

A MONITORING SYSTEM

Field of the Invention

- 5 The present invention relates to a monitoring system for monitoring the status of a facility such as an automated teller machine (ATM), and a method of monitoring such a facility.

Background of the Invention

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It is known to provide a monitoring system, for example for monitoring the status of an automated teller machine (ATM), of the type wherein in response to detection of an alarm situation at the ATM, an alarm signal is sent to a remote surveillance station. The alarm signal is used at the surveillance station to communicate the alarm
15 situation to an operator, and based on the alarm situation appropriate action can be taken by the operator.

However, current such monitoring systems are relatively unsophisticated, in particular in relation to handling of communication errors between components of the system,
20 since such communication errors commonly necessitate system downtime while the error is identified and rectified.

Summary of the Invention

- 25 In accordance with a first aspect of the present invention, there is provided a monitoring system for monitoring the status of a monitored facility, the monitoring system comprising:

an alarm receiver arranged to receive an alarm signal indicative of an alarm situation at the monitored facility from a facility monitoring device, and to decode the
30 alarm signal to produce alarm data indicative of the alarm situation based on the alarm signal;

a server arranged to receive the alarm data from the alarm receiver and to make the alarm data available to an operator terminal, the operator terminal using the received alarm data to communicate the alarm situation to an operator of the operator

terminal;

at least 2 communication paths through which alarm data is able to pass when the alarm data is sent from the alarm receiver to the server, a defined one of the communication paths being active such that at any time alarm data is communicated
5 through the defined one of the communication paths; and

a switching device arranged to select one of the communication paths as an active communication path to use to communicate the alarm data from the alarm receiver to the server;

wherein the server is arranged to communicate an acknowledgement signal to
10 the alarm receiver when the alarm data is received at the server; and

wherein the system is arranged to select an alternative one of the communication paths as the active communication path if the acknowledgement signal is not received at the alarm receiver.

15 In one embodiment, the alarm receiver is arranged to resend the alarm data to the server if an acknowledgement signal is not received at the alarm receiver from the server.

In one embodiment, the system is arranged to determine that communications from
20 the alarm receiver are not being received at the server if an acknowledgement signal is not received at the alarm receiver after a defined number of resend attempts, and the switching device is arranged to select an alternate communication path as the active communication path to use to communicate the alarm data from the alarm receiver to the server based on the indication. The defined number of resend
25 attempts may be 3.

In one embodiment, the alarm receiver is arranged to communicate a control signal to the switching device when the system determines that communications from the alarm receiver are not being received at the server, the control signal indicative of
30 which communication path to use as the active communication path.

In one embodiment, the system is arranged to produce an audible and/or visible warning when an indication is produced that communications from the alarm receiver are not being received at the server.

35 In one embodiment, the system is arranged to send a heartbeat signal between the alarm receiver and the server and to change the active communication path when the

heartbeat signal is not received.

In one embodiment, the system includes a network arranged to facilitate communications between the alarm receiver, the server and the communication
5 paths. The network may include an addressable network such as an IP Ethernet type network.

In one embodiment, the alarm receiver is arranged to communicate using RS232 type communications, and the system includes a first network adapter arranged to
10 interface the alarm receiver with the network.

In one embodiment, the switching device is arranged to communicate using RS232 type communications, and the system includes a second network adapter for each communication path, each second network adapter arranged to interface the
15 switching device with the network.

In one embodiment, the system is arranged such that the alarm signal received by the alarm receiver from a facility monitoring device passes through the active communication path to the alarm receiver.
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In one embodiment, the alarm receiver, the switching device and the server are disposed at a surveillance station remotely located relative at least one facility monitoring device.

25 In accordance with a second aspect of the present invention, there is provided a method of monitoring the status of a monitored facility, the method comprising:
receiving at an alarm receiver an alarm signal indicative of an alarm situation at the monitored facility;
decoding the alarm signal to produce alarm data indicative of the alarm
30 situation based on the alarm signal;
communicating the alarm data from the alarm receiver to a server;
making the alarm data available to an operator terminal;
providing at least 2 communication paths through which alarm data is able to pass when the alarm data is communicated from the alarm receiver to the server, a

defined one of the communication paths being active such that at any time alarm data is communicated through the defined one of the communication paths;

communicating an acknowledgement signal from the server to the alarm receiver when the alarm data is received at the server; and

5 selecting an alternative one of the communication paths as the active communication path to use to communicate the alarm data from the alarm receiver to the server when the acknowledgement signal is not received at the alarm receiver.

Brief Description of the Drawings

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The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a monitoring system in accordance with an embodiment of the present invention;

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Figure 2 is a block diagram illustrating example functional components of an alarm receiver of the system shown in Figure 1;

Figure 3 is a block diagram illustrating example functional components of a server of the system shown in Figure 1; and

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Figure 4 is a block diagram of a monitoring system in accordance with an alternative embodiment of the present invention;

Description of an Embodiment of the Invention

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The present monitoring system operates such that one or more facilities are monitored for an alarm situation, and when an alarm situation is detected, an alarm signal is sent to an operator at a remotely located surveillance station. In response to the alarm signal, the operator is able to carry out appropriate action, for example view image and/or video feeds from the monitored facility in order that the operator can assess the alarm situation, and if necessary alert a response team or the police.

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Referring to Figure 1, a schematic block diagram of a monitoring system 10 for monitoring one or more facilities 12 according to an embodiment of the invention is shown. In this example, several facilities 12 are monitored and the monitored facilities 12 are automated teller machines (ATM), although it will be understood that the facilities 12 may take the form of any machine, building or location desired to be monitored.

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The monitoring system 10 is configured so that operators of work stations 14 disposed remotely relative to the facilities 12, for example at a remote surveillance station 15, are able to monitor the status of the facilities 12, in particular whether an alarm situation exists at the facilities 12, and to instigate appropriate action where
5 necessary. In this example, the work stations 14 are computing devices such as personal computers. However, it will be understood that any device capable of providing an operator with information indicative of the status of the facilities 12 is envisaged.

10 The monitoring system 10 includes at least one alarm panel 16, each alarm panel 16 being associated with one or more facilities 12 desired to be monitored. Each alarm panel 16 in this example receives one or more inputs indicative of the alarm status of one or more associated facilities 12 and uses the inputs to determine whether an alarm situation exists. Such inputs may include images and/or video information,
15 information indicative of whether an unauthorized intrusion has occurred, information indicative of tampering with a facility 12, and so on.

When the alarm panel 16 determines that an alarm situation exists, an alarm signal is generated. In this example, the alarm signal is communicated wirelessly, for example
20 using a 3.5G wireless communications link 18, to a telecommunications network 20. In order that the facility 12 associated with the alarm signal may be readily identified, the alarm panel 16 may be arranged to add meta data indicative of the facility 12 to the alarm signal.

25 In this example, the telecommunications network 20 communicates the alarm signal to the remote surveillance station 15, the telecommunications network 20 communicating with the surveillance station 15 through a dedicated communications link, in this example a digital leased circuit (DLC) 22. However, it will be appreciated that any other communication path between the alarm panel 16 and the surveillance
30 station 15 is envisaged.

The surveillance station 15 includes a network 24 which in this example is an addressable network in the form of an IP Ethernet type network, although it will be understood that other network types are envisaged. The network 24 is in

communication with the digital leased circuit 22, and during use the network 24 receives an alarm signal from an alarm panel 16 associated with a facility 12 experiencing an alarm situation, and passes the alarm signal to an alarm receiver 26 connected to the network 24 through a network adapter 28. In this example, the
5 network adapter 28 is necessary because the alarm receiver is configured to communicate using RS232 type protocols, while the network 24 uses IP type protocols.

The alarm signal communicated between the alarm panel 16 and the alarm receiver
10 26 may use any suitable protocol appropriate for communicating the alarm status information from the alarm panel to the alarm receiver 26. For example, the alarm signal may use Ademco Contact ID, SIA, Radionic modem III, 4+2 format protocol, or any other suitable protocol.

15 On receipt of the alarm signal at the alarm receiver 26, the alarm signal is decoded by the alarm receiver 26, and alarm data indicative of the status of the facility 12 associated with the alarm signal is sent from the alarm receiver 26 through the network 24 to a server 30. The server 30, in turn, makes the data indicative of the alarm signal available to the or each work station 14 for viewing by an operator.

20 For this purpose, the surveillance station 15 includes a switching device 32 and first and second network adapters 34, 36 respectively. Each of the first and second network adapters 34, 36 in this example serves as an interface between RS232 type protocols used by the alarm receiver 26 and IP type protocols used by the network
25 24.

The switching device 32 is arranged to receive alarm data from the alarm receiver 26 through a data path 38, and to control switching of the received alarm data to a first communication path A including the first network adapter 34 or a second
30 communication path B including the second network adapter 36. Each of the first and second communication paths A, B communicates with the network 24 and is able to communicate alarm data from the switching device to the server 30.

In order to facilitate control of switching, the switching device 32 receives a control signal from the alarm receiver through a control path 39. The control signal contains information usable by the switching device 32 to determine which communication path A, B to use to communicate the alarm data from the switching device 32 to the
5 network 24.

Ordinarily, when an alarm signal is received by the alarm receiver 26 and corresponding alarm data is sent to the switching device 32, a control signal is communicated from the alarm receiver 26 to the switching device 32 to cause the
10 switching device 32 to direct the alarm data through the first communication path A to the server 30.

On receipt of the alarm data, the server 30 generates and sends an acknowledgement signal indicative that the alarm data has been received by the
15 server 30 to the alarm receiver 26 through the network 24 and communication path A.

The alarm receiver 26 is configured such that if an acknowledgement signal is not received from the server 30, a repeat communication including the alarm data is sent from the alarm receiver 26 through communication path A to the network 24 and the
20 server 30. This may occur several times until either an acknowledgement signal is received by the alarm receiver 26 from the server 30 or a defined number of resend attempts has occurred.

If after a defined number of repeat communications, an acknowledgement signal is
25 still not received by the alarm receiver 26, a warning signal is generated by the alarm receiver 26 indicative that the alarm data may not be reaching the server 30 and thereby the work stations 14. In order to communicate this to personnel at the surveillance station 15, the warning signal may be used to generate an audible and/or visible alarm at the surveillance station 15.

30 As a consequence of the indication that the alarm data may not be reaching the server 30, a control signal is communicated from the alarm receiver 26 to the switching device 32 through the control path 39 to cause the switching device 32 to select communication path B as the active communication path instead of

communication path A. At the next resend attempt, the switching device 32 is then caused to communicate the alarm data to the server 30 through communication path B instead of communication path A. The audible and/or visible alarm may indicate to an operator that communication path B is currently active for communicating the
5 alarm data from the switching device 32 to the network 24.

It will be appreciated that communication path B serves as a backup to communication path A should a fault occur with communication path A to the extent that alarm data fails to reach the server 30. In this way, system downtime due to
10 communication faults between the alarm receiver 26 and the server 30 is avoided.

Example functional components 40 of the alarm receiver 26 are shown in Figure 2. In this example, the functional components 40 are implemented using a processor and associated instructions stored in a memory, although it will be understood that other
15 implementations are possible.

The functional components 40 comprise an alarm signal decoder 42 arranged to receive an alarm signal from an alarm panel 16 and to decode the alarm signal to produce alarm data used by the server 30 to communicate the status of the facility
20 associated with the alarm signal to an operator of a work station 14.

The components 40 also include an alarm acknowledgement receiver 44 responsive to an acknowledgement signal sent by the server 30 to the alarm receiver 26, and arranged to cause a warning generator 46 to generate a warning signal after a
25 defined number of failed attempts to communicate the alarm data to the server 30. The alarm acknowledgement receiver 44 is also arranged to communicate with a switch controller 48 arranged to generate a control signal usable by the switching device to select communication path A or communication path B. If an acknowledgement signal is received from the server 30, the alarm acknowledgement
30 receiver 44 causes the switch controller to generate a control signal usable by the switching device to select communication path A as the active communication path. If an acknowledgement signal is not received from the server 30 after a defined number of repeat attempts, for example 3 attempts, the alarm acknowledgement receiver 44 causes the switch controller to generate a control signal usable by the switching

device to select communication path B as the active communication path.

Example functional components 50 of the server 30 are shown in Figure 3. In this example, the functional components 50 are implemented using a processor and
5 associated instructions stored in a memory, although it will be understood that other implementations are possible. The server 30 may be implemented using a computing device such as a personal computer.

The functional components 50 include an alarm management application 52 arranged
10 to receive alarm data from the alarm receiver 26 and to store the alarm data locally at the server 30, for example in a database 54. In this example, the alarm data stored in the database is indicative of historical alarm situations communicated to the server 30 from one or more alarm panels 16, and the alarm data stored in the database 54 is accessible by the work stations 14 through a web server 56. In this way, the work
15 stations 14 are able to view the information indicative of alarm situations in html format using a web browser.

The functional components 50 also include an alarm acknowledgement generator 58 arranged to generate an acknowledgement signal when advised by the alarm
20 management application 52 that alarm data has been received. The alarm acknowledgement generator 58 sends the acknowledgement signal to the alarm receiver 26 to indicate to the alarm receiver 26 that the alarm data has been received.

While the above embodiment is described in relation to a monitoring system 10
25 wherein the alarm receiver 26, the switching device 32 and the server 30 are disposed at the same location at a surveillance station 15, it will be understood that other implementations are possible. For example, the server 30 may be disposed at a different location to the alarm receiver 26 and the switching device 32.

30 A schematic block diagram of an alternative monitoring system 60 is shown in Figure 4. Like and similar features are indicated with like reference numerals.

The alternative system 60 operates in a similar way to the system 10 shown in Figure 1 in that a backup communication path B is provided for communications between the alarm receiver 26 and the server 30 if no acknowledgement signal is received by the alarm receiver 26 from the server 30. However, with this embodiment, instead of
5 providing a dedicated communication path from the network 24 to the alarm receiver 26 through which the alarm signal passes, the alarm signal emanating from the alarm panel 16 passes through communication path A to the switching device 32, and through the switching device 32 via the data path 38 to the alarm receiver 26.

10 In addition to the acknowledgement signal that serves to indicate whether the alarm data is being successfully received by the server 30 and thereby whether to switch communications through the backup communication path B, the system may be arranged to send a heartbeat signal between the alarm receiver 26 and the server 30 through the communication path A, and to switch to communication path B when the
15 heartbeat signal is not received. For example, the alarm receiver 26 may be arranged to periodically send a heartbeat signal to the server 30 and await a reply. If a reply is received, the alarm receiver 26 communicates a control signal to the switching device to use communication path A as the active communication path. If a reply is not received, the alarm receiver 26 communicates a control signal to the
20 switching device to use communication path B as the active communication path. In this way, since the system continuously self checks to determine whether communication path A is operational, a back-up path is effectively provided for the alarm signal communicated from the network 24 to the alarm receiver 26.

25 Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

Claims:

The Claims defining the invention are as follows:

- 5 1. A monitoring system for monitoring the status of a monitored facility, the monitoring system comprising:
an alarm receiver arranged to receive an alarm signal indicative of an alarm situation at the monitored facility from a facility monitoring device, and to decode the alarm signal to produce alarm data indicative of the alarm situation based on the
10 alarm signal;
a server arranged to receive the alarm data from the alarm receiver and to make the alarm data available to an operator terminal, the operator terminal using the received alarm data to communicate the alarm situation to an operator of the operator terminal;
15 at least 2 communication paths through which alarm data is able to pass when the alarm data is sent from the alarm receiver to the server, a defined one of the communication paths being active such that at any time alarm data is communicated through the defined one of the communication paths; and
a switching device arranged to select one of the communication paths as an
20 active communication path to use to communicate the alarm data from the alarm receiver to the server;
wherein the server is arranged to communicate an acknowledgement signal to the alarm receiver when the alarm data is received at the server; and
wherein the system is arranged to select an alternative one of the
25 communication paths as the active communication path if the acknowledgement signal is not received at the alarm receiver.
2. A monitoring system as claimed in claim 1, wherein the alarm receiver is arranged to re-communicate the alarm data to the server if the acknowledgement
30 signal is not received at the alarm receiver from the server.
3. A monitoring system as claimed in claim 2, wherein the system is arranged to determine that communications from the alarm receiver are not being received at the server if the acknowledgement signal is not received at the alarm receiver after a

defined number of re-communication attempts.

4. A monitoring system as claimed in claim 3, wherein the defined number of re-communication attempts is 3.

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5. A monitoring system as claimed in claim 3 or claim 4, wherein the alarm receiver is arranged to communicate a control signal to the switching device when the system determines that communications from the alarm receiver are not being received at the server, the control signal indicative of which communication path to use as the active communication path.

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6. A monitoring system as claimed in any one of claims 3 to 5, wherein the system is arranged to produce an audible and/or visible warning when an indication is produced that communications from the alarm receiver are not being received at the server.

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7. A monitoring system as claimed in any one of the preceding claims, wherein the system is arranged to send a heartbeat signal between the alarm receiver and the server, and to change the active communication path when the heartbeat signal is not received.

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8. A monitoring system as claimed in any one of the preceding claims, wherein the system includes a network arranged to facilitate communications between the alarm receiver, the server and the communication paths.

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9. A monitoring system as claimed in claim 8, wherein the network includes an addressable network such as an IP Ethernet type network.

10. A monitoring system as claimed in claim 8 or claim 9, wherein the alarm receiver is arranged to communicate using RS232 type communications, and the system includes a first network adapter arranged to interface the alarm receiver with the network.

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11. A monitoring system as claimed in claim 10, wherein the switching device is arranged to communicate using RS232 type communications, and the system includes a second network adapter for each communication path, each second network adapter arranged to interface the switching device with the network.

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12. A monitoring system as claimed in any one of the preceding claims, wherein the system is arranged such that the alarm signal received by the alarm receiver from a facility monitoring device passes through the active communication path to the alarm receiver.

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13. A monitoring system as claimed in any one of the preceding claims, wherein the alarm receiver, the switching device and the server are disposed at a surveillance station remotely located relative at least one facility monitoring device.

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14. A method of monitoring the status of a monitored facility, the method comprising:

receiving at an alarm receiver an alarm signal indicative of an alarm situation at the monitored facility;

20 decoding the alarm signal to produce alarm data indicative of the alarm situation based on the alarm signal;

communicating the alarm data from the alarm receiver to a server;

making the alarm data available to an operator terminal;

25 providing at least 2 communication paths through which alarm data is able to pass when the alarm data is communicated from the alarm receiver to the server, a defined one of the communication paths being active such that at any time alarm data is communicated through the defined one of the communication paths;

communicating an acknowledgement signal from the server to the alarm receiver when the alarm data is received at the server; and

30 selecting an alternative one of the communication paths as the active communication path to use to communicate the alarm data from the alarm receiver to the server when the acknowledgement signal is not received at the alarm receiver.

15. A method as claimed in claim 14, comprising re-communicating the alarm data to the server if the acknowledgement signal is not received at the alarm receiver from the server.
- 5 16. A method as claimed in claim 15, comprising determining that communications from the alarm receiver are not being received at the server if the acknowledgement signal is not received at the alarm receiver after a defined number of communication attempts.
- 10 17. A method as claimed in claim 16, wherein the defined number of communication attempts is 3.
- 15 18. A method as claimed in claim 16 or claim 17, comprising communicating a control signal from the alarm receiver to the switching device when an indication is produced that communications from the alarm receiver are not being received at the server, the control signal indicative of which communication path to use as the active communication path.
- 20 19. A method as claimed in any one of claims 14 to 18, comprising producing an audible and/or visible warning when an indication is produced that communications from the alarm receiver are not being received at the server.
- 25 20. A method as claimed in any one of claims 14 to 19, comprising sending a heartbeat signal between the alarm receiver and the server, and changing the active communication path when the heartbeat signal is not received.
- 30 21. A method as claimed in any one of claims 14 to 20, comprising providing a network arranged to facilitate communications between the alarm receiver, the server and the communication paths.
22. A method as claimed in any one of claims 14 to 21, comprising receiving the alarm signal at the alarm receiver through the active communication path.

23. A method as claimed in any one of claims 14 to 22, comprising disposing the alarm receiver, the switching device and the server at a surveillance station remotely located relative at least one facility monitoring device.