not found, then the EDF001A file header file is created to include the account number, location, EDI sequence number (= 0), the Order type (= 'S'), the Order origin (= 'P') and who placed the order (e.g., = 'PDA/FAX') . Once the EDF001A fields are written, fields for EDF002A are written to include the ECP Account number, location, EDI sequence # = 0, UPC, Unit of measure, and order quantity (e.g., = minimum quantity). Finally, as a further result of this processing, the following inventory tracking values are further updated in the master inventory file VMF002 as described herein with respect to Figures 3(b) steps 125-127 for the respective ECP accounts. It should be understood that, as part of this VMR002 process

478, if the on-hand inventory level is not less than the re-order point threshold, the on-hand inventory level for the ECP may be compared against a second "Warning" threshold "WW" which will indicate to the ECP that certain inventory levels are low and that the customer or ECP may want to initiate a re-order. That is, as indicated at step 314, Figure 8, the program VMR002 478 may additionally read the VMF002 and determine if the on-hand inventory level <= warning threshold level (i.e., XX <= WW) and if so, initiate a warning message to the ECP user as indicated at step 320, Figure 8. Otherwise the process continues to step 302 to wait for the next order.

Figure 5(b) is an example depiction of a PDA screen display 400 for a local ECP illustrating a snapshot of that ECP's on-hand inventory levels for revenue, and diagnostic lenses. As depicted, upon selection of inventory tracking function implementing software provided for ECP use in the PDA 16, there is displayed menu options including: a menu option 403 for reviewing inventory by product family; an option 406 for reviewing inventory by SKU number; an option 408 for initiating placement of new orders; an option 410 for reviewing inventory by product type; and an option 412 for reviewing the overall inventory. Preferably, when viewing a snap-shot of the overall inventory as depicted in Figure 5(b), for each type of lens there is provided bar chart markers 415 indicating the physical quantities on hand; markers 420 indicating quantities dispensed; and, markers 425 indicating logical quantities desired to meet expected demand or usage. As shown in Figure 5(b), there is shown an indication 430 that an order has been placed for diagnostic lenses. Further, as a result of warning threshold comparisons, a low inventory warning indication 435 is provided with markers 440 indicating lenses and possible amounts to be re-ordered for the example inventoried lens products shown in the display.

In a further embodiment, triggers for automatically ordering lens products for individual customers may be implemented. For instance, after providing a supply of lenses for particular customers, e.g. a 90 day supply, the number of days may be tracked by the ECP and/or order entry system such that an order for a new supply may be automatically generated for that particular patient. Thus, rather than the ECP having to enter the order, a trigger may be built into the ECP PDA software which tracks a number of days elapsed after dispensing a particular supply for a customer. After a pre-set time has elapsed, then, the ECP may be automatically notified that a patient's

supply may have depleted to the extent that a new lens order should be generated or, alternately, an order may be automatically generated and fulfilled in the manner described herein so that a particular patient may automatically receive a new lens shipment.

Referring back to Figures 5(b) and 8, as a further part of the dynamic inventory tracking process is the step 318 of automatically generating orders from order holding file to EDI order interface files either as a result of a determination of low inventory levels at step 312, or as a result of initially receiving an order request as indicated by broken line 319 in Figure 8. Thus, in the next step 318, a process VMR003 (as shown in Figure 2) is invoked to create the orders from EDF001A and EDF002A. Preferably, at a specified time, e.g., daily, the program VMR003 executes to generate orders for the day's activity. Particularly, VMR003 reads the EDF001A file until the EOF is encountered and chain to the EDF001 file with account number, location and EDI sequence number. If not found, then the fields from the order header created EDF001A are moved to EDF001 and are written to EDF001. Then, the program sets and reads EDF002A on account number, location and EDI sequence number until not found. If found, then the fields from EDF002A are moved to EDF002 and the EDF002 file is written. This is a loop process, and continues until EOF is encountered in the EDF001A. Upon successful program completion, EDF001A and EDF002A are cleared. As further shown in Figure 2, at steps 49, a program VMR004 is executed to generate an invoice summary request utilizing the VMF004 EDI file format which request is generated and placed on a fax queue. This request is a confirmation to the ECP to inform the ECP of the quantity of product ordered and the delivery date.

While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

CLAIMS:

1. A dynamic inventory tracking and management system comprising:

a server device for enabling access to a database for storing lens product information, said lens product information including inventory data comprising types and amounts of lens products maintained in inventory at various locations responsible for dispensing lenses to customers, said manufactured lens products comprising packages having readable indicia for directly indicating the lens product information or providing reference to associated lens product information included in the database;

device provided at each location for scanning indications provided on packages of lens products dispensed to customers at the respective location and obtaining inventory tracking information including a lens product type identifier and a quantity dispensed for each lens product type associated with a location;

mechanism for enabling direct communication of scanned inventory tracking information obtained at each said locations to said database server over a communication network;

a mechanism for tracking each inventory maintained at the various locations based on said scanned inventory tracking information, said tracking mechanism updating quantities of lens products dispensed at each location for each lens product type with quantities maintained in said inventory levels for each location, and reporting updated inventory lens product inventory level information for use at each location.

2. The dynamic inventory tracking and management system as claimed in Claim 1, wherein said mechanism for directly communicating with said database server for entering information includes a wired connection to said communication network.

3. The dynamic inventory tracking and management system as claimed in Claim 1, wherein said communications network includes one from the group comprising: a public switched telephone network, a public Internet, and, a private Intranet.

4. The dynamic inventory tracking and management system as claimed in Claim 1, further including order entry infrastructure providing lens product ordering and fulfillment functions for said various locations, said scanning device provided at each location further enabling entry of lens product order information based on said updated inventory lens product inventory reported to said location, wherein said order information is capable of being directly communicated to said order entry infrastructure over said communication network.

5. The dynamic inventory tracking and management system as claimed in Claim 4, further comprising mechanism for authenticating a location prior to receiving directly communicated inventory tracking information from said device at that location .

6. The dynamic inventory tracking and management system as claimed in Claim 5, wherein said tracking mechanism includes: mechanism for comparing an updated inventory level maintained for a location against a predefined lens order threshold for specified lens product types, said mechanism automatically initiating generation of an order for communication to said order entry infrastructure for enabling automatic lens supply replenishment for specific lens products at a location.

7. The dynamic inventory tracking and management system as claimed in Claim 5, wherein said tracking mechanism includes: mechanism for comparing an updated inventory level maintained for a location against a predefined lens order threshold for specified lens product types, said mechanism automatically generating a message for communication to said location indicating a low supply of specific lens products at said location.

8. The dynamic inventory tracking and management system as claimed in Claim 4, wherein said scanning device provided at each location further enables entry of lens

product re-order information for particular customers, said customer re-order information capable of being directly communicated to said order entry infrastructure over said communication network.

9. The dynamic inventory tracking and management system as claimed in Claim 8, wherein said scanning indications provided include further indications associated with re-order information for a particular customer, said scanning device provided at each location further scanning said further indications for transmission of associated re-order information when re-ordering lenses for said customers.

10. The dynamic inventory tracking and management system as claimed in Claim 4, wherein said lens product types to be tracked include one or more from the group comprising: diagnostic lenses for trial fitting on a particular patient where the identity of the test patient remains anonymous, yet traceable via a test patient identification code .

11. The dynamic inventory tracking and management system as claimed in Claim 4, wherein said lens product types to be tracked include revenue lenses, said revenue lenses including one or more from the group comprising: revenue lenses maintained in a stock inventory and, doctor controlled patient delivery (DCPD) revenue lenses.

12. The dynamic inventory tracking and management system as claimed in Claim 4, wherein said device provided at each location for scanning indications provided on packages of lens products dispensed to customers includes mechanism for storing lens product information scanned for ordering and inventory tracking purposes, said system periodically communicating said stored information at each said locations to said database server over said communication network

13. The dynamic inventory tracking and management system as claimed in Claim 1, wherein lens product information stored in said database server includes one or more of the group comprising: a lens product code, a lot number, stock keeping unit (SKU), and a quantity and lens parameters.

14. The dynamic inventory tracking and management system as claimed in Claim 1, wherein said scanning device is a hand-held unit.

15. A method for dynamically tracking inventory of lens products, said method comprising the steps of:

a) storing in memory lens product information including inventory data comprising types and amounts of lens products maintained in inventory at various locations responsible for dispensing lenses to customers, said manufactured lens products comprising packages having readable indicia for directly indicating said lens product information;

b) scanning indications provided on packages of lens products dispensed to customers at the respective location and obtaining inventory tracking information including a lens product type identifier and a quantity dispensed for each packaged lens dispensed and associated with a location;

c) directly communicating scanned inventory tracking information obtained at each said locations to said database server over a communication network; and,

d) tracking inventory maintained at the various locations based on said scanned inventory tracking information by updating quantities of lens products dispensed with quantities maintained in said inventory levels for each location; and reporting updated inventory lens product inventory level information for use at each location.

16. The method as claimed in Claim 15, wherein said step b) of directly communicating further includes the step of enabling a wired data transfer transmission for directly entering information to said database.

17. The method as claimed in Claim 15, further including the step of: entering lens product order information based on said updated inventory lens product inventory

reported to said location, and, directly communicating said order information to an order entry infrastructure over said communication network for providing lens product ordering and fulfillment functions for said various locations.

18. The method as claimed in Claim 17, wherein prior to step c) the step of authenticating a location prior to receiving directly communicated inventory tracking information from said device at that location .

19. The method as claimed in Claim 18, wherein said tracking inventory step d) includes the step of:

comparing an updated inventory level maintained for a location against a first predefined lens order threshold for specified lens product types; and,

automatically initiating generation of an order for enabling automatic lens supply replenishment for specific lens products at a location.

20. The method as claimed in Claim 18, wherein said tracking inventory step d) further includes the step of:

comparing updated inventory level maintained for a location against a second predefined lens order threshold for specified lens product types; and,

automatically generating a message for communication to said location indicating a low supply of specific lens products at a location.

21. The method as claimed in Claim 17, wherein said lens product types to be tracked include one or more from the group comprising: diagnostic lenses for trial fitting on a particular patient, said method further including the step of: auto-replenishing said diagnostic lenses based on customizable business rules setup for each location, whereby when a low level threshold meets a business rule criteria for that location, a

predetermined quantity of diagnostic lenses will be automatically shipped to the location.

22. The method as claimed in Claim 17, further including the step of: enabling entry of lens product re-order information for particular customers, and directly communicating said customer re-order information to said order entry infrastructure over said communication network.

23. The method as claimed in Claim 22, wherein said scanning indications provided include further indications associated with re-order information for a particular customer, said scanning step comprising: scanning said further indications for transmission of associated re-order information when re-ordering lenses for said customers.

24. The method as claimed in Claim 23, further including the step of:

storing lens product information scanned for ordering or inventory tracking purposes; and,

periodically communicating said scanned information obtained at each said locations to said database server over said communication network.

25. A device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for dynamically tracking inventory of lens products, said method steps comprising:

a) storing in a memory, lens product information including inventory data comprising types and amounts of lens products maintained in inventory at various locations responsible for dispensing lenses to customers, said manufactured lens products comprising packages having readable indicia for directly indicating said lens product information;

b) scanning indications provided on packages of lens products dispensed to customers at the respective location and obtaining inventory tracking information including a lens product type identifier and a quantity dispensed for each lens product type associated with a location;

c) directly communicating scanned inventory tracking information obtained at each said locations to said database server over a communication network; and,

d) tracking inventory maintained at the various locations based on said scanned inventory tracking information by updating quantities of lens products dispensed with quantities maintained in said inventory levels for each location; and reporting updated inventory lens product inventory level information for use at each location.

26. The device readable by a machine as claimed in Claim 25, wherein said step b) of directly communicating further includes the step of enabling a wired data transfer transmission for directly entering information to said database.

27. The device readable by a machine as claimed in Claim 25, further including the step of: entering lens product order information based on said updated inventory lens product inventory reported to said location, and, directly communicating said order information to an order entry infrastructure over said communication network for providing lens product ordering and fulfillment functions for said various locations.

28. The device readable by a machine as claimed in Claim 25, wherein prior to step c) the step of authenticating a location prior to receiving directly communicated inventory tracking information from said device at that location .

29. The device readable by a machine as claimed in Claim 28, further wherein said tracking inventory step d) includes the step of:

comparing an updated inventory level maintained for a location against a first predefined lens order threshold for specified lens product types; and,

automatically initiating generation of an order for communication to said order entry infrastructure for enabling automatic lens supply replenishment for specific lens products at a location.

30. The device readable by a machine as claimed in Claim 28, wherein said tracking inventory step d) further includes the step of:
comparing updated inventory level maintained for a location against a second predefined lens order threshold for specified lens product types; and,

automatically generating a message for communication to said location indicating a low supply of specific lens products at a location.

31. The device readable by a machine as in Claim 27, wherein said lens product types to be tracked include one or more from the group comprising: diagnostic lenses for trial fitting on a particular patient said method further including the step of: auto-replenishing said diagnostic lenses based on customizable business rules setup for each location whereby each time a the low level threshold meets a business rule criteria for that location, a predetermined quantity of diagnostic lenses will be automatically shipped to the location.

32. The device readable by a machine as claimed in Claim 27, further including the step of: enabling entry of lens product re-order information for particular customers, and directly communicating said customer re-order information to said order entry infrastructure over said communication network.

33. The device readable by a machine as claimed in Claim 27, wherein said scanning indications provided include further indications associated with re-order information for a particular customer, said scanning step comprising: scanning said further indications for transmission of associated re-order information when re-ordering lenses for said customers.

34. The device readable by a machine as claimed in Claim 33, further including the steps of:

storing lens product information scanned for ordering or inventory tracking purposes; and,

periodically communicating said scanned information obtained at each said locations to said database server over said communication network.