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(54) Title   **DEVICE FOR FORWARDING TEXT MESSAGES FROM MONITORING SYSTEMS TO USERS, USE AND METHOD OF INSTALLATION OF THE DEVICE, AND SYSTEM INCLUDING THE DEVICE**
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(57) Abstract

Disclosed is a device for forwarding text messages from at least one monitoring system to at least one user. The device comprises: a mobile communication interface for receiving and sending text messages; a network interface for connecting to at least one web service providing a first availability state for each user; a processing unit; and a memory configured with a second availability state for each user and at least one rule for forwarding text messages from a monitoring system to at least one user. The device is configured to, for each user, updating the second availability state based on the first availability state. When a text message is received from a monitoring system, the device: selects at least one rule for forwarding messages from the monitoring system; and forwards the received message to the users addressed by the selected rule and having a second availability state set as available.
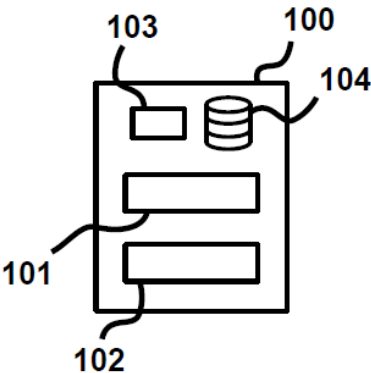
DEVICE FOR FORWARDING TEXT MESSAGES FROM MONITORING SYSTEMS TO USERS, USE AND METHOD OF INSTALLATION OF THE DEVICE, AND SYSTEM INCLUDING THE DEVICE

The present invention relates to a device for forwarding text messages from at least one monitoring system to at least one user. The present invention also relates to a use of the device. Also, the present invention relates to a system for transmitting text messages from at least one monitoring system to at least one user. The present invention further relates to a method of installing the device.

Nowadays, many monitoring systems, used in private or public infrastructures, are capable of sending text messages (e.g. via a Short Message Service (SMS)) directly to pre-configured telephone numbers. Typically, the feature of sending direct text messages is useful for keeping relevant personnel quickly informed about changes of state detected by the monitoring system, such as a change to an unintended state of operation. For example, an industrial control or monitoring system may be provided for periodically monitoring the temperature of a cold storage room and, when the temperature is detected to be above or under a safety range, sending a text message to the personnel responsible for the cold storage room. In another example, a monitoring system monitoring the HTTP traffic being received by a computer server in a hospital or a government agency may send a text message to an IT administrator when the rate of HTTP requests is above a preconfigured threshold or when the computer server is rebooted.

However, in practice, it often happens that people who are absent (e.g. because they are on holiday) still receive text message alerts from the monitoring systems. This may happen due to various reasons, such as a human mistake in keeping the telephone number configurations in the monitoring systems updated or on physically handing a duty

telephone to the right person.

A known approach for addressing this challenge includes providing an improved monitoring system that is also connectable to a web service for obtaining an availability state related to the users set for receiving text message alerts. Examples of such a web service are directory services such as Microsoft's Active Directory or Lync, Novell's eDirectory, Apache's ApacheDS, Oracle's Oracle Internet Director, OpenDS. The monitoring system allows consulting the directory service for the current availability state related to pre-configured users, in addition to the monitoring procedures of the monitoring system. For example, an IT monitoring system may be configured to send a text message to an IT administrator when there is an email account in an organization exceeding a pre-configured threshold size. Prior to sending the text message alert, the monitoring system may check in a directory service of the organization if the IT administrator is absent or busy in a meeting, and, if an absence is detected, instead send the text message alert to a different pre-configured telephone number.

Although this known approach solves the challenge of minimizing the monitoring system's text messages that are sent to unavailable users, it requires providing a lot of additional computational functionality and complexity in the monitoring system side. In addition to implementing monitoring and text message procedures, the monitoring system in this approach must be configured to check the user availability. Adapting already existing monitoring systems can be expensive and require a lot of effort. In many situations, this approach is impractical as it is not feasible to replace or adapt existing monitoring systems. Moreover, this approach is difficult to scale when there are many monitoring systems being used, as each monitoring system requires configuration and maintenance. Furthermore, this approach can also be difficult to use when there are many users and directory services being used.

US 2013/154822 A1 discloses a method for an alarm event notification from a server system in relation to a premises, such as a home or building. The alarm event notification may be related to a security breach that was detected to occur at the premises. The method is disclosed to include: receiving in a server system an alarm event in relation to the

premises and, in reaction, determining a presence status of a client application, generating a message in relation to the alarm event, and sending the message to the client application having the presence status of being present.

The invention will now be disclosed and has for its object to remedy or to reduce at least one of the drawbacks of the prior art, or at least provide a useful alternative to the prior art. The object is achieved through features, which are specified in the description below and in the claim(s) that follow. The invention is defined by the independent patent claim(s). The dependent claim(s) define advantageous embodiments of the invention.

According to a first aspect of the invention, there is provided a device for forwarding text messages from at least one monitoring system to at least one user. The device comprises: a mobile communication interface for receiving and sending text messages via a mobile network; and a network interface for connecting the device to at least one web service via a network, the at least one web service providing a first availability state for each user. The device further comprises a processing unit; and a memory configured with a second availability state for each user and at least one rule for forwarding text messages received from a monitoring system to at least one user. The device is configured to carry out the step of, for each user, updating the second availability state based on the first availability state. When a text message is received from a monitoring system, the device is configured to carry out the steps of: selecting at least one rule for forwarding text messages received from the monitoring system; and forwarding the received text message to any user that is addressed by the selected at least one rule and has a second availability state set as available.

The configured steps achieve the following advantages. Firstly, the second availability state allows having the availability state of each user affect the forwarding of text messages while also minimizing the risk of having forwarding failures occur due to failures in retrieving data from the at least one web service. Thus, if the at least one web service is down and inoperative, the device can continue to operate due to the second availability state configured in the memory. Secondly, the device manages the second availability state as a copy of the first availability state, which is advantageous in providing a fast look-up data

structure for achieving a quick forwarding of the text messages arriving at the device.

Also, the device can operate with one or more monitoring devices, which simplifies the effort needed in configuring each monitoring system and makes it easier to scale a system including the device and the at least one monitoring system. Furthermore, the device can operate with one or more web services providing a first availability state for each user. This is advantageous in that users from different organizations can receive text messages from the at least one monitoring system. In sum, the device allows any of the following monitoring system to user relations: one-to-one; many-to-one; one-to-many; and many-to-many.

Moreover, the device provides a contribute to an increased security of the monitoring systems while enabling the availability state of each user to affect the forwarding of the text messages. Using the device avoids sharing data about the users and web services with the monitoring systems. Thus, if a monitoring system gets attacked and successfully intruded by someone having malicious intentions, the monitoring system will not hold data about the users. The device usage also avoids sharing data with the web services that could allow mapping or obtaining an overview of the monitoring systems.

Optionally, the memory is configured with a first search pattern for each of the at least one monitoring system, and the device is further configured to, when a text message is received from a monitoring system, carry out the step of: if a first search pattern for the monitoring system matches at least a portion of the text message, forwarding the received text message to any user addressed by the selected at least one rule independently of the second availability state of the user.

Optionally, each of the at least one forwarding rule comprises a second search pattern, and the selecting step comprises selecting at least one rule for forwarding text messages received from the monitoring system, each selected rule comprising a second search pattern that matches at least a portion of the text message.

Thus, the device can change its state of operation and forward messages differently depending on the content of a text message received from a monitoring system. For

example, a text message from a critical monitoring system may be forwarded to a critical group of users when the text message includes any of the words "FAIL" or "CRITRICAL".

Optionally, the memory is further configured with a whitelist comprising at least one sender authorized to send text messages to the device, and wherein, when a text message is received from a monitoring system, the device is further configured to carry out the step of, if the text message was received from a monitoring system that is not a sender included in the whitelist, preventing further steps from being carried out. Thus, the device can implement an origin policy, which defines the monitoring systems that can send messages to the device and allows increasing the security of the device.

Optionally, the at least one web service provides at least one first user group, wherein the memory of the device is configured with at least one rule for forwarding text messages received from a monitoring system to at least one second user group and/or at least one user, wherein each first user group and each second user group comprises a user group identifier and a list of at least one user, and wherein the device is further configured to carry out the step of, for each second user group, updating the second user group based on a first user group comprising the same user group identifier as the second user group.

A user group is a data structure defined for grouping at least one user. Thus, the device can forward a text message to a user group, which means that the text message is sent to each of the telephone numbers of the users in the user group.

Optionally, the memory is further configured with at least one administrator user, wherein, when a text message is received from a monitoring system, the device is further configured to carry out the step of, if no forwarding rule is selected, forwarding the text message to the at least one administrator user. Thus, the text messages received from the monitoring systems are guaranteed to be forwarded to at least one user, even if all the users set their availability state as unavailable.

Optionally, the step of updating the second availability state comprises sending a text message to the at least one administrator user if: there is at least one rule in which all users addressed by the rule do not have the second availability state set as available; and/or

there is at least one monitoring system for which there is no forwarding rule with at least one user having the second availability state set as available.

Optionally, the step of updating the second availability state comprises, prior to updating the second availability state, the step of, if there is at least one rule in which all users addressed by the rule will not have the second availability state set as available, preventing the updating of the second availability state. Thus, this step prevents, a priori, the forwarding rules configured in the device from entering a state in which there are no available users for receiving text messages.

Optionally, the at least one web service is any of: a virtual switchboard system for telecommunications; and/or a directory service.

Optionally, for each of the at least one web service, connecting the device to the web service comprises periodically connecting to an Application Programming Interface (API) of the web service; and/or connecting the device to the web service using a websocket. For example, periodically connecting to an API of the web service may be implemented as a connection every minute, every 10 minutes, every 1 hour, every day at 2am, among other implementations.

Optionally, the network interface is any of a wire communication interface and/or a wireless communication interface.

According to a second aspect of the present invention, there is provided a use of a device for forwarding text messages from at least one monitoring system to at least one user, the device being as described above.

According to a third aspect of the present invention, there is provided a system for transmitting text messages from at least one monitoring system to at least one user, the system comprising: a device as described above; the at least one monitoring system; and at least one mobile device for receiving text messages. Each monitoring system is configured to send a text message to the device after detecting a change of operational state.

According to a fourth aspect of the present invention, there is provided a method of installing a device as described above. The method comprises the steps of:

- providing the device;

- configuring each of the at least one monitoring system to send text messages to the device;

- configuring the device to connect to the at least one web service;

- for each monitoring system, configuring the memory of the device with a rule for forwarding text messages from the monitoring system to at least one user.

The following describes examples of preferred embodiments illustrated in the accompanying drawings, wherein:

Fig. 1   shows a schematic view of a device embodiment;

Fig. 2   shows a schematic view of a system embodiment forwarding a text message from a monitoring system to two mobile devices.

The drawings are shown in a schematic and simplified manner, and features that are not necessary for explaining the invention to a skilled person may be left out. Identical reference numerals refer to identical or similar features in the drawings. The various features shown in the drawings may not necessarily be drawn to scale.

Turning now to Fig. 1, it shows a device embodiment 100 for forwarding text messages from at least one monitoring system to at least one user. The device 100 includes a mobile communication interface 101 for receiving and sending text messages, a network interface 102 for connecting the device 100 to a web service 200, and a processing unit 103 and a memory 104 for processing computational tasks.

The device 100 may be implemented in many known ways. For example, the device 100 may be provided as an embedded system, such as an Arduino or a Raspberry Pi possibly accompanied by modules implementing additionally necessary functionality, for example the mobile communication interface 101 and the network interface 102.

The mobile communication interface 101 may be implemented so that it provides the device 100 with the ability to send and receive text messages via a Short Message Service (SMS) available through a mobile communications network. For example, the mobile communication interface 101 may be associated with a 4G SIM card with a valid mobile number and subscription.

The network interface 102 can provide the device 100 with a wired communication interface, such as an Ethernet interface, and/or a wireless communication interface, such as a WiFi interface.

The memory 104 is configured with an availability state of each user and at least one rule for forwarding text messages received from a monitoring system to at least one user. These configurations may be implemented using suitable data structures, such as a list, a dictionary or a table. For example, each user may be represented by an identifier and matched with a corresponding availability state. In another example, each monitoring system may be represented by a unique number, such as a telephone number, and matched with a corresponding list of at least one user identifier. Thus, the device 100 can receive text messages from a monitoring system and forward the text message to at least one available user in accordance with at least one forwarding rule for the monitoring system and the availability states of each user addressed by the at least one forwarding rule.

Also, in the device embodiment 100 shown in Fig. 1, the memory 104 is further configured so that a rule for forwarding text messages received from a monitoring system may indicate at least one user group for receiving the text messages from the monitoring system, in addition or instead of indicating at least one user. This configuration allows simplifying the definitions of forwarding rules by joining users into groups.

Also, in the device embodiment 100 shown in Fig. 1, it is possible to have text messages being forwarded in way that depends on the content of the text message. For example, the memory 104 may be further configured so that a search pattern is provided for at least one of the monitoring systems. Then, when a text message is received from a monitoring system, the device 100 may check if there is a search pattern for the monitoring system

and if the search pattern matches at least a portion of the received text message. In that case, the device 100 forwards the received text message to any user addressed by a selected forwarding rule independently of the availability state of the user. In another example, the memory 104 may be configured so that a rule for forwarding text messages received from a monitoring system includes a search pattern as part of the rule, so that, when the device 100 selects forwarding rules, at least one rule is selected in which the rule comprises a search pattern that matches at least a portion of the text message.

Moreover, in the device embodiment 100 shown in Fig. 1, the memory 104 is further configured with a whitelist comprising at least one sender authorized to send text messages to the device. The whitelist can be pre-configured with the telephone numbers of the monitoring system that are authorized to send text messages to the device 100. Thus, the device 100 can, when a text message is received from a monitoring system, check if the text message was received from a monitoring system that is not a sender included in the whitelist and, in that case, prevent further steps from being carried out.

Furthermore, in the device embodiment 100 shown in Fig. 1, the memory 104 is further configured with at least one administrator user so that, when a text message is received from a monitoring system, the device 100 can check if no forwarding rule is selected and, in that case, forward the text message to the at least one administrator user. Therefore, the text messages received from the monitoring systems are guaranteed to be forwarded to at least one user, even if all the users set their availability state as unavailable.

However, this may not be ideal, as an administrator user will possibly not know what needs to be done in reaction to the text message, which may lead to delays in reacting to the text message, which in turn may create risk for the organization. Thus, the device 100 is further configured so that, when a user availability state is updated in the memory 104, the device 100 sends a text message to the at least one administrator user if:

- there is at least one rule in which all users addressed by the rule do not have the availability state set as available; and/or

- there is at least one monitoring system for which there is no forwarding rule with at least

one user having the availability state set as available.

Therefore, the administrator user is presented with information quickly after the device 100 enters an operational state in which the administrator user may start having text messages being forwarded from a monitoring system due to lack of available users.

Also, the device 100 may be configured so that, when a user availability state is updated in the memory 104, the device 100 checks, prior to updating the availability state, if there is at least one rule in which all users addressed by the rule will not have the availability state set as available. In that case, the device 100 prevents the updating of the availability state. Advantageously, the device 100 works towards avoiding an operational state in which an administrator user may start having text messages being forwarded from a monitoring system.

Fig. 2 shows a system 300 for transmitting text messages from two monitoring systems 900, 901 to three users within an organization. For illustrative purposes, only three users are shown, although, in practice, an organization may have hundreds or thousands of users. Each of the three users has been assigned with a mobile device 910, 911, 912 for receiving text messages. The system 300 includes the two monitoring systems 900, 901 (shown on the left-hand side of Fig. 1) for monitoring operational processes within the organization, the three mobile devices 910, 911, 912 (shown on the right-hand side) for receiving text messages, and the device 100 shown in Fig. 1 for receiving text messages from the monitoring systems 900, 901 and forwarding the received text messages to the mobile devices 910, 911, 912.

The two monitoring systems 900, 901 monitor operational processes within the organization. Each monitoring system 900, 901 includes a mobile communications interface 900a, 900b for sending text messages. The monitoring systems 900, 901 are both configured to send all text messages to the device 100 when a pre-configured change of operational state is detected.

There are many known types of monitoring systems. In general, a monitoring system may operate by reading measurements from hardware sensors and/or software sensors. The

monitoring system may further operate by detecting a pre-configured change of operational state, such as a change to an unintended state of operation. Additionally, the monitoring system may, after the pre-configured change of operational state is detected, operate to send a text message to a pre-configured telephone number.

5   Hardware sensors are suitable for measuring physical parameters related to the operational process, such as a temperature, a magnetic field magnitude, an electric current, among others. Software sensors are suitable for reading data parameters related to the operational process. For example, a software sensor may periodically read a software variable and check the latter for changes over time, or it may monitor a socket or
10   a file descriptor for new data.

The organization also includes a web service 200 (shown at the lower right corner in Fig. 1) that stores an availability state for each of the three users. The web service 200 is external to the system 300 shown in Fig. 1; therefore, for illustrative purposes, the web service 200 is schematically illustrated in dashed lines.

15   The web service 200 in Fig. 1 is a virtual switchboard system that is used in the organization for the purpose of managing the telephone numbers and mobile devices 910, 911, 912 that have been assigned to the three users. The web service 200 includes a database 200a for storing the current availability state for each of the three users. For example, the current availability state for a user may be a state identifier, such as "available" and "unavailable".

20   The device 100 and the three mobile devices 910, 911, 912 communicate with the web service 200 for setting and getting an availability state for each of the three users. Each user may get and set a respective availability state via the mobile device 910, 911, 912, and the device 100 consults the updated availability states of each user by communicating with the web service 200 via the network interface 102.

25   There are many possible ways of implementing the mobile devices 910, 911, 912. In Fig. 2, each of the three mobile devices 910, 911, 912 is a smartphone configured with an application to communicate with the web service 200. An example of such an application is a web browser or a dedicated application installed in the mobile device 910, 911, 912.

For ease of reference, the mobile devices 910, 911, 912 in Fig. 2 are referred to as the first, second and third mobile devices 910, 911, 912 as shown vertically from top to bottom in Fig. 2. Also, the monitoring systems 900, 901 in Fig. 2 are referred to as the first and second monitoring system 900, 901 as shown vertically from top to bottom in Fig. 2.

5 The situation illustrated in Fig. 2 shows the device 100 forwarding a text message from the first monitoring system 900 to the first and third mobile devices 910, 912. The message has been sent after the first monitoring device 900 has detected an unintended state of operation, such as a security door in a building that has been kept opened for more than 1 minute. The text message paths are illustrated with arrows in Fig. 2: from the first

10 monitoring system 900 to the device 100; and subsequently from the device 100 to the first and third mobile devices 910, 912. As also illustrated, the device 100 does not forward the text message to the second mobile device 911.

The user of the second mobile device 911 is on holidays and has, prior to the situation in Fig. 2, used the second mobile device 911 to set its availability state accordingly, e.g. by

15 setting an "unavailable" state identifier. Also prior to the situation shown in Fig. 2, the device 100 connected, via the network interface 102, to the web service 200, e.g. via an Application Programming Interface (API) of the web service 200, and updated the user availability states in the memory 104. The device 100 is configured to perform the updating step and check for changes of availability states every two minutes. Thus, the memory 104

20 was up to date with the availability state of the second user, i.e. "unavailable", when the first monitoring system 900 issued the text message. Moreover, prior to the situation shown in Fig. 2, the memory 104 was configured with a rule for forwarding all text messages received from the first monitoring system 900 to the three users. Thus, the memory 104 was also up to date with a useful forwarding rule when the first monitoring system 900

25 issued the text message.

Upon reception of the text message from the first monitoring system 900, the device 100 consulted its memory 104 to select the forwarding rule for forwarding text messages received from the first monitoring system 900. Then, the device 100 forwarded the received text message to any user that is addressed by the selected forwarding rule and

has an availability state set as available. Therefore, the first and second users, respectively assigned with the first and second mobile devices 910, 912, received the text message from the first monitoring system 900, whereas the second user, assigned with the second mobile device 911, did not receive the text message.

In some embodiments, the device 100 may be configured to register the reception and forwarding of text messages. For example, the device 100 may register the entries shown in Table 1 after a few text messages have been received and forwarded.

Table 1 - Example of entries registered by device 100

Date	Time	Received from monitoring system	Received text message
30 March 2022	16h40	Station B, Controller 1 (telephone no. 1)	Water level sensor #7 Low -13,6 cm
1 April 2022	10h09	Station H, Controller 3 (telephone no. 2)	CRITICAL low pressure in pipe P12 (master)
3 April 2022	03h32	Station B, Controller 1 (telephone no. 1)	Water level sensor #7 Low -9,6 cm

The registration of events in a time log can be useful for identifying recurring problems. Machine-generated notifications, such as those issued via text message from a monitoring system 900, usually have a structure that can be parsed, the structure containing, for example, a location, time and date data, a sensor identifier, relevant measurement values and a description of the event. Over a period of time, the data from received notifications can be used to extract statistical metadata that can be used to prevent more extensive and costly errors. As shown in Table 1, the monitoring system "Controller 1" in Station B has detected a low water lever on 30 March 2022 at 16h40 (first row of the table) and on 3 April 2022 at 03h32 (third row of the table). These two occurrences may indicate a repeated

pattern and thus suggest that an intervention is needed.

In some embodiments, machine learning or artificial intelligence methods may be applied on the data gathered from the text messages over a period of time so that reports are created showing trends on individual monitoring systems and sensors. Further reports may be created showing a composite picture of different types of sensors, which individually may not give a cause for concern, but where a report composed of data from different sensors can give a nuanced picture.

In one embodiment, the data gathered from the received text messages over a period of time can be transferred from the device 100 to another computational system, and the latter may apply machine learning methods, artificial intelligence methods or business intelligence analysis to the transferred data. This embodiment is advantageous in that the computational resources required to be provided in the device 100 are reduced, which also reduces the cost of the device 100. Also, this embodiment provides versatility as to the kinds of analysis and reports that may be processed from the data gathered from the text messages received by the device 100.

In the foregoing description, references to "SMS" may refer to a text messaging service that can have different colloquialisms depending on the region. It may simply be referred to as a "text" in North America, the United Kingdom, Australia, New Zealand, and the Philippines, an "SMS" (Short Message Service) in most of mainland Europe, or an "MMS" or "SMS" in the Middle East, Africa, and Asia. Also, references to sending a text message to a device embodiment 100 may refer to the text message being sent to a telephone number associated with a mobile communications interface 101 comprised by the device embodiment 100. Moreover, references to sending a text message to a user may refer to the text message being sent to a telephone number associated with a mobile device 910, 911, 912 assigned to the user. Furthermore, references to receiving a text message from monitoring system may refer to the text message being received from a telephone number associated with the monitoring system.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative

embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

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The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used advantageously.

Claims

1.   A device (100) for forwarding text messages from at least one monitoring system (900, 901) to at least one user, the device (100) comprising:

- a mobile communication interface (101) for receiving and sending text messages via a mobile network; and

- a processing unit (103),

characterized in that the device (100) comprises:

- a network interface (102) for connecting the device (100) to at least one web service (200) via a network, the at least one web service (200) providing a first availability state for each user; and

- a memory (104) configured with a second availability state for each user and at least one rule for forwarding text messages received from a monitoring system (900, 901) to at least one user,

wherein the device (100) is configured to carry out the step of:

- for each user, updating the second availability state based on the first availability state, and

wherein, when a text message is received from a monitoring system (900, 901), the device (100) is configured to carry out the steps of:

- selecting at least one rule for forwarding text messages received from the monitoring system (900, 901); and

- forwarding the received text message to any user that is addressed by the selected at least one rule and has a second availability state set as available.

2.   Device according to claim 1, wherein the memory is configured with a first search pattern for each of the at least one monitoring system, and

wherein, when a text message is received from a monitoring system, the device is further configured to carry out the step of:

- if a first search pattern for the monitoring system matches at least a portion of the text message, forwarding the received text message to any user addressed by the selected at least one rule independently of the second availability state of the user.

3.   Device according to any of the preceding claims, wherein each of the at least one forwarding rule comprises a second search pattern, and

wherein the selecting step comprises selecting at least one rule for forwarding text messages received from the monitoring system, each selected rule comprising a second search pattern that matches at least a portion of the text message.

4.   A device according to any of the preceding claims, wherein the memory is further configured with a whitelist comprising at least one sender authorized to send text messages to the device, and

wherein, when a text message is received from a monitoring system, the device is further configured to carry out the step of:

- if the text message was received from a monitoring system that is not a sender included in the whitelist, preventing further steps from being carried out.

5.   Device according to any of the preceding claims, wherein the at least one web service provides at least one first user group,

wherein the memory is configured with at least one rule for forwarding text messages received from a monitoring system to at least one second user group and/or at least one user,

wherein each first user group and each second user group comprises a user group identifier and a list of at least one user, and

wherein the device is further configured to carry out the step of:

- for each second user group, updating the second user group based on a first user group comprising the same user group identifier as the second user group.

6.   Device according to any of the preceding claims, wherein the memory is further configured with at least one administrator user,

wherein, when a text message is received from a monitoring system, the device is further configured to carry out the step of:

- if no forwarding rule is selected, forwarding the text message to the at least one administrator user.

7.   Device according to claim 6, wherein the step of updating the second availability state comprises sending a text message to the at least one administrator user if:

     - there is at least one rule in which all users addressed by the rule do not have the second availability state set as available; and/or

5   - there is at least one monitoring system for which there is no forwarding rule with at least one user having the second availability state set as available.

8.   Device according to claim 6, wherein the step of updating the second availability state comprises, prior to updating the second availability state, the step of:

     - if there is at least one rule in which all users addressed by the rule will not have

10   the second availability state set as available, preventing the updating of the second availability state.

9.   Device according to any of the preceding claims, wherein the at least one web service is any of: a virtual switchboard system for telecommunications; and/or a directory service.

15   10.   Device according to any of the preceding claims, wherein, for each of the at least one web service, connecting the device to the web service comprises:

     - periodically connecting to an Application Programming Interface (API) of the web service; and/or

     - connecting the device to the web service using a websocket.

20   11.   Device according to any of the preceding claims, wherein the network interface is any of a wire communication interface and/or a wireless communication interface.

12.   Use of a device (100) for forwarding text messages from at least one monitoring system (900, 901) to at least one user, the device (100) being as described in any of the claims 1 to 11.

13.   System (300) for transmitting text messages from at least one monitoring system (900, 901) to at least one user, **characterized in that** the system (300) comprises:

     - a device (100) as described in any of the claims 1 to 11;

     - the at least one monitoring system (900, 901), wherein each monitoring system (900, 901) is configured to send a text message to the device (100) after detecting a change of operational state; and

     - at least one mobile device (910, 911, 912) for receiving text messages.

14.   A method of installing a device (100) according to any of the claims 1 to 11, **characterized in that** the method comprises the steps of:

     - providing the device (100);

     - configuring each of the at least one monitoring system (900, 901) to send text messages to the device (100);

     - configuring the device (100) to connect to the at least one web service (200); and

     - for each monitoring system (900, 901), configuring the memory (104) of the device (100) with a rule for forwarding text messages from the monitoring system (900, 901) to at least one user.

P a t e n t k r a v

1. Anordning (100) for å videresende en tekstmelding fra minst ett
   overvåkingssystem (900, 901) til minst én bruker, anordningen (100) omfatter:
   – et mobilkommunikasjonsgrensesnitt (101) for å motta og sende tekstmeldinger
5 via et mobilnettverk; og
   – en prosesseringsenhet (103),
   k a r a k t e r i s e r t   v e d at anordningen (100) omfatter:
   – et nettverksgrensesnitt (102) for å forbinde anordningen (100) til minst én
   nettjeneste (200) via et nettverk, den minst ene nettjenesten (200) tilveiebringer
10 en første tilgjengelighetstilstand for hver bruker; og
   – et minne (104) konfigurert med en andre tilgjengelighetstilstand for hver
   bruker og minst én regel for å videresende tekstmeldinger fra et
   overvåkingssystem (900, 901) til minst én bruker,
   hvori anordningen (100) er konfigurert til å utføre trinnet:
15 – for hver bruker, å oppdatere den andre tilgjengelighetstilstanden basert på den
   første tilgjengelighetstilstanden, og
   hvori, når en tekstmelding mottas fra et overvåkingssystem (900, 901),
   anordningen (100) er konfigurert til å utføre trinnene:
   – å velge minst én regel for å videresende tekstmeldinger mottatt fra
20 overvåkingssystemet (900, 901); og
   – å videresende den mottatte tekstmeldingen til enhver bruker som er adressert
   av den valgte minst ene regelen og har en andre tilgjengelighetstilstand satt til
   tilgjengelig.

2. Anordning ifølge krav 1, hvori minnet er konfigurert med et første søkemønster
25 for hvert av det minst ene overvåkingssystemet, og
   hvori, når en tekstmelding mottas fra et overvåkingssystem, anordningen videre
   er konfigurert til å utføre trinnet:
   – hvis et første søkemønster for overvåkingssystemet samsvarer med i det
   minste et parti av tekstmeldingen, å videresende den mottatte tekstmeldingen til

enhver bruker adressert av den valgte minst ene regelen uavhengig av den andre tilgjengelighetstilstanden til brukeren.

3. Anordning ifølge hvilket som helst av de foregående kravene, hvori hver av den minst ene videresendingsregelen omfatter et andre søkemønster, og

   hvori utvelgelsestrinnet omfatter å velge minst én regel for å videresende tekstmeldinger mottatt fra overvåkingssystemet, hver valgte regel omfatter et andre søkemønster som samsvarer med minst et parti av tekstmeldingen.

4. Anordning ifølge hvilket som helst av de foregående kravene, hvori minnet videre er konfigurert med en hviteliste omfattende minst én sender autorisert til å sende tekstmeldinger til anordningen, og

   hvori, når en tekstmelding mottas fra et overvåkingssystem, anordningen videre er konfigurert til å utføre trinnet:

   – hvis tekstmeldingen ble mottatt fra et overvåkingssystem som ikke er en sender inkludert på hvitelisten, å forhindre ytterligere trinn fra å utføres.

5. Anordning ifølge hvilket som helst av de foregående kravene, hvori den minst ene nettjenesten tilveiebringer minst én første brukergruppe,

   hvori minnet er konfigurert med minst én regel for å videresende tekstmeldinger mottatt fra et overvåkingssystem til minst én andre brukergruppe og/eller minst én bruker,

   hvori hver første brukergruppe og hver andre brukergruppe omfatter en brukergruppeidentifikator og en liste av minst én bruker, og

   hvori anordningen videre er konfigurert til å utføre trinnet:

   – for hver andre brukergruppe, å oppdatere den andre brukergruppen basert på en første brukergruppe omfattende den samme brukergruppeidentifikatoren som den andre brukergruppen.

6. Anordning ifølge hvilket som helst av de foregående kravene, hvori minnet videre er konfigurert med minst én administratorbruker,

   hvori, når en tekstmelding mottas fra et overvåkingssystem, anordningen videre er konfigurert til å utføre trinnet:

– hvis ingen videresendingsregel er valgt, å videresende tekstmeldingen til den minst ene administratorbrukeren.

7. Anordning ifølge krav 6, hvori trinnet med å oppdatere den andre tilgjengelighetstilstanden omfatter å sende en tekstmelding til den minst ene administratorbrukeren hvis:
– det er minst én regel hvor alle brukere som er adressert av regelen ikke har den andre tilgjengelighetstilstanden satt til tilgjengelig; og/eller
– det er minst ett overvåkingssystem hvor det ikke er noen videresendingsregel med minst én bruker som har den andre tilgjengelighetstilstanden satt til tilgjengelig.

8. Anordning ifølge krav 6, hvori trinnet med å oppdatere den andre tilgjengelighetstilstanden omfatter, før oppdatering av den andre tilgjengelighetstilstanden, trinnet:
– hvis det er minst én regel hvor alle brukere som er adressert av regelen ikke vil ha en andre tilgjengelighetstilstand satt som tilgjengelig, å forhindre oppdatering av den andre tilgjengelighetstilstanden.

9. Anordning ifølge hvilket som helst av de foregående kravene, hvori den minst ene nettjenesten er hvilken som helst av: et virtuelt sentralbordsystem for telekommunikasjon; og/eller en katalogtjeneste.

10. Anordning ifølge hvilket som helst av de foregående kravene, hvori, for hver av den minst ene nettjenesten, å forbinde anordningen til nettjenesten omfatter:
– periodisk forbindelse til et programmeringsgrensesnitt (API) for nettjenesten; og/eller
– å forbinde anordningen til nettjenesten ved bruk av en websocket.

11. Anordning ifølge hvilket som helst av de foregående kravene, hvori nettverksgrensesnittet er hvilket som helst av et kabelkommunikasjonsgrensesnitt og/eller et trådløst kommunikasjonsgrensesnitt.

12. Anvendelse av en anordning (100) for å videresende tekstmeldinger fra minst ett overvåkingssystem (900, 901) til minst én bruker, anordningen (100) er som beskrevet i hvilket som helst av kravene 1 til 11.

13. System (300) for å overføre tekstmeldinger fra minst ett overvåkingssystem (900, 901) til minst én bruker, k a r a k t e r i s e r t   v e d   at systemet (300) omfatter:

– en anordning (100) som beskrevet i hvilket som helst av kravene 1 til 11;

– det minst ene overvåkingssystemet (900, 901), hvori hvert overvåkingssystem (900, 901) er konfigurert til å sende en tekstmelding til anordningen (100) etter deteksjon av en endring av driftstilstand; og

– minst én mobilanordning (910, 911, 912) for å motta tekstmeldinger.

14. Fremgangsmåte for installasjon av en anordning (100) ifølge hvilket som helst av kravene 1 til 11,

k a r a k t e r i s e r t   v e d   at fremgangsmåten omfatter trinnene:

– å tilveiebringe anordningen (100);

– å konfigurere hvert av det minst ene overvåkingssystemet (900, 901) til å sende tekstmeldinger til anordningen (100);

– å konfigurere anordningen (100) til å forbindes til den minst ene nettjenesten (200); og

– for hvert overvåkingssystem (900, 901), å konfigurere minnet (104) til anordningen (100) med en regel for å videresende tekstmeldinger fra overvåkingssystemet (900, 901) til minst én bruker.
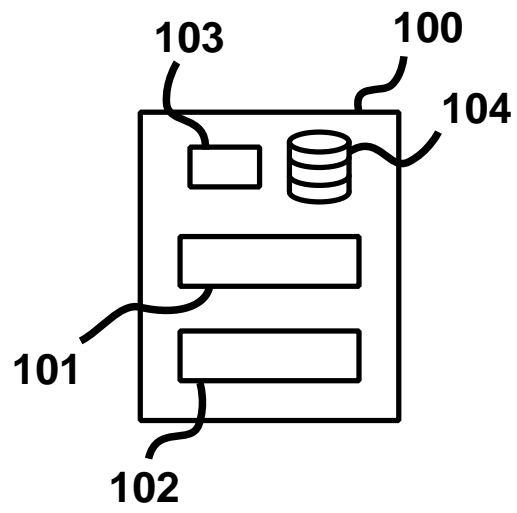
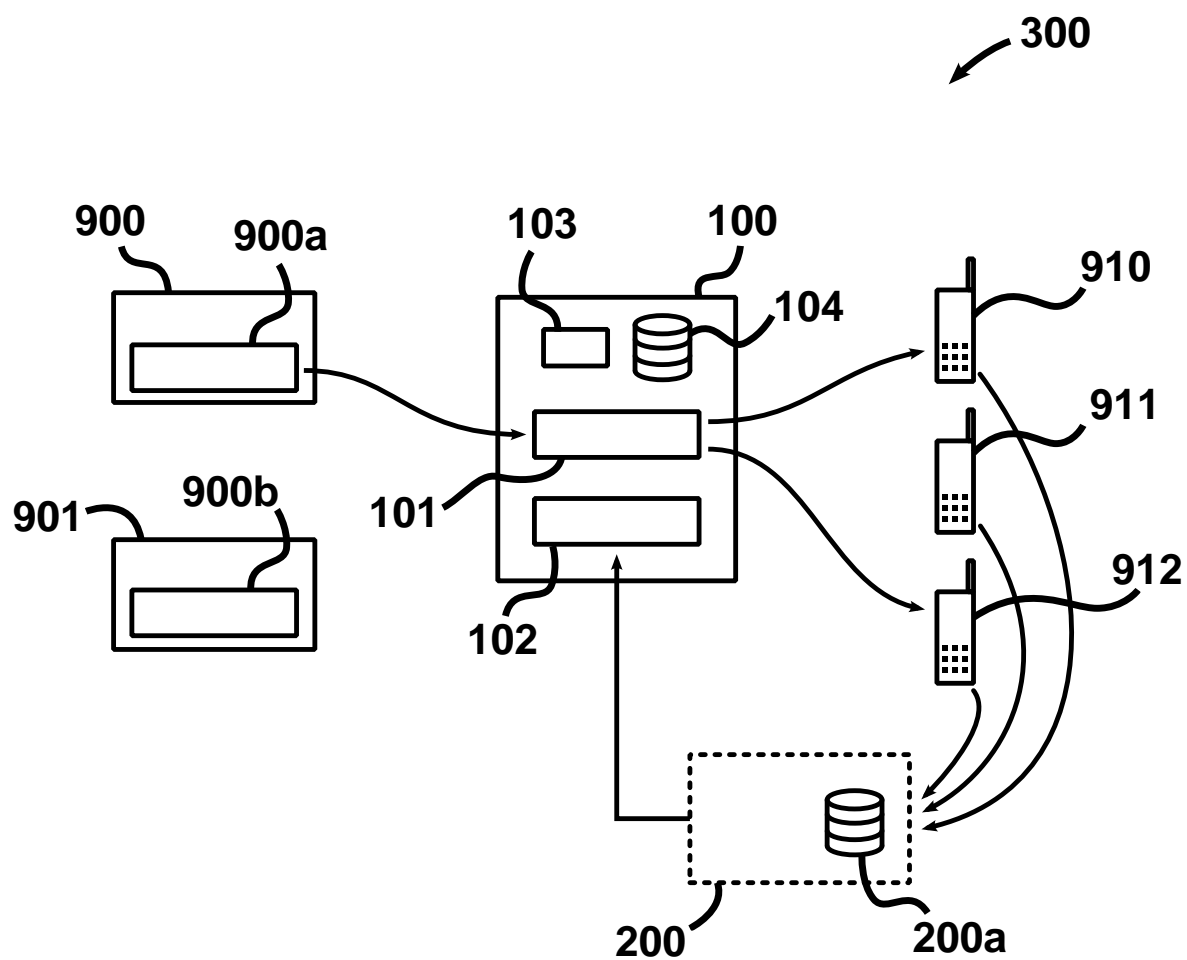**103** **100**
104
101
102

Fig. 1

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Fig. 2