US 20220159009A1

(19) **United States**

(12) **Patent Application Publication**

ISENMANN et al.

(10) **Pub. No.: US 2022/0159009 A1**

(43) **Pub. Date: May 19, 2022**

(54) **APPARATUS FOR PROTECTING ACCESS TO SEGMENTS IN DISTRIBUTED SYSTEMS**

(71) Applicant: **VEGA Grieshaber KG**, Wolfach (DE)

(72) Inventors: **Andreas ISENMANN**, Haslach im Kinzigtal (DE); **Clemens HENGSTLER**, Haslach (DE); **Florian BURGERT**, Gengenbach (DE)

(73) Assignee: **VEGA Grieshaber KG**, Wolfach (DE)

(21) Appl. No.: **17/525,198**

(22) Filed: **Nov. 12, 2021**

(30) **Foreign Application Priority Data**

Nov. 13, 2020 (EP) 20 207 449.8

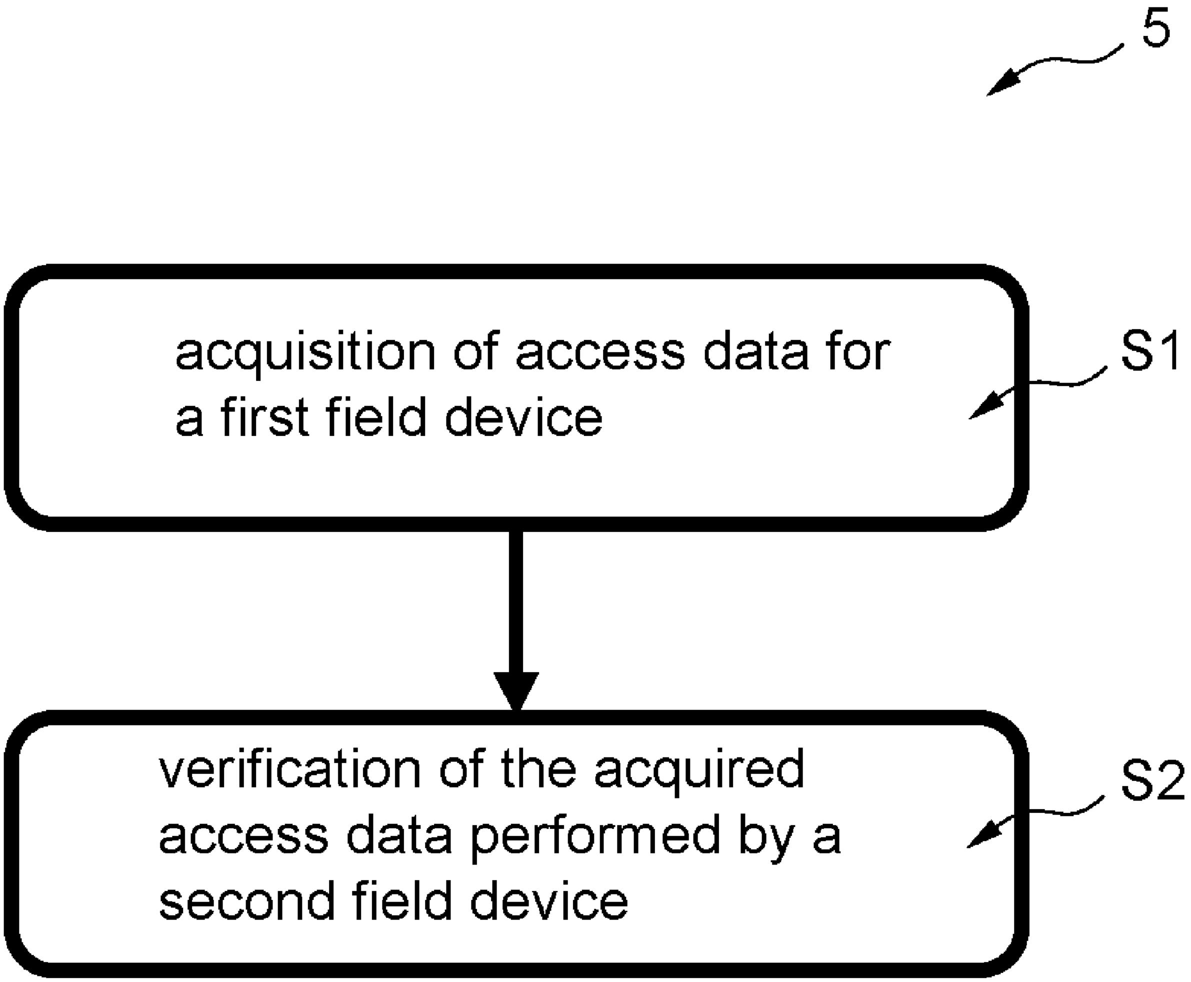
Publication Classification

(51) **Int. Cl.**
H04L 29/06 (2006.01)

(52) **U.S. Cl.**
CPC ***H04L 63/104*** (2013.01); ***H04L 63/20*** (2013.01); ***H04L 63/101*** (2013.01)

(57) **ABSTRACT**

An apparatus for protecting access to a segment in distributed systems is provided, the apparatus including: an input device configured to acquire access data for a first field device; and a verification device configured to verify the acquired access data from a second field device, the first field device and the second field device being coupled to the segment. A computer network segment comprising at least two apparatuses, a method of protecting access to a segment in distributed systems, and a nontransitory computer-readable storage medium are also provided.


5
acquisition of access data for a first field device
S1
verification of the acquired access data performed by a second field device
S2

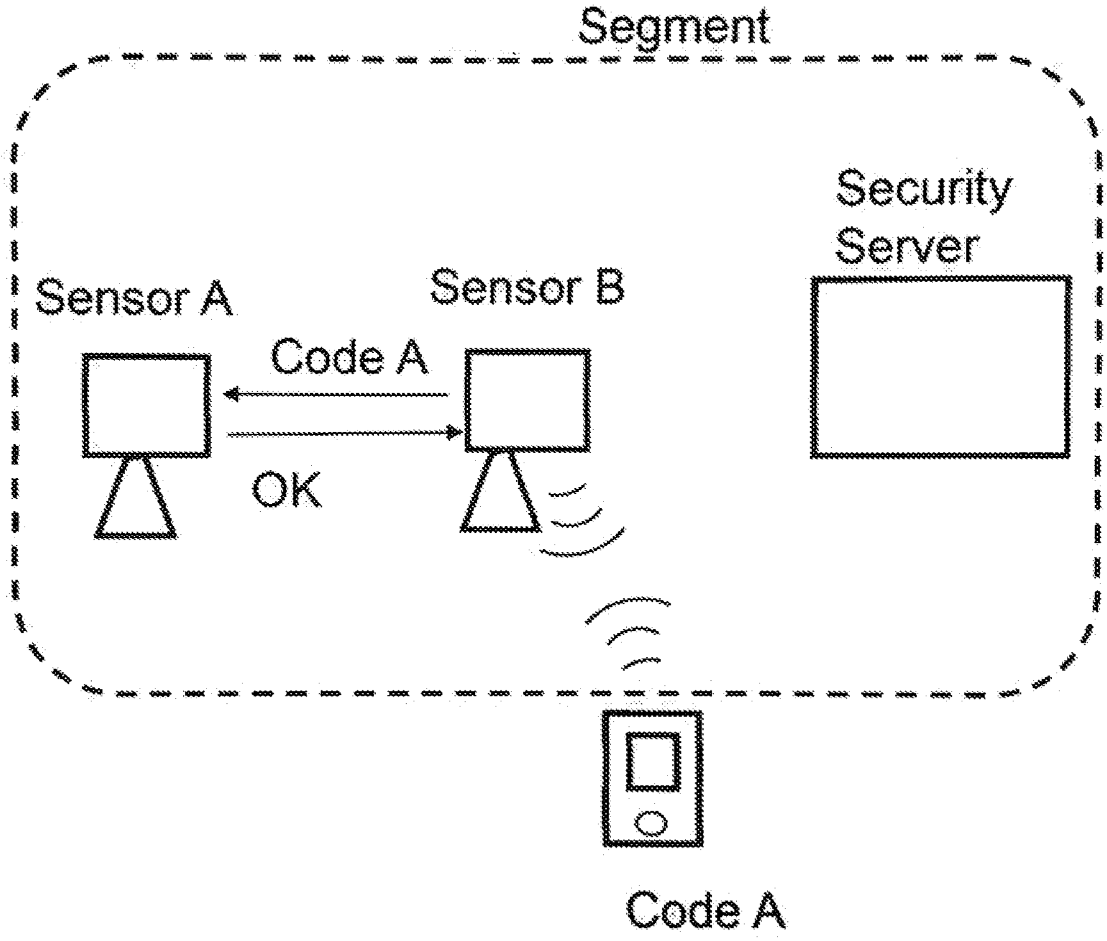


Fig. 1

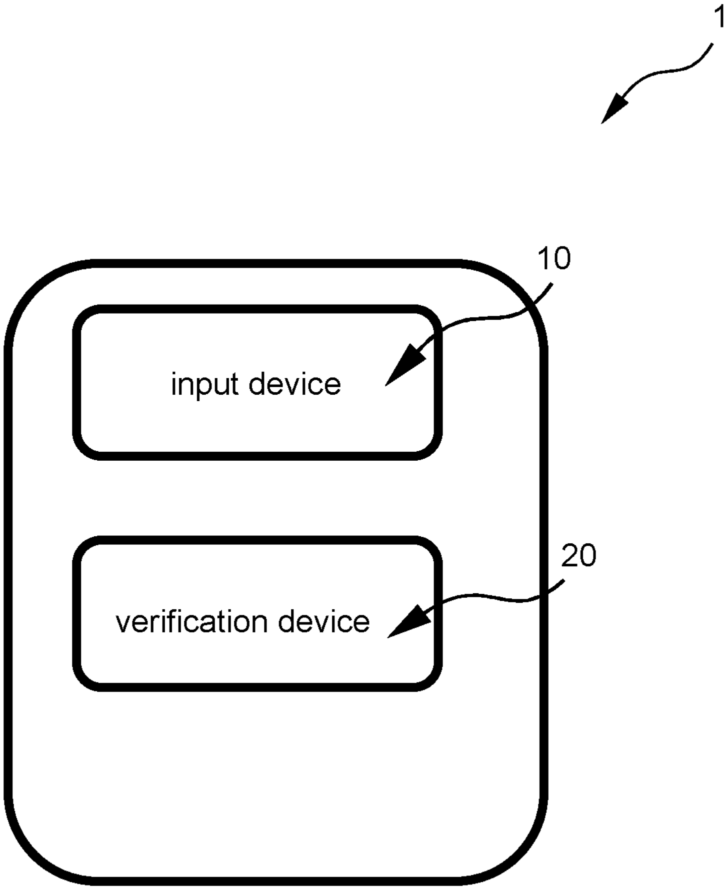


Fig. 2

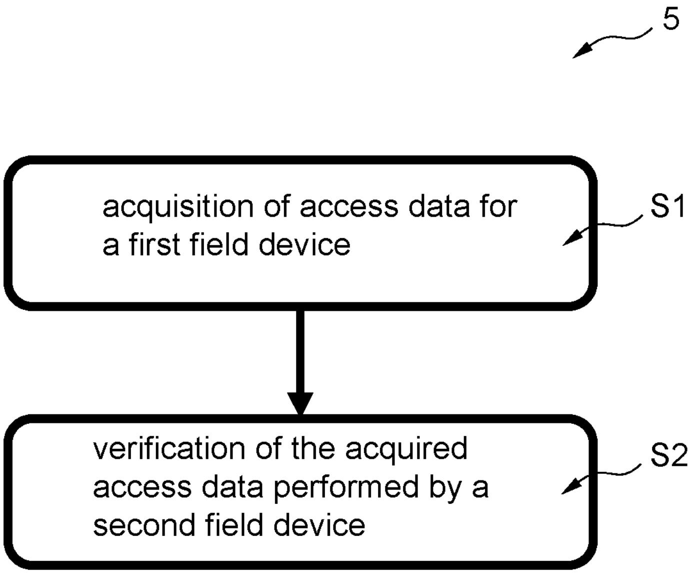

5
acquisition of access data for a first field device
S1
verification of the acquired access data performed by a second field device
S2

Fig. 3

APPARATUS FOR PROTECTING ACCESS TO SEGMENTS IN DISTRIBUTED SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of the filing date of European Patent Application No. 20 207 449.8, filed on 13 Nov. 2020, the entire content of which is incorporated herein by reference.

FIELD

[0002] The invention relates to an apparatus for protecting access to segments in distributed systems. Further, the present invention relates to a method for protecting access for a segment in distributed systems, and a corresponding program element and computer-readable storage medium.

BACKGROUND

[0003] A central user administration in distributed systems can be done, for example, with the so-called Lightweight Directory Access Protocol, a protocol standard for querying and modifying information of a directory service, also known as Active Directory.

[0004] According to the current state of the art, each field device is equipped with an individual access code and an individual code for locking the parameterization.

[0005] If a large number of sensors are used in a process plant, the valid access code must be entered for each individual sensor, which ensures a high level of security but represents a certain hurdle in the application.

SUMMARY

[0006] It is an object of the present invention to provide an improved apparatus for protecting access for segments in distributed systems.

[0007] The present invention enables to provide a verification of the access data by all field devices grouped in a segment.

[0008] This task is solved by the features of the independent patent claims. Further embodiments of the invention result from the sub claims and the following description of embodiments.

[0009] A first aspect of the invention relates to an apparatus for protecting access for a segment in distributed systems, the apparatus comprising: an input device adapted to detect access data for a first field device.

[0010] Further, the apparatus according to the invention comprises verification means adapted to verify the acquired access data from a second field device, wherein the first field device and the second field device are coupled to the segment.

[0011] Advantageously, the present invention allows connection to a segment having a plurality of field devices to any field device in that segment even if the access code to a field device of the segment is known.

[0012] For this purpose, the required access data of all field devices coupled to a segment are checked for correctness when establishing a connection to a field device. If a field device from the segment confirms that the access data is correct, access to the desired field device is enabled.

[0013] Advantageously, the present invention enables a secure yet simple access to a field device to be provided.

[0014] According to one embodiment of the invention, it is provided that the verification device is adapted to provide access to the first field device and/or the second field device using the access data.

[0015] According to one embodiment of the invention, it is provided that the verification device is adapted to temporarily enable access using the access data.

[0016] According to one embodiment of the invention, it is provided that the verification device is configured to use the access data to temporarily enable access for a predetermined period of time and/or for a predetermined process sequence. The process sequence may comprise a sequence of program steps for providing access to a field device.

[0017] According to one embodiment of the invention, it is provided that the verification device is adapted to verify the acquired access data for access to the first field device of the segment by all field devices of the segment.

[0018] According to one embodiment of the invention, it is provided that the device is a security server.

[0019] Another aspect of the invention relates to a method for protecting an access for a segment in distributed systems.

[0020] As a first step of the method for protecting an access for a segment in distributed systems, an acquisition of access data for a first field device is performed.

[0021] As a second step of the method of protecting access for a segment in distributed systems, verifying the captured credentials from a second field device, wherein the first field device and the second field device are coupled to the segment.

[0022] At this point, it should be noted that according to a further aspect of the invention, the features described above and below with respect to the field device or the apparatus may also be implemented as process steps.

[0023] Similarly, the method steps described above and below may be performed by certain embodiments of the field device or apparatus.

[0024] According to a further aspect of the invention, there is disclosed a program element which, when executed on a processor of the field device or apparatus, instructs the field device or apparatus comprising the apparatus of the invention to protect access for a segment to perform the steps described above and below.

[0025] According to another embodiment of the invention, there is disclosed a computer-readable medium on which a program element described above is stored.

[0026] The program element may be part of software stored on a processor. Furthermore, this embodiment of the invention comprises a program element which is subject to the method or individual method steps described above and below.

[0027] According to another embodiment of the invention, the distributed system comprising the device according to the invention for protecting an access for a segment may be realized as a distributed computing environment.

[0028] According to another embodiment of the invention, the distributed system may comprise the device according to the invention for protecting an access for a segment as a networked client-server system with a smartphone as a client having access to field devices or level meters and to storage or processing resources in a computer cloud.

[0029] The term "computer cloud" refers to an IT infrastructure that is made available via the Internet, for example.

[0030] According to a further embodiment of the invention, the distributed system comprising the device according to the invention for protecting an access for a segment may be formed as a networked heterogeneous or homogeneous computer network comprising at least two devices according to the first aspect and/or a plurality of field devices or level measurement devices interacting via the computer network or, for example, also as an ad hoc network or networked via the Internet.

[0031] According to another embodiment of the invention, the computer network comprising the device of the invention for protecting access may be divided into computer network segments.

[0032] Further embodiments of the invention are described below with reference to the figures. Where the same reference signs are used in the following description of figures, these designate the same or similar elements. The representations in the figures are schematic and not to scale.

BRIEF DESCRIPTION OF THE FIGURES

[0033] FIG. **1** shows an apparatus for protecting access for a segment in distributed systems according to one embodiment of the invention.

[0034] FIG. **2** illustrates an apparatus for protecting access for a segment in distributed systems according to one embodiment of the invention.

[0035] FIG. **3** shows a flowchart of a method for protecting access for a segment in distributed systems according to one embodiment of the invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0036] The illustrations in the figures are schematic and not to scale.

[0037] If the same reference signs are used in different figures in the following figure description, these designate the same or similar elements. However, the same or similar elements can also be designated by different reference signs.

[0038] FIG. **1** shows an apparatus for protecting access for a segment in distributed systems according to one embodiment of the invention.

[0039] According to one embodiment of the invention, it is provided that a verification of the access data for access to a field device of a segment is performed by all or at least by a predetermined proportion of the field devices of the segment, such as more than half or one third.

[0040] According to one embodiment of the invention, if the access data matches the access data stored in a field device, access is enabled.

[0041] According to one embodiment of the invention, it is provided that, in case of integration of a security server into the segment of the field devices, this security server can centrally provide access to the sensors in the segment.

[0042] According to one embodiment of the invention, it is provided that a temporary release is made, e.g., for a service technician for all field devices of the segment in which a time-limited access code is set up on one of the field devices or on the security server.

[0043] According to one embodiment of the invention, it is provided that each field device may be included in a plurality of segments. In this way, it is possible to control which access data may act on which field devices.

[0044] For a field device A, for example, the access data from a field device of segment A must then be known, whereas for a field device B the access data of segment A and segment B can be used if field device A is only part of segment A, whereas field device B is part of segments A and B.

[0045] According to one embodiment of the invention, the field devices are designed as field devices for process automation, in particular for determining a process variable such as level or pressure.

[0046] FIG. **2** illustrates an apparatus for protecting access for a segment in distributed systems according to one embodiment of the invention.

[0047] The apparatus **1** for protecting access for a segment in distributed systems includes an input device **10** and a verification device **20**.

[0048] The input device **10** is configured to acquire access data for a first field device.

[0049] The verification device **20** is adapted to verify the captured credentials from a second field device, wherein the first field device and the second field device are coupled to the segment.

[0050] FIG. **3** shows a flowchart of a method **5** for protecting access for a segment in distributed systems according to one embodiment of the invention.

[0051] As a first step of the method for protecting an access for a segment in distributed systems, an acquisition S**1** of access data for a first field device is performed.

[0052] As a second step of the method for protecting access for a segment in distributed systems, a verification S**2** of the acquired access data is performed by a second field device, wherein the first field device and the second field device are coupled to the segment.

[0053] According to one embodiment of the invention, it is provided, that the access data is used to provide access to the first field device and/or the second field device.

[0054] According to one embodiment of the invention, it is provided, that access is temporarily enabled with the access data.

[0055] It should also be noted that “comprising” and “comprising” do not exclude other elements or steps, and the indefinite articles “one” or “a” do not exclude a plurality.

[0056] It should further be noted that features or steps that have been described with reference to any of the above embodiments may also be used in combination with other features or steps of other embodiments described above. Reference signs in the claims are not to be regarded as limitations.

1. An apparatus for protecting access to a segment in distributed systems, the apparatus comprising:

an input device configured to acquire access data for a first field device; and

a verification device configured to verify the acquired access data from a second field device,

wherein the first field device and the second field device are coupled to the segment.

2. The apparatus according to claim **1**,

wherein the verification device is further configured to enable access to the first field device and/or the second field device with the access data.

3. The apparatus according to claim **2**,

wherein the verification device is further configured to temporarily enable access with the access data.

4. The apparatus according to claim **3**,

wherein the verification device is further configured to use the access data to temporarily enable access for a predetermined period of time and/or for a predetermined process sequence.

5. The apparatus according to claim **1**, wherein the verification device is further configured to verify the acquired access data for access to the first field device of the segment by all field devices of the segment.

6. The apparatus according to claim **1**, wherein the apparatus is configured as a security server.

7. A field device comprising an apparatus according to claim **1**.

8. A computer network segment comprising at least two apparatuses according to claim **1**.

9. The computer network segment according to claim **8**,

wherein a first apparatus of the at least two apparatuses is implemented in the first field device and a second apparatus of the at least two apparatuses is implemented in the second field device.

10. A method of protecting access to a segment in distributed systems, the method comprising steps of:

acquiring access data for a first field device; and

verifying captured credentials from a second field device,

wherein the first field device and the second field device are coupled to the segment.

11. The method according to claim **10**, wherein the access data is used to provide access to the first field device and/or the second field device.

12. The method according to claim **11**, wherein the access data is used to temporarily enable access with the access data.

13. A nontransitory computer-readable storage medium comprising instructions stored therein, which, when executed by a computer, cause the computer to perform the steps of the method of claim **10**.

* * * * *