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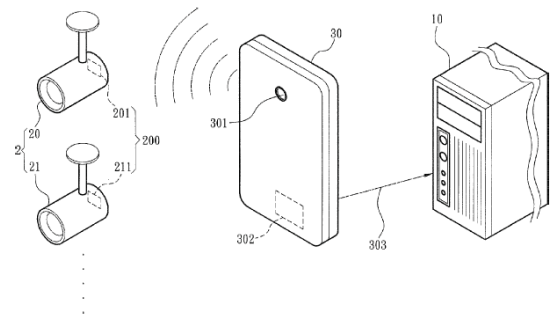
(54) Title: **System for detecting network apparatuses for establishing a point-to-point connection**

(57) Main claim: A system for detecting network apparatuses for establishing a point-to-point connection, having:
at least one network server (10) which is provided with an apparatus list;

at least one network apparatus (2) provided with a built-in identification code and a bar code (200) corresponding thereto used to establish a connection, wherein the network apparatus (2) is connected to the network server (10) via the Internet for entering the identification code into the apparatus list; and

at least one terminal apparatus (30) which has a video capture module (301), with which the terminal apparatus (30) captures a bar code (200) arranged in a network apparatus (2) and generates a request signal (303) corresponding to the bar code (200), which can be forwarded to the network server (10) via the Internet;

wherein the network server (10) searches in its apparatus list for a network apparatus (2) corresponding to the request signal and communicates to the network apparatus that the terminal apparatus (30) wants to establish a point-to-point connection with it, so that a communication channel (50) can be established between the network apparatus (2) and the terminal apparatus (30), ...



Description

[0001] The invention relates to a system for establishing a point-to-point connection, in particular a system for detecting network apparatuses for establishing a point-to-point connection.

[0002] As technology develops and the Internet becomes more widespread, a network camera, for example, can be installed in a site to be monitored, which can then be monitored all over the world via the Internet. In the event of an emergency, a user can even contact a local emergency service online via Internet watching so that they can take appropriate emergency measures and bring the emergency under control. In this sense, the Internet is playing an increasingly important role in the fight against crime and in the preservation of evidence. Nevertheless, the above solution can still be improved. For example, if a conventional video surveillance system is installed in a normal apartment, a complicated patch cable system usually has to be laid in addition so that corresponding network cameras can be installed in all corners of the apartment. To overcome these disadvantages, it is currently quite common on the market to connect the individual network cameras to a local wireless network, which significantly simplifies complicated installation work because no additional cabling is required. However, the solution with the local wireless network is also not flawless because data transmission of the local wireless network is usually based on electromagnetic waves, the transmission of which in the apartment is often blocked by walls or floors between individual stories, which strongly influences the coverage area of the wireless transmission.

[0003] Power Line Communication, the so-called final alternative for broadband network access, is considered to be one of the most competitive technologies of the future because power line communication does not require any additional cabling and can also eliminate the aforementioned disadvantages of the local wireless network. As the name suggests, power line communication is a telecommunications technology that transmits data and multimedia signals such as audio and video signals at a high transmission rate. In technical terms, power line communication is a carrier frequency system that uses existing power lines to set up a network for data transmission in a frequency range of 4 MHz to 21 MHz or a frequency range of 2 MHz to 30 MHz, wherein the telecommunication signals are first encoded and modulated at one transmission end using an orthogonal frequency-division multiplexing process and then transmitted through the power lines. The transmitted signals are subsequently filtered out at a receiving end by means of a current line coupler and a high-frequency filter and are recovered as useful signals in their baseband by appropriate decoding and demodulation. Therefore, the technology can not only save costly installation, but also eliminate the possibility of not receiving useful signals, because on the one hand it does not require additional wiring, and on the other

hand it is not negatively affected by any obstacle inside the apartment. Exact details about power line communication can be found in the specifications US2005-0047379 and US2004-0186908.

[0004] Power line communication can not only connect several network cameras that are installed at different locations, but also enable the video images recorded at home by any of the network cameras to be monitored via the Internet in connection with a point-to-point transmission technology. Specification TW M382669 discloses such a system consisting of a video surveillance system and its controller, wherein the system has a camera, a power line coupler, a first router, a second router, a point-to-point server and a monitoring apparatus. The video images recorded by the camera are compressed into digital video signals, transmitted to the power line coupler and then forwarded to the Internet via the first router. The camera is automatically connected to the point-to-point server after a connection to the Internet has been established, wherein the point-to-point server establishes a connection with the first router connected to the camera using a hole-punching technique. The monitoring apparatus is also automatically connected to the point-to-point server after it is connected to the Internet, wherein the point-to-point server also performs a hole-punching process for the second router connected to the monitoring apparatus. After the aforementioned hole-punching processes, a direct connection is established between the camera and the monitoring apparatus, i.e., the camera can now transmit the recorded video images directly to the monitoring apparatus without having to depend on the point-to-point server.

[0005] Although the system disclosed in the above specification uses the existing power lines for data transmission due to power line communication and produces a point-to-point connection between the camera and the monitoring apparatus, it still has a disadvantage, namely that such a point-to-point connection can only be established in this case, if corresponding point-to-point servers are provided by the same service provider or if all terminal apparatuses concerned are equipped with the same software, which severely limits the possibility of expansion and compatibility of the network apparatuses and the terminal apparatuses. In order to eliminate the above disadvantages, the prior art introduced a point-to-point Internet connection platform having a management server, a plurality of point-to-point servers and a plurality of near-end apparatuses and network apparatuses, each of which is provided with programming interfaces (API), wherein the management server is connected to the respective point-to-point servers via the Internet and the programming interfaces (API) are suitable for different operating systems. In a practical application, a set of identification codes (ID) is assigned to each of the network apparatuses, using which set of identification codes the network apparatuses are connected to the management server after being turned on, wherein the

identification codes are entered as address information when logging into the management server. When the identification codes (ID) of a network apparatus are entered at a near-end apparatus, the near-end apparatus sends a request signal to the management server that it needs address information to establish a point-to-point connection with the network apparatus. Based on the address received, the near-end apparatus can establish a direct connection with the point-to-point server. Because both the network apparatus and the near-end apparatus have the compatible programming interfaces (API), the point-to-point server can establish a direct connection between the network apparatus and the near-end apparatus without any problems.

[0006] Although the above system can solve the problem of linking to the Internet after expanding the network apparatuses, the solution is still disadvantageous because the number and complexity of identification codes will increase accordingly as the number of network apparatuses increases. For example, an identification code can consist of more than 10 digits or English letters. If the user selects a specific network apparatus and wants to monitor it, an identification code (ID) corresponding to the network apparatus must be entered at its near-end apparatus. Even if the near-end apparatus is a smartphone, it is still always difficult and complicated to enter an excessively long identification code consisting of several digits and letters manually, such that a direct connection between the near-end apparatus and the network apparatus cannot be established quickly.

[0007] The object of the invention is to solve the input problem resulting from an excessively long identification code in order to be able to quickly establish a direct connection between a terminal apparatus and a network apparatus.

[0008] According to the invention, this object is achieved by a system for detecting network apparatuses for establishing a point-to-point connection which has the features specified in claim 1. Further advantageous developments of the invention are disclosed in the dependent claims.

[0009] In accordance with the invention, a system for detecting network apparatuses for establishing a point-to-point connection is provided, having the following:

at least one network server which is provided with an apparatus list;

at least one network apparatus provided with a built-in identification code and a bar code corresponding thereto used to establish a connection, wherein the network apparatus is connected to the network server via the Internet for entering the identification code into the apparatus list; and

at least one terminal apparatus which has a video capture module, with which the terminal apparatus captures a bar code arranged in a network apparatus and generates a request signal corresponding to the bar

code, which can be forwarded to the network server via the Internet,

wherein the network server searches in its apparatus list for a network apparatus corresponding to the request signal and communicates to the network apparatus that the terminal apparatus wants to establish a point-to-point connection with it, so that a communication channel is established between the network apparatus and the terminal apparatus, wherein the network apparatus and the terminal apparatus can establish a point-to-point connection.

[0010] In accordance with an exemplary embodiment of the invention, the network server establishes a communication channel between the network apparatus and the terminal apparatus using the hole-punching technique.

[0011] In accordance with an exemplary embodiment of the invention, the Internet is selected from a group comprising Ethernet, LAN [abbreviation for Local Area Network], WAN [abbreviation for Wide Area Network], VPN [abbreviation for Virtual Private Network].

[0012] In accordance with an exemplary embodiment of the invention, the bar code used to establish the connection has a previously agreed password, so that the video capture module can generate a bar code image used to establish the connection after capturing the bar code arranged in the second network apparatus.

[0013] In accordance with an exemplary embodiment of the invention, the terminal apparatus is provided with a second bar code reader module which can convert the bar code image used to establish the connection into an identification code and a previously agreed password, wherein the request signal simultaneously comprises the identification code and the previously agreed password.

[0014] In accordance with an exemplary embodiment of the invention, the request signal contains a bar code image used to establish the connection, while the network server has a first bar code reader module which converts the bar code image used to establish the connection into an identification code and a previously agreed password.

[0015] In accordance with an exemplary embodiment of the invention, the bar code used to establish the connection is a QR code or a one-dimensional bar code.

[0016] Compared to the prior art, the present invention has the following advantages:

A direct connection between a mobile apparatus and a network apparatus can be established quickly. Compared to the known technology, the identification code is no longer entered manually because a bar code corresponding to the identification code is arranged on the network apparatus, which is then captured by a video capture module built into a mobile apparatus. The captured bar code image is recognized as an identification code so that the network server can quickly

establish a point-to-point connection between the network apparatus and the terminal apparatus using the identification code.

[0017] The invention and its embodiments are explained in more detail below with reference to the drawings. In the drawings:

[0018] **Fig. 1** shows a schematic representation of a first embodiment in accordance with the invention;

[0019] **Fig. 2** shows a schematic representation of a second embodiment in accordance with the invention;

[0020] **Fig. 3** shows a schematic representation of the process according to the invention, showing how the hole-punching connection message is transmitted;

[0021] **Fig. 4** shows the procedure for establishing a point-to-point connection; and

[0022] **Fig. 5** shows a flow chart in accordance with the present invention.

[0023] In the following, the system for detecting network apparatuses for establishing a point-to-point connection of the present invention is explained with reference to the accompanying drawings.

[0024] For a better technical explanation of the present invention, the present invention and its embodiments are shown schematically with reference to **Fig. 1** and **Fig. 2**. As represented in the figures, in a preferred exemplary embodiment, the present invention comprises at least a network server **10**, a network apparatus **2** and a terminal apparatus **30**, wherein a first network apparatus **20** and a second network apparatus **21** are used in this exemplary embodiment instead of said network apparatus **2**. In other words, the number of network apparatuses **2** in the present invention can be increased or decreased as required. The terminal apparatus **30** can be a cell phone, a tablet PC, a notebook PC, etc., which are provided with a built-in camera. The first and second network apparatus **20**, **21** may each be a network camera, a webcam or a network monitor, but this does not limit the present invention in any manner. In the exemplary embodiment, the terminal apparatus **30** is a cell phone, while the first and second network apparatus **20**, **21** are each a network camera.

[0025] Both the first network apparatus **20** and the second network apparatus **21** are each provided with a built-in identification code A or B and are connected to the network server **10** via the Internet, wherein the network can be an Ethernet network, an Internet connected by a wireless network, LAN [abbreviation for Local Area Network], WAN [abbreviation for Wide Area Network], VPN [abbreviation for Virtual Private Network]. If the first and second network apparatus **20**, **21** are each a network camera installed in an apartment, they can be connected to the network server **10** by means of a router,

a power line coupler and the existing power lines, i.e., the two-network apparatuses **20**, **21** are connected to the network server **10** by means of power line communication technology. Since power line communication is a known technology and at the same time not a focus of the present invention, it will not be explained in more detail here.

[0026] When the first and second network apparatus **20**, **21** are connected to the network server **10** via the Internet, they enter their respective identification codes A, B and address information into an apparatus list of the network server **10** when logging in. The technical focus of the present invention is that the network apparatus **2** is provided with a bar code **200** used to establish a connection. In the exemplary embodiment, the first network apparatus **20** is provided with a first bar code **201** and the second network apparatus is provided with a second bar code **211**, wherein the first bar code **201** contains information about the first identification code A and the second bar code **211** contains information about the second identification code B. To contain even more complicated information of the identification codes A, B, the first and second bar codes **201**, **211** may be a two-dimensional code such as a QR code, but the present invention is in no way limited to this, i.e., the first and second bar codes **201**, **211** may also be implemented as a one-dimensional bar code.

[0027] In order to be able to read or decode the first and second bar codes **201**, **211** for establishing the connection, two embodiments are provided according to the invention. **Fig. 1** shows the first embodiment, wherein the terminal apparatus **30** has a programming interface (API) and a video capture module **301**, which in a preferred case is a video camera. If the user decides to establish a direct connection between the first network apparatus **20** and the end apparatus **30**, the user can operate the programming interface (API) such that the video capture module **301** captures the first bar code **201** arranged on the first network apparatus **20** and generates a corresponding bar code image required to establish the connection, which is then read by a second bar code reader module **302** installed in the end apparatus **30** and recognized as the first identification code A. Subsequently, a request signal **303** containing the first identification code A is generated in the terminal apparatus **30** and forwarded to the network server **10**, wherein the programming interface (API) uses the wireless network connected to the terminal apparatus **30**.

[0028] Taking into account that the decoded identification code can be intercepted or unlawfully used by a morally degenerate third party during data transmission of the wired network en route, the present invention offers a second embodiment with reference to **Fig. 2**, in which the terminal apparatus **30** is provided with a programming interface (API) and a video capture module **301**. When the user decides to connect the first

network apparatus **20** directly to the terminal apparatus **30**, the programming interface (API) is actuated so that the video capture module **301** captures the first bar code **201** and then generates a bar code image required to establish the connection. The difference to the first embodiment is that the barcode image required to establish the connection is not read or decoded by the terminal apparatus **30** in the second embodiment. Therefore, the request signal **303** generated in the terminal apparatus **30** contains a barcode image used to establish a connection, wherein the programming interface (API) forwards the request signal **303** to the network server **10** through the wireless network connected to the terminal apparatus **30**.

[0029] In the second embodiment, the first bar code **201** used to establish the connection can be a QR code which, in addition to the request signal **303**, contains the bar code image in its original data format, wherein the QR code is transmitted to the network server **10** via the wireless network. This increases the level of security of the present invention because another person needs special software to read or decode the QR code. For the same reason, a first bar code reader module **101** is arranged in the network server **10**, which reads the first bar code **201** contained in the request signal **303** and converts it into the first identification code A.

[0030] In **Fig. 3**, the hole-punching process of the present invention is shown schematically. As shown, the network server **10** receives a request signal **303** used to establish a connection, which contains a barcode image containing the first identification code A, regardless of whether the first identification code is generated in a terminal apparatus **30** or in the network server **10** by analysis. Using the first identification code A, the network server **10** searches in its apparatus list for a network address of the network apparatus corresponding to the first identification code. Because the identification code A mentioned in the exemplary embodiment is the identification code arranged in the first network apparatus **20**, the network server **10** uses the network address found, which corresponds to the first identification code A, to communicate to the first network apparatus **20** that the terminal apparatus **30** wants to establish a direct connection with it. Based on the known hole-punching technique, the network server **10** forwards a hole-punching connection message **401**, **402** to the first network apparatus **20** and the terminal apparatus **30**, respectively, so that a direct communication channel **50** is established between the network apparatus **20** and the terminal apparatus **30**, as represented in **Fig. 4**. This establishes a point-to-point connection between the network apparatus **20** and the terminal apparatus **30** via this communication channel.

[0031] As a further improvement, the first network apparatus **20** can be protected by a password agreed in advance by the user. If the user wants to log into the first network apparatus **20** with the terminal apparatus **30**,

the agreed password must be entered into his terminal apparatus **30**, wherein the programming interface (API) forwards the entered password to the first network apparatus **20** via the Internet. The terminal apparatus **30** is only authorized to exchange data with the first network apparatus **20** if the password entered matches the previously agreed password.

[0032] To save manual password entry, the first bar code **201** can contain the previously agreed password in addition to the identification code. The point-to-point connection is then established as follows: The video capture module **301** captures the bar code **201** arranged in the first network apparatus **20** and accordingly generates a bar code image for establishing a connection, which is converted into an identification code and a previously agreed password by the first and second bar code reader module **101**, **302**, so that the terminal apparatus **30** is simultaneously authorized to exchange data with the network apparatus **20** when the connection is established with the network apparatus **20**.

[0033] In another embodiment, the identification code and the previously agreed password of the first network apparatus **20** are processed by the programming interface (API) of the terminal apparatus **30** so as to be converted into a bar code used to establish a connection, wherein the bar code used to establish a connection is stored for a next connection with the network apparatus **20**. In addition to the above-mentioned option, the programming interface (API) can forward the bar code used to establish a connection, which contains the identification code and the agreed password, of the first network apparatus **20** to another terminal apparatus via the wireless network so that the latter can also establish a direct connection with the first network apparatus **20** and exchange data therewith.

[0034] In **Fig. 5**, a flow chart of the present invention is shown to illustrate a point-to-point connection setup of a network apparatus with a terminal apparatus. As shown, at least one network apparatus must be connected to a network server via the Internet (step S1). In the network server, the built-in identification code and the network addresses of the network apparatus are stored in an apparatus list, wherein the bar code used to establish the connection is also arranged on the network apparatus itself (step S2). Subsequently, the bar code used to establish the connection is captured by means of a video capture module installed in a terminal apparatus and converted into a request signal, which is forwarded to the network server via a wireless network used by the terminal apparatus (step S3). After receiving the request signal, the network server searches in its apparatus list for the network apparatus that corresponds to the request signal. The network apparatus is then informed that the terminal apparatus wants to establish a direct connection with it. Using the hole-punching technique, a communication channel is established between the network apparatus and the terminal apparatus, via which the network apparatus and the terminal apparatus

establish a point-to-point connection (step S4).

[0035] According to **Fig. 5**, at least one network apparatus must be connected to a network server via the Internet (S1).

[0036] A built-in identification code of the network apparatus is entered in an apparatus list of the network server, while a bar code corresponding to the identification code, which is used to establish the connection, is applied to the network apparatus itself (S2).

[0037] The bar code used to establish the connection is captured by means of a video capture module built into a terminal apparatus, which generates a request signal that is forwarded to the network server via a wireless network (S3).

[0038] After receiving the request signal, the network server searches in its apparatus list for the network apparatus that corresponds to the request signal, wherein the network apparatus is informed that the terminal apparatus wants to establish a direct connection with it. Using the hole-punching technique, a point-to-point connection is established between the network apparatus and the end apparatus (S4).

[0039] In summary, the corresponding network apparatuses of the present invention are each assigned a bar code used to establish a connection, which can be captured by means of a video capture module built into a terminal apparatus, wherein the captured bar code image is decoded in the terminal apparatus or in a network server as an identification code. As a result, the present invention enables a fast point-to-point connection to be established between a terminal apparatus and a network apparatus because the identification code is no longer entered manually.

[0040] In summary, a system for detecting network apparatuses for establishing a point-to-point connection is described, having: at least one network server **10** which is provided with an apparatus list; at least one network apparatus **2** provided with a built-in identification code and a bar code **200** corresponding thereto used to establish a connection, wherein the network apparatus **2** is connected to the network server **10** via the Internet for entering the identification code into the apparatus list; and at least one terminal apparatus **30** which has a video capture module **301**, with which the terminal apparatus **30** captures a bar code **200** arranged in a network apparatus **2** and generates a request signal **303** corresponding to the bar code **200**, which can be forwarded to the network server **10** via the Internet. This allows a communication channel **50** to be established between the network apparatus **2** and the terminal apparatus **30**, via which the network apparatus **2** and the terminal apparatus **30** can establish a point-to-point connection.

[0041] The foregoing description represents the exemplary embodiments of the invention and is not intended to limit the claims. All equivalent changes and modifications which can be made by a person skilled in art in accordance with the description and drawings of the invention are within the scope of protection of the present invention.

List of reference signs

2	network apparatus
10	network server
101	first bar code reader module
20	first network apparatus
200	bar code used to establish a connection
201	first bar code used to establish a connection
21	second network apparatus
211	second bar code for establishing a connection
30	terminal apparatus
301	video capture module
302	second bar code reader module
303	request signal
401, 402	hole-punching connection message
50	communication channel

CITATIONS INCLUDED IN THE DESCRIPTION

This list of documents listed by the applicant has been generated automatically and is included solely for the convenience of the reader. The list is not part of the German patent or utility model application. The DPMA assumes no liability for any errors or omissions.

Cited patent literature

- US 2005-0047379 [0003]
- US 2004-0186908 [0003]
- TW 382669 [0004]

Claims

1. A system for detecting network apparatuses for establishing a point-to-point connection, having:
at least one network server (10) which is provided with an apparatus list;

at least one network apparatus (2) provided with a built-in identification code and a bar code (200) corresponding thereto used to establish a connection, wherein the network apparatus (2) is connected to the network server (10) via the Internet for entering the identification code into the apparatus list; and

at least one terminal apparatus (30) which has a video capture module (301), with which the terminal apparatus (30) captures a bar code (200) arranged in a network apparatus (2) and generates a request signal (303) corresponding to the bar code (200), which can be forwarded to the network server (10) via the Internet; wherein the network server (10) searches in its apparatus list for a network apparatus (2) corresponding to the request signal and communicates to the network apparatus that the terminal apparatus (30) wants to establish a point-to-point connection with it, so that a communication channel (50) can be established between the network apparatus (2) and the terminal apparatus (30), via which the network apparatus (2) and the terminal apparatus (30) can establish a point-to-point connection.

2. The system according to claim 1, characterized in that the video capture module (301) captures the bar code (200) of the network apparatus (2) and then generates a bar code image.

3. The system according to claim 2, characterized in that the terminal apparatus (30) is provided with a bar code reader module (302) which can convert the bar code image used to establish the connection into an identification code, wherein the request signal (303) comprises the identification code.

4. The system according to claim 2, characterized in that the request signal (303) contains a bar code image used to establish the connection, while the network server (10) has a bar code reader module (101) which converts the bar code image used to establish the connection into an identification code.

5. The system according to claim 1, characterized in that the network server (10) establishes a communication channel (50) between the network apparatus (2) and the terminal apparatus (30) using the hole-punching technique.

6. The system according to claim 1, characterized in that the Internet is selected from a group comprising Ethernet, LAN [abbreviation for Local Area Network], WAN [abbreviation for Wide Area Network], VPN [abbreviation for Virtual Private Network].

7. The system according to claim 1, characterized in that the network apparatus (2) can be protected by a previously agreed password, wherein the terminal apparatus (30) can log into the network apparatus (2) by means of the previously agreed password.

8. The system according to claim 7, characterized in that the bar code (200) used to establish the connection comprises the previously agreed password, so that the video capture module (301) can generate a bar code image used to establish the connection after capturing the bar code (200) arranged in the second network apparatus (2).

9. The system according to claim 8, characterized in that the terminal apparatus (30) is provided with a bar code reader module (302) which can convert the bar code image used to establish the connection into an identification code and a previously agreed password, wherein the request signal (303) simultaneously contains the identification code and the previously agreed password.

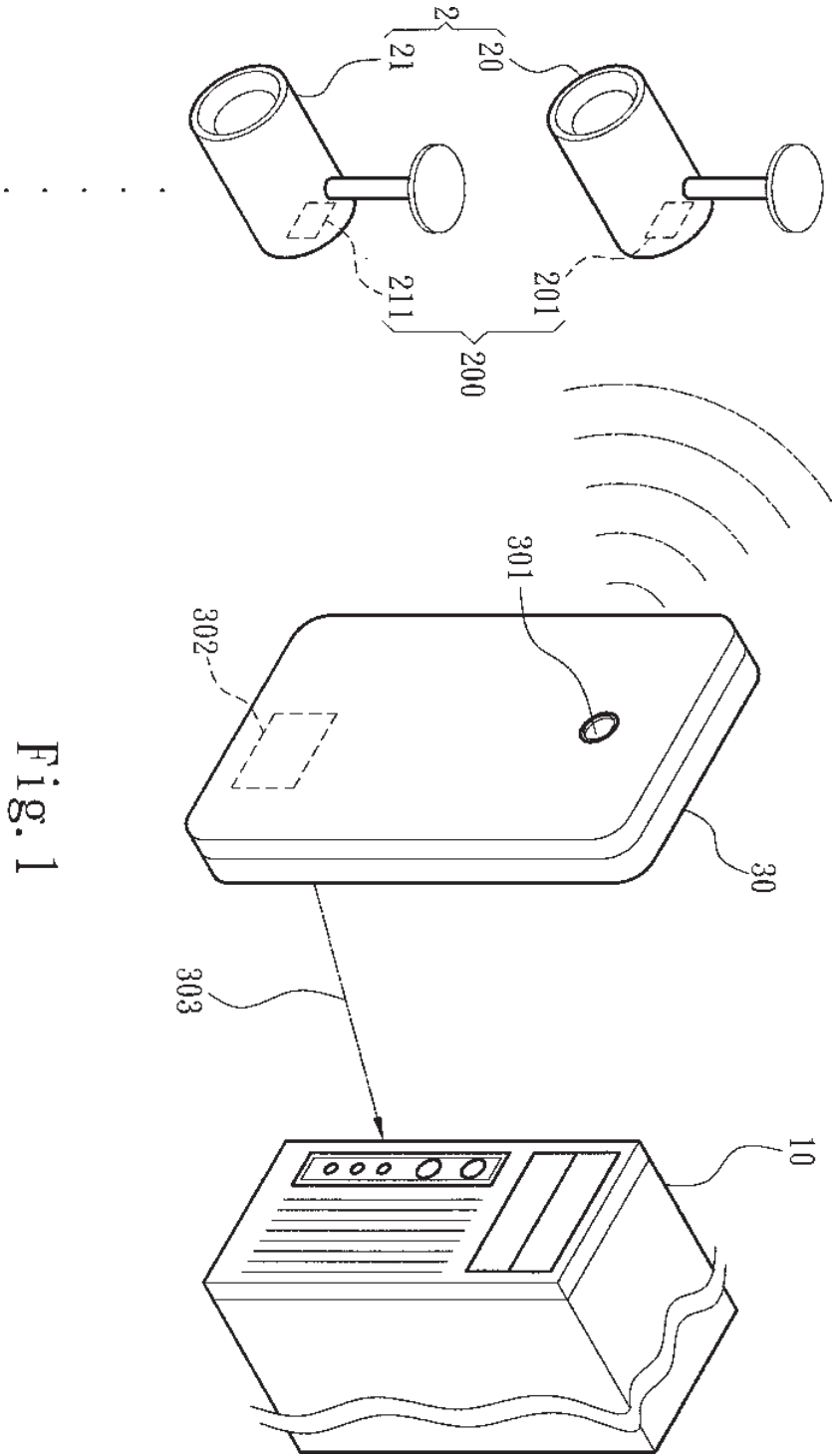
10. The system according to claim 8, characterized in that the request signal (303) contains a bar code image used to establish the connection, while the network server (10) has a bar code reader module (101) which converts the bar code image used to establish the connection into an identification code and a previously agreed password.

11. The system according to any of claims 1 to 10, characterized in that the bar code (200) used to establish the connection is a QR code.

12. The system according to any of claims 1 to 10, characterized in that the bar code (200) used to establish the connection is a one-dimensional bar code.

Five sheets of drawings follow

Accompanying drawings



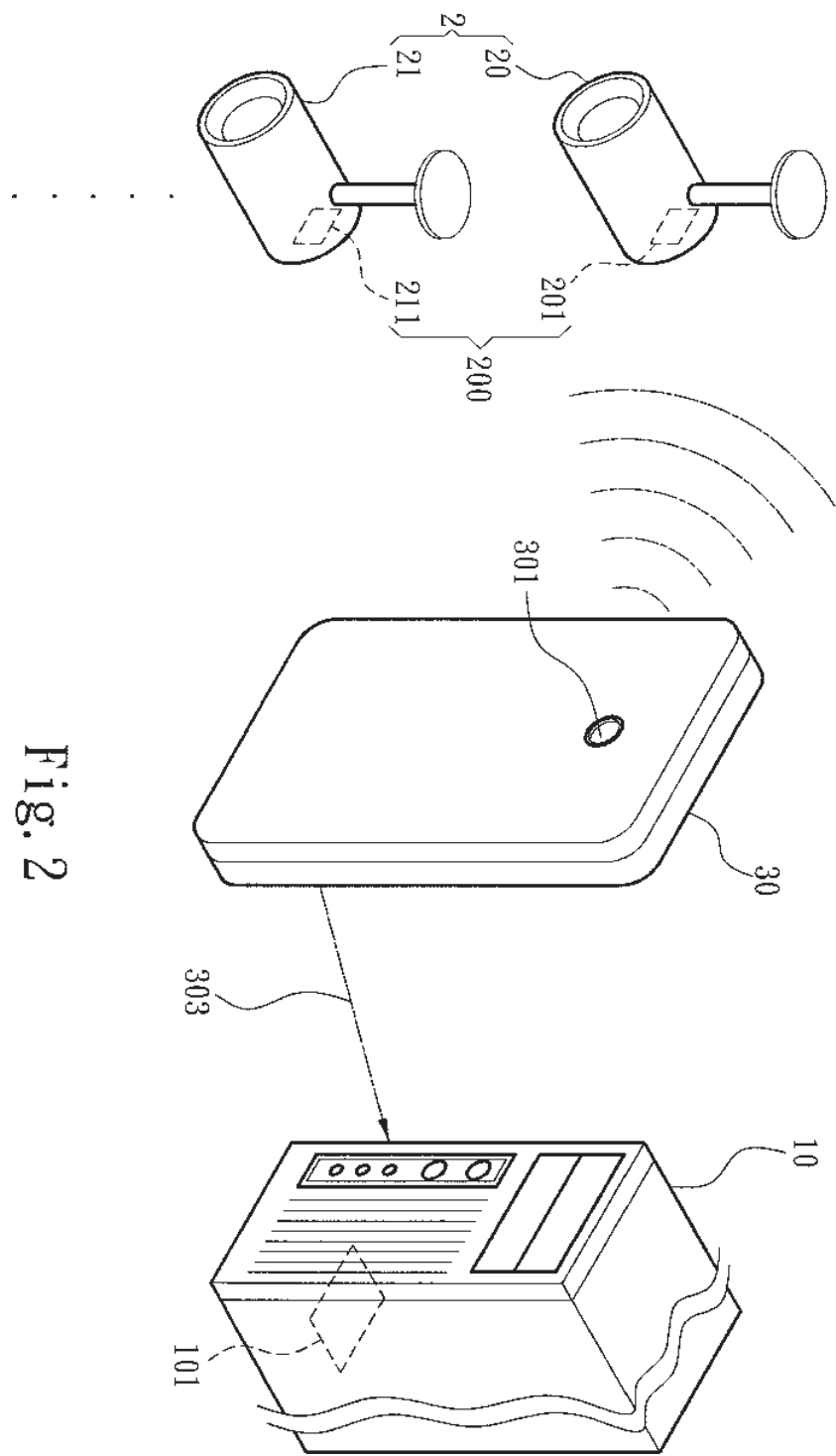


Fig. 2

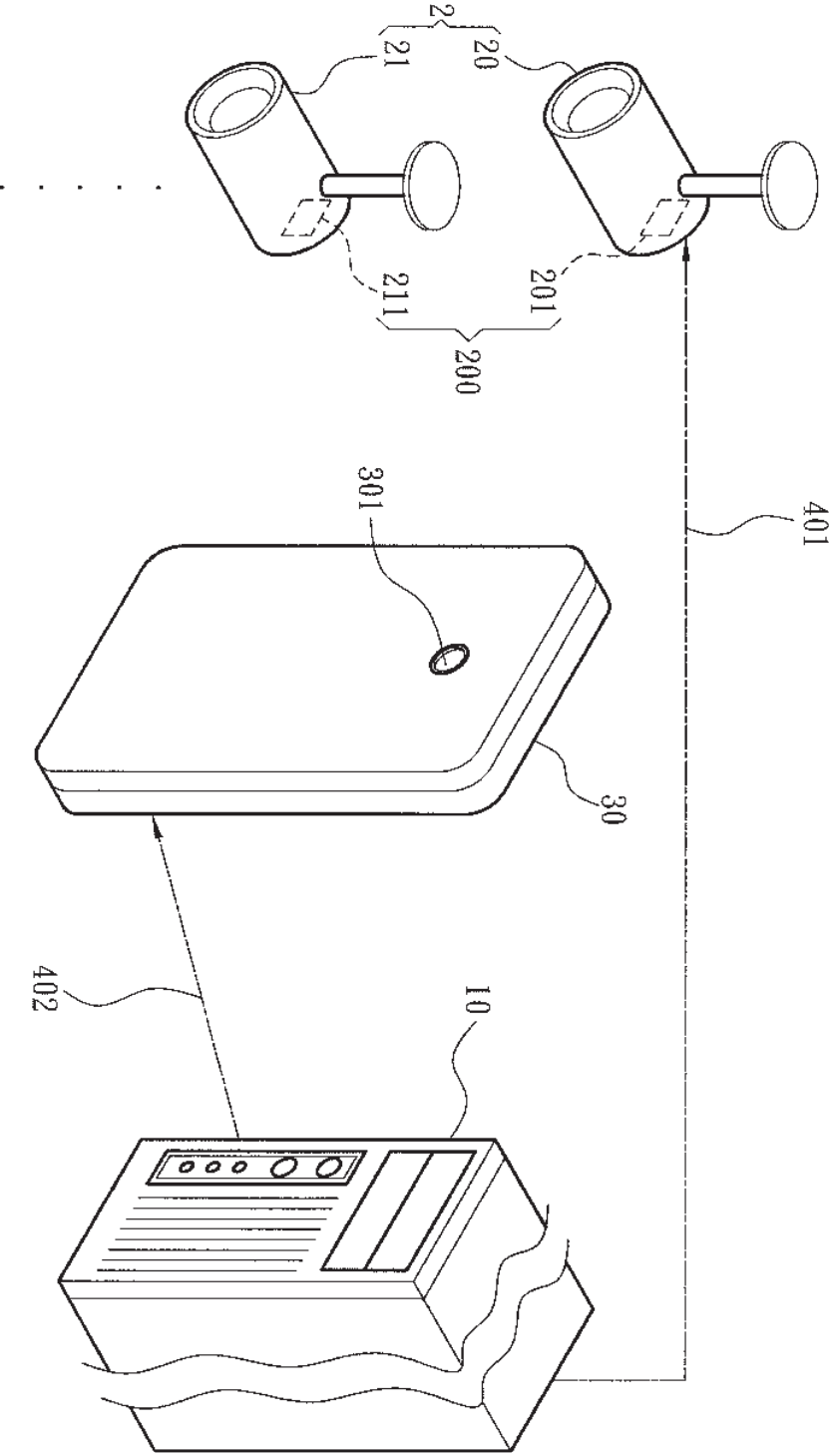


Fig. 3

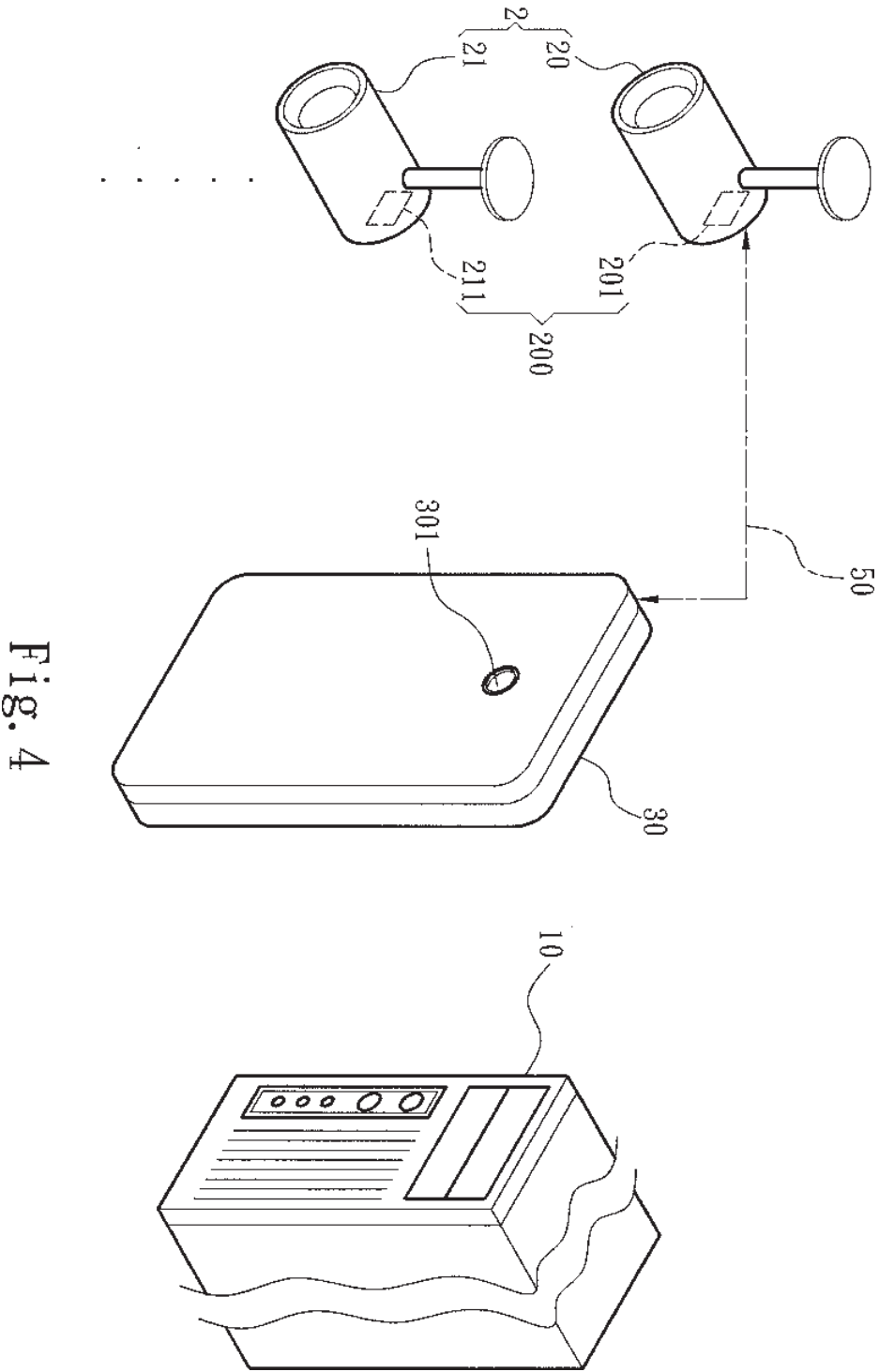


Fig. 4

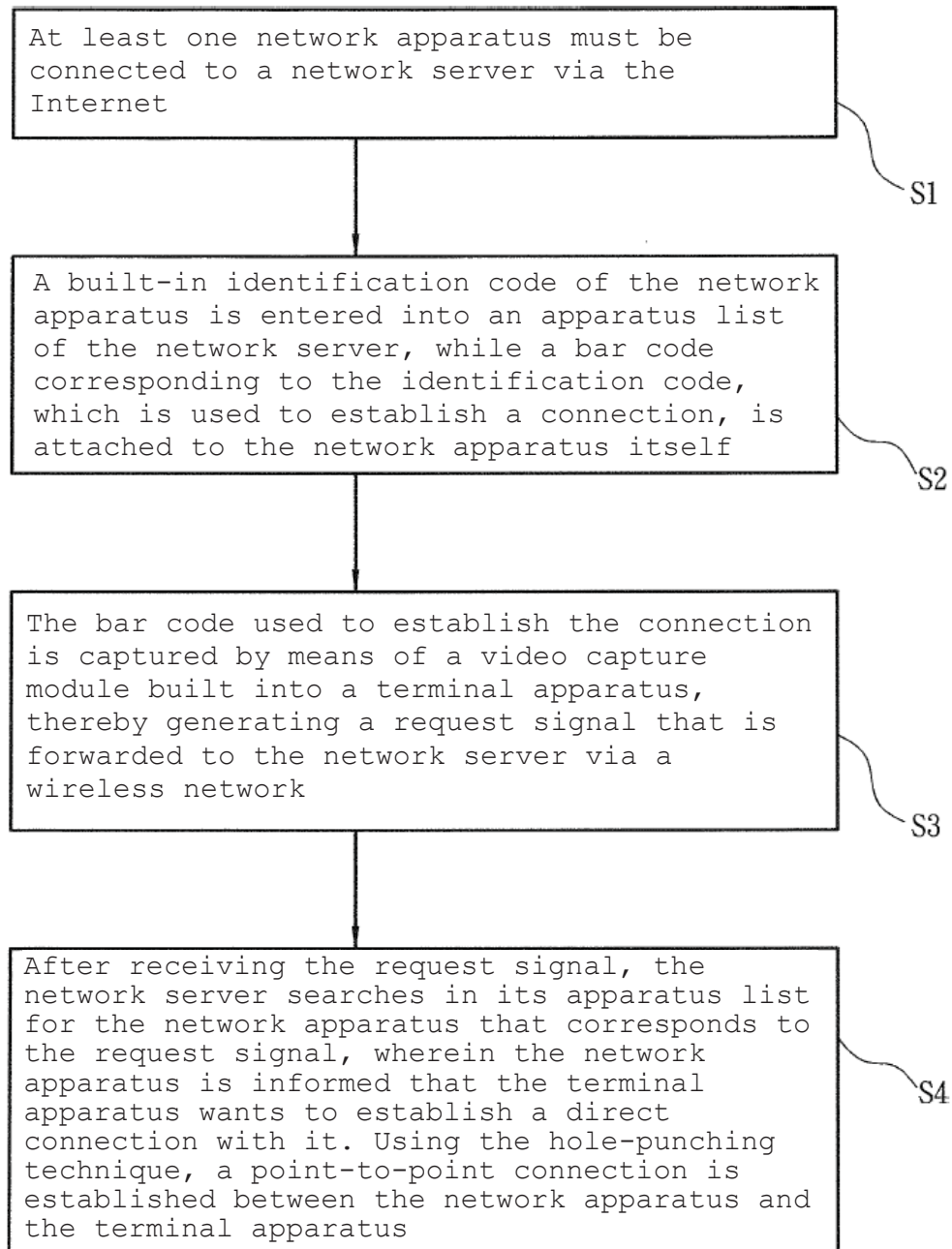


Fig. 5



TRANSLATOR'S CERTIFICATE OF TRANSLATION

Questel-Orbit, Incorporated
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Questel Project Number: FRPC2340038UT-LZ_Q
Date: January 9, 2024

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

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