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(54) Improved security system

(57) A security control apparatus comprises a digital video recording apparatus (40), a camera (42) linked to the digital video recording apparatus (40), an EPoS apparatus (20) with a screen and a server (10) linking the digital video recording apparatus (40) to the EPoS apparatus (20). The server (10) includes a retail event management apparatus having means for coordinating events recorded on the digital video recording apparatus (40) with specific activities on the EPoS apparatus (20) and means for viewing the coordinated events and specific activities on the screen of the EPoS apparatus (20).

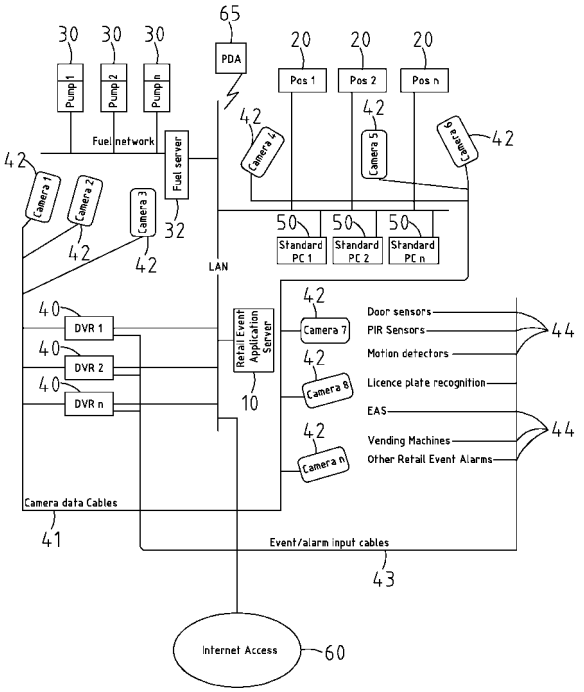

Fig. 1

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Description

[0001] The present invention relates to an improved security system and in particular to an improved security system within a retail environment and specifically to a security control apparatus having a retail event management apparatus. However the security system or security control apparatus is not limited to use within a retail environment.

[0002] Various activities within a retail environment require knowledge of what customers, staff and supplier operatives did at a specific point in time to prevent fraud from occurring. Both retail systems' electronic point of sale (EPOS) apparatus and video footage by digital video recording (DVR) need to be reviewed to clarify the situation in the event of a suspected dishonest occurrence or bad practice. This assists in the detection of fraud, identifying the culprit, successful prosecution and the reduction in shrinkage or taking corrective action where bad practice has taken place.

[0003] In today's ever-competitive market place and particularly in the retail segment there is a demand for faster real time information. In this competitive industry, there is downward pressure on staffing levels and an increasing use of part-time staff. In many cases, there is no longer permanent full time security staff available to management. In the past, a dedicated skilled security presence would monitor cameras and pan tilt and/or zoom (PTZ) a camera in on suspicious or unusual activity. Even with a security presence, it happens that certain fraudulent activities are overlooked and thus not detected. More and more responsibility is being placed on the already busy manager.

[0004] Because of a relentless squeeze on margins it is more important than ever not only to deter fraud but also to recover the stock or cash and prosecute the perpetrators. It is also important that the best practices are maintained.

[0005] Businesses now also need to protect themselves against litigation by having proof of correct operation. Prevention of sale of certain goods, such as the sale of cigarettes and alcohol to minors or at illegal times need to be closely controlled by management.

[0006] There are many products on the market that provide partial solutions to these problems but they all have weaknesses in one or more areas. They are not properly integrated and do not present the necessary data real time. When the systems are audited or reviewed it is too late to retrieve the stock or to get a prosecution.

[0007] It is well known in the industry that staff are the most common offenders as they have the most opportunity but also suppliers and customers are guilty of fraud. They all need to be monitored and controlled.

[0008] Some areas of concern to managers and owners of retail premises are shrinkage of stock, customers driving off without paying at fuel forecourts, theft of other stock, giving stock free of charge or at a reduced cost to a customer known to the cashier using the EPOS system, known as "Sweet Hearting" theft of cash, access to restricted areas, sale of controlled products such as alcohol and cigarettes to minors or outside designated times, monitoring of other areas of concern such as fire exits or secure doors. These are retail events that occur at random and frequently. A cashier is any authorized member of staff (Manager, security, general and part time staff) operating the EPOS system. Typically they will have a log on password that identifies them on the system.

[0009] Customer "drive offs" occur when a customer drives off before paying for fuel or pays for the wrong pump. This can be monitored by flagging a nozzle lift, nozzle drop or fuelling start or fuelling stop by detecting signals returned by the pump to a central controller.

[0010] Digital video recorders (DVRs) currently are connectable to sensors such as door sensors and various motion detectors. They are monitored for opening and closing, activating cameras to PTZ and/or to record images. These help in the control of access to restricted areas such as stores, offices and cabinets containing expensive low margin stock, such as vending machines and expensive liquor cabinets.

[0011] Vending machines are now capable of being controlled by EPOS systems to provide control over this stock. See for example Irish Patent Specification No. 84210 in the name of January Patents Limited.

[0012] EPOS systems are also capable of being configured to give increased control over certain activities such as the sale of tobacco and alcohol, such as control of the cashier by only permitting those over the legal age to sell, forcing the request for ID of the customer, forcing the intervention of a manager or supervisor and most importantly recording all such controls.

[0013] Problems which can occur in current situations are varied and can include some of the following examples:

As mentioned previously, customers have been known to drive off after fuelling at filling stations and it is difficult to have visibility of customers in certain parts of the store to know what they are doing. Staff can misappropriate stock by selling a product at a reduced price, by selling and then voiding the sale, and by accessing unauthorised areas of the store. Staff can also misappropriate payments by giving the incorrect change to a customer. It is worth noting that in most cases the majority of fraud is perpetrated by staff.

The present invention provides a security control apparatus comprising a digital video recording apparatus, a camera linked to the digital video recording apparatus, a computer apparatus with a screen and a server linking the digital video recording apparatus to the computer apparatus, the server including a retail management apparatus having means for coordinating events recorded on the digital video recording apparatus with specific activities on the com-

puter apparatus and means for viewing the coordinated events and specific activities on screen.

[0014] Other features of the invention are specifically defined in the appended claims.

[0015] The retail event management apparatus provides for the control of digital video recording (DVR) apparatus by the EPoS apparatus.

[0016] The present invention also gives real time access to video footage which is preventative rather than with existing systems where footage is reviewed at a later stage after the suspected activity takes place.

[0017] Fundamental to the solution is a DVR Control Server Application running on a personal computer (PC) (this application may or may not also run on the EPoS apparatus or the DVR) and a minimum of one EPoS unit running an EPoS DVR Application.

[0018] Multiple EPoS units, each running the EPoS DVR Application can be connected to the DVR Control Server Application.

[0019] The DVR apparatus is linkable to the network (LAN) in the store as are the EPoS systems and the DVR Control Server Application.

[0020] Multiple DVR apparatuses can be controlled by the DVR Control Server Application.

[0021] It is also possible to have both the EPoS DVR Application and the DVR Control Server Application running on a single EPoS unit connected to a single DVR apparatus.

[0022] The present invention allows any type of EPoS system to be connected to any type of DVR apparatus once the EPoS DVR Application and the DVR Control Server Application are configured correctly.

[0023] This solution allows for more than one person if required to carry out a DVR operation. Up until this solution, a DVR operation was carried out in one of a number of ways. For fuel type transactions, the cashier/owner had to physically go to the DVR apparatus to view the DVR images and video footage (typically in an office). The cashier/owner does not have information such as the product sale date/time to reference and has to rely on their skill in reviewing the DVR images and video footage to determine the identification of problematic product sales. This is time consuming and error prone and increases the potential for sales to be lost completely.

[0024] For in-store transactions, a printer output is captured by a piggyback device hooked up to the printer or the customer display but causes infrastructural changes and additional cabling to be run to designated EPOS systems.

[0025] The present invention ensures that only a cashier identified to and logged on to an EPoS system running the EPoS DVR Application in conjunction with the DVR Control Application Server can request to view DVR images and video footage from a DVR machine.

[0026] The present invention ensures that any EPOS system can provide printer output over the LAN without additional infrastructural changes being required and that any EPOS system may be chosen for collection of this information without specific EPOS system designation needed.

[0027] When a fuel transaction occurs, the DVR Control Server Application detects the fuel transaction being actioned and will automatically (if programmed) instigate a pan, tilt and zoom (PTZ) camera image acquisition. On conclusion of a fuel transaction, the DVR Control Server Application will automatically instigate static camera image retrieval.

[0028] At this point, the EPoS DVR Application has automatic access to the fuel transaction images and these may on demand be reviewed during the transaction lifetime directly on the EPOS. Any of the images may also be further requested for on demand video footage playback operation.

[0029] If the fuel transaction is deemed fraudulent, then the details of the fuel transaction may be printed to the receipt which can then be used to easily find the related video footage on the DVR machine should criminal proceedings be deemed necessary.

[0030] For accounting purposes, the cashier would post the potential fraudulent fuel transaction to an appropriate in-house account for subsequent reconciliation and for revenue audit purposes.

[0031] Where queries arise during transactions, the text streaming capability over the LAN is provided by the EPOS DVR Application directly to the DVR machine for later review by the store owner/manager. No extra infrastructure other than the LAN itself is required and should queries regards any transaction occur, the DVR machine can be consulted for a dual view of the video footage and text streaming information being presented as detail of what actually occurred at the EPOS DVR till system.

[0032] The DVR Control Application Server can also route DVR video requests to another DVR apparatus in cases where there is more than one DVR machine connected.

[0033] The DVR Control Server Application in conjunction with the EPoS DVR Application allow the user to configure the touch panels on the EPoS unit with all information corresponding to the layout of the cameras connected to the DVR machine. In the case of modern touch-screen EPoS units, these columns will be represented on a panel on the touch-screen with graphical images and / or product descriptions. The cashier will select the required camera image by touching the relevant graphical image.

[0034] The EPOS System can also enable the cashier to view any of the in-store cameras real-time to aid the viewing of actions being carried out by customers, staff or suppliers in difficult to view positions from the checkout desk without having to be at the DVR location.

[0035] The EPOS system can also enable the manager/store owner to review the actions of cashiers in cases of dispute, as the EPOS system can display both video footage and till receipt operations at the time of the dispute.

[0036] The EPOS system can also enable the manager/store owner to review any incidents of note, e.g. access to unauthorised areas and the like without having to be at the DVR location.

[0037] The invention also has the ability to monitor for other retail events such as the sale of legally sensitive products such as tobacco and alcohol. The invention can help and prove compliance with legislation by capturing the cashier asking for identification from customers attempting to purchase such goods. The invention may be configured in many ways to alert a manager if desired but also to hold on record the event for subsequent verification if required.

[0038] The invention will hereinafter be more particularly described with reference to the accompanying drawing which shows, by way of example only, a number of embodiments of a security system according to the invention.

[0039] In the drawings:

Figure 1 is a schematic representation of a first embodiment of the security system according to the invention which includes a separate retail event application server;

Figure 2 is a schematic representation of a second embodiment of the security system in which the retail event application server is integrated with a server for fuel dispensers.

Figure 3 is a schematic representation of a third embodiment of the security system in which the retail event application server is integrated with a DVR apparatus;

Figure 4 is a schematic representation of a fourth embodiment of the security system in which the retail event application server is integrated on an EPOS terminal;

Figure 5 is a flowchart showing the operation of the EPOS terminal and

Figure 6 is a flowchart showing the operation of the retail event application server.

[0040] Referring to Figure 1, the security system is controlled by a retail event management server 10 to which is linked over a local area network (LAN) 12 to each EPoS apparatus 20 operating in the retail environment, to each of the fuel dispensers 30 operating in a filling station forecourt via a fuel dispensing server 32, to a number of digital video recording (DVR) apparatus 40, to the back office computer or computers 50 and optionally to an internet web access means 60 or PDA device 65 by which the server 10 can be accessed remotely from a company's headquarters or from an owner's home.

[0041] Connected to the DVR apparatus 40 by camera data cables 41 are a number of cameras 42, one or more of which can be the PTZ type. Also connected to the DVR apparatus 40 by event alarm input cables 43 are a plurality of triggering elements 44 by means of which the DVR apparatus 40 instructs one or more of the cameras 42 to start recording an event. Examples of triggering are activation of door sensors and/or motion detectors, cigarette vending, alcohol vending and any other detectable retail events. Other triggering elements associated with the fuel dispensers 30 are nozzle lift, nozzle drop, fuel start and fuel stop. When the server 10 detects such an event, it instructs the DVR apparatus to instruct a camera to commence or cease operating as appropriate.

[0042] Figure 2 is similar to Figure 1 except that the retail event application server 10 is integrated with the fuel dispensing server 32. Figure 3 illustrates the embodiment where the retail event application server 10 is integrated with a DVR server apparatus 40 and Figure 4 illustrates an embodiment in which the retail event application server 10 is integrated on an EPOS terminal 20.

[0043] Referring now to Figure 5, the flowchart showing the operation of the EPOS terminal 20 commences with step 70 of viewing the DVR links. At 71 the cashier presses or touches a DVR button and is given an option at 72 to select a pump to view a DVR link. If not, the DVR link is cancelled and the DVR link ends at 77. At 73, the pump DVR panel is presented for selection. The cashier can select a drive off option at 74 and if selected can produce a drive off receipt at 75. If not, the cashier has the option at 76 to select a DVR image to zoom into. If not selected, the DVR link is cancelled and the DVR link ends at 77. If the cashier does select the DVR image to zoom, the DVR zoom image is presented at 78. At 79 the cashier has the option to select an on-demand playback request which is handled at 80. If a playback is not requested, the cashier exits the zoom image view and the program returns to 73.

[0044] A program for running the retail event application server is shown in Figure 6. The program commences at sub main step 90. A check takes place at 91 if the configuration is initialised. If not successful then the message "Failed to initialise CBE DVR link using configuration information!", vbExclamation and vbOKOnly, "CBEDVR Link Startup Error" is displayed at 92, an exit routine is commenced at 93 and the program ends at 94. If the check is successful at 91, the program sets up the DVR controls configuration at 95 and also initiates a routing "bExiting = False". At 96 if the routine is not bExiting, then the program goes to the exit routine at 93 and the program ends at 94. If the routine is successful at 96, then the program enters the main program routine at 97 where the program operates in terms of the following routines:

ManagePTZTransactionDetection oconfig
DoEvents
SendPTZPresetCommands oconfig
DoEvents

```
ManageTransactionDetection oconfig
DoEvents
CollectAliveTransationImages oconfig
g_oFrmGUI.lblCurrTxns.Caption = "Live Txns:" & g_
colAliveTxns.count
DoEvents
RemoveDeadTransactionImgages oconfig
DoEvents
ManageVideoRequest oconfig
DoEvents
ManageOtherEvents oconfig
Sleep 100
bExiting = g_oFrmGUI.ExitSelected
```

[0045] In a further embodiment not shown in the drawings, the security apparatus, including a camera is incorporated into or linked with a vending machine, such as a cigarette vending machine, so that each sale of cigarettes can be coordinated with a video image of the customer for real time monitoring and/or subsequent review for security and/or verification of the age appearance of the customers of the vending machine.

[0046] Other technologies such as face recognition and licence plate recognition may also be interfaced to provide more data.

[0047] These are only a sample of such retail evens that require tight control. There may be others in specific retail situations.

[0048] The retail event application can be configured to react in many ways to suit each situation; such as record, prompt real time at the POS, remote location over the internet, or to other personal equipment such as mobile phone or PDA, transmission of video streams to any of the above options as required and present evidence to aid prosecution.

[0049] The benefits of the invention are many but include the following:

- Real-time information is presented to the correct person when it is most useful.
- The manager is not tied to a desk in a back office or other location that the DVR may be placed.
- The manager is allowed to carry out other duties safe in the knowledge that if something happens he will be alerted.
- The manager can monitor a storeroom being stocked by a deliveryman without leaving the EPOS system unattended.
- It provides for centralised monitoring of several remote sites such as multi-store branches.
- All systems are integrated and all resources are pulled together.

[0050] If it is to be understood that the invention is not limited to the specific details described herein which are given by way of example only and that various modifications and alterations are possible without departing from the scope of the invention as defined in the claims. The invention will also be adaptable to future technology changes and improvements.

Claims

1. A security control apparatus comprising a digital video recording apparatus, a camera linked to the digital video recording apparatus, a computer apparatus with a screen and a server linking the digital video recording apparatus to the computer apparatus, the server including a retail event management apparatus having means for coordinating events recorded on the digital video recording apparatus with specific activities on the computer apparatus and means for viewing the coordinated events and specific activities on the screen.

2. A security control apparatus as claimed in Claim 1, in which the retail event management apparatus provides for the control of digital video recording apparatus by the computer apparatus and provides for real time access to video footage.

3. A security control device as claimed in Claim 1 or Claim 2, in which the computer apparatus is a personal computer or an electronic point of sale (EPoS) apparatus, each having a screen.

4. A security control apparatus as claimed in Claim 3, including a plurality of EPoS apparatus, each connected to the retail event management apparatus and having means for viewing the coordinated events and specific activities on its screen.

5. A security control apparatus as claimed in Claim 4, in which the digital video recording apparatus is linked to a local area network together with the EPoS apparatus and the retail event management apparatus.

6. A security control apparatus as claimed in any one of the preceding claims, in which a plurality of DVR apparatus are controllable by the retail event management apparatus.

7. A security control apparatus as claimed in Claim 5, in which any EPOS apparatus is adapted to provide printer output for security information over the local area network without additional infrastructural changes being required and that any EPOS apparatus is selectable for collection of the security information without requiring specific EPOS system designation.

8. A security control apparatus as claimed in any one of the preceding claims, in which the retail event management apparatus is operable to detect a fuel

transaction being actioned and optionally will instigate a pan, tilt and zoom (PTZ) camera image acquisition, and on conclusion of the fuel transaction, the retail event management apparatus is operable to instigate static camera image retrieval, the selected EPoS apparatus having automatic access to the fuel transaction images and which on selection by a user can be reviewed during the transaction lifetime directly on the screen of the EPOS apparatus and in which any of the images may also be further requested for on demand video footage playback operation.

9. A security control apparatus as claimed in Claim 8, in which, if the fuel transaction is deemed fraudulent, the details of the fuel transaction are printed onto the receipt of the relevant transaction, which may then be used to locate the related video footage on the digital video recording apparatus for further action.

10. A security control apparatus as claimed in any one of the preceding claims, which is operable to allow the user to configure touch panels on the screen of the EPoS apparatus with information corresponding to the layout of the or each camera connected to the digital video recording apparatus, whereby the user can select the required camera image by touching the relevant graphical image.

11. A security control apparatus as claimed in any one of the preceding claims, which is operable to enable a user to view on the screen the output of any in-store cameras real-time to aid the viewing of actions being carried out by customers, staff or suppliers in remote or view obscured locations.

12. A security control apparatus as claimed in any one of the preceding claims, in which the EPOS apparatus is operable to enable the manager/store owner to review the actions of cashiers in cases of dispute, as the EPOS apparatus is operable to display both video footage and till receipt operations at the time of the dispute.

13. A security control apparatus as claimed in any one of the preceding claims, in which the apparatus is operable to monitor restricted retail events such as the sale of legally sensitive products such as tobacco and alcohol, whereby the apparatus can verify compliance with legislation by, for example, capturing a cashier asking for identification from a customer attempting to purchase such goods and is operable to record the event for subsequent verification.

14. A security control apparatus as claimed in any one of the preceding claims, which is integrated with a vending machine, with one or more cameras mounted on the vending machine, so that each sale of a product from the vending machine can be coordinated with a video image of the customer for real time monitoring and/or subsequent review.

15. A security control apparatus as claimed in any one of the preceding claims, which includes face recognition means and/or licence plate recognition means.

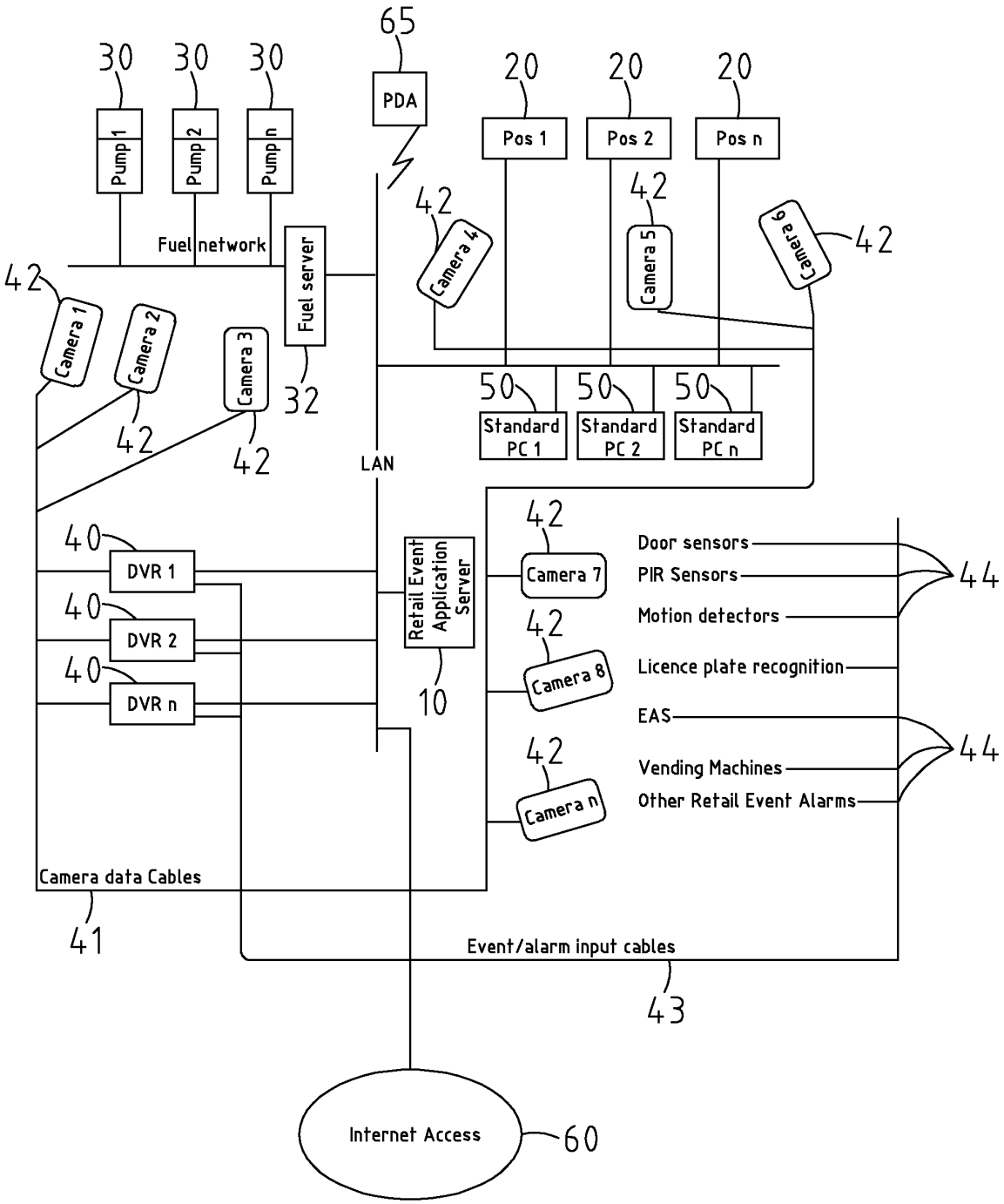
65
PDA
30
30
30
Pump 1
Pump 2
Pump n
20
20
20
Pos 1
Pos 2
Pos n
Fuel network
Fuel server
32
42
Camera 1
Camera 2
Camera 3
Camera 4
Camera 5
Camera 6
50
50
50
Standard PC 1
Standard PC 2
Standard PC n
LAN
40
DVR 1
DVR 2
DVR n
Retail Event Application Server
10
Camera 7
Camera 8
Camera n
Door sensors
PIR Sensors
Motion detectors
Licence plate recognition
EAS
Vending Machines
Other Retail Event Alarms
44
Camera data Cables
41
Event/alarm input cables
43
Internet Access
60

Fig. 1

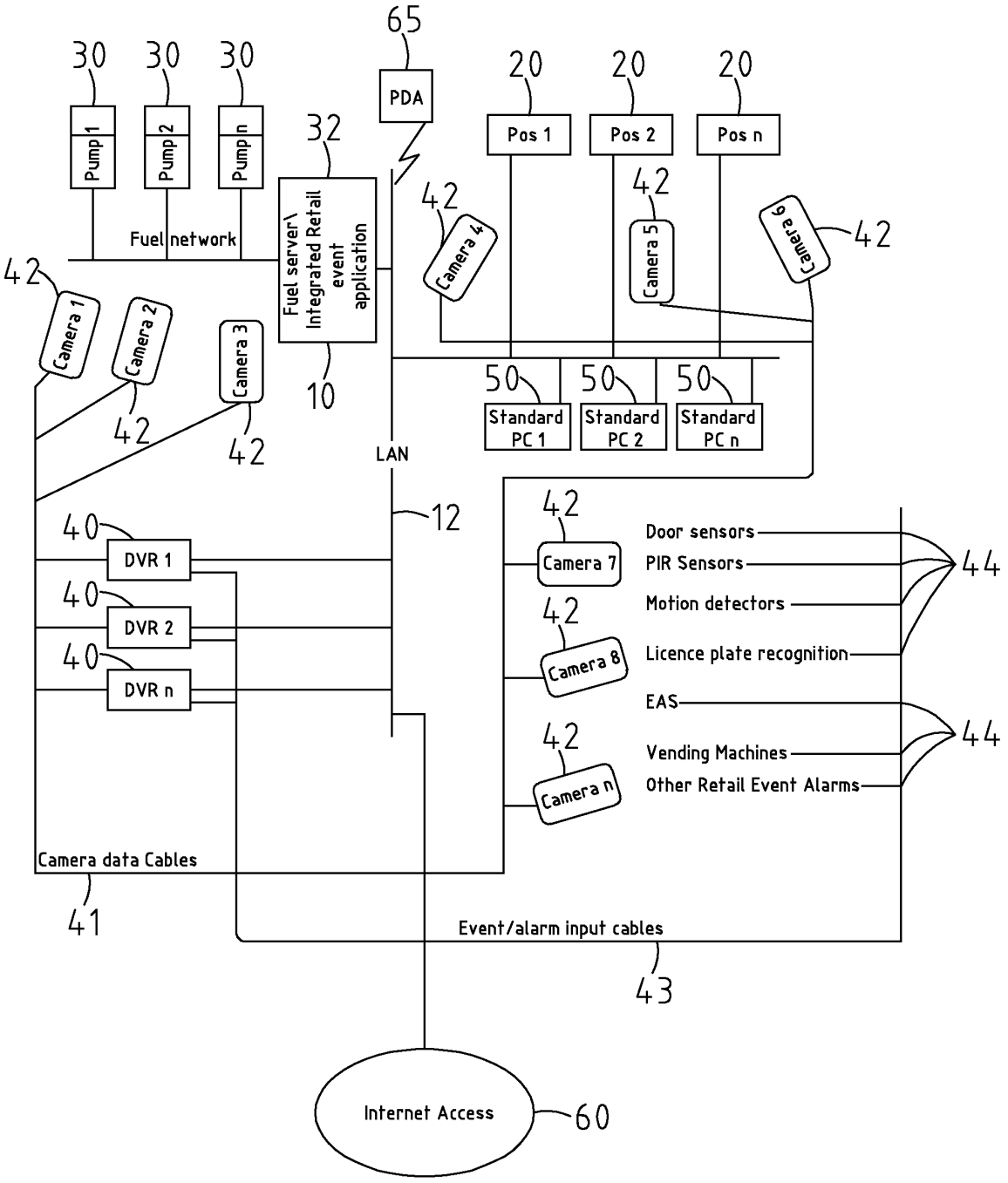
65
PDA
30
30
30
Pump 1
Pump 2
Pump n
32
Fuel network
Fuel server\ Integrated Retail event application
10
20
20
20
Pos 1
Pos 2
Pos n
42
Camera 1
Camera 2
Camera 3
Camera 4
Camera 5
Camera 6
50
50
50
Standard PC 1
Standard PC 2
Standard PC n
LAN
12
40
DVR 1
DVR 2
DVR n
Camera 7
Camera 8
Camera n
Door sensors
PIR Sensors
Motion detectors
Licence plate recognition
EAS
Vending Machines
Other Retail Event Alarms
44
Camera data Cables
41
Event/alarm input cables
43
Internet Access
60

Fig. 2

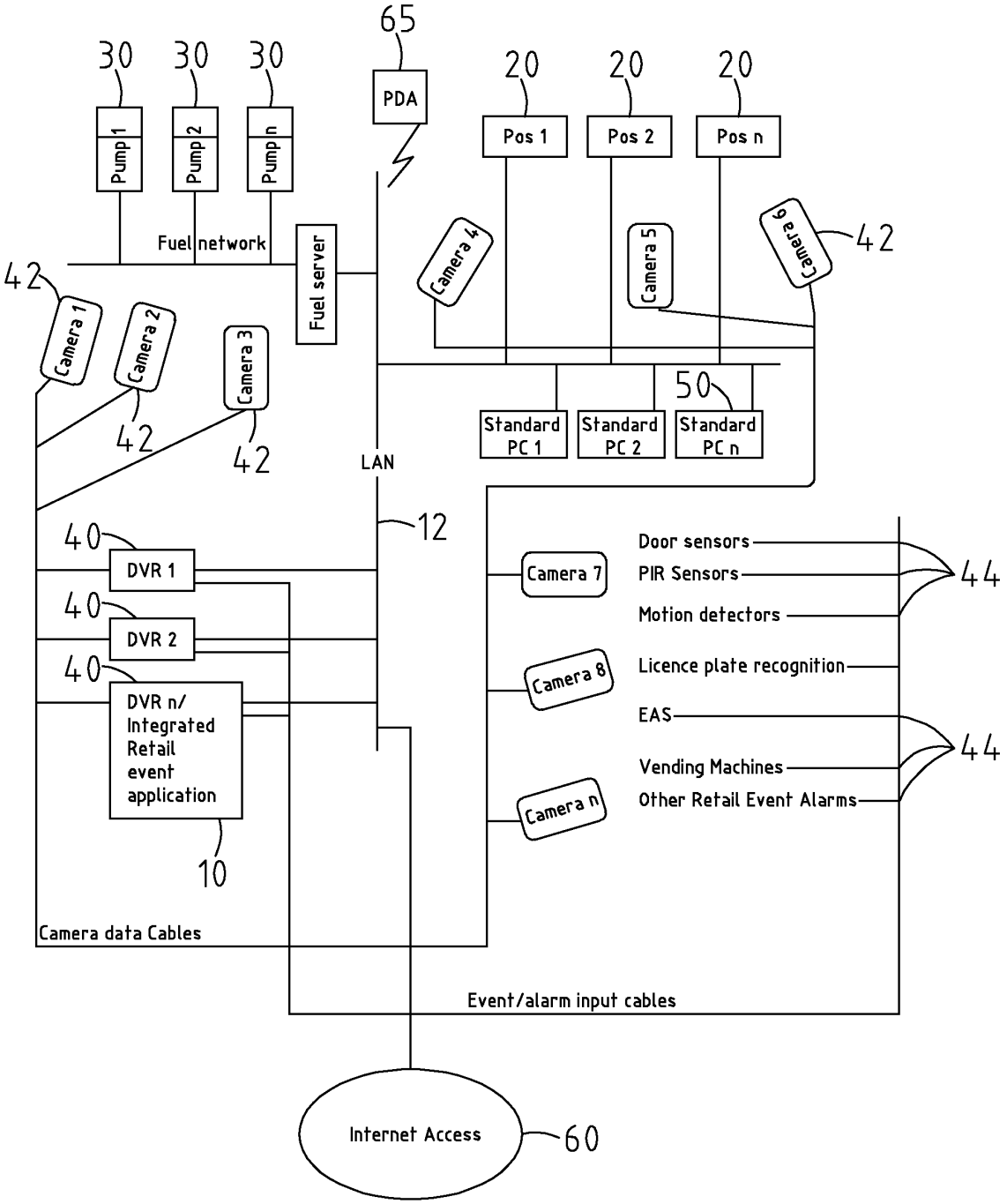
65
30
30
30
PDA
20
20
20
Pump 1
Pump 2
Pump n
Pos 1
Pos 2
Pos n
Fuel network
Fuel server
Camera 4
Camera 5
Camera 6
42
42
Camera 1
Camera 2
Camera 3
42
42
50
Standard PC 1
Standard PC 2
Standard PC n
LAN
12
40
DVR 1
40
DVR 2
40
DVR n/ Integrated Retail event application
10
Camera 7
Camera 8
Camera n
Door sensors
PIR Sensors
Motion detectors
Licence plate recognition
EAS
Vending Machines
Other Retail Event Alarms
44
44
Camera data Cables
Event/alarm input cables
Internet Access
60

Fig. 3

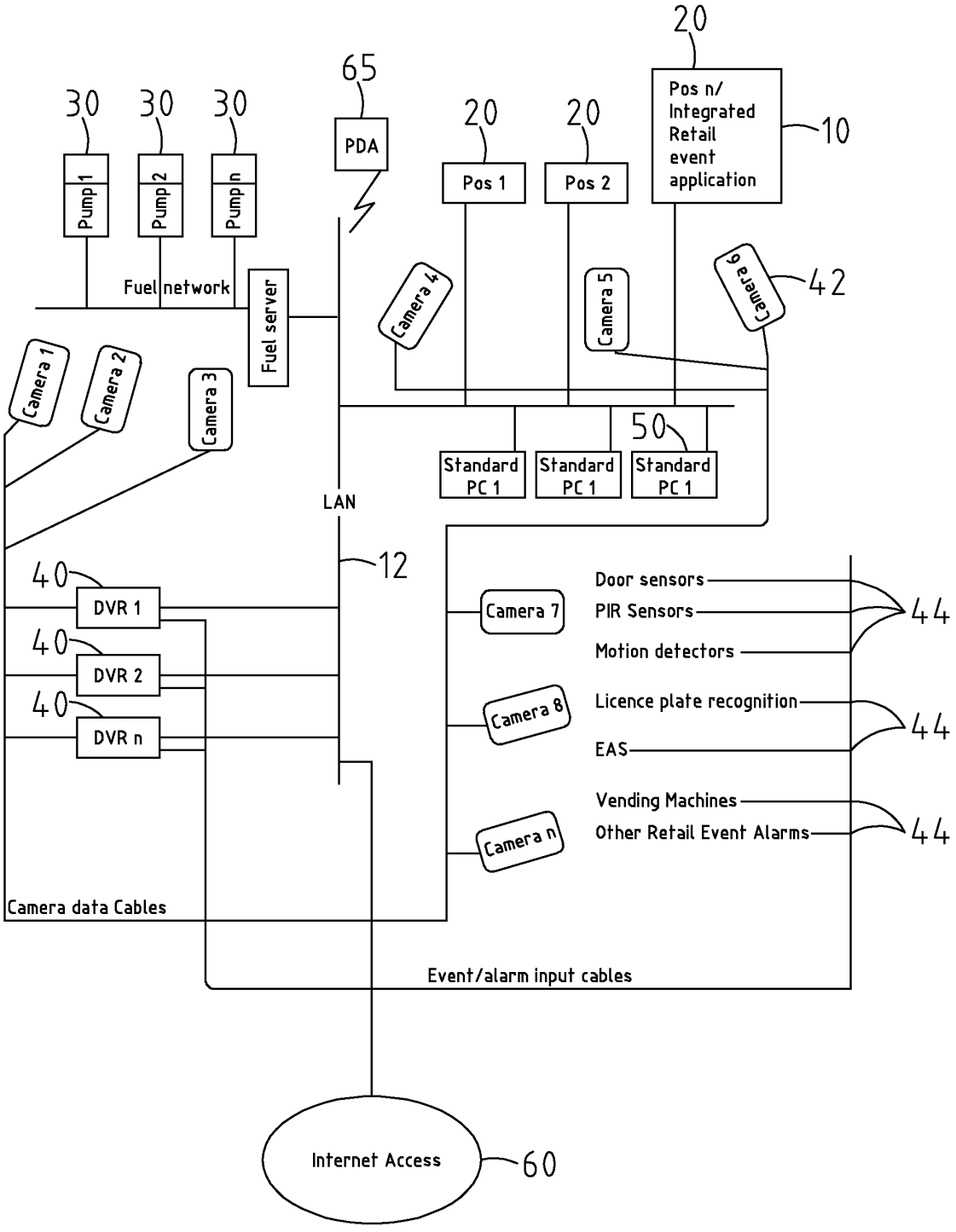
20
65
30
30
30
PDA
20
20
Pos n/
Integrated
Retail
event
application
10
Pump 1
Pump 2
Pump n
Pos 1
Pos 2
Fuel network
Fuel server
Camera 4
Camera 5
Camera 6
42
Camera 1
Camera 2
Camera 3
50
Standard
PC 1
Standard
PC 1
Standard
PC 1
LAN
12
40
DVR 1
40
DVR 2
40
DVR n
Camera 7
Camera 8
Camera n
Door sensors
PIR Sensors
Motion detectors
44
Licence plate recognition
EAS
44
Vending Machines
Other Retail Event Alarms
44
Camera data Cables
Event/alarm input cables
Internet Access
60

Fig. 4

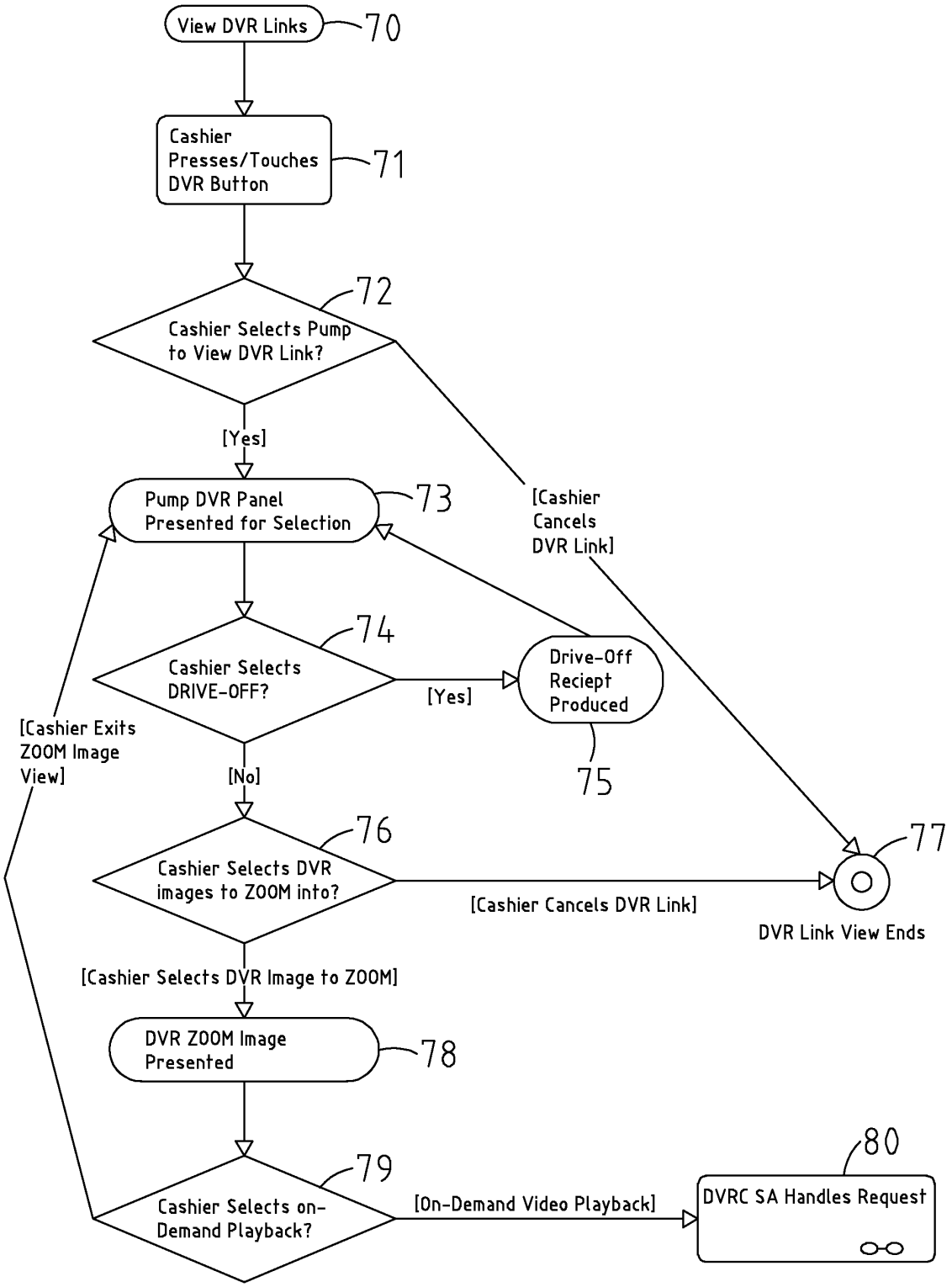
View DVR Links
70
Cashier Presses/Touches DVR Button
71
Cashier Selects Pump to View DVR Link?
72
[Yes]
[Cashier Cancels DVR Link]
Pump DVR Panel Presented for Selection
73
Cashier Selects DRIVE-OFF?
74
[Yes]
Drive-Off Reciept Produced
75
[Cashier Exits ZOOM Image View]
[No]
Cashier Selects DVR images to ZOOM into?
76
77
[Cashier Cancels DVR Link]
DVR Link View Ends
[Cashier Selects DVR Image to ZOOM]
DVR ZOOM Image Presented
78
Cashier Selects on-Demand Playback?
79
80
[On-Demand Video Playback]
DVRC SA Handles Request

Fig. 5

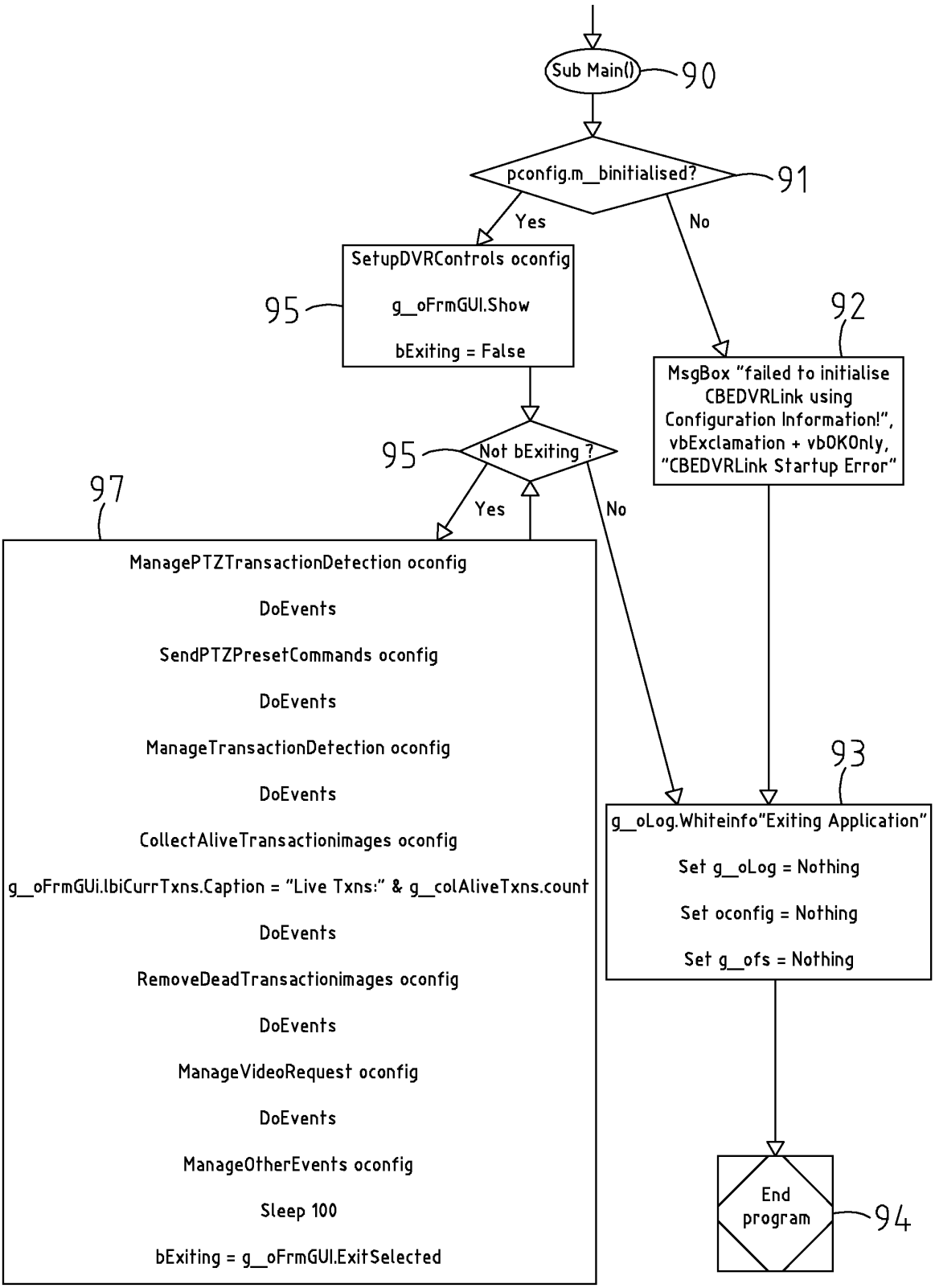
Sub Main()
90
pconfig.m_binitialised?
91
Yes
No
SetupDVRControls oconfig
g_oFrmGUI.Show
bExiting = False
95
92
MsgBox "failed to initialise CBEDVRLink using Configuration Information!", vbExclamation + vbOKOnly, "CBEDVRLink Startup Error"
95
Not bExiting ?
Yes
No
97
ManagePTZTransactionDetection oconfig
DoEvents
SendPTZPresetCommands oconfig
DoEvents
ManageTransactionDetection oconfig
DoEvents
CollectAliveTransactionimages oconfig
g_oFrmGUi.lbiCurrTxns.Caption = "Live Txns:" & g_colAliveTxns.count
DoEvents
RemoveDeadTransactionimages oconfig
DoEvents
ManageVideoRequest oconfig
DoEvents
ManageOtherEvents oconfig
Sleep 100
bExiting = g_oFrmGUI.ExitSelected
93
g_oLog.Whiteinfo"Exiting Application"
Set g_oLog = Nothing
Set oconfig = Nothing
Set g_ofs = Nothing
End program
94

Fig. 6

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 2071

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2003/098910 A1 (KIM PILSOO [US]) 29 May 2003 (2003-05-29) * abstract * * paragraphs [0009], [0012], [0014], [0015], [0018], [0021], [0034] - [0036], [0050], [0052]; figures 1-5 *	1-7, 10-13 8,9,14, 15	INV. G08B13/196
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Place of search	Date of completion of the search	Examiner
Munich	18 May 2009	Wright, Jonathan

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