

5 Description

Title

Security system with control device

10 State-of-the-art

15 The invention refers to a security system for the surveillance and/or for the control of sections in a surveillance area with at least one control unit, which is designed for the input and/or output of information and/or signals in one of these sections, and with a communication network, which is arranged for the communication connection of the at least one control unit, whereby the control unit has a first Ethernet-connection for communicating with the communication network.

20 Access control systems, e.g. in buildings, have the function to verify the access authorization of persons, who want to enter or leave the building or sections thereof. While there is only one access control with many installations, it is common for security-relevant areas to define sections with different access authorizations. It is 25 also possible that buildings on a terrain are provided with different access authorizations. While in case of a single access control the access control system can be locally placed at the entrance, it is necessary in case of an access control system with multiple sections and with different authorizations to place decentralized verification devices. For the central operation of these verification 30 devices, they must be connected with a data network, by which the authorizations can be activated or updated and processed verifications can be transmitted.

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For instance, the patent application DE 100 012 53 A1 reveals a device for the input and/or output of information, which serves for the use of one of the application areas time control, access control, security equipment or building equipment. The device is designed as a unit ready for installation and has a communication module, which provides the connection with the communication network. The communication happens e.g. via a RS485-network or a LSN (local security network).

Disclosure of the invention

In line with the invention, a security system for surveillance and/or for the control of sections in a surveillance area is proposed with the characteristics of claim 1. Preferred or favorable design versions of the invention result from the subclaims, the following description and the enclosed Figures.

Primarily, the security system is suitable and/or designed for the implementation of time control, access control, security equipment or building equipment. The surveillance area can be arranged as a building, several buildings or a building complex, a site and/or another local surrounding. The sections are preferably arranged as gate sections, which are designed e.g. as turnstiles, doors, separating devices or similar.

The security system has at least one control device, preferably an array of such control devices, which are (is) designed for the input and/or output of information and/or signals in one of the sections. For example, the information can be information about authorizations, which are transmitted to the control unit for the purpose of verification and/or authorization check.

Particularly, the information can consist of information about authorizations, such as information on an uploaded authorization card, badge etc., of an entered authorization information, e.g. a code, and/or of a recorded authorization information, such as biometric data.

For example, the signals can be in form of status signals and are particularly related to the status of the gate (e.g. open/closed/faulty) and/or the activity of the gate (e.g. active/passive). In the first place, the signals encompass the control signals for the opening and closing of the gate.

The security system includes a communication network, which is designed for the communication connection of the at least one control unit, particularly by means of exchange of communication signals, so that the control device can exchange the information and/or the signals or the data via the communication network. The communication signals are preferably arranged as Ethernet-data-transfer batches and/or as digital signals.

The control device has an Ethernet-connector for the communication with the communication network. The Ethernet-connection is preferably a 10 Mbit/s, 100 Mbit/s, 1 Gigabit/s or 10 Gigabit/s Ethernet-connection, particularly realized as fast Ethernet-connection. If possible, the Ethernet-connection is defined by the standard IEEE 802.3.

In line with the invention, it is proposed that the control device has at least a second Ethernet-connection for the communication with the communication network. The second Ethernet-connection is preferably realized under the same standard as the first Ethernet-connection and/or identical in construction and /or identical in function.

A possible advantage of the invention is the fact that a redundant link of the control device to the communication network is possible via the doubled Ethernet-connection. Particularly, the first and the second Ethernet-connection can be operated independently from the function status of the other Ethernet-connection. The modification according to the present invention makes it possible to keep the control device operational, if a supply line to one of the two Ethernet-connections is disrupted or faulty. It can be seen as a big advantage that both network connections can be based on the same standard,

so that during the project planning, assembly and start of operation one must take into consideration only the characteristics of one standard, e.g. regarding the unshielded cable length, shielding etc.

5 In the most general design version it is possible that the control device is locally supplied with one voltage, e.g. via its own power supply unit or a supply line. However, in a much preferred advancement of the invention, the first and/or the second Ethernet-connection are designed that besides the communication signals a
10 supply voltage can be transmitted for the supply of the control unit.

In many design versions, this way of transmission of the supply voltage can be named as PoE (Power over Ethernet). The benefit of this enhancement is the fact that the control device does not need a self-
15 sustaining supply voltage or additional cables for supplying the voltage.

In a much preferred advancement of the invention, besides the Ethernet's communication signals a preferably analog additional signal can be transmitted in the first and/or second Ethernet-connection.
20 Similarly as with the supply voltage, it is advantageous that without any additional effort for wiring and supplementary signal can be transmitted.

The additional signal is much preferred as alarm signal, particularly
25 as fire alarm signal. Because of safety-related reasons, in many countries it is not allowed to transmit in terms of software alarm signals, in particular fire alarm signals, in the normal data stream. It is rather stipulated to transmit the alarm signal as a separate, preferably analog signal. By the fact that the first and/or second Ethernet-connection are (is) designed for the transmission of the additional signal,
30 the already existing cables of the Ethernet can be used for the transmission of the additional signal as well.

As a much preferred option, the control device is connected with the
35 communication network via the Ethernet-connectors by multiple, particularly eight-wire network cables. These network cables have

preferably four twisted-pair cables with in total eight wires, whereby only four or six wires are used for the transmission of the Ethernet-communication. Thus, the remaining four or two wires can be used for the transmission of the supply voltage and/or the alarm signal.

5 For this purpose, commercially and easily available network cables of high quality can be used for the wiring of the communication device and even so the supply voltage and the additional signal can be transmitted at the same time.

10 As a much preferred option, the Ethernet-connectors have sockets, which are designed for eight-pin (8P8C) modular plugs, particularly "RJ-45". The modular plugs can be designed without shielding, however preferably with shielding.

15 In a potential advancement of the invention it is intended that the control device is designed to transmit the additional signal and/or the supply voltage in wires of the network cables, which are used in the Ethernet-communication. This modification has possibly the advantage that in a single network cable the supply voltage as well as
20 the additional signal can be transmitted. Preferably, both network cables, which are connected with the two Ethernet-connectors have this functionality. By this way, a completely redundant system is formed, whereby the Ethernet-communication, the supply voltage and the additional signal are transmitted redundantly.

25 Given the structure of the communication network it may be intended as an option that two different network segments are formed, which function independently from each other, whereby one network segment is assigned to each Ethernet-connector. In this design version, not only the
30 network cables are arranged in duplication or partial duplication, but also entire network segments are realized in duplication or redundantly, in order to ensure the functioning of the security system in the case of a breakdown of one network segment.

35 The communication network has particularly a first master controller and a second redundant master controller, whereby the

master controller and/or the second redundant master controller are designed for the communication with the control unit. As seen from the network structure, the master controller and the redundant master controller can be arranged in a common network segment or also in two network segments being independent from each other.

In a favorable advancement of the invention, the control device is designed as a gate and/or door control, which carries out an authorization control at these access areas.

In the case of realization of the invention, the control device includes an operating element for the input of a signal for the opening of the gate or door respectively, particularly a tactile sensor and/or a reader for identification badges and/or interfaces for the signal-related connection with this or another operating element or identification badge reader.

Further characteristics, benefits and effects of the invention result from the following description of preferred design versions of the invention as well as from the enclosed Figures. Therein are shown:

- Fig. 1 a schematic picture in batches of a security system sector as a first design version of the invention;
- Fig. 2 a schematic picture in detail enlargement within the Figure 1;
- Fig. 3 a schematic picture in batches of a possible first structure of a security system as a second design version of the invention;
- Fig. 4 another structure of a security system as a third design version of the invention;
- Fig. 5 a schematic picture of a control device in the security system:

Fig. 6 a schematic picture of another component in the security system of the abovementioned Figures.

The Figure 1 shows in a very schematic picture a security system 1, which is arranged for example as a door control system. The security system 1 includes an array of control devices 2, which are designed for the control of doors or gates for their opening and closing. In terms of data, the control devices 2 are connected via a communication network 3, so that data can be exchanged with the control devices 2 via the communication network 3.

The control units 2 are designed as local devices, which are placed near the door or gate to be controlled.

For the communication with the communication network 3, the control device 2 has two separate Ethernet-connectors 4, which are connected with the communication network 3 by the Ethernet-cables 5. The control device 2 is designed in the way that the Ethernet-cables 5 are used redundantly, so that in case of damage or malfunction of either Ethernet-cable 5 a communication between the control unit 2 and the communication network 3 is still sustained.

The Figure 2 shows a detailed picture of the control unit 2, in the Figure 1 as well in a schematic picture. Each Ethernet-connector 4 is connected with an Ethernet-cable 5 having eight wires, whereby for example two wires each are twisted with each other. The socket of the Ethernet-connector 4 for example is designed as J45-connector. The communication with the communication network 3 takes place digitally according to the Ethernet-standard via four wires 5a each of the Ethernet-cables 5. The other four cables 5b can be used for the transmission of the supply voltage and/or additional signals. The transmission of the supply voltage via the four free cables 5b is also known as Power over Ethernet (PoE). Alternatively or additionally, analog signals and/or additional signals can be transmitted as well via the four wires 5a being used for the network communication. By doing so, for each Ethernet-connection the following options are possible:

A: Network communication and supply voltage

B: Network communication and additional signal

C: Network communication and additional signal and supply voltage

Depending on the intended arrangement, the two Ethernet-connections 4 can be completely designed in duplication, by arranging them according to options A, B or C. In the case B, the supply voltage would be realized for example via a self-sustaining supply voltage of the control unit 2.

Alternatively, a mixed operation is also possible, where for example the first Ethernet-connection 4 is operated according to option A and the second Ethernet-connection 4 is operated according option B.

In principle, an integration of further Ethernet-connectors 4 into the control device 2 is also possible.

The Figure 3 shows a first structure of a security system 1 in a schematic picture in batches as another design version of the invention. The security system 1 can be divided in three levels or layers, whereby the first layer I encompasses a data management server 6 (DMS), which is designed for example as a personal computer with a Windows server operating system and a data base management system, such as Oracle, MSSQL or MySQL. All information of the security system 1 are managed on the server 6. For example, authorizations and information of identification badges can be entered on work stations not being depicted, which are queried and verified with the control devices 2.

In a second layer II, one or more main control devices 7 (Main Access Controller) are implemented, which communicate with the control units 2 and for example receive information of the position of persons in the surveillance area. For example, the main control devices can be designed to supply 64 control units 2 with communication signals.

In such security system 1, several main control devices 7 can be arranged, whereby for example for each building to be kept under surveillance or for each more complex area to be kept under surveillance such main control device 7 is provided. As a supplement, a signal supply device 8 can be provided in the layer II, which feeds the supply voltage and/or the additional signal into the Ethernet-cables 5. As an option, the signal supply device 8 or the layer II has generally an interruption-free power supply 9 for securing the supply voltage.

The control devices 2 are implemented in a third layer III, which encompass an array of inputs and outputs for monitoring and control of the doors and if applicable devices for the reading of identification badges, e.g. identification cards. In the structure depicted in Figure 3, only the Ethernet-cables 5 and the Ethernet-connectors 4 are redundantly designed.

The Figure 4 shows in contrast a structure, which is arranged similarly to that one in Figure 3, whereby two main control devices 7 are provided for each building or each logical area. As an option, separate signal supply devices 8 and interruption-free power supply units 9 can also be provided. In this structure, each control device 2 is supplied by at least two main control devices 7 with communication and if applicable additional signals and supply voltage. In this structure, the operation can be secured even in case of breakdown of one main control device 7, because the entire communication can run redundantly via the other main control device 7.

In another structure, which is depicted in the Figure 4 by a dotted line, two separate servers 6 functioning independently from each other are provided, so that even in case of a server breakdown a redundant server 6 can supply the control units via the main control device 7 with communication signals.

The Figure 5 shows in a very schematic picture the composition of a control device 2 from the previous Figures. The control device 2 has the two Ethernet-connectors 4 being separated from each other, as well as optionally supplementing connectors for a supply voltage 10, an input 11 for the status detection of the door or gate (open/closed), an input 12 for an external operating button, as well as output channels 13 for the control of the door or gate. The operating button is for example designed as REX-unit (Request-to-Exit). A supplementing service port 14 is optionally provided according to standard R232.

The Figure 6 shows an optional supplement for the security system 1, whereby in a possible design version of the signal supply device 8 a fire alarm signal can be routed via the Ethernet-cables 5 to the control device 2. As a possible response to the present fire alarm signal, the door being controlled by the control unit 2 is unlocked and/or opened. For that, the signal supply device 8 has an alarm signal input 15, through which a fire alarm signal, e.g. from a manual fire alarm box, can be connected. The signal supply device 8 includes also at least one Ethernet-input 17, which is connected with the server 6, and several Ethernet-outputs 18, which are connected with the Ethernet-connectors 4 of the control units 2. As an option, the signal supply device 8 is equipped with an interruption-free voltage supply unit 19, batteries or rechargeable batteries, in order to transform the present fire alarm signal into an analog, electrical signal or to amplify it. Alternatively, the signal supply device 8 is equipped with another voltage supply device. The analog signal being transformed from the fire alarm signal is fed into the Ethernet-cables 5 as described above, whereby the entire signal route between the alarm signal generator and the control unit 2 is analog. In other design versions, the fire alarm signal is fed into the Ethernet-cables 5 via a passive component.

By using two Ethernet-connectors 4 per control unit 2 preferably each with PoE-capacity, the invention allows for an inexpensive

realization of a completely redundant implementable security system 1, which complies with the requirements of security applications and optionally which is able to transmit a fire alarm signal according to the provisions.

5 Claims

1. Security system (1) for the surveillance and/or for the control of sections in a surveillance area,
- 10 with at least one control device (2), which is designed for the input and/or output of information and/or signals in one of these sections,
- with a communication network (3), which is arranged for the
- 15 communication connection of the at least one control unit (2),
- whereby the control unit (2) has a first Ethernet-connector (4) for communicating with the communication network (3),
- 20 thus characterized, that
- the control unit (2) has a second Ethernet-connector (4) for communicating with the communication network (3) and the control unit (2) is designed, so that in the first and in the second Ethernet-connector (4) a supply voltage can be transmitted.
- 25 2. Security system (1) according to claim 1, thus characterized, that the second Ethernet-connector (4) is designed as a redundant communication connection.
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3. Security system (1) according to one of the previous claims,
- 35 thus characterized, that in the first and/or in the second Ethernet-connector (4) an analog additional signal can be transmitted.

4. Security system (1) according to claim 3, thus characterized, that the analog signal is arranged as alarm signal, particularly as fire alarm signal.

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5. Security system (1) according to one of the previous claims, thus characterized, that the control unit (2) is connected via the Ethernet-connectors (4) by eight-wire network cables (5).

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6. Security system (1) according to one of the previous claims, thus characterized, that the control unit (2) is designed to transmit the analog signal and/or the supply voltage in wires, which are not used in the communication connection to the communication network (3).

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7. Security system (1) according to one of the previous claims, thus characterized, that the communication network (3) has two different network segments, whereby one network segment each is assigned to one of the Ethernet-connectors (4).

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8. Security system (1) according to one of the previous claims, thus characterized, that the communication network (3) has one redundant master controller.

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9. Security system (1) according to one of the previous claims, thus characterized, that the control unit (2) is designed as a gate and/or door control device.

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10. Security system (1) according to one of the previous claims, thus characterized, that the control unit (2) has lighting body, a tactile sensor and/or a reader for identification badges.