

Description

Title of Invention:

DATA TRANSMISSION SYSTEM

5 Technical Field

[0001]

10 An aspect of the present invention relates to a data transmission system for transmitting operation information pertaining to an operating status of an elevator.

Background Art

[0002]

15 Patent Literature 1 discloses an example of a system for monitoring an elevator. In response to a call from an intercom in an elevator car, the system of Patent Literature 1 connects to a mobile phone of a specific monitoring person and transmits, to the mobile phone of the monitoring person, video data of a surveillance camera
20 installed at an elevator landing. In accordance with a command to switch video data of a monitoring target, the system switches the video data to be transmitted to the mobile phone.

25 Citation List

[Patent Literature]

[0003]

[Patent Literature 1]

Japanese Patent No. 4369253

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Summary of Invention

Technical Problem

[0004]

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However, Patent Literature 1 does not disclose a technique related to transmission and reception of information pertaining to an elevator using a publishing/subscribing communication method.

[0005]

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An aspect of the present invention has an object to use a publishing/subscribing communication method to easily determine, on the publishing side, whether to continue a process for publishing operation information pertaining to an operating status of an elevator.

Solution to Problem

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[0006]

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A data transmission system in accordance with an aspect of the present invention includes: a server device that functions as a broker; and at least one communication device, the server device and the at least one communication device being capable of communicating

with each other with use of a publishing/subscribing communication method, the at least one communication device including a reception section that receives, from an elevator control device which is connected to the at least one communication device so as to be capable of communicating with the at least one communication device, operation information pertaining to an operating status of an elevator controlled by the elevator control device, a publishing section that switches an operation mode to one of (i) a transmission mode in which, every time the reception section receives the operation information, publishing of the operation information to the server device with a prescribed first topic is carried out and (ii) a non-transmission mode in which the publishing is not carried out, and a subscribing section that, when the operation mode is switched to the transmission mode, subscribes to, with respect to the server device, a second topic created on the basis of identification information of the elevator, the server device including a first transmission section that transmits, to the at least one communication device which has subscribed to the second topic with respect to the server device, a transmission continuation request for the operation information which transmission continuation request has been published from a requester device to the server device with the

second topic, and during the transmission mode, the publishing section continuing the transmission mode in a case where the at least one communication device receives the transmission continuation request before a lapse of a prescribed period since last receiving the transmission continuation request, and switching the operation mode to the non-transmission mode in a case where the prescribed period has elapsed without the at least one communication device receiving the transmission continuation request since last receiving the transmission continuation request.

Advantageous Effects of Invention

[0007]

An aspect of the present invention makes it possible to use a publishing/subscribing communication method to easily determine, on the publishing side, whether to continue a process for publishing operation information pertaining to an operating status of an elevator.

Brief Description of Drawings

[0008]

Fig. 1 is a block diagram illustrating an example configuration of a data transmission system in accordance with an embodiment of the present invention.

Fig. 2 is a sequence diagram illustrating an example flow of data based on first use of an API.

Fig. 3 is a sequence diagram illustrating an example flow of data based on second and subsequent use of the API after switching to a transmission mode.

Fig. 4 is a sequence diagram illustrating an example flow of data in a case where the API has not been used for a prescribed period.

Description of Embodiments

[0009]

A data transmission system 100 of the present embodiment will be described below.

[0010]

[Overview of data transmission system]

First, an overview of the data transmission system 100 will be described on the basis of Fig. 1. Fig. 1 is a block diagram illustrating an example configuration of the data transmission system 100.

[0011]

The data transmission system 100 is a system capable of transmitting, from an elevator control device 2 to a terminal device 9, operation information pertaining to an operating status of an elevator 1 controlled by the elevator control device 2. The data transmission system 100 transmitting the operation information of the elevator 1 to the terminal device 9 makes it possible for a user of

the terminal device 9 to understand the operating status of the elevator 1.

[0012]

5 The operation information includes, for example, information such as the status of occurrence of abnormalities in the elevator 1 and the service status of the elevator 1. The information that indicates the service status may include, for example, information such as the position of a car, the weight in the car, and door
10 opening/closing status. The operation information is associated with identification information of the elevator 1. In addition to the operation information, detailed information pertaining to the elevator 1, such as a model name of the elevator 1 and installation information of the
15 elevator 1 may be associated with the identification information of the elevator 1.

[0013]

 The number of elevators 1 from which the operation information is to be acquired may be one or more. Note,
20 however, that the operation information of the elevator 1 which has been designated by the user is preferably transmitted to the terminal device 9.

[0014]

 A user of the data transmission system 100 is, for
25 example, a user entering and exiting the elevator 1. The

user of the data transmission system 100 may be, for example, a manager of the elevator 1. Alternatively, the user of the data transmission system 100 may be, for example, a maintenance person performing maintenance of the elevator 1. In this case, a monitoring device that monitors the operating status of the elevator 1 may be used as the terminal device 9.

[0015]

In the present embodiment, as illustrated in Fig. 1, the data transmission system 100 includes, for example, the elevator 1, the elevator control device 2, a communication device 3, a first server device 4, a second server device 5, a transmission destination device 6, a storage device 7, a requester device 8, and the terminal device 9. The first server device 4, the second server device 5, the storage device 7, and the requester device 8 may be constructed on, for example, a virtual private cloud (VPC), as illustrated in Fig. 1. Furthermore, a part or all of the transmission destination device 6 may be constructed on the virtual private cloud.

[0016]

The elevator control device 2 is a device that is connected to the elevator 1 so as to be capable of communicating with the elevator 1, that controls an operation of the elevator 1, and that monitors the

operating status of the elevator 1. The elevator control device 2 is connected to the communication device 3 so as to be capable of communicating with the communication device 3, and transmits, to the communication device 3, the operation information of the elevator 1 controlled by the elevator control device 2. The elevator control device 2 may transmit, to the communication device 3, the detailed information pertaining to the elevator 1 together with the operation information.

[0017]

The elevator control device 2 generates the operation information in association with the identification information of the elevator 1 and transmits the operation information to the communication device 3 by a method A described below. Furthermore, the elevator control device 2 may be capable of transmitting the operation information to the communication device 3 by a method B described below. Note that the method B is a method which is often employed conventionally as a communication method between the elevator control device 2 and the communication device 3. Thus, the data transmission system 100 may be constructed by adding the method A to an existing system in which the method B is employed.

[0018]

(Method A: Push type) The elevator control device 2

transmits the operation information to the communication device 3 every time a change occurs in the operating status of the elevator 1. In this case, every time the elevator control device 2 generates the operation information, the elevator control device 2 transmits the operation information to the communication device 3 via a first control line 101 connecting the elevator control device 2 and the communication device 3. In the method A, a transmission request for the operation information is not made from the communication device 3 to the elevator control device 2.

[0019]

(Method B: Pull type) At a timing when the elevator control device 2 receives the transmission request for the operation information from the communication device 3, the elevator control device 2 transmits, to the communication device 3, the operation information as a response to the transmission request. In this case, the elevator control device 2 transmits the operation information to the communication device 3 via a second control line 102 connecting the elevator control device 2 and the communication device 3. Hereinafter, the transmission request to the elevator control device 2 by the method B is referred to as a "request for transmission on each occasion".

[0020]

The operating status of the elevator 1 can change from moment to moment. Thus, the operation information is transmitted by the method A at a higher frequency than the operation information is transmitted by the method B. It is therefore preferable to employ, for the first control line 101, a communication standard which enables more frequent communication than that employed for the second control line 102. For example, the first control line 101 may be RS422, and the second control line 102 may be RS232C. Note, however, that a communication standard equivalent to that employed for the first control line 101 may be employed for the second control line 102.

[0021]

The communication device 3 is a device that is connected to each of the first server device 4 and the second server device 5 so as to be capable of communicating with each of the first server device 4 and the second server device 5 and that transmits and receives data to and from the first server device 4 and to and from the second server device 5. For example, SORACOM (registered trademark) can be used for communication between the communication device 3 and each of the first server device 4 and the second server device 5. Note that a communication network connecting the communication

device 3 and the first server device 4 and a communication network connecting the communication device 3 and the second server device 5 may be physically the same or may be physically separated.

5 [0022]

The communication device 3 transmits, to the first server device 4, the operation information that has been received from the elevator control device 2 by the method A. Specifically, in accordance with a publishing/subscribing communication method, the communication device 3 starts, at a prescribed timing, transmitting, to the first server device 4, the operation information that has been received from the elevator control device 2 by the method A, and stops, at a prescribed timing, transmitting the operation information to the first server device 4. That is, the communication device 3 is a device that is capable of communicating with the first server device 4 in accordance with the publishing/subscribing communication method. Hereinafter, the publishing/subscribing communication method is referred to as a "first communication method". A protocol used in the first communication method is preferably, for example, message queuing telemetry transport (MQTT). Using the MQTT protocol allows the operation information to be frequently transmitted from

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the communication device 3 to the first server device 4. Thus, the operation information that has been frequently transmitted from the elevator control device 2 to the communication device 3 in accordance with the method A is subsequently frequently transmitted from the communication device 3 to the first server device 4. That is, in the data transmission system 100, the operation information can be frequently transmitted throughout from the elevator control device 2 to the first server device 4.

[0023]

Meanwhile, in accordance with a second communication method different from the first communication method, the communication device 3 may transmit, to the second server device 5, the operation information that has been received from the elevator control device 2 by the method B. The second communication method need not be of a publishing/subscribing type. For example, a protocol based on Transmission Control Protocol/Internet Protocol (TCP/IP) may be used, or a uniquely defined protocol may be used. Note that the second communication method is a method which is often employed as a communication method between an existing elevator monitoring system and the communication device 3.

[0024]

In the method B, the operation information to be transmitted by the elevator control device 2 to the communication device 3 as a response to the request for transmission on each occasion may be the latest operation information at a time point when the request for transmission on each occasion is received from the communication device 3. Alternatively, the operation information may be untransmitted operation information accumulated up to the time point when the request for transmission on each occasion is received. In the latter case, the elevator control device 2 may generate the operation information every time a change occurs in the operating status of the elevator 1, and store the operation information in a storage unit (not illustrated) of the elevator control device 2. In this case, upon receiving the request for transmission on each occasion from the second server device 5, to the second server device 5, the communication device 3 may transmit, as a response to the request for transmission on each occasion, the operation information that is stored in a storage unit (not illustrated) of the communication device 3 at that time point.

[0025]

Furthermore, the communication device 3 receives a

"transmission initiation request" for the operation information from the second server device 5 in accordance with the second communication method. In response to reception of the transmission initiation request, the communication device 3 transmits the operation information to the first server device 4 in accordance with the first communication method every time the communication device 3 receives the operation information from the elevator control device 2. That is, the transmission initiation request is a request to initiate real-time transmission of the operation information to the first server device 4. Moreover, the communication device 3 receives a "transmission continuation request" for the operation information from the first server device 4 in accordance with the first communication method. While continuously receiving the transmission continuation request, the communication device 3 continues to transmit, to the first server device 4, the operation information that is received from the elevator control device 2. That is, the transmission continuation request is a request to continue the real-time transmission of the operation information to the first server device 4.

[0026]

One elevator control device 2 and one communication device 3 are provided to one elevator 1. As described

earlier, the data transmission system 100 may include one elevator 1 or may include a plurality of elevators 1. In a case where the data transmission system 100 includes the plurality of elevators 1, one set of the elevator control device 2 and the communication device 3 is provided to each of the elevators 1.

[0027]

The first server device 4 is a device that functions as a broker and that is capable of communicating with the communication device 3 in accordance with the first communication method. The data transmission system 100 may be any system as long as the system includes at least the first server device 4 and the communication device 3 that are capable of communicating with each other in accordance with the first communication method, the first server device 4 serving as a broker. While receiving the operation information from the communication device 3 in accordance with the first communication method, every time the first server device 4 receives the operation information, the first server device 4 transmits the received operation information to the transmission destination device 6.

[0028]

Further, the first server device 4 is a device that is connected to the second server device 5 and the requester

device 8 so as to be capable of communicating with the second server device 5 and the requester device 8 in accordance with the first communication method. The first server device 4 transmits, to the communication device 3 in accordance with the first communication method, the transmission continuation request that has been received from the requester device 8, and transmits, to the second server device 5 in accordance with the second communication method, the transmission initiation request that has been received from the requester device 8.

[0029]

The first server device 4 functions as a broker. Thus, the communication device 3 carries out subscription with respect to the first server device 4 so that the first server device 4 can transmit, to the communication device 3, the transmission continuation request which has been received from the requester device 8. Such subscription will be described later as a description of a subscribing section 313 of the communication device 3.

[0030]

The second server device 5 transmits, to the communication device 3 in accordance with the second communication method, the transmission initiation request for the operation information which transmission

initiation request has been received from the first server device 4. In a case where the request for transmission on each occasion for the operation information is received from the requester device 8, the second server device 5 may transmit the request for transmission on each occasion to the communication device 3 in accordance with the second communication method, and receive the operation information as a response to the request for transmission on each occasion. In this case, the second server device 5 executes a process for storing the received operation information in the storage device 7. In the present embodiment, the second server device 5 directly stores the operation information in the storage device 7, but may store the operation information in the storage device 7 via a relay device.

[0031]

The transmission destination device 6 is a device that, every time the device receives the operation information from the first server device 4, executes a process for storing the received operation information in the storage device 7. In the present embodiment, the transmission destination device 6 directly stores the operation information in the storage device 7, but may store the operation information in the storage device 7 via a relay device. The transmission destination device 6 may

be, for example, a device that is provided as a web service platform such as AWS IoT Core. The storage device 7 is a device that stores the operation information, and includes, for example, a database. In order to store the operation information that is frequently transmitted, the database included in the storage device 7 is preferably NoSQL database (e.g., a key-value database) that has excellent scalability. The database and a mechanism for storing the operation information in the database may be provided as a database cloud service.

[0032]

As described earlier, the first server device 4 functions as a broker. Thus, the transmission destination device 6 subscribes to a prescribed first topic with respect to the first server device 4 so that the first server device 4 can transmit, to the transmission destination device 6, the operation information which has been received from the communication device 3. The first topic is a topic for receiving the operation information, and may be set to any value.

[0033]

After receiving the transmission initiation request, the communication device 3 initiates transmission of the operation information to the first server device 4. Thus, before the first server device 4 starts receiving the

operation information, the transmission destination device 6 subscribes to the first topic with respect to the first server device 4 so that the first server device 4 can transmit the operation information to the transmission destination device 6 every time the first server device 4 receives the operation information. In the present embodiment, the transmission destination device 6 subscribes to the first topic with respect to the first server device 4 before the terminal device 9 uses (calls) an application programming interface (API) 813.

[0034]

The requester device 8 has a function for providing the operation information of the designated elevator 1 which operation information can be used by the terminal device 9. In the present embodiment, the requester device 8 is, for example, a web server, and the function is provided through the API 813. The API 813 is a software interface that can be used by a web browser or application software (hereinafter simply referred to as "terminal-side software") executed in the terminal device 9 and that is for acquiring the operation information of the elevator 1 which operation information is stored in the storage device 7, and transmitting the operation information to the terminal device 9. While the terminal device 9 is using the API 813, the requester device 8 sequentially acquires the operation

information of the designated elevator 1 from the storage device 7 and transmits the acquired operation information to the terminal device 9. The expression "while the terminal device 9 is using the API 813" refers to a state where the terminal-side software that can use the API 813 is being executed in the terminal device 9 in order to acquire the operation information of the elevator 1 which has been designated by the user.

[0035]

In a case where the API 813 is used by the terminal device 9 after a prescribed period has elapsed since the API 813 was last used by the terminal device 9, the requester device 8 executes a process for transmitting the transmission initiation request for the operation information to the first server device 4. That is, when the terminal device 9 starts to use the API 813, the requester device 8 transmits the transmission initiation request to the first server device 4. In the present embodiment, the requester device 8 directly transmits the transmission initiation request to the first server device 4, but may transmit the transmission initiation request to the first server device 4 via a relay device.

[0036]

Further, in so doing, the requester device 8 receives designation information designating the elevator 1 from

which the operation information is to be acquired (for example, the identification information of the elevator 1). Thus, the requester device 8 transmits, to the first server device 4, the transmission initiation request including the received designation information. This allows the first server device 4 to (i) transmit the transmission initiation request to the communication device 3 that is provided to the designated elevator 1 and (ii) receive the operation information from the communication device 3.

[0037]

Furthermore, the requester device 8 transmits the transmission continuation request to the first server device 4 while the terminal device 9 is using the API 813. Since the first server device 4 also transmits the transmission continuation request to the communication device 3 that is provided to the designated elevator 1, the first server device 4 transmits, to the communication device 3, the designation information designating the elevator 1, together with the transmission continuation request.

[0038]

The first server device 4 transmits and receives data to and from the communication device 3 in accordance with the first communication method. Thus, the requester device 8 creates a second topic on the basis of the

identification information of the elevator 1 and publishes the transmission continuation request to the first server device 4 with the created second topic. This allows the first server device 4 to transmit the transmission continuation request to the communication device 3 that is provided to the designated elevator 1 and that subscribes to the second topic.

[0039]

The terminal device 9 is a device that is capable of receiving an input operation by the user and that is capable of notifying the user of the operation information which has been transmitted by the elevator control device 2. The terminal device 9 may be a device that is capable of notifying the user of the detailed information which has been transmitted by the elevator control device 2. In the present embodiment, the terminal device 9 functions as a display device that displays various types of information. The terminal device 9 also functions as an input device that is capable of receiving the input operation by the user. The terminal device 9 can receive, as the input operation by the user, an operation for acquiring the operation information of the elevator 1, the operating status of which the user desires to understand. Further, the terminal device 9 can receive, as the input operation by the user, an operation for designating the elevator 1

from which the operation information is to be acquired.

[0040]

The terminal device 9 may be, for example, a smartphone, a tablet terminal, a laptop computer, or the like, but is not limited thereto. The terminal device 9 only needs to include at least a communication function, a function of displaying various types of information, and a function of receiving an input operation. The number of terminal devices 9 may be one or more.

[0041]

By using the API 813, the terminal device 9 can (i) cause the requester device 8 to issue the transmission initiation request and the transmission continuation request for the operation information of the designated elevator 1 and (ii) receive the operation information from the requester device 8. When starting to use the API 813, the terminal device 9 receives an input operation for designating the elevator 1 from which the operation information is to be acquired. This allows the terminal device 9 to transmit the designation information to the requester device 8 when using the API 813. By using the API 813, the terminal device 9 may cause the requester device 8 to issue the request for transmission on each occasion for the operation information, and may receive the operation information of the designated elevator 1 from

the requester device 8.

[0042]

When the terminal device 9 uses the API 813 for the first time, the requester device 8 transmits the transmission initiation request to the first server device 4. Thereafter, every time the terminal device 9 uses the API 813, the requester device 8 transmits the transmission continuation request to the first server device 4. Every time the terminal device 9 uses the API 813 after using the API 813 for the first time, the terminal device 9 receives and displays the operation information that has been acquired from the storage device 7 by the requester device 8. The terminal device 9 uses the API 813 at a prescribed frequency (for example, once every 10 seconds) during, for example, execution of the foregoing terminal-side software.

[0043]

Note that an embodiment of the API 813 is not limited to an embodiment in which the operation information is passively provided to the terminal device 9 in response to a request from the terminal device 9, but may be an embodiment in which the operation information is actively provided to the terminal device 9. For example, in a case where a change occurs in a stored state of the operation information in the storage device 7 in a situation

where the terminal device 9 subscribes to the first topic with respect to the requester device 8 and the requester device 8 subscribes to the first topic with respect to the storage device 7 (in a case where new operation information is stored in the storage device 7), an aspect may be employed in which the requester device 8 publishes, to the terminal device 9, the operation information that is stored in the storage device 7.

[0044]

<Method for transmitting transmission initiation request>

As described earlier, in the present embodiment, the first server device 4 is configured to transmit the transmission initiation request to the communication device 3 via the second server device 5 by the second communication method. Alternatively, the first server device 4 may directly transmit the transmission initiation request to the communication device 3 by the first communication method without passing through the second server device 5. However, in this case, for example, in order for the communication device 3 to monitor reception of the transmission initiation request from the first server device 4, it is necessary to constantly connect a communication session between the communication device 3 and the first server device 4 and subscribe to the

communication session in accordance with the first communication method.

[0045]

5 This requires the first server device 4 to have processing performance enough to withstand constant connection of the communication session. Moreover, it is necessary to keep the communication session active corresponding to the number of communication devices 3. In general, a large number of communication devices 3 are
10 connected to the first server device 4. Thus, the first server device 4 is required to exhibit high performance in order to constantly connect the communication session between a large number of communication devices 3 and the first server device 4. Furthermore, a time during which
15 the real-time transmission of the operation information is required is limited in many cases, whereas constantly connecting the communication session causes extra communication load.

[0046]

20 Thus, the present embodiment prevents or reduces processing load and communication load of the first server device 4 by transmitting the transmission initiation request to the communication device 3 via the second server device 5 in accordance with the second
25 communication method.

[0047]

<Purpose of data transmission system>

The data transmission system 100 of the present embodiment includes the first server device 4 and the communication device 3 that are capable of communicating with each other in accordance with the first communication method, and the first control line 101. While continuously receiving the transmission continuation request after receiving the transmission initiation request for the operation information, the communication device 3 transmits the operation information to the first server device 4 every time the operating status of the elevator 1 changes. Then, the first server device 4 stores the operation information in the storage device 7 every time the first server device 4 receives the operation information. Thus, in the data transmission system 100, the terminal device 9 can sequentially acquire, during a period in which the terminal-side software using the API 813 is being executed, the operation information that is stored in the storage device 7, and the user can visually recognize, in real time, the operating status of the elevator 1 that can change from moment to moment. The following description will discuss examples of a specific function and a specific process that achieve such a data transmission system 100.

[0048]

[Details of data transmission system]

The following description will mainly discuss examples of specific configurations of the communication device 3, the first server device 4, and the requester device 8 on the basis of Fig. 1.

[0049]

<Communication device>

As illustrated in Fig. 1, the communication device 3 includes, for example, a first control section 31 and a second control section 32. The first control section 31 includes, for example, a reception section 311, a publishing section 312, and a subscribing section 313. The second control section 32 includes, for example, a transmission/reception section 321.

[0050]

The reception section 311 receives the operation information from the elevator control device 2. The reception section 311 receives the operation information from the elevator control device 2 via the first control line 101 every time the operating status of the elevator 1 that has been designated by the user changes.

[0051]

The publishing section 312 controls transmission and reception of data to and from the first server device 4

in accordance with the first communication method, and switches an operation mode to one of (i) a transmission mode in which, every time the reception section 311 receives the operation information, publishing of the received operation information to the first server device 4 with a prescribed first topic is carried out and (ii) a non-transmission mode in which the publishing is not carried out. In the present embodiment, when the communication device 3 (the transmission/reception section 321 of the second control section 32 thereof) receives the transmission initiation request for the operation information, the publishing section 312 switches the operation mode to the transmission mode. This allows the publishing section 312 to publish the operation information to the first server device 4 at a timing when the transmission initiation request is received.

[0052]

During the transmission mode, the publishing section 312 continues the transmission mode in a case where the communication device 3 receives the transmission continuation request for the operation information before a lapse of a prescribed period since last receiving the transmission continuation request. In contrast, the publishing section 312 switches the operation mode to the non-transmission mode in a case

where the prescribed period has elapsed without the communication device 3 receiving the transmission continuation request since last receiving the transmission continuation request. The prescribed period is preferably longer than a reception interval at which the transmission continuation request is continuously received. The reception interval may be a time equivalent to an interval at which the terminal device 9 uses the API 813.

[0053]

The publishing section 312 switching the operation mode in accordance with the reception status of the transmission continuation request makes it possible to easily determine, on the publishing side, whether to continue a process for publishing the operation information in accordance with the first communication method. Further, the first server device 4, which functions as a broker, cannot monitor the communication device 3 to actively acquire the operation information. Thus, by monitoring the reception status of the transmission continuation request (that is, by monitoring the first server device 4), the communication device 3 determines whether to transmit the operation information to the first server device 4.

[0054]

The subscribing section 313 controls transmission

and reception of data to and from the first server device 4 in accordance with the first communication method. When the operation mode is switched to the transmission mode, with respect to the first server device 4, the subscribing
5 section 313 subscribes to the second topic that has been created on the basis of the identification information of the elevator 1. The second topic only needs to be created so that the elevator 1 can be identified by the first control section 31.

10 [0055]

As described earlier, the requester device 8 publishes the transmission continuation request to the first server device 4 with the second topic that has been created on the basis of the identification information of
15 the designated elevator 1. Thus, in a case where the second topic that makes it possible to identify the elevator 1 to which the communication device 3 is connected is subscribed to with respect to the first server device 4, the first server device 4 can transmit the transmission
20 continuation request to the communication device 3 that is connected to the designated elevator 1.

[0056]

The transmission/reception section 321 receives the transmission initiation request from the second server
25 device 5 and transmits, to the first control section 31, a

signal indicating that the transmission initiation request has been received. Thus, at a timing when the transmission/reception section 321 receives the transmission initiation request, the publishing section 312 switches the operation mode to the transmission mode and publishes the operation information to the first server device 4, and the subscribing section 313 subscribes to the second topic with respect to the first server device 4. [0057]

<First server device>

As illustrated in Fig. 1, the first server device 4 that functions as a broker includes, for example, a server control section 41. The server control section 41 controls an operation of the first server device 4 and includes, for example, a first transmission section 411, a second transmission section 412, and a server transmission section 413.

[0058]

The first transmission section 411 transmits, to the communication device 3 that has subscribed to the second topic with respect to the first server device 4, the transmission continuation request that has been published from the requester device 8 to the first server device 4 with the second topic. This allows the first server device 4 to transmit the transmission continuation request

to the communication device 3 that is connected to the designated elevator 1.

[0059]

5 Upon receiving the operation information that has
been published from the publishing section 312, the
second transmission section 412 transmits the received
operation information to the transmission destination
device 6 that has subscribed to the first topic with respect
to the first server device 4. This allows the transmission
10 destination device 6 to store, in the storage device 7, the
operation information of the designated elevator 1 which
operation information has been received by the first server
device 4. Thus, the requester device 8 can acquire the
operation information from the storage device 7 and
15 transmit the operation information to the terminal device
9.

[0060]

20 The server transmission section 413 transmits, to
the second server device 5, the transmission initiation
request that has been received from the requester device
8. This allows the first server device 4 to transmit the
transmission initiation request to the communication
device 3 via the second server device 5 (in accordance with
the second communication method).

25 [0061]

<Requester device>

As illustrated in Fig. 1, the requester device 8 includes, for example, a requester control section 81. The requester control section 81 controls an operation of the requester device 8 and includes a requester transmission section 811, a requester publishing section 812, and the API 813.

[0062]

As described earlier, in a case where the API 813 is used by the terminal device 9 after a prescribed period has elapsed since the API 813 was last used by the terminal device 9, the requester transmission section 811 transmits the transmission initiation request to the first server device 4. In the present embodiment, when the API 813 is used in a state where the API 813 has not been used for a prescribed period, the requester transmission section 811 transmits, to the first server device 4, the transmission initiation request including the designation information designating the elevator 1 from which the operation information is to be acquired.

[0063]

The requester publishing section 812 publishes the transmission continuation request to the first server device 4 with the second topic that has been created on the basis of the identification information of the

designated elevator 1. In the present embodiment, the requester publishing section 812 publishes the transmission continuation request to the first server device 4 with the second topic every time the API 813 is used by the terminal device 9 after the API 813 is used by the terminal device 9 for the first time. That is, the requester publishing section 812 publishes the transmission continuation request to the first server device 4 with the second topic while the operation information is being provided from the requester device 8 to the terminal device 9 at a prescribed frequency by the terminal device 9 using the API 813. The second topic only needs to be created by the requester control section 81 so that the designated elevator 1 can be identified. The prescribed frequency corresponds to a usage frequency of the API 813. In a case where the API 813 actively provides the operation information to the terminal device 9, the prescribed frequency may be determined in correspondence with a frequency at which a change occurs in the storage device 7.

[0064]

As described earlier, the API 813 is an example of the function for providing the operation information of the designated elevator 1. The terminal device 9 using the API 813 allows the requester transmission section 811 to (i)

designate the elevator 1 from which the operation information is to be acquired and (ii) transmit the transmission initiation request to the first server device 4. Further, the requester publishing section 812 can also

5 designate the elevator 1 from which the operation information is to be acquired, and transmit the transmission continuation request to the first server device 4. On the basis of such transmission, the operation information of the designated elevator 1 is stored in the

10 storage device 7. Thus, while the terminal device 9 is using the API 813, the requester device 8 can sequentially acquire the operation information of the designated elevator 1 from the storage device 7 and transmit the acquired operation information to the terminal device 9.

15 [0065]

[Sequence]

Next, a flow of data between devices will be described on the basis of Figs. 2 to 4. Fig. 2 is a sequence diagram illustrating an example flow of data based on first use of

20 the API 813. Fig. 3 is a sequence diagram illustrating an example flow of data based on second and subsequent use of the API 813 after switching to the transmission mode. Fig. 4 is a sequence diagram illustrating an example flow of data in a case where the API 813 has not been used for

25 a prescribed period.

[0066]

Fig. 3 shows an example of a sequence following a sequence of Fig. 2, and Fig. 4 shows an example of a sequence following the sequence of Fig. 3. In Figs. 2 to 4, it is assumed that the operation information is transmitted from the elevator control device 2 to the communication device 3 via the first control line 101 every time a change occurs in the operating status of the elevator 1.

[0067]

In the present embodiment, as illustrated in Fig. 2, the transmission destination device 6 subscribes to the first topic with respect to the first server device 4 before the API 813 is used by the terminal device 9 (S1). This allows the first server device 4 to transmit the operation information to the transmission destination device 6 at a timing when the communication device 3 receives the transmission initiation request from the second server device 5 and publishes the operation information to the first server device 4.

[0068]

The terminal device 9 receives an input operation for acquiring the operation information of the elevator 1, the operating status of which the user desires to understand. Upon receiving this input operation, the terminal device 9 uses the API 813 of the requester device 8 (S2). In so doing,

the terminal device 9 also transmits, to the requester device 8, the designation information of the elevator 1 that has been designated by the user.

[0069]

5 In the requester device 8, the requester transmission section 811 transmits, to the first server device 4, the transmission initiation request including the designation information (S3). In the first server device 4, the server transmission section 413 transmits, to the second server
10 device 5, the transmission initiation request that has been received from the requester device 8 (S4). The second server device 5 transmits, to the communication device 3, the transmission initiation request that has been received from the first server device 4 (S5).

15 [0070]

 In the communication device 3, the transmission/reception section 321 receives the transmission initiation request from the second server device 5. Such reception causes the publishing section 312
20 to switch the operation mode from the non-transmission mode to the transmission mode (S6). Then, the publishing section 312 publishes, to the first server device 4 with the first topic, the operation information that has been received from the elevator control device 2 (S8). The
25 publishing section 312 publishes the operation

information to the first server device 4 with the first topic every time the publishing section 312 receives the operation information from the elevator control device 2.

[0071]

5 Further, in the communication device 3, by the transmission/reception section 321 receiving the transmission initiation request, with respect to the first server device 4, the subscribing section 313 subscribes to the second topic that has been created on the basis of the
10 identification information of the elevator 1 to which the communication device 3 is connected (S7). The process in S7 may be carried out at a timing before or simultaneously with the process in S6 or may be carried out a timing at or after the start of the process in S8, provided that the
15 timing is after the communication device 3 receives the transmission initiation request in S5.

[0072]

 In S1, the transmission destination device 6 subscribes to the first topic with respect to the first server
20 device 4. Thus, in the first server device 4, the second transmission section 412 transmits, to the transmission destination device 6, the operation information of the designated elevator 1 which operation information has been published from the communication device 3 (S9). The
25 second transmission section 412 transmits the operation

information to the transmission destination device 6 every
time the second transmission section 412 receives the
operation information from the communication device 3.
Then, the transmission destination device 6 stores the
5 operation information in the storage device 7 every time
the transmission destination device 6 receives the
operation information from the first server device 4 (S10).
[0073]

Subsequently, as illustrated in Fig. 3, the terminal
10 device 9 uses the API 813 following the first use of the API
813 (S11). In the requester device 8, the requester
publishing section 812 publishes the transmission
continuation request to the first server device 4 with the
second topic that has been created on the basis of the
15 identification information of the elevator 1 (S12). This
allows the first server device 4 to transmit, to the
communication device 3 that has subscribed to the same
second topic as the second topic, the transmission
continuation request that has been published by the
20 requester device 8.

[0074]

In S7 in Fig. 2, the second topic that has been
created on the basis of the identification information of
the elevator 1 is subscribed to from the communication
25 device 3 to the first server device 4. Thus, in the first

server device 4, the first transmission section 411 transmits, to the communication device 3 that has subscribed to the second topic which has been created on the basis of the identification information of the designated elevator 1, the transmission continuation request that has been published by the requester device 8 (S13).

[0075]

Further, in the requester device 8, the requester control section 81 sequentially acquires the operation information of the designated elevator 1 from the storage device 7 in response to use of the API 813 in S11 (S14), and transmits the operation information to the terminal device 9 (S15). In and after S10 in Fig. 2, the storage device 7 stores the operation information that is generated every time a change occurs in the operating status of the elevator 1. Thus, the terminal device 9 can notify the user of the operating status of the elevator 1 in real time by sequentially receiving the operation information from the requester device 8.

[0076]

In the communication device 3, after the transmission/reception section 321 receives the transmission initiation request in S5 in Fig. 2, the first control section 31 starts timekeeping. Then, the

publishing section 312 determines whether to receive the transmission continuation request before a lapse of a prescribed period after reception of the transmission initiation request. The publishing section 312 which
5 determines that the transmission continuation request transmitted in S13 has been received before the lapse of the prescribed period continues the transmission mode. Thus, the publishing section 312 continues to publish the operation information to the first server device 4 with the
10 first topic every time the publishing section 312 receives the operation information from the elevator control device 2 (S16). Timekeeping by the first control section 31 is reset by reception of the transmission continuation request by the publishing section 312, or by the lapse of the
15 prescribed period.

[0077]

In the first server device 4, every time the second transmission section 412 receives the operation information of the designated elevator 1 from the
20 communication device 3, the second transmission section 412 transmits the operation information to the transmission destination device 6 (S17). Then, the transmission destination device 6 stores the operation information in the storage device 7 every time the
25 transmission destination device 6 receives the operation

information from the first server device 4 (S18).

[0078]

5 In contrast, the publishing section 312 which determines that the prescribed period has elapsed since reception of the transmission initiation request in S5 in Fig. 2 switches the operation mode from the transmission mode to the non-transmission mode. During the non-transmission mode, even if the communication device 3 receives the operation information from the elevator control device 2 every time the operating status of the elevator 1 changes, the communication device 3 does not publish the operation information to the first server device 4. That is, the communication device 3 stops transmission of the operation information to the first server device 4 by switching the operation mode to the non-transmission mode.

[0079]

20 In a case where the terminal device 9 uses the API 813 following the previous use of the API 813 (S21), the requester device 8 publishes the transmission continuation request to the first server device 4 with the second topic that has been created on the basis of the identification information of the elevator 1 (S22). The first server device 4 transmits, to the communication device 3 that has subscribed to the same second topic as the second

25

topic, the transmission continuation request that has been published by the requester device 8 (S23).

[0080]

Further, in the requester device 8, the requester
5 control section 81 sequentially acquires the operation
information of the designated elevator 1 from the storage
device 7 in response to use of the API 813 in S21 (S24),
and transmits the operation information to the terminal
device 9 (S25). In and after S10 in Fig. 2, the storage
10 device 7 continues to store the operation information that
is generated every time a change occurs in the operating
status of the elevator 1. Thus, the requester device 8 can
continue to transmit, to the terminal device 9, the
operation information that indicates the latest operating
15 status of the elevator 1. This allows the terminal device 9
to notify the user of the operating status of the elevator 1
in real time.

[0081]

In the communication device 3, the first control
20 section 31 starts timekeeping again after the transmission
continuation request is received in S13. Then, the
publishing section 312 determines whether to receive the
next transmission continuation request within a
prescribed period after reception of the transmission
25 continuation request. That is, the publishing section 312

determines whether to receive the transmission continuation request before a lapse of a prescribed period since last receiving the transmission continuation request. The publishing section 312 which determines that the transmission continuation request transmitted in S23 has been received before the lapse of the prescribed period continues the transmission mode. Thus, the publishing section 312 continues to publish the operation information to the first server device 4 with the first topic every time the publishing section 312 receives the operation information from the elevator control device 2 (S26).

[0082]

In the first server device 4, every time the second transmission section 412 receives the operation information of the designated elevator 1 from the communication device 3, the second transmission section 412 transmits the operation information to the transmission destination device 6 (S27). Then, the transmission destination device 6 stores the operation information in the storage device 7 every time the transmission destination device 6 receives the operation information from the first server device 4 (S28).

[0083]

Thereafter, similarly, in a case where the API 813 is used by the terminal device 9 (S31), the requester

publishing section 812 of the requester device 8 publishes the transmission continuation request with the second topic (S32). Subsequently, the first transmission section 411 of the first server device 4 transmits the transmission continuation request to the communication device 3 that has subscribed to the same second topic as the second topic (S33). Further, the requester device 8 continues to acquire the operation information from the storage device 7 (S34), and transmits the operation information to the terminal device 9 (S35).

[0084]

The publishing section 312 which determines that the transmission continuation request transmitted in S33 has been received before a lapse of a prescribed period after reception of the transmission continuation request in S23 continues the transmission mode. Thus, the publishing section 312 continues to publish the operation information to the first server device 4 with the first topic every time the publishing section 312 receives the operation information from the elevator control device 2 (S36). Then, the second transmission section 412 of the first server device 4 transmits, to the transmission destination device 6, the operation information that has been published from the communication device 3 (S37), and the transmission destination device 6 continues to

store the operation information in the storage device 7 (S38). Same applies to S41 to S48 illustrated in Fig. 4.

[0085]

In this way, the publishing section 312 continues to publish the operation information to the first server device 4 while receiving the next transmission continuation request before a lapse of a prescribed period after reception of the transmission continuation request (that is, while continuously receiving the transmission continuation request). Thus, while the terminal device 9 is continuously using the API 813, the requester device 8 can transmit, to the terminal device 9, the operation information that indicates the latest operating status of the elevator 1.

[0086]

In contrast, the publishing section 312 which determines the lapse of the prescribed period without receiving the transmission continuation request since last receiving the transmission continuation request switches the operation mode from the transmission mode to the non-transmission mode. As illustrated in Fig. 4, the publishing section 312 which determines that the next transmission continuation request has not been received before the lapse of the prescribed period after reception of the transmission continuation request in S43 switches the

operation mode from the transmission mode to the non-transmission mode (S51).

[0087]

As described earlier, the elevator control device 2
5 transmits the operation information to the communication
device 3 every time a change occurs in the operating status
of the elevator 1 controlled by the elevator control device
2. However, in the communication device 3, after the
operation mode is switched to the non-transmission mode,
10 the publishing section 312 does not publish the operation
information to the first server device 4 even if the
publishing section 312 receives the operation information.
That is, the communication device 3 stops transmission of
the operation information to the first server device 4 by
15 switching the operation mode to the non-transmission
mode.

[0088]

Thus, the communication device 3 can transmit the
operation information to the first server device 4 only
20 while continuously receiving the transmission
continuation request after receiving the transmission
initiation request. That is, the operation information can
be transmitted to the first server device 4 only while the
API 813 is being continuously used. Thus, while the API
25 813 is being used, the terminal device 9 can notify the

user of the operating status of the elevator 1 in real time.
In contrast, in a situation where the API 813 is not used,
extra communication load can be prevented or reduced
because a communication session in accordance with the
5 first communication method is not established between the
communication device 3 and the first server device 4.

[0089]

In a case where a shared elevator 1 is designated in
a plurality of terminal devices 9 and any of the terminal
10 devices 9 uses the API 813, the requester device 8
transmits the transmission initiation request for the
operation information of the shared elevator 1 to the first
server device 4. On the basis of such transmission, the
communication device 3 can switch the operation mode to
15 the transmission mode.

[0090]

As described earlier, the communication device 3
which receives the next transmission continuation request
before a lapse of a prescribed period after reception of the
20 transmission continuation request continues the
transmission mode. The requester device 8 transmits the
transmission continuation request to the first server
device 4 in a case where any of the terminal devices 9 is
using the API 813. Thus, while any of the terminal devices
25 9 is using the API 813, the communication device 3

continues the transmission mode and continues to publish the operation information to the first server device 4.

[0091]

5 In contrast, in a case where none of the terminal devices 9 uses the API 813, the requester device 8 stops transmitting the transmission continuation request to the first server device 4. That is, in a case where it is considered that none of users browses the operation information of the designated elevator 1, the requester
10 device 8 stops transmitting the transmission continuation request to the first server device 4. Thus, the communication device 3 which, due to none of the terminal devices 9 using the API 813, does not receive the transmission continuation request before a lapse of a
15 prescribed period since last receiving the transmission continuation request from the first server device 4 switches the operation mode to the non-transmission mode. The communication device 3 stops transmission of the designated operation information to the first server
20 device 4 by switching the operation mode to the non-transmission mode.

[0092]

Thus, in a case where a plurality of users attempt to browse the operating status of the designated elevator 1,
25 the communication device 3 continues the switched

transmission mode. This allows at least one of the plurality of terminal devices 9 to notify the users of the operating status of the elevator 1 in real time. Then, only after a state is reached where none of the users browses the operating status of the designated elevator 1, the communication device 3 switches the operation mode to the non-transmission mode and stops transmission of the operation information to the first server device 4.

[0093]

Aspects of the present invention can also be expressed as follows:

A data transmission system in accordance with Aspect 1 of the present invention includes: a server device that functions as a broker; and at least one communication device, the server device and the at least one communication device being capable of communicating with each other with use of a publishing/subscribing communication method, the at least one communication device including a reception section that receives, from an elevator control device which is connected to the at least one communication device so as to be capable of communicating with the at least one communication device, operation information pertaining to an operating status of an elevator controlled by the elevator control device, a publishing section that switches an operation

mode to one of (i) a transmission mode in which, every time the reception section receives the operation information, publishing of the operation information to the server device with a prescribed first topic is carried out and (ii)

5 a non-transmission mode in which the publishing is not carried out, and a subscribing section that, when the operation mode is switched to the transmission mode, subscribes to, with respect to the server device, a second topic created on the basis of identification information of

10 the elevator, the server device including a first transmission section that transmits, to the at least one communication device which has subscribed to the second topic with respect to the server device, a transmission continuation request for the operation information which

15 transmission continuation request has been published from a requester device to the server device with the second topic, and during the transmission mode, the publishing section continuing the transmission mode in a case where the at least one communication device receives

20 the transmission continuation request before a lapse of a prescribed period since last receiving the transmission continuation request, and switching the operation mode to the non-transmission mode in a case where the prescribed period has elapsed without the at least one communication

25 device receiving the transmission continuation request

since last receiving the transmission continuation request.
[0094]

In Aspect 2 of the present invention, a data transmission system is configured such that, in Aspect 1,
5 the elevator control device transmits the operation information to the at least one communication device every time a change occurs in the operating status of the elevator controlled by the elevator control device.

[0095]

10 In Aspect 3 of the present invention, a data transmission system is configured such that, in Aspect 1 or 2, the requester device has a function for providing the operation information of a designated elevator which operation information is capable of being used by a
15 terminal device of a user of the data transmission system, and while the operation information is being provided from the requester device to the terminal device at a prescribed frequency by the terminal device using the function, publishes the transmission continuation request to the
20 server device with the second topic which has been created on the basis of identification information of the designated elevator.

[0096]

In Aspect 4 of the present invention, a data
25 transmission system is configured such that, in any one

of Aspects 1 to 3, the server device includes a second transmission section that, upon receiving the operation information which has been published from the publishing section, transmits the received operation information to a transmission destination device which has subscribed to the first topic with respect to the server device, every time the transmission destination device receives the operation information from the server device, the transmission destination device carries out a process for storing the received operation information in a storage device, and the requester device has a function for providing the operation information of a designated elevator which operation information is capable of being used by a terminal device of a user of the data transmission system, and while the terminal device is using the function, sequentially acquires the operation information of the designated elevator from the storage device and transmits the acquired operation information to the terminal device.

[0097]

In Aspect 5 of the present invention, a data transmission system is configured such that, in any one of Aspects 1 to 4, the requester device has a function for providing the operation information of a designated elevator which operation information is capable of being used by a terminal device of a user of the data

transmission system, and in a case where the function is used by the terminal device after the prescribed period has elapsed since the function was last used by the terminal device, executes a process for transmitting a transmission initiation request for the operation information to the at least one communication device, and the publishing section switches the operation mode to the transmission mode when the at least one communication device receives the transmission initiation request.

[0098]

In Aspect 6 of the present invention, a data transmission system is configured such that, in any one of Aspects 3 to 5, the function is provided through an application programming interface (API).

[0099]

[Software implementation example]

Functions of each device (excluding the storage device 7) (hereinafter called "device") constituting the data transmission system 100 can be carried out by a program that is for causing a computer to function as the device and that is for causing the computer to function as each of control blocks of the device (in particular, each of sections included in the first control section 31, the second control section 32, the server control section 41, and the requester control section 81).

[0100]

In this case, the device includes a computer that has, as hardware for executing the program, at least one control device (e.g., a processor) and at least one storage
5 device (e.g., a memory). The functions described in the embodiments are carried out by using the control device and the storage device to execute the program.

[0101]

The program may be recorded in at least one non-
10 transitory computer-readable recording medium. Such a recording medium may be included or need not be included in the device. In the latter case, the program may be supplied to the device via any wired or wireless transmission medium.

15 [0102]

Some or all of the functions of the control blocks can be realized by a logic circuit. For example, the present invention encompasses, in its scope, an integrated circuit in which a logic circuit that functions as each of the
20 control blocks is formed. Alternatively, the functions of the control blocks can be realized by, for example, a quantum computer.

[0103]

Further, each of the processes described in the
25 embodiments may be carried out by artificial intelligence

(AI). In this case, AI may be operated by the control device, or may be operated by another device (for example, an edge computer, a cloud server, or the like).

[0104]

5 [Additional remarks]

The present invention is not limited to the embodiments, but can be altered by a skilled person in the art within the scope of the claims. The present invention also encompasses, in its technical scope, any embodiment
10 derived by combining technical means disclosed in differing embodiments.

Reference Signs List

[0105]

- 15 1 Elevator
2 Elevator control device
3 Communication device
4 First server device (server device)
6 Transmission destination device
20 7 Storage device
8 Requester device
9 Terminal device
100 Data transmission system
311 Reception section
25 312 Publishing section

313 Subscribing section

411 First transmission section

412 Second transmission section

813 API (function)

Claims

[Claim 1]

A data transmission system comprising: a server
5 device that functions as a broker; and at least one
communication device, the server device and the at least
one communication device being capable of communicating
with each other with use of a publishing/subscribing
communication method,

10 the at least one communication device including

a reception section that receives, from an
elevator control device which is connected to the at least
one communication device so as to be capable of
communicating with the at least one communication
15 device, operation information pertaining to an operating
status of an elevator controlled by the elevator control
device,

a publishing section that switches an operation
mode to one of (i) a transmission mode in which, every time
20 the reception section receives the operation information,
publishing of the operation information to the server
device with a prescribed first topic is carried out and (ii)
a non-transmission mode in which the publishing is not
carried out, and

25 a subscribing section that, when the operation

mode is switched to the transmission mode, subscribes to,
with respect to the server device, a second topic created
on the basis of identification information of the elevator,

the server device including a first transmission
5 section that transmits, to the at least one communication
device which has subscribed to the second topic with
respect to the server device, a transmission continuation
request for the operation information which transmission
continuation request has been published from a requester
10 device to the server device with the second topic, and

during the transmission mode, the publishing
section continuing the transmission mode in a case where
the at least one communication device receives the
transmission continuation request before a lapse of a
15 prescribed period since last receiving the transmission
continuation request, and switching the operation mode to
the non-transmission mode in a case where the prescribed
period has elapsed without the at least one communication
device receiving the transmission continuation request
20 since last receiving the transmission continuation request.

[Claim 2]

The data transmission system as set forth in claim
1, wherein

25 the elevator control device transmits the operation

information to the at least one communication device every time a change occurs in the operating status of the elevator controlled by the elevator control device.

5 [Claim 3]

The data transmission system as set forth in claim 1, wherein

the requester device has a function for providing the operation information of a designated elevator which operation information is capable of being used by a terminal device of a user of the data transmission system, and while the operation information is being provided from the requester device to the terminal device at a prescribed frequency by the terminal device using the function, publishes the transmission continuation request to the server device with the second topic which has been created on the basis of identification information of the designated elevator.

20 [Claim 4]

The data transmission system as set forth in claim 1, wherein

the server device includes a second transmission section that, upon receiving the operation information which has been published from the publishing section,

transmits the received operation information to a transmission destination device which has subscribed to the first topic with respect to the server device,

every time the transmission destination device
5 receives the operation information from the server device, the transmission destination device carries out a process for storing the received operation information in a storage device, and

the requester device has a function for providing the
10 operation information of a designated elevator which operation information is capable of being used by a terminal device of a user of the data transmission system, and while the terminal device is using the function, sequentially acquires the operation information of the
15 designated elevator from the storage device and transmits the acquired operation information to the terminal device.

[Claim 5]

The data transmission system as set forth in claim
20 1, wherein

the requester device has a function for providing the operation information of a designated elevator which operation information is capable of being used by a terminal device of a user of the data transmission system,
25 and in a case where the function is used by the terminal

device after the prescribed period has elapsed since the
function was last used by the terminal device, executes a
process for transmitting a transmission initiation request
for the operation information to the at least one
5 communication device, and

the publishing section switches the operation mode
to the transmission mode when the at least one
communication device receives the transmission initiation
request.

10

[Claim 6]

The data transmission system as set forth in any one
of claims 3 to 5, wherein

the function is provided through an application
15 programming interface (API).