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(54) Title: METHOD AND APPARATUS FOR PROVIDING PRICE UPDATES

(57) Abstract: A computer implemented method and system for providing price updates is provided. Data is received by a system. The received data is filtered by the system to identify triggers in the received data. Actions related to identified triggers are performed by the system. Business rule compliance is performed according to a business rule hierarchy. Updated prices are provided.

METHOD AND APPARATUS FOR PROVIDING PRICE UPDATES

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BACKGROUND OF THE INVENTION

15   The present invention relates to providing prices for items. More

specifically, the invention relates to providing price updates for a subset of

items.

In businesses, prices of various products must be set. In a store chain,

prices may need to be set for thousands of items for thousands of stores.

20   Each week, new products are introduced or costs, competitor prices,

and other price related factors change, which may make frequent price updates

desirable. It would be desirable to provide a method and apparatus for

providing price updates.

25   ## SUMMARY OF THE INVENTION

To achieve the foregoing, and in accordance with the purpose, a

method for providing price updates is provided. Data is received. The

received data is filtered to identify triggers in the received data. Actions

related to identified triggers are performed. Business rule compliance is

performed according to a business rule hierarchy. Updated prices are

provided.

5   In another embodiment of the invention an apparatus for providing

price updates comprising computer readable media is provided. A computer

code for receiving data is provided. A computer code for filtering the received

data to identify triggers in the received data is provided. A computer readable

code for performing actions related to identified triggers is provided. A

10   computer readable code for performing business rule compliance is provided.

A computer code for providing updated prices is provided.

          These and other features of the present invention will be described in

more detail below in the detailed description of the preferred embodiments

and in conjunction with the following figures.

15   BRIEF DESCRIPTION OF THE DRAWINGS

          The present invention is illustrated by way of example, and not by way

of limitation, in the figures of the accompanying drawings and in which like

reference numerals refer to similar elements and in which:

          FIG. 1 is a schematic view of a system that is used in a preferred

20   embodiment of the invention.

FIG. 2 is a high level flow chart of a process used in an embodiment of

the invention.

FIG. 3 is a more detailed flow chart of a rule compliance process.

FIG.'S 4A and 4B illustrate a computer system, which forms part of a

5   network and is suitable for implementing embodiments of the present

invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described in detail with reference to

10   a few preferred embodiments thereof as illustrated in the accompanying

drawings. In the following description, numerous specific details are set forth

in order to provide a thorough understanding of the present invention. It will

be apparent, however, to one skilled in the art, that the present invention may

be practiced without some or all of these specific details. In other instances,

15   well known process steps and/or structures have not been described in detail in

order to not unnecessarily obscure the present invention.

A system for providing price updates to a subset of items is provided.

The price update may provide updates to prices that may be set according to

an optimization program or may be set by other means. Price updating is an

20   important pricing challenge due to the frequency at which prices are updated,

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the large number of events that may cause updating, and the large number of

items that may need price updating.

To facilitate discussion, FIG. 1 is a schematic illustration of a system

that may be used in providing price updates. A price updating system 100 is

5   connected to a network 102. A store computer system 104 is connected to the

network 102 and communicates to the price updating system 100 through the

network 102. The network 102 may be a local area network (LAN) or a wide

area network (WAN). An example of a LAN is a private network used by a

mid-sized company with a building complex. Publicly accessible WANs

10   include the Internet, cellular telephone network, satellite systems and plain-

old-telephone systems (POTS). Examples of private WANs include those

used by multi-national corporations for their internal information system

needs. The network 102 may also be a combination of private and/or public

LANs and/or WANs. In such an embodiment, the price updating system 100

15   is connected to the network 102. The computer system for the store 104 is

able to bi-directionally communicate with the price updating system 100 over

the network 102.

Computer readable media may be used by the price updating system 100

to communicate over the network 102 to collect store specific information to

20   provide price updates and to receive feedback and updated information.

FIG. 2 is a flow chart of a process that may be used in a preferred

embodiment of the invention. A rule system is first set up (step 202).

In a preferred embodiment, the rule system uses the following

terminology. A "Trigger" is a change in the environment beyond a threshold

5   to which a retailer responds by an action. There are three kinds of triggers in

this embodiment: product cost changes, competitive price changes, and new

product introductions. An example of a trigger is when the cost of the product

increases by more than 5%. A "Directly Affected Product" is a product on

which a trigger acts. An "Action" is a set of pricing actions that is taken in

10   response to a trigger. In this embodiment, the actions are to the directly

affected product. An example of an action would be to set the price of the

directly affected product to maintain the gross margin present prior to the

increase in the cost of the product. "Business Rules" are rules that define

pricing relationships. In this embodiment, business rules define a price

15   relationship between different products or a group of products. An example of

a business rule is a size rule that states that a larger size item should have a

lower average unit cost than a smaller size item of the same size family. An

example of a size family is Advil Caplets (a brand of a certain product), with

size classes of Large, Medium, and Small. A "Secondary Product" or

20   "Related Product" is a product that is related to a directly affected product by a

business rule. A product may be designated as both a "Directly Affected

Product" and a "Secondary Product". In such a case, the product is considered

to be a "Directly Affected Product." In the above example of a rule, an item

of a size class of the same size family would be a related product. A "Trigger

Priority" is a priority assigned to each trigger, where actions of triggers with

higher priority supercede actions of triggers of lower priority. A "Filter" is a

5   set of specified thresholds that a change must meet or exceed to become a

trigger.

The system is set up by defining triggers and related actions, prioritizing

triggers, defining business rules, and prioritizing business rules. The triggers

may be defined by a system manager or an end user, or may be set up as a

10   default by a system manager. This allows the end user to modify the settings

at a later point. In addition, the triggers can also be "hardwired" into the

program. A user interface 108 may be provided to allow a user to define

certain aspects of the system, such as business rule hierarchy, trigger

hierarchy, or threshold levels during this set-up step.

15   Data is then received from a data source (step 204). The data source

may be one or more stores or other sources of data or the store computer

system 104 of FIG. 1 and may be provided to the price updating system 100.

Such data may be, for example, prices, competitor prices, costs, or new

product information. The data may be provided on a periodic basis, such as

20   daily or weekly.

A filter is used to identify triggers in the received data using thresholds (step 208). The filter may define a plurality of triggers. The triggers may be prioritized. The thresholds may include the percent of change and the extent of change. If an event provides a given change that does not meet the

5   threshold criteria, the event may be recorded and added to future event changes. As previously mentioned, there are three kinds of triggers in this embodiment: product cost changes, competitive price changes, and new product introductions. In this embodiment, a competitive price change for a given product will become a trigger only if the event passes thresholds for

10 significance, which may include percent of change, extent of price change (number of stores affected), and volume of sales affected. For a cost change, thresholds may include percent of change and the extent of change (number of stores). The thresholds may be user-specified.

The price updating system 100 may then perform actions related to the

15 triggers (step 212). The actions change the price of the directly affected product. The actions are prioritized according to the priority of the trigger. In this embodiment of the invention, the actions are executed in an order of lowest priority to highest priority. Each time a price is changed, a database may record the action and the trigger causing the action. This is one method

20 of allowing the higher priority actions to supercede the lower priority actions. Other embodiments may use other methods to implement prioritized actions. Conflicting actions may be related to triggers of the same priority, which

would then require a tie-breaking process. In this embodiment, the tie-breaking process is determining the resulting prices from each action and selecting the action that provides the highest overall price. Other tie-breaking processes may be used.

5   A rule compliance process is then performed (step 216). The business rules are arranged in a hierarchy, in which business rules at a higher level are more important than those lower down. Higher priority business rules take precedence over lower priority business rules. If a business rule of higher priority is in conflict with a business rule of lower priority, then the higher

10   priority business rule is applied. The guiding principle for bringing business rules into compliance is that it must be done with the minimal number of price changes. In this embodiment, if two business rules of equal priority are in conflict, the conflict is resolved by choosing the solution that results in the higher prices. In the preferred embodiment, a single business rule hierarchy is

15   used for all triggers for a business. In other embodiments, each trigger may have a different set of business rules with different hierarchies. In such a case, hierarchies related to triggers with higher priorities will have higher priorities.

In some cases the business rules cannot be brought into compliance. In such cases the aim is to reduce the extent of the infeasibility, while changing

20   as few prices as possible.

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FIG. 3 is a more detailed flow chart of one embodiment of a process for

the rule compliance step (step 216). The rule compliance step adds rules

iteratively in order of priority. The highest priority rules are selected first

(step 304). The total infeasibility of these rules is reduced as much as possible

5   by changing prices. The extent of the remaining infeasibility for the rules is

recorded as the measure of rule compliance. The next iteration begins by

adding the set of rules at the next level of priority. The total infeasibility for

both sets of rules taken together is minimized. However, this is done while

ensuring that the infeasibility measure recorded in the previous iteration for

10   the first set of rules (at a higher priority) is maintained. The resulting level of

infeasibility of the second set of rules is now recorded. The next set of rules of

lower priority is added in the next iteration, and the process repeats until no

more rules remain. At each iteration the infeasibility measure of the rules

added in that iteration is minimized while keeping the compliance

15   (infeasibility) measures of the previously added rules at their incoming level.

The final step in the rule compliance process determines the minimal number

of price changes required to reduce the infeasibilities of the rules to the levels

recorded in the preceding iterations.

A determination is made on whether the selected rule requires a price

20   change (step 308). If a price change is found to be required, the price is

changed to comply with the rule to the extent possible (step 310), and then the

process goes back to the step of selecting the highest priority rule (step 304).

If it is determined that the selected rule does not require a price change (step 308) then a determination is made on whether there is a rule with a lower priority than the selected rule (step 312). If there is no lower priority rule than the selected rule, then the rule compliance step (step 216) is done (step 314).

5   If there is a lower priority rule than the selected rule, then the next lower priority rule becomes the selected rule (step 316). Then the process goes back to the step of determining whether the selected rule requires a price change (step 308). A historical record of changes may be used to prevent lower priority rules from undoing a change by a higher priority rule.

10   The resulting updated prices may be provided to the stores (step 220). This allows the stores to update prices on a periodic basis.

FIG.'S 4A and 4B illustrate a computer system 900, which is suitable for implementing embodiments of the present invention. FIG. 4A shows one possible physical form of the computer system. Of course, the computer

15   system may have many physical forms ranging from an integrated circuit, a printed circuit board, and a small handheld device up to a huge super computer. Computer system 900 includes a monitor 902, a display 904, a housing 906, a disk drive 908, a keyboard 910, and a mouse 912. Disk 914 is a computer-readable medium used to transfer data to and from computer

20   system 900.

FIG. 4B is an example of a block diagram for computer system 900. Attached to system bus 920 are a wide variety of subsystems. Processor(s) 922 (also referred to as central processing units, or CPUs) are coupled to storage devices, including memory 924. Memory 924 includes random access

5 memory (RAM) and read-only memory (ROM). As is well known in the art, ROM acts to transfer data and instructions uni-directionally to the CPU and RAM is used typically to transfer data and instructions in a bi-directional manner. Both of these types of memories may include any suitable type of the computer-readable media described below. A fixed disk 926 is also coupled

10 bi-directionally to CPU 922; it provides additional data storage capacity and may also include any of the computer-readable media described below. Fixed disk 926 may be used to store programs, data, and the like and is typically a secondary storage medium (such as a hard disk) that is slower than primary storage. It will be appreciated that the information retained within fixed disk

15 926 may, in appropriate cases, be incorporated in standard fashion as virtual memory in memory 924. Removable disk 914 may take the form of any of the computer-readable media described below.

CPU 922 is also coupled to a variety of input/output devices, such as display 904, keyboard 910, mouse 912 and speakers 930. In general, an

20 input/output device may be any of: video displays, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting

recognizers, biometrics readers, or other computers. CPU 922 optionally may
be coupled to another computer or telecommunications network using network
interface 940. With such a network interface, it is contemplated that the CPU
might receive information from the network, or might output information to

5   the network in the course of performing the above-described method steps.
Furthermore, method embodiments of the present invention may execute
solely upon CPU 922 or may execute over a network such as the Internet in
conjunction with a remote CPU that shares a portion of the processing.

In addition, embodiments of the present invention further relate to

10   computer storage products with a computer-readable medium that have
computer code thereon for performing various computer-implemented
operations. The media and computer code may be those specially designed and
constructed for the purposes of the present invention, or they may be of the
kind well known and available to those having skill in the computer software

15   arts. Examples of computer-readable media include, but are not limited to:
magnetic media such as hard disks, floppy disks, and magnetic tape; optical
media such as CD-ROMs and holographic devices; magneto-optical media
such as floptical disks; and hardware devices that are specially configured to
store and execute program code, such as application-specific integrated

20   circuits (ASICs), programmable logic devices (PLDs) and ROM and RAM
devices. Examples of computer code include machine code, such as produced
by a compiler, and files containing higher level code that are executed by a

computer using an interpreter. Computer readable media may also be
computer code transmitted by a computer data signal embodied in a carrier
wave and representing a sequence of instructions that are executable by a
processor.

Examples

The relationships between triggers, priorities, actions, and business
rules may be illustrated by a Rule-Trigger Matrix as illustrated below:

Trigger	Priority	Action	Business Rules
Environment Change (cost update, competitive price change, new product)	Trigger priority.	Take this action or set of actions to adjust the prices of affected products.	Satisfy these rules to the extent possible according to hierarchy.

A sample Rule-Trigger Matrix is illustrated below:

Trigger	Priority	Action	Business Rules
Cost Update	1	"Match price increase with cost increase"	Line Rules, Brand Rules, and Size Rules.
Competitive Price Change	2	"Bring corresponding product price within certain range of this new competitive price."	
New Products	3	"Set price to be Cost + 15%."	

This table implies the following: Process the actions corresponding to the triggers in reverse order of priority – "New Products," "Competitive Price Change," and "Cost Update." If there are conflicts in the actions corresponding to triggers at different priorities, the actions required of the

5   higher priority trigger are chosen. This means that the actions of "Cost Update" triggers take precedence over actions of "Competitive Price Change" triggers, which in turn trump the actions of "New Product" triggers. If there are conflicts in the actions required of triggers at the same level, the actions that result in higher prices are chosen as a tie-breaker. The tie-breaker

10   definitions are used whenever necessary. In this example of Rule-Trigger Matrix for a cost update trigger, a match price increase with cost increase action is attached. A "match price increase with cost increase" action may raise or lower the price according to the raising or lowering of the cost. For the competitive price trigger, the action of bringing the corresponding product

15   price within a certain range of the new competitive price action is attached. For the new products trigger, a set price to cost plus 15% action is attached or a retailer may be able to define the price on the new product.

Once the actions have been executed, a business rule compliance step is implemented. The business rules are in a hierarchy, and business rules at the

20   top of the hierarchy must be satisfied before those lower down. In this example, Line Rules are satisfied before Brand Rules, and Brand Rules before Size Rules. The tie-breaker definitions are used whenever necessary.

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<u>Line, Brand, Size Examples:</u>

Products may have relationships with other products according to the line of product, the size of product, and the brand of product. The table below provides an example of different products. In this example, two brands of products are provided the first brand being National, and the second brand being HCF. Products a, b, c, d, w, x, y, z are the same National brand. In this example, for each brand there are two flavors of each product type, namely onions and jalapeños. Products a, b, c, d are the same flavor of the same brand, so that they are different size classes in the same size family. For each size family there are four size classes of 8, 15, 28, and 56. Products d, z, s, and n are the same size class. This results in sixteen individual products with Sku's a-d, k-n, p-s, and w-z, as shown in the table below.

	Line 4	Line 3	Line 2	Line 1
National beans – onions				
Sku	a	b	c	d
Size	8	15	28	56
National beans – jalapeños				
Sku	w	x	y	z
Size	8	15	28	56

	Line D	Line C	Line B	Line A
HCF beans – onions				
Sku	p	q	r	s
Size	8	15	28	56
HCF beans – jalapeños				
Sku	k	l	m	n
Size	8	15	28	56

A simple example of a brand rule would be that the difference in price between different brands of the same size and same flavor would be a set value. For example, for products d and s, the difference in price $d - s = J$, where J is a constant.

5   In a simple example of a size rule, it may be specified that the per unit cost of a smaller item of a product type of a brand must be greater than a per unit cost of a larger item of the same product type and brand.

A line of products may be different flavors of the same size and same brand of a product type. Products d and z are in the same line. A simple line

10   rule may be that all products in the same line are the same price.

Case I: Cost of product *d* goes up.

In this case, the cost of product d goes a sufficient amount to create a cost update trigger. In this case, a system is set up (step 202). To provide a simple case, only one trigger is specified in the Trigger-Rule Matrix. The

15   single trigger is a cost update trigger. The action for the trigger is to match a price increase with a cost increase. The business rule hierarchy is that the line rule has the highest priority, the size rule has the next highest priority, and the brand rule has the lowest priority. The business rules provided above for line, size, and brand will be used.

20   The Trigger-Rule Matrix is:

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Trigger	Priority	Action	Business Rules
Cost Update	1	"Match price increase with cost increase"	Line, Size, Brand

Data is then received from the stores (step 204). In this case, the cost of product d has increased sufficiently to create a trigger. The data is filtered to identify that the cost of product d has increased more than a specified

5   threshold (step 208). Actions related to the trigger are then performed (step 212). The only action specified in the Trigger-Rule Matrix is to match price increase with cost increase. An increase in the cost of product d requires an increase in the price of product d to match price increase with cost increase. As a result, the action increases the price of product d. Since only one action

10   is specified, and only one trigger has been found, the actions are completed.

Next, a rule compliance is performed (step 216) according to the business rules and their hierarchy. The highest priority rule is selected (step 304). The business rule with the highest priority is the line rule, which specifies that different flavors of the same brand and size of product type

15   should be the same. A determination is made as to whether the line rule requires a change in price (step 308). Since the price of product d has increased, the line rule states that the price of product z should be increased by the same amount. Since the selected rule (the line rule) requires a price change (step 308) the price of product z is increased to comply with the

20   selected rule (step 310). In this example, none of the other line rules are

infeasible and so require no further action. In general, it is possible that several

rules of a given priority are infeasible and finding the lowest level of

infeasibility possible will require them to be considered simultaneously. The

total level of infeasibility, zero in this example, for the line rules is recorded

5   and a determination is made on whether a lower priority rule exists (step 312).

Since a lower priority rule exists, the next lower priority rule, the size rule, is

selected (step 316). A determination is made as to whether the selected rule,

the size rule, requires a price change (step 308). In this example, the increase

in the price of product d has made the per unit cost of product d greater than

10   the per unit cost of product c, which is a smaller size of the same brand and

flavor. Therefore, the selected rule requires a price change, but this change

must be done while maintaining the level of infeasibility of the line rule at its

current level of zero. As a result, the price of product c is increased to comply

with the size rule, and the price of product y is increased to equal the price of

15   product c in order to maintain the feasibility of the line rule between them

(step 310). Note that in this example, changing the prices in this way does not

induce any additional infeasibilities in the set of rules being considered. The

increase in prices of larger size products d, z, c, and y are not sufficient to

violate the size rule regarding smaller size products a, b, w, and x. In general,

20   price changes in the compliance phase would take these potential

infeasibilities into account. After this step, the level of infeasibility of the line

rules and the size rules are recorded separately.

The next highest priority rule is again selected (step 304). It is found that the brand rules have the next highest priority (step 312). The brand rules are then selected (step 316). It is determined that, since the price of product d increased, the difference between the price of product d and the price of

5   product s has increased, violating the brand rule and requiring a price change (step 308). The price of product s is increased (step 310) and, to keep the line rules at their current level of compliance, the price of product n is increased to be equal to the price of s. The compliance measure of each of the other rules is unaffected and so the process stops.

10

The updated prices are then provided to the stores (step 220).

Case II: Cost of product *d* goes up by $1 and that of product z by 1.50.

This case uses the same Trigger-Rule Matrix and same business rules

15   and business rule hierarchy as the previous case. In this case, the cost of product d goes up by $1 and the cost of product z goes up by $1.50. In this case, a system is set up (step 202). To provide a simple case, only one trigger is specified in the Trigger-Rule Matrix. The single trigger is a cost update trigger. The action for the trigger is to match a price increase with the cost

20   increase. The business rule hierarchy is that the line rule has the highest priority, the size rule has the next highest priority, and the brand rule has the

lowest priority. The business rules provided above for line, size, and brand will be used.

Data is then received from the stores (step 204). In this case, the data indicates that the cost of product d has increased by $1 and the cost of product z is increased by $1.50. The data is filtered to identify that the cost of product d and product z have increased more than a specified threshold (step 208), so that each event is designated as a trigger. Actions related to the triggers are then performed (step 212). The only action specified in the Trigger-Rule Matrix is to match a price increase with a cost increase. An increase in the price of the product is required to match the price increase with cost the increase. As a result, the action for a first trigger increases the price of product d by $1.00 and the action for a second trigger increases the price of product z by $1.50. Since only one action is specified for each trigger, and only two triggers have been found, the actions are completed.

Next, a rule compliance is performed (step 216) according to the business rules and their hierarchy. In this case, a step by step process through the flow chart of FIG. 3 will not be provided, since an understanding of the step by step process of the flow chart of FIG. 3 has already been provided, and since other methods may be used in other embodiments of the invention. The line rule increases the price of product d by $0.50. There is a conflict with the line rule. One application of the line rule would lower the price of product z by $0.50 and another application of the line rule would increase the price of

product d by $0.50. Since this example uses a tie breaker by using the rule

that provides the highest prices, the application that increases the price of

product d by $0.50 is performed. A size rule then is used to increase the price

of product c. A line rule is then used to increase the price of product y. A

5   brand rule is then used to increase the price of product s. A line rule is then

used to increase the price of product n.

Case III: Cost of product *d* goes up, competitive price on product *s* falls.

In this case, the cost of product d rises a sufficient amount to create a

10   cost update trigger and the competitive price on product s falls a sufficient

amount to create a trigger. In this case, a system is set up (step 202). In this

case, two triggers are specified in the Trigger-Rule Matrix. The highest

priority trigger is a cost update trigger. The action for this trigger is to match a

price increase with the cost increase. The lowest priority trigger is the

15   competitive price change trigger. The action for this trigger is to maintain a

maximum competitive price difference. The business rule hierarchy is that the

line rule has the highest priority, the size rule has the next highest priority, and

the brand rule has the lowest priority. The business rules provided above for

line, size, and brand will be used.

20   The Trigger-Rule Matrix is:

Trigger	Priority	Action	Business Rules

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Cost Update	1	"Match price increase with cost increase"	Line, Size, Brand
Competitive Price Change	2	"Maintain competitive price."	

Data is then received from the stores (step 204). In this case, the data indicates that the cost of product d has increased and the competitive price of product s has fallen. The data is filtered to identify that the cost of product d

5   has increased more than a specified threshold and the competitive price of product s has decreased by a specified threshold (step 208), so that each event is designated as a trigger. Actions related to the triggers are then performed (step 212). In this embodiment, the lowest priority action is performed first. Since the competitive price change trigger has the lowest priority, the action of

10   maintaining the competitive price of product s is first performed by lowering the price of product s. Next, the action related to the higher priority cost update trigger is performed. The price increase is matched with the cost increase by increasing the price of product d.

Next, a rule compliance is performed (step 216) according to the

15   business rules and their hierarchy. In this case, a step by step process through the flow chart of FIG. 3 will not be provided, since an understanding of the step by step process of the flow chart of FIG. 3 has already been provided, and since other methods may be used in other embodiments of the invention. The line rule increases the price of product z. A size rule then is used to increase

the price of product c. A line rule is then used to increase the price of product

y. A brand rule is then used to increase the price of product s. Increasing the

price of product s is in direct conflict with the action of decreasing the price of

product s caused by the competitive price trigger. Since the price of product d

5   was increased by the cost update trigger, which has a higher priority, and the

price increase of product d is the cause of the price increase of product s, the

price of product s is increased because the cost update trigger has a higher

priority than the competitive price change trigger. A line rule is then used to

increase the price of product n. Thus, in rule compliance, higher priority

10   triggers are able to override lower priority triggers, in this embodiment of the

invention.

Case IV: Cost of product *d* goes up $1.00, cost of product *c* goes up 50c.

This case uses the same Trigger-Rule Matrix and same business rules

and business rule hierarchy as the previous case. In this case, the cost of

15   product d goes up by $1 and the cost of product c goes up by $0.50. In this

case, a system is set up (step 202). The highest priority trigger is a cost update

trigger. The action for this trigger is to a match price increase with cost a

increase. The lowest priority trigger is the competitive price change trigger.

The action for this trigger is to maintain a maximum competitive price

20   difference. The business rule hierarchy is that the line rule has the highest

priority, the size rule has the next highest priority, and the brand rule has the

lowest priority. The business rules provided above for line, size, and brand
will be used.

Data is then received from the stores (step 204). In this case, the cost
of product d has increased by $1 and the cost of product c is increased by

5    $0.50. The data is filtered to identify that the cost of product d and product c
have increased more than a specified threshold (step 208), so that each event is
designated as a trigger. Actions related to the triggers are then performed
(step 212). The action specified in the Trigger-Rule Matrix for cost update
triggers is to match a price increase with a cost increase. An increase in the

10   cost of a product is required to match the price increase with the cost increase.
As a result, the action for one trigger increases the price of product d by $1.00
and the action for a second trigger increases the price of product c by $0.50.
Since only one action is specified for each trigger, and only two triggers have
been found, the actions are completed.

15   Next, a rule compliance is performed (step 216) according to the
business rules and their hierarchy. In this case, a step by step process through
the flow chart of FIG. 3 will not be provided, since an understanding of the
step by step process of the flow chart of FIG. 3 has already been provided, and
since other methods may be used in other embodiments of the invention. The

20   line rule increases the price of product z by $1.00. A size rule then is used to
increase the price of product c. Although the price of product c was increased
by an action, a subsequent rule may further increase the price of product c.

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Although the triggers that initially changed the prices have the same priority, a tie-breaker following the rule that provides the highest price should be followed. A line rule is then used to increase the price of product y. A brand rule is then used to increase the price of product s. A line rule is then used to

5   increase the price of product n.

When a new product is introduced, the price may be provided by the retailer, by their category manager or pricing analyst. The relationship between the new product and other products may be specified. The relationships may specify line, brand and size relationships. The price of the

10   new product or other products may be changed during a business rule compliance process. In an example, if the price from the retailer is $1.25, but the new product is placed in Line A, which has a price of $1.50 for all the products in the line prior to the Price Update, then the new products price will be changed to $1.50.

15   In one embodiment, a price optimization program may be used to provide a price optimization, which may be used as a metric to measure the price updates to an optimization standard.

In other embodiments, a "maintain the gross margin" action may be attached to a cost update trigger. In an example a "maintain the gross margin"

20   action, a product may have a cost of $12.54 and a price of $16.99, which provides a gross margin of 26.19%. If the cost is increased by $1 to $13.54,

then to maintain a gross margin of 26.19%, the price is increased to %18.34. Other variants of maintaining the gross margin may be used.

While this invention has been described in terms of several preferred embodiments, there are alterations, modifications, permutations, and substitute

5   equivalents, which fall within the scope of this invention. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, modifications, permutations, and substitute equivalents as fall within the true spirit and scope

10 of the present invention.

CLAIMS

What is claimed is:

1.   A computer implemented method for providing price updates, comprising:

5   receiving data;

filtering the received data to identify triggers in the received data;

performing actions related to identified triggers;

performing business rule compliance according to a business rule hierarchy; and

10   providing updated prices.

2.   The computer implemented method, as recited in claim 1, further comprising:

defining a plurality of thresholds to identify triggers;

15   defining actions related to each trigger of the plurality of triggers; and

defining the business rule hierarchy.

3.   The computer implemented method, as recited in claim 2, wherein the actions have a hierarchy, where performing the actions is done

20   according to the hierarchy of the actions.

4.   The computer implemented method, as recited in claim 3, wherein performing the business rule compliance is done according to the business rule hierarchy.

5

5.   The computer implemented method, as recited in claim 4, wherein at least one of the triggers is selected from at least one of a new product trigger, a cost change trigger, and a competitor price change trigger.

10   6.   The computer implemented method, as recited in claim 5, wherein at least one of the business rules is selected from at least one of a brand rule, a size rule, and a line rule.

7.   The computer implemented method, as recited in claim 6, 15   wherein the business rule hierarchy is user definable.

8.   The computer implemented method, as recited in claim 7, wherein the triggers are prioritized and wherein the priority of the trigger is user defined.

20

9.   The computer implemented method, as recited in claim 8, wherein the hierarchy of actions is defined by trigger priority.

10.   The computer implemented method, as recited in claim 9, further comprising the step of allowing a user to set a plurality of price indicator ranges.

5   11.   The computer implemented method, as recited in claim 10, further comprising using a tie-breaking process.

12.   The computer implemented method, as recited in claim 11, wherein the tie-breaking process selects a result that provides highest prices.

10

13.   The computer implemented method, as recited in claim 12, wherein a single rule hierarchy is used for all triggers.

14.   The computer implemented method, as recited in claim 13,
15   wherein each action changes only the price of a product that triggered the action.

15.   The computer implemented method, as recited in claim 7, wherein the triggers and actions are product specific.

20

16.   An apparatus for providing price updates, comprising computer readable media, comprising:

computer code for receiving data;

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computer code for filtering the received data to identify triggers in the received data;

computer readable code for performing actions related to identified triggers;

5   computer readable code for performing business rule compliance; and

computer code for providing updated prices.

17.   The apparatus, as recited in claim 16, further comprising:

computer readable code for defining a plurality of thresholds to
10   identify triggers;

computer readable code for defining actions related to each trigger of the plurality of triggers; and

computer readable code for defining the business rule hierarchy.

15   18.   The apparatus, as recited in claim 17, wherein the actions have a hierarchy, where the computer readable codes for performing the actions performs the actions according to the hierarchy of the actions.

19.   The apparatus, as recited in claim 18, further comprising
20   computer readable code for providing a tie-breaking process.
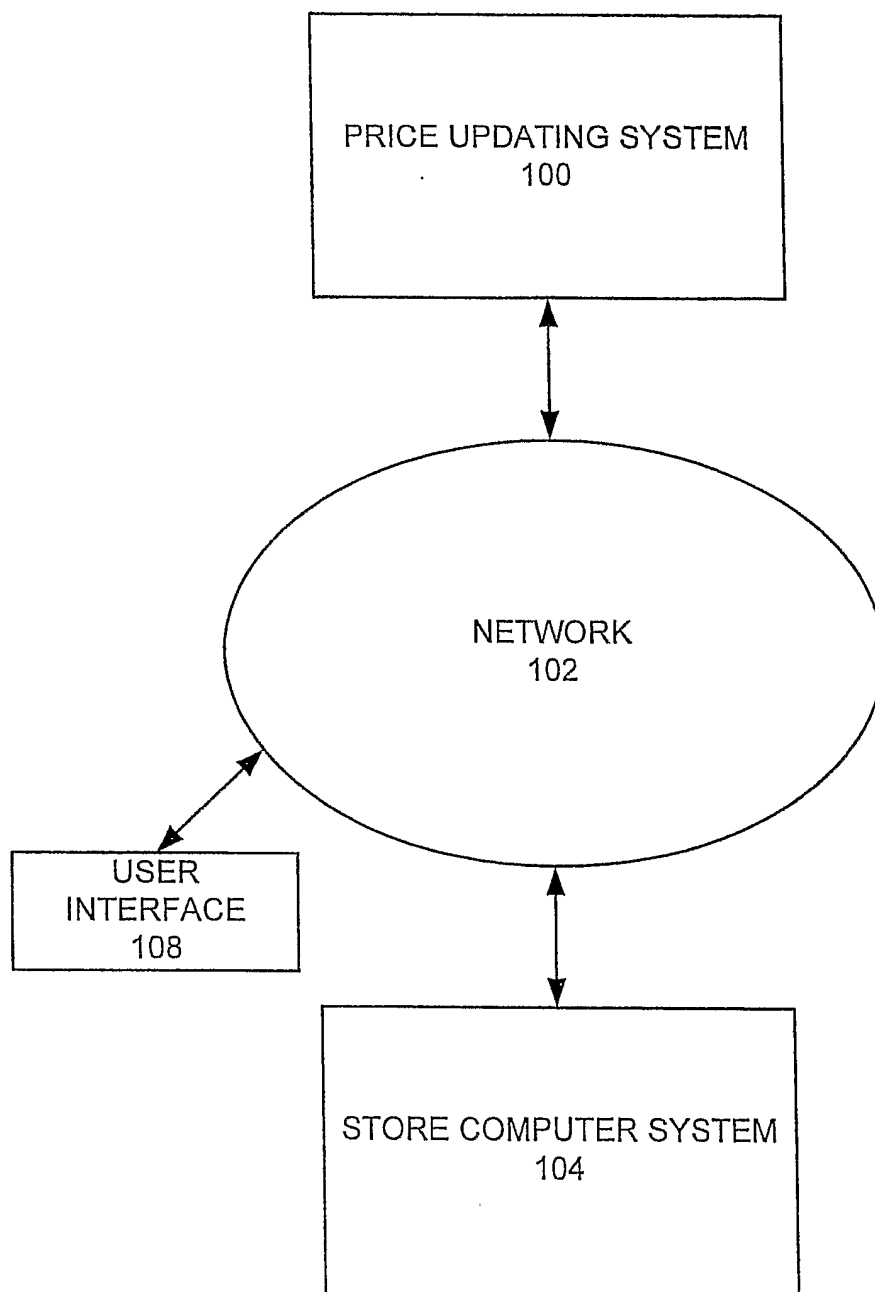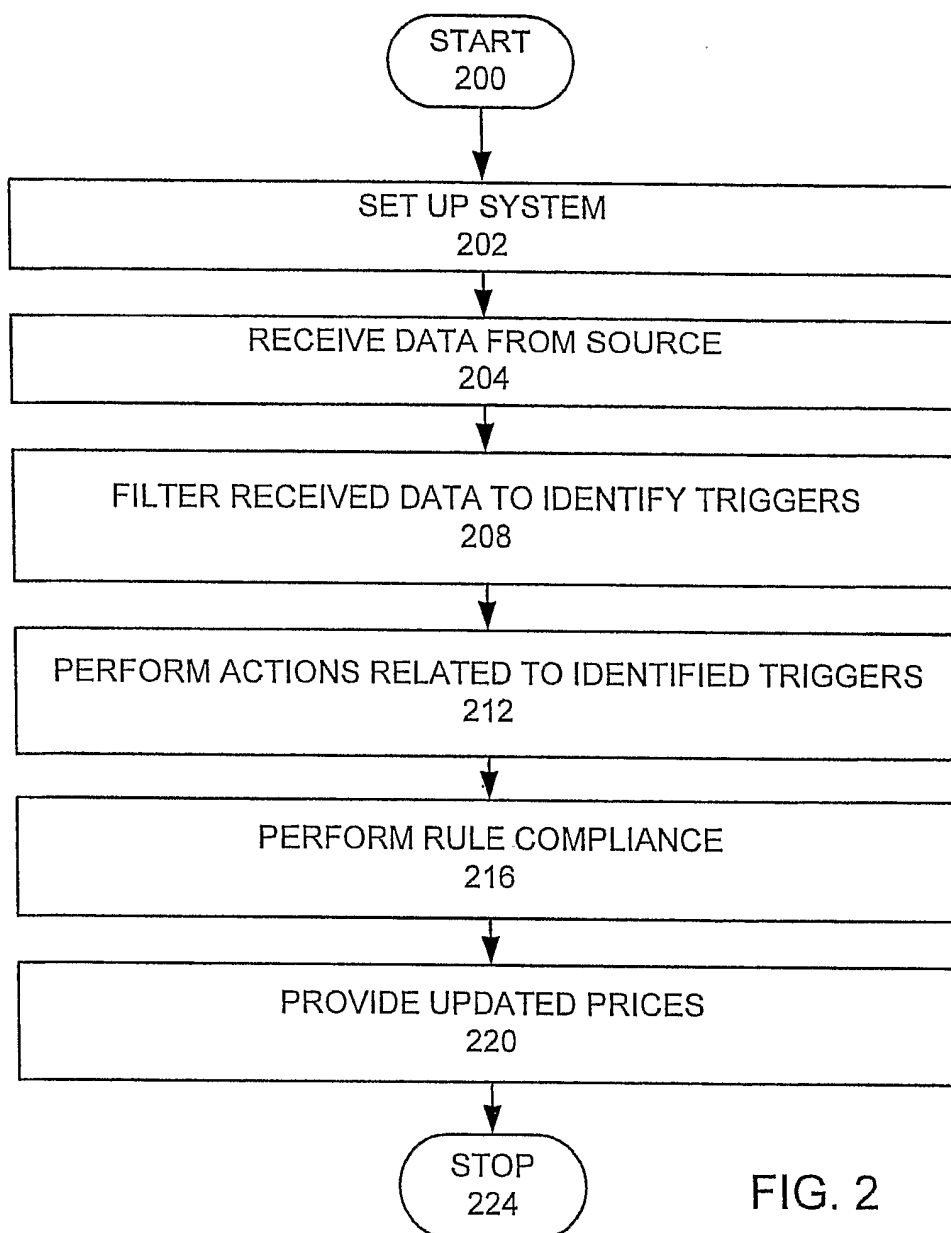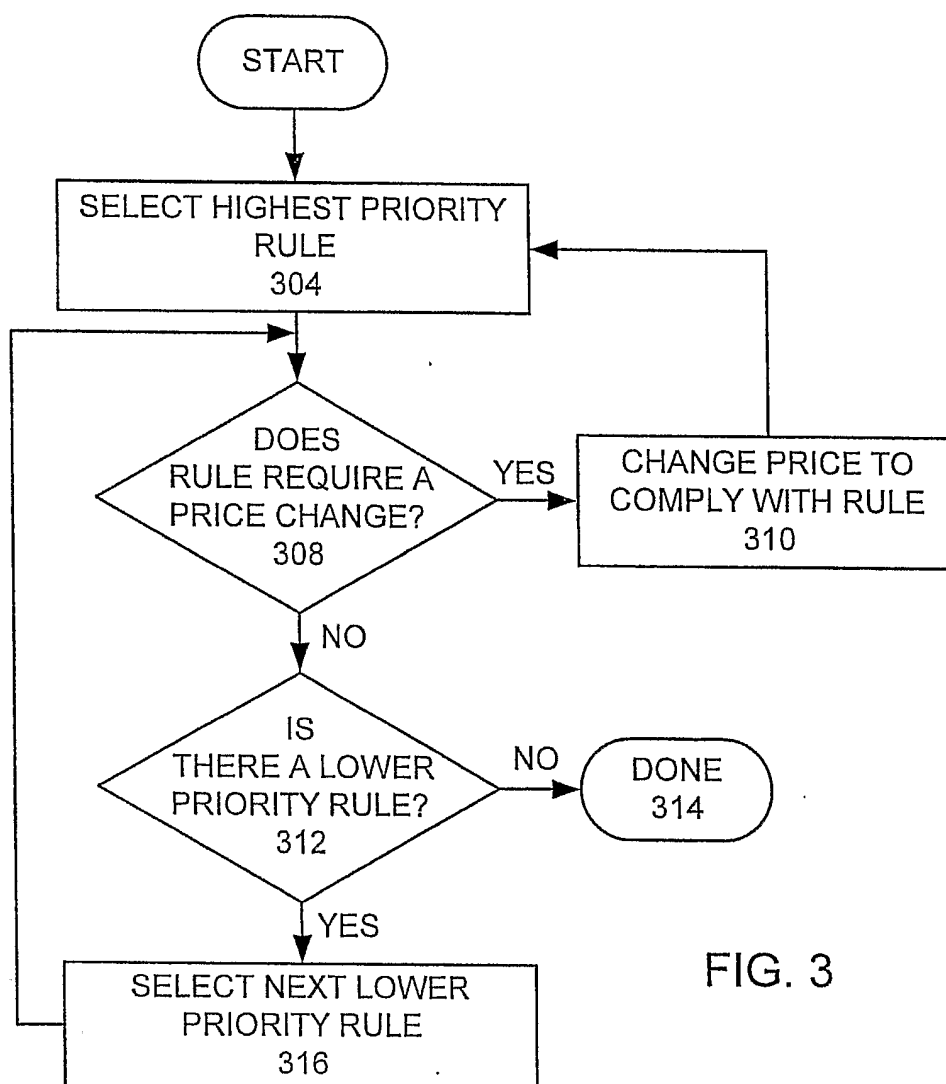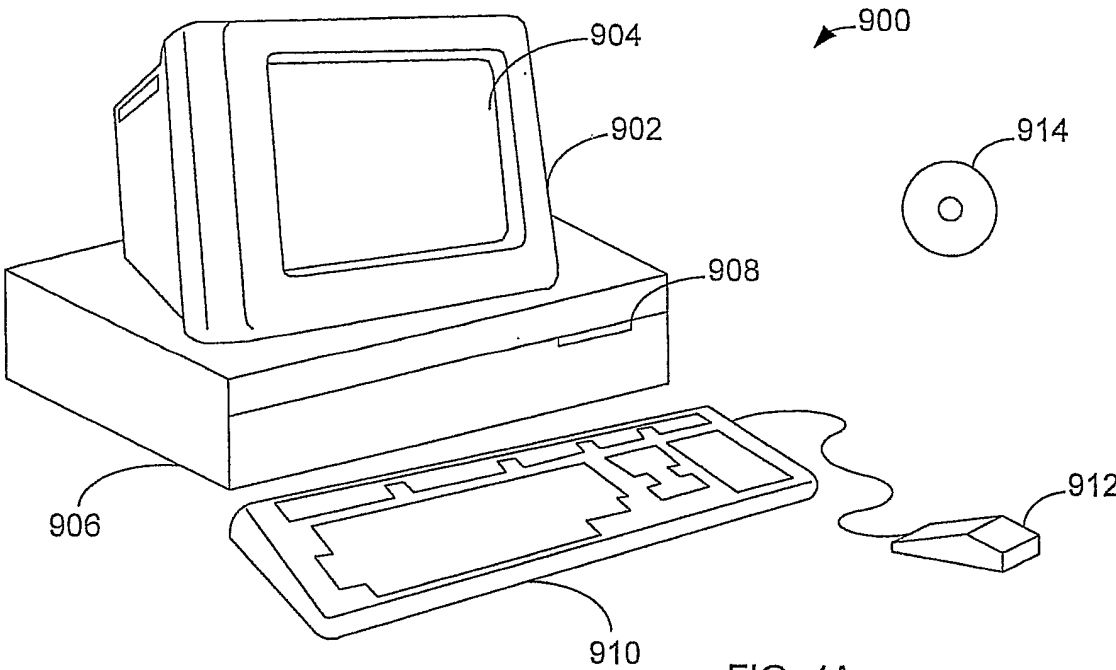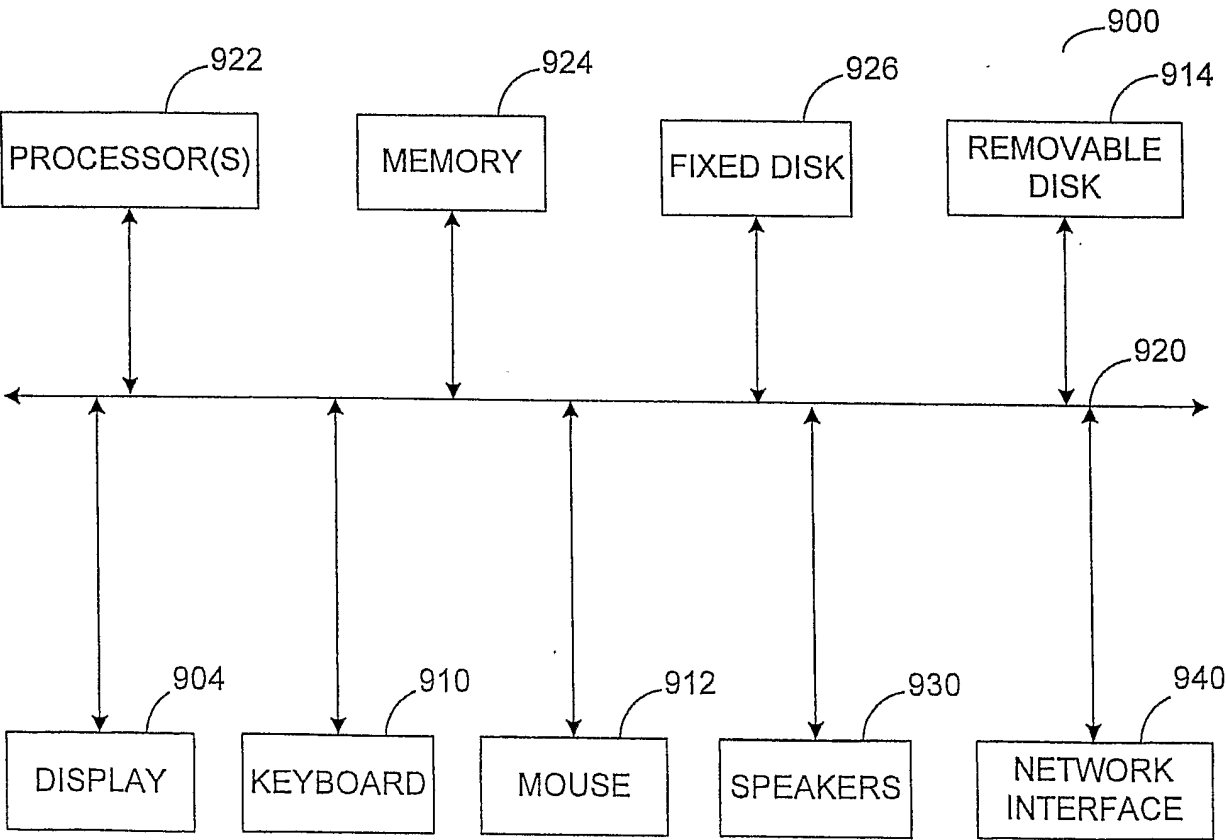
PRICE UPDATING SYSTEM
100

NETWORK
102

USER
INTERFACE
108

STORE COMPUTER SYSTEM
104

FIG. 1

```
        ┌─────────────┐
        │    START    │
        │     200     │
        └─────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│           SET UP SYSTEM                │
│               202                      │
└───────────────────────────────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│        RECEIVE DATA FROM SOURCE        │
│               204                      │
└───────────────────────────────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│   FILTER RECEIVED DATA TO IDENTIFY     │
│              TRIGGERS                   │
│               208                      │
└───────────────────────────────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│  PERFORM ACTIONS RELATED TO IDENTIFIED │
│              TRIGGERS                   │
│               212                      │
└───────────────────────────────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│         PERFORM RULE COMPLIANCE        │
│               216                      │
└───────────────────────────────────────┘
               │
               ▼
┌───────────────────────────────────────┐
│         PROVIDE UPDATED PRICES         │
│               220                      │
└───────────────────────────────────────┘
               │
               ▼
        ┌─────────────┐
        │    STOP     │        FIG. 2
        │     224     │
        └─────────────┘
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FIG. 3

FIG. 4A

PROCESSOR(S)	MEMORY	FIXED DISK	REMOVABLE DISK

DISPLAY	KEYBOARD	MOUSE	SPEAKERS	NETWORK INTERFACE

FIG. 4B

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : G06K 15/00
US CL : 235/378
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols) U.S. : 235/378 235/375,383; 705/400,1,401,16
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,456,986 B1 (Boardman et al.) 24 September 2002, see entire document.	1-10, 15-18
Y		11, 19
Y	US 6,134,534 A (Walker et al.) 17 October 2000, see entire document.	11, 19
A	US 6,012,834 A (Dueck et al.) 11 January 2000.	1-19
A	US 5,790,643 A (Gordon et al.) 04 August 1998.	1-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
"E"	earlier application or patent published on or after the international filing date
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed

"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 December 2003 (19.12.2003)	28 JAN 2004
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer *Transcribed from* LISSI M. MARQUIS *James R. Matthew* Telephone No. (703) 308-2260

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