(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 October 2015 (15.10.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/156560 A1

(51) International Patent Classification:
G06Q 50/10 (2012.01)

(21) International Application Number:
PCT/KR2015/003432

(22) International Filing Date:
6 April 2015 (06.04.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10-2014-0043800 11 April 2014 (11.04.2014) KR

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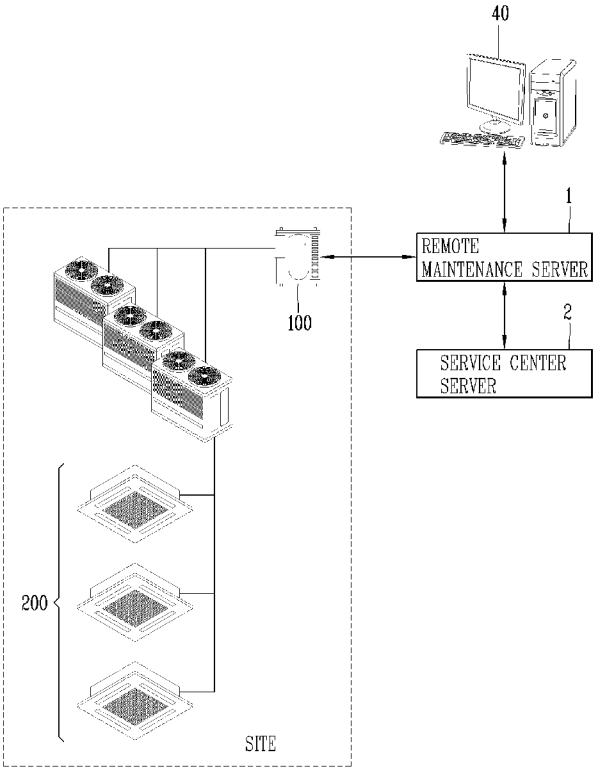
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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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(54) Title: REMOTE MAINTENANCE SERVER, TOTAL MAINTENANCE SYSTEM INCLUDING THE REMOTE MAINTENANCE SERVER AND METHOD THEREOF



(57) Abstract: The present disclosure discloses a remote maintenance system including a remote maintenance server configured to remotely control facilities, and a service center server configured to receive information on an abnormal facility among the facilities from the remote maintenance server, and perform service registration based on the information on the abnormal facility.

WO 2015/156560 A1

Published:

— *with international search report (Art. 21(3))*

Description

Title of Invention: REMOTE MAINTENANCE SERVER, TOTAL MAINTENANCE SYSTEM INCLUDING THE REMOTE MAINTENANCE SERVER AND METHOD THEREOF

Technical Field

[1] The present disclosure relates to a remote maintenance server, a remote maintenance system including the same and a remote maintenance method thereof, and more particularly, to a remote maintenance system or the like in which a remote maintenance server and a service center server are mutually linked with each other.

[2]

Background Art

[3] In recent years, the need for a remote maintenance system (remote total maintenance system (TMS)) for remotely maintaining a plurality of control regions (control sites, maintenance points) provided with a facility consuming energy has been recognized.

[4] Here, the plurality of control regions may be structures or buildings disposed at various locations.

[5] In case of conventional structure or buildings, as facilities provided therein are modernized, automatic control systems for automatically controlling sub-systems (facilities or apparatuses) such as power, lighting, conditioning, fire, security, and the like are expanded.

[6] In line with that, the development of central monitoring systems such as a building management system (BMS) capable of managing sub-systems in a totally integrated manner have been actively carried out.

[7] However, the role of such a building management system is concentrated on controlling the functions of facilities provided in one building.

[8] Accordingly, a management system for maintaining, repairing facilities provided in each building and managing an amount of energy (or power) consumption thereof is needed, and in particular, a remote total maintenance system for remotely managing a plurality of controls sites in an integrated manner has been required.

[9]

Disclosure of Invention

Technical Problem

[10] A technical task aspect of the present disclosure is to provide a remote maintenance system in which a remote maintenance server and a service center server are mutually linked with each other to receive automated post-processing for an abnormal facility, a

remote maintenance system including the same, and a remote maintenance method using the same.

[11]

Solution to Problem

[12] As a means for solving the foregoing technical task, the present disclosure discloses a remote maintenance system, including a remote maintenance server configured to remotely control facilities; and a service center server configured to receive information on an abnormal facility among the facilities from the remote maintenance server, and perform service registration based on the information on the abnormal facility.

[13] According to an embodiment, upon receiving a service provision request for the abnormal facility, the remote maintenance server may transmit a service registration request to the service center server based on the service provision request, and the service center server may perform service registration based on the information on the abnormal facility according to the service registration request.

[14] According to an embodiment, the remote maintenance server may perform user authentication prior to receiving service provision request information on the abnormal facility.

[15] According to an embodiment, the remote maintenance system may further include a gateway configured to convert a protocol to enable communication between the facility and the remote maintenance server.

[16] According to an embodiment, the gateway may generate a control command to transmit it to the facility or transmit a control command received from the remote maintenance server to the facility.

[17] According to an embodiment, the remote maintenance server may include a communication unit configured to receive the status information of the facility from the facility, and a controller configured to determine whether or not the facility is abnormal based on the received status information of the facility, wherein the communication unit transmits information on an abnormal facility that has been determined by the controller to the service center server.

[18] According to an embodiment, the controller may set a facility selected by an external input received from an input unit to an abnormal facility.

[19] According to an embodiment, the information on the abnormal facility may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[20] According to an embodiment, the site information may include a type of facility

installed in the site, a number of facility installations for each type of facility or location information of the site.

[21] According to an embodiment, the product information of the abnormal facility may include a type of the abnormal facility, a model name of the abnormal facility, an identifier of the abnormal facility or a name of the abnormal facility.

[22] According to an embodiment, the failure information of the abnormal facility may include a failure code of the abnormal facility, and when there are a multiple abnormalities for a facility, the failure information may further include a number of failures for each of the abnormal facilities or a number of failures for each facility with which communication is not made.

[23] According to an embodiment, upon receiving the service registration request, the service center server may transmit an alarm signal on the service registration act to at least one repairman's terminal.

[24] According to an embodiment, the service center server may maintain a service schedule for the abnormal facility.

[25] According to an embodiment, the remote maintenance server may transmit information on an abnormal facility among the facilities to a service center server to allow the service center server to perform service registration based on the information on the abnormal facility.

[26] According to an embodiment, upon receiving a service provision request for the abnormal facility, the remote maintenance server may transmit a service registration request to the service center server based on the service provision request to allow the service center server to perform service registration based on the information on the abnormal facility.

[27] According to an embodiment, the information on the abnormal facility may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[28] Furthermore, the present disclosure discloses a remote maintenance server for remotely controlling facilities, and the remote maintenance server may include a communication unit configured to receive the status information of the facility from the facility, a controller configured to determine whether or not the facility is abnormal based on the received status information of the facility, and a service unit configured to perform service registration based on information on the abnormal facility.

[29] According to an embodiment, upon receiving a service provision request for the abnormal facility from an external input, the service unit may perform service registration based on information on the abnormal facility according to the service provision request.

[30] According to an embodiment, the information on the abnormal facility may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[31] In addition, the present disclosure discloses a remote maintenance method for remotely controlling facilities using a remote maintenance server, and the method may include allowing the remote maintenance server to receive the status information of the facility from the facility, allowing the remote maintenance server to determine whether or not the facility is abnormal based on the received status information of the facility, transmitting information on an abnormal facility that has been determined by the remote maintenance server to a service center server, and allowing the service center server to perform service registration based on the information on the abnormal facility.

[32] According to an embodiment, the method may further include allowing the service center server to provide the information on the abnormal facility to an administrator, allowing the remote maintenance server to receive a service provision request for the abnormal facility, and allowing the remote maintenance server to transmit a service registration request to the service center server based on the service provision request, wherein said performing service registration performs service registration based on information on the abnormal facility according to the service registration request.

[33] According to an embodiment, the method may further include allowing the remote maintenance server to perform user authentication prior to receiving service provision request information for the abnormal facility.

[34] According to an embodiment, said receiving the status information of the facility may include allowing a gateway to convert a protocol so as to transmit data received from the facility to the remote maintenance server.

[35] According to an embodiment, the information on the abnormal facility may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[36] According to an embodiment, the site information may include a number of facility installations of the site or location information of the site.

[37] According to an embodiment, the product information of the abnormal facility may include a type of the abnormal facility, a model name of the abnormal facility, an identifier of the abnormal facility or a name of the abnormal facility.

[38] According to an embodiment, the failure information of the abnormal facility may include a failure code of the abnormal facility, and when there are multiple abnormalities for a facility, the failure information may further include a number of failures

for each of the abnormal facilities or a number of failures for each facility with which communication is not made.

[39] According to an embodiment, the method may further include allowing the service center server to transmit an alarm signal on the service registration act to at least one repairman's terminal upon receiving the service registration request.

[40] According to an embodiment, the method may further include allowing the service center server to receive an inquiry request for a service schedule of the abnormal facility, and allowing the service center server to provide the service schedule according to the inquiry request.

[41] Furthermore, the present disclosure discloses a computer readable recording medium on which a computer program for executing the remote maintenance method is written.

Advantageous Effects of Invention

[42] A remote maintenance server, a remote maintenance system including the same, and a remote maintenance method thereof according to an embodiment disclosed in the present disclosure may automate a post-processing reception for an abnormal facility among facilities controlled by the remote maintenance server.

[43] As described above, the service center server may be linked with the remote maintenance server, thereby having an effect of receiving correct information without additionally entering information such as the site or location information of an abnormal facility when receiving post-processing.

[44] Furthermore, a remote maintenance server, a remote maintenance system including the same, and a remote maintenance method thereof according to an embodiment disclosed in the present disclosure may perform user authentication upon receiving a service provision request, thereby having an effect of blocking a service request from an unauthorized person as well as preventing intrusion on an abnormal facility.

[45]

Brief Description of Drawings

[46] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[47] In the drawings:

[48] FIG. 1A is a conceptual view in the aspect of relationship between constituent elements illustrating a remote total maintenance system according to an embodiment disclosed in the present disclosure;

[49] FIG. 1B is a conceptual view in the aspect of geographical location relationship between constituent elements illustrating a remote total maintenance system according

to an embodiment disclosed in the present disclosure;

[50] FIG. 2 is a configuration diagram illustrating the configuration of a remote maintenance system according to an embodiment disclosed in the present disclosure;

[51] FIG. 3 is an exemplary view illustrating a specific connection relationship between a local controller and facilities or apparatuses in a remote total maintenance system (or remote maintenance system) according to an embodiment disclosed in the present disclosure;

[52] FIG. 4 is an exemplary view specifically illustrating a connection structure between a remote maintenance server and a plurality of local controllers in a remote total maintenance system (or remote maintenance system) according to an embodiment disclosed in the present disclosure;

[53] FIG. 5 is a configuration diagram briefly illustrating the configuration of a remote maintenance system according to an embodiment disclosed in the present disclosure;

[54] FIG. 6 is a view briefly illustrating the configuration of a remote maintenance server according to an embodiment disclosed in the present disclosure;

[55] FIG. 7 is a view illustrating a screen provided to an administrator according to an embodiment disclosed in the present disclosure;

[56] FIG. 8 is a view illustrating another screen provided to an administrator according to an embodiment disclosed in the present disclosure;

[57] FIG. 9 is an exemplary view illustrating an external terminal connected to a remote maintenance server according to an embodiment disclosed in the present disclosure;

[58] FIG. 10 is a configuration diagram illustrating the configuration of a terminal connected to a remote maintenance server disclosed in the present disclosure; and

[59] FIG. 11 is a step-by-step flow chart illustrating a remote maintenance method according to an embodiment of the present disclosure.

[60]

Mode for the Invention

[61] In the following, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings to such an extent that the present invention can be easily embodied by a person having ordinary skill in the art to which the present invention pertains. However, the present invention may be implemented in various different forms, and therefore, the present invention is not limited to the illustrated embodiments. In order to clearly describe the present invention, parts not related to the description are omitted, and like reference numerals designate like constituent elements throughout the specification.

[62] Hereinafter, detailed technical content to be implemented by the present disclosure will be specifically and clearly described with reference to the accompanying

drawings.

[63] Remote total maintenance system

[64] Hereinafter, a remote total maintenance system (or remote maintenance system) according to an embodiment disclosed in the present disclosure will be described in detail with reference to FIGS. 1A through 4.

[65] However, a remote total maintenance system disclosed in FIGS. 1A through 4 is only illustrative, and it should be understood by those skilled in the art that technologies disclosed in the present disclosure can be applicable to various types of remote maintenance systems, point maintenance systems, store maintenance systems or chain store maintenance systems.

[66] FIGS. 1A and 1B are conceptual views illustrating a remote total maintenance system according to an embodiment disclosed in the present disclosure.

[67] FIG. 1A is a conceptual view in the aspect of relationship between constituent elements illustrating a remote total maintenance system according to an embodiment disclosed in the present disclosure.

[68] Referring to FIG. 1A, a remote total maintenance system 10 according to an embodiment of the present disclosure may include at least one facility 200 consuming energy, a local controller 100 configured to control or maintain the at least one facility 200, and a remote maintenance server 1.

[69] The remote maintenance server 1 may perform the role of maintaining, repairing and managing at least one control region, control side or maintenance point (site A ~ site D).

[70] Each of the at least one control region (site A ~ site D) may include the at least one facility 200 consuming energy or power.

[71] Furthermore, the at least one control region (site A ~ site D) may include a local controller 100 for controlling or managing the at least one facility.

[72] The remote maintenance server 1 may remotely monitor the status of at least one facility 200 provided in the at least one control region (site A ~ site D), respectively, thereby performing a maintenance, repair and management function on the at least one facility 200.

[73] Here, the status of the at least one facility 200 may be a status associated with at least one of a control setting state, an operation state and a fault state corresponding to the at least one facility 200.

[74] Here, the control setting state may denote a control attribute or control parameter on the at least one facility 200 and denote a variable having various control objects under the control of the facility.

[75] For example, when the facility is an air conditioner, the control setting, control attribute or control parameter may be a target temperature (or set temperature), an

upper limit temperature, a lower limit temperature, a flow rate, whether it is running or stopped, and the like.

[76] On the contrary, for example, when the facility is a lighting fixture, the control setting, control attribute or control parameter may be illumination, brightness, and the like.

[77] The remote maintenance server 1 may detect a fault status or the like of the at least one facility 200. In this case, the remote maintenance server 1 may acquire status information on the at least one facility 200 from the local controller 100.

[78] When a specific facility of the at least one facility 200 is failed, the remote maintenance server 1 may access a service center (specifically, service center server) (not shown) providing a service for repairing the facility to request a repair work so as to carry out repair on the specific facility. Upon receiving a request for the repair work, the service center may carry out a work for dispatching a service technician for repair work to a control site provided with the specific facility. The detailed description thereof will be described later.

[79] Communication between the remote maintenance server 1 and the local controller 100 may be carried out in various communication modes or communication protocols.

[80] For example, the remote maintenance server 1 and the local controller 100 may perform communication in at least one communication mode or communication protocol of a mobile communication network, Transmission Control Protocol/Internet Protocol (TCP/IP), Local Area Network (LAN), Wireless LAN, Wi-Fi, Wireless Broadband (Wibro) and World Interoperability for Microwave Access (Wimax).

[81] Communication between the local controller 100 and the at least one facility 200 may be carried out in various communication modes or communication protocols.

[82] For example, the local controller 100 and the at least one facility 200 may perform communication in a wired communication mode such as RS-232, RS-485, universal serial bus (USB), IEEE 1394, Thunderbolt, and the like.

[83] Furthermore, the remote maintenance system 10 may further include an additional terminal 40 connected to the remote maintenance server 1 in a wired or wireless manner.

[84] A user or administrator of the remote maintenance system 10 may access the remote maintenance server 1 through the additional terminal 40 to remotely maintain the at least one control region (site A ~ site D).

[85] The additional terminal 40 may denote a terminal in a broad sense to have a concept containing a portable terminal. For example, the additional terminal 40 may denote various devices or apparatuses, such as a personal computer, a digital television (TV), a smart TV, a smart phone, a portable terminal, a mobile terminal, a personal digital assistant (PDA), a portable multimedia player (PMP) terminal, a laptop computer, a

Wibro terminal, an internet protocol television terminal (IPTV), a digital broadcast terminal, a telematics terminal, a navigation terminal, an audio video navigation terminal, a television, a 3D television, an audio/video (A/V) system, a home theater system, an information providing center, a call center, and the like.

[86] FIG. 1B is a conceptual view in the aspect of geographical location relationship between constituent elements illustrating a remote total maintenance system according to an embodiment disclosed in the present disclosure.

[87] Referring to FIG. 1B, the remote total maintenance system 10 according to an embodiment of the present disclosure may perform a function of remotely maintaining control regions, control sites or maintenance points (11-19) disposed at various locations across the country.

[88] The remote maintenance system 10 may include at least one control region (11-19) provided with a facility (or facility device) consuming energy, and the remote maintenance server 1 configured to maintain the at least one control region (11-19).

[89] The at least one control region (11-19) may correspond to site A through site D illustrated in FIG. 1A.

[90] The remote maintenance system 10 may having a structure in which the at least one control region (11-19) are mutually connected across the country.

[91] As illustrated in FIG. 1B, the remote maintenance system 10 may form one network in which the at least one control region (11-19) provided with a facility device are distributed over a broad region, and connected to the remote maintenance server 1.

[92] Here, the remote maintenance system 10 may further include a regional server (not shown) connected to at least one specific control region of the at least one control region (11-19) to maintain the specific control region, and connected to the remote maintenance server 1.

[93] The regional server may be an additional server for relaying data between the specific control region and the remote maintenance server 1 or any one of the plurality of control regions may be operated as a server.

[94] Here, each of the control regions (11-19) may be distributed across the country or in some areas.

[95] Furthermore, each of the control regions (11-19) may be connected to the remote maintenance server 1, and the remote maintenance server 1 may monitor a plurality of control regions to maintain the operation.

[96] For example, each control region may denote a maintenance object that should be collectively maintained by the center (or headquarter) or a maintenance point that should be maintained, repaired and managed by a remote maintenance server, and may have a broad concept including a structure, a building, a store, a mall and a school, and the like.

[97] For example, when the control region is a store, the control region may be a chain store such as a convenience store, a bakery, and the like.

[98] The remote maintenance system 10 may form at least one control region (11-19) provided with an air conditioner as well as other facility devices as a network as illustrated in FIG. 1B, thereby allowing the remote maintenance server 1 to maintain and control a plurality of control regions distributed thereover.

[99] Here, the remote maintenance system 10 may maintain consumption power (or energy consumption) for each point in a national level as well as in a regional level, and moreover, broadly maintain it over a wide range including a plurality of countries.

[100] Each of the at least one control region (11-19) may include one or more facilities (or facility devices) and apparatuses.

[101] As a facility (or sub-system) provided within the control region, the facility may denote an air conditioner, a ventilator, an air conditioning unit (air handling unit), a fan, a boiler, a cooling tower, a pump, a temperature/humidity sensor, a chiller unit, a lighting fixture, a power device, a refrigerator, a freezer, a showcase, a fire system, and the like.

[102] Furthermore, when a cooling tower system is used as a facility, for example, the apparatus may denote a cooling tower, a pump, a temperature sensor, and the like.

[103] According to an embodiment disclosed in the present disclosure, the remote maintenance server 1 may acquire information on an amount of energy consumption during a specific time period in the at least one control region (11-19).

[104] Here, the specific time period may be specified or set by the user.

[105] Furthermore, the specific time period may be specified in the unit of days, weeks or months.

[106] For example, the remote maintenance server 1 may acquire information on the amount of energy consumption per each day. Furthermore, for example, the remote maintenance server 1 may acquire information on an amount of energy consumption from January 1 to January 20.

[107] According to an embodiment, the remote maintenance server 1 may divide the at least one control region (11-19) into at least one group (control group, maintenance group, family, control family or maintenance family) based on a specific classification criterion.

[108] There may be a plurality of specific classification criteria. Accordingly, when there is a plurality of specific classification criteria, classification into the at least one group may be carried out on the basis of the foregoing multidimensional clustering techniques.

[109] The classification criterion may be a classification criterion according to regional characteristics (characteristics for a control site or maintenance point) for the at least

one control region (11-19).

[110] According to an embodiment, the regional characteristics may include at least one of a static attribute and a dynamic attribute of the control region.

[111] The static attribute may be at least one of a size of the at least one control region (11-19), a location of the at least one control region (11-19), and a facility capacity for a facility installed (or provided) in the at least one control region (11-19).

[112] For example, an attribute for the size of the at least one control region (11-19) may denote an area, a floor height, a number of floors, and a window width, and the like of the region.

[113] Furthermore, for example, an attribute for the location of the at least one control region (11-19) may denote a direction (east, west, south, north), a latitude, a longitude and geographical location, and the like, at which the at least one control region (11-19) is located.

[114] Furthermore, for example, the facility capacity for a facility may denote a number of lighting fixtures, a power consumption of lighting fixture, a number of air conditioners, a capacity of air conditioner, a number of refrigeration facilities, a capacity of refrigeration facility, and the like.

[115] Furthermore, the dynamic attribute may be weather information corresponding to a point (or region) at which the at least one control region (11-19) is located.

[116] For example, the dynamic attribute may include at least one of daily average ambient temperature, maximum ambient temperature and minimum ambient temperature, rainfall, snowfall and cloudiness corresponding to a point (or region) at which the at least one control region (11-19) is located.

[117] Specifically, the remote maintenance server 1 may divide the at least one control region (11-19) into a plurality of groups based on a store size (area) and a scale of lighting (number of lighting fixtures).

[118] For example, the remote maintenance server 1 may divide the at least one control region (11-19) into a large-scale group (first group) with a large size of the control region and a large scale of the lighting, a medium-scale group (second group) with a medium size of the control region and a medium scale of the lighting, and a small-scale group (third group) with a small size of the control region and a small scale of the lighting.

[119] In this case, each of the first to the third group may include at least one control region corresponding to this.

[120] According to an embodiment, there may be a plurality of the classification criteria.

[121] For example, the classification criteria may include a plurality of classification criteria for the foregoing static attribute and dynamic attribute of a control region.

[122] In this case, the remote maintenance server 1 may apply a multidimensional

clustering technique to classify the at least one control region (11-19) into the at least one group according to the plurality of classification criteria.

[123] The multidimensional clustering technique may be carried out in various ways.

[124] For example, the multidimensional clustering technique may be a K-means clustering technique.

[125] The K-means clustering technique may denote a classification or clustering method of selecting a number (k) of individual clusters and criterion thereof from a plurality of data sets, and allowing the means close to the relevant criterion to belong to the relevant cluster.

[126] In addition, it should be clearly understood by those skilled in the art that various clustering techniques can be applicable to a technology disclosed in the present disclosure.

[127] According to an embodiment, classification into the at least one group may be carried out in various requests.

[128] For example, the remote maintenance server 1 may periodically perform the classification work according to a user request (or user input).

[129] Furthermore, for example, the remote maintenance server 1 may perform the classification work according to the need, and specifically for example, the remote maintenance server 1 may automatically perform the classification work when a new control region, control site or maintenance point is added.

[130] Furthermore, for example, the remote maintenance server 1 may periodically perform the classification. Specifically, for example, the remote maintenance server 1 may perform the classification in the unit of days, weeks or months.

[131] Considering a specific scenario of the execution of group classification according to an embodiment disclosed in the present disclosure, the remote maintenance server 1 may classify control regions into groups according to a static attribute of the foregoing classification criteria.

[132] It is because the static attribute is not a frequently modified or changed classification criterion in terms of time, and classification is carried out only when registering a new control region.

[133] Furthermore, the remote maintenance server 1 may reclassify the control regions in the unit of days on the basis of a classification result based on the dynamic attribute according to a dynamic attribute of the foregoing classification criteria.

[134] It is because the dynamic attribute has a characteristic of being changed in the unit of days and periodic classification is required.

[135] Finally, the remote maintenance server 1 may generate a control command in the unit of groups based on a final group sequentially classified based on the static attribute and the dynamic attribute to control energy or power consumption in the unit of groups.

[136] FIG. 2 is a configuration diagram illustrating the configuration of a remote maintenance system according to an embodiment of the present disclosure.

[137] Referring to FIG. 2, the remote maintenance system (or remote total maintenance system) 10 according to an embodiment of the present disclosure may include a remote maintenance server 1, a local controller 100', 100" connected to the remote maintenance server 1 via a communication network, at least one facility 200', 200" and apparatus 300', 300".

[138] As a sub-system constituting the remote maintenance system 10, the facility 200', 200" may denote an air conditioner, a ventilator, an air conditioning unit, a fan, a boiler, a cooling tower, a pump, a temperature/humidity sensor, a freezer, a lighting fixture, a power device, a fire system, and the like.

[139] Furthermore, when a cooling tower system is used as a facility, for example, the apparatus 300', 300" may denote a cooling tower, a pump, a temperature senor, and the like.

[140] As a device for comprehensively controlling, monitoring or maintaining the entire situation of a building, the remote maintenance server 1 may include the facilities 200', 200", for example, additional terminals for machine equipment, lighting, power, access control, disaster prevention, parking management, facilities management, and the like.

[141] The remote maintenance server 1 may be an automatic server for sharing information with the local controller 100', 100" through network communication, and controlling, monitoring or maintaining the facility 200', 200" and apparatus 300', 300" contained therein.

[142] Here, the first local controller 100' and the second local controller 100" may denote local controllers provided at different control regions, control sites or maintenance points, respectively.

[143] According to an embodiment disclosed in the present disclosure, the remote maintenance server 1 may collect information on facilities provided or disposed in the control regions, respectively, to efficiently maintain, repair or manage each of the control regions, respectively.

[144] For the purpose of this, the remote maintenance server 1 may provide a user interface or input/output screen capable of receiving a user input and displaying the maintenance or repair process for a facility according to the user input and processing result thereof.

[145] The control region, control site or maintenance point may denote a maintenance object that should be collectively maintained by the center (or headquarter) or a maintenance point that should be maintained, repaired and managed by a remote maintenance server, and may have a broad concept including a structure, a building, a store, a mall and a school, and the like.

[146] Here, the structure or building may denote an architectural structure, and may denote

a mall, a convenience store, a store, a home, an office, an officetel, a factory building, a school, a hospital building, or the like.

[147] The local controller 100', 100" may be connected to the remote maintenance server 1 via a communication network to execute a management program received from the remote maintenance server 1.

[148] The local controller 100', 100" may be referred to as an advanced control platform (ACP) due to the role of maintaining, repairing, controlling and managing the facilities 200', 200" within the control region.

[149] Furthermore, the local controller 100', 100" may communicate and exchange information with the remote maintenance server 1, and receive and execute the management program or a control command according to the management program to control the facilities 200', 200".

[150] Furthermore, the local controller 100', 100" may write or store facility-related information such as control output and status change of facilities within a control region through one or more apparatuses 400, 400' provided in the facilities 200', 200", for example, sensors and manipulation devices, respectively.

[151] The local controller 100', 100" may be a microcomputer configured to control, maintain or monitor the facility 200', 200" or apparatus 300', 300" according to the management program, for example.

[152] In other words, the local controller 100', 100" may be connected to the remote maintenance server 1 via a communication network (P10) to transmit and receive required information with each other.

[153] Accordingly, the local controller 100', 100" may directly control an input/output signal of the facility 200', 200" or apparatus 300', 300" to monitor, maintain or control air conditioning and other facilities provided in the control region.

[154] Specifically, the local controller 100', 100" may be connected between the remote maintenance server 1 and the one or more facilities 200', 200" to receive a management program or a control command according to the management program to execute it.

[155] Furthermore, the local controller 100', 100" may transmit the execution result to the remote maintenance server 1. To this end, the remote maintenance server 1 may include a communication unit as a device for transmitting the management program or a control command according to the management program and receiving an execution result according to the management program or a control command according to the management program from the local controller 100', 100".

[156] The local controller 100', 100" may further include a display unit as a device for displaying the execution result on a user screen.

[157] The remote maintenance server 1 and the local controller 100', 100" may be connected to each other via a communication network (P10).

[158] According to an embodiment disclosed in the present disclosure, the communication network may include various communication protocols.

[159] For example, the remote maintenance server 1 and the local controller 100', 100" may be at least one of a mobile communication network, Transmission Control Protocol/Internet Protocol (TCP/IP), Local Area Network (LAN), Wireless LAN, Wi-Fi, Wireless Broadband (Wibro) and World Interoperability for Microwave Access (Wimax).

[160] Furthermore, according to an embodiment, the local controller 100', 100" may be connected to the facilities 200', 200" trough a communication network (P20', P20").

[161] For example, the local controller 100', 100" may be connected to the facilities 200', 200" based on RS-485.

[162] FIG. 3 is an exemplary view illustrating a specific connection relationship between a local controller and facilities or apparatuses in a remote total maintenance system (remote maintenance system) according to an embodiment disclosed in the present disclosure.

[163] Referring to FIG. 3, the remote maintenance server 1 may be connected to the local controller 100 as described above.

[164] Furthermore, the remote maintenance server 1 may include a terminal 40 that accesses the remote maintenance server 1 from the outside.

[165] Furthermore, a heating and cooling device, such as an air conditioner, a cooler, a heating cabinet or the like, a lighting fixture and a security device may be provided within one maintenance point or control region 30'.

[166] Furthermore, a plurality of power meters 151 to 154 connected to the facility devices, respectively, to measure an amount of power consumption.

[167] Here, indoor units 154-1, 151-1, 151-2, an outdoor unit 154-2, a refrigerator 152-3, a show case 152-2, a heating cabinet 152-1, a calculator 153-1, a lighting fixture 151-3 may be provided in the store.

[168] A plurality of indoor units 154-1, 151-1, and 151-2 may perform air conditioning in a room, and the plurality of indoor units may be operated in a single or combined manner according to their indoor air-conditioning loads.

[169] Furthermore, an air conditioner may further include a unit such as a ventilator, an air purifier, a dehumidifier, a humidifier and the like in addition to the indoor units and outdoor units, but an example in which indoor units and output units are installed therein will be described below, and the number of indoor units and output units may not be necessarily limited to the drawing.

[170] Here, the indoor unit may include an indoor heat exchanger (not shown), an indoor fan (not shown), an expansion valve (not shown) configured to expand refrigerant supplied, and a plurality of sensors (not shown).

[171] Furthermore, the output unit may include a compressor (not shown) configured to receive and compress refrigerant, a heat exchanger (not shown) configured to exchange heat between refrigerant and outdoor air, an accumulator (not shown) configured to extract gaseous refrigerant from the supplied refrigerant and supply it to the compressor, and a 4-way valve (not shown) configured to select a passage of refrigerant according to a heating operation.

[172] At least one lighting fixture 151-3 may be installed, and controlled by a switch connected thereto.

[173] The refrigerator 152-3 or show case 152-2 may maintain the inside at a preset temperature to store foods.

[174] The show case 152-2 may expose cool air according to its cooling cycle to decrease its internal temperature.

[175] The heating cabinet 152-1 may maintain its internal temperature above a predetermined temperature, thereby maintaining things therewithin to be warm.

[176] Furthermore, the calculator 153-1 may manage cash and issue a receipt.

[177] For facility devices provided at a point in such a manner, data and information on power consumption for each device in an operation state for each device may be maintained through the local controller 100 (or point controller) within the maintenance point or control region.

[178] As a device for comprehensively controlling, maintaining or monitoring the entire situation of a control region, the local controller 100 may include facility devices provided or installed in the control region, for example, additional terminals for machine equipment, lighting, power, access control, disaster prevention, parking management, facilities management, and the like.

[179] The local controller 100 may store energy data measured and entered from power meters 151 to 154, and store control data on each device and data on the operation state.

[180] Furthermore, the local controller 100 may be connected to the remote maintenance server 1 to transmit and receive data, and change control settings for each device, and monitor its operation according to data received from the remote maintenance server 1.

[181] Here, a unique account may be allocated to the remote maintenance server 1 for each point (or store) to issue an ID according to the account.

[182] The local controller 100 may access the remote maintenance server 1 through an ID which is an account of the point, thereby receiving control data for the relevant point and control records.

[183] Here, the control data may have a broad concept including the foregoing facility control schedule or facility maintenance schedule.

[184] The facility control schedule may include information on a setting value according to

the time of a control attribute or control parameter for the foregoing facilities.

[185] Furthermore, as a schedule for maintaining or repairing the facilities, the facility maintenance schedule may include information on a maintenance and inspection schedule, past history, and the like of the facilities.

[186] Furthermore, as a schedule for maintaining an amount of power consumption of the facilities, the facility maintenance schedule may include information on a setting value according to the time of a control attribute or control parameter for maintaining the amount of power consumption of the facilities under a predetermined value.

[187] The local controller 100 may transmit information on an amount of power consumption (or energy consumption) for each control region collected and stored therein to the remote maintenance server 1, and receive its resultant rate information.

[188] Furthermore, the local controller 100 may transmit its own facility control schedule or facility maintenance schedule to the remote maintenance server 1 according to the need or according to a request of the remote maintenance server 1.

[189] The remote maintenance server 1 may divide each control region using an account allocated to each control region and transmit the requested data.

[190] Furthermore, the local controller in each control region may access the remote maintenance server 1 using an account allocated to itself, and request data on each control region to the remote maintenance server 1.

[191] Here, IDs with different authorities may be allocated to the remote maintenance server 1 and each control region, respectively, and data displayed according to the authority set to an ID during an access using the ID may be displayed in a limited manner.

[192] During an access to the remote maintenance server 1 through an ID of the control region, control site or maintenance point, only data on the relevant maintenance point may be provided from the remote maintenance server 1.

[193] The remote maintenance server 1 may control (or maintain) a plurality of control regions, control sites or maintenance points in an integrated manner or control (or maintain) in an individual manner according to the setting, and a predetermined maintenance point may be exceptionally processed during an integrated control (or maintenance).

[194] Furthermore, the remote maintenance server 1 may provide data for a predetermined maintenance point according to an access account in connection with an access of the terminal 40 such as a portable terminal, a laptop computer, and the like.

[195] Here, the data of a maintenance point corresponding to the access account may be transmitted regardless of the type of the accessed terminal.

[196] FIG. 4 is an exemplary view specifically illustrating a connection structure between a remote maintenance server and a plurality of local controllers in a remote total

maintenance system (or remote maintenance system) according to an embodiment disclosed in the present disclosure.

[197] Referring to FIG. 4, a remote total maintenance system according to an embodiment disclosed in the present disclosure may include a plurality of control regions, control sites or maintenance points 30 and a remote maintenance server 1 connected to the plurality of control regions 30 via a network.

[198] Furthermore, the plurality of control regions 30, respectively, may include local controllers 100-1 to 100-3.

[199] The local controllers 100-1 to 100-3 may perform the role of a gateway for converting various information or communication data according to a remote communication protocol to transmit or receive the converted information or data to or from the remote maintenance server 1. In other words, the local controllers 100-1 to 100-3 may perform the function of a router for transmitting and receiving signals corresponding to the various information or communication data.

[200] In this case, the local controllers 100-1 to 100-3 may include a protocol conversion unit (not shown) configured to convert the various information or communication data according to a remote communication protocol.

[201] According to a modified embodiment, a remote total maintenance system according to an embodiment disclosed in the present disclosure may include a gateway (not shown) configured to perform the role of a router.

[202] In this case, the gateway may be disposed between the remote maintenance server 1 and the local controllers 100-1 to 100-3.

[203] The remote maintenance server 1 may include a display unit (not shown) configured to display a device maintenance screen.

[204] Here, the device maintenance screen may be a screen for displaying any one of air conditioning information, refrigeration information, power usage information, facility information, fault history information, fault setting information, and energy usage information.

[205] The remote maintenance system may be connected to the remote maintenance server 1 via a network, and may further include a terminal 40 configured to receive and display the device maintenance data from the remote maintenance server 1.

[206] The plurality of control regions 30 may include at least one facility or device 110-1 to 110-3 provided within the plurality of control regions 30.

[207] Here, the facility or device 110-1 to 110-3 may include an air conditioner, a refrigerator, a freezer, a showcase, and the like, disposed within the plurality of control regions 30, and the remote maintenance server 1 may collect status data on the at least one facility or device 110-1 to 110-3.

[208] The status data may include information on an indoor temperature when the each

facility or device 110-1 to 110-3 is an air conditioner, and on an inside temperature when the each facility or device 110-1 to 110-3 is a refrigerator, a freezer or a showcase.

[209] Furthermore, the status data may include humidity, a flow rate as well as a current temperature.

[210] In addition, the facility or device 110-1 to 110-3 may include a facility within the control region such as a power meter or the like, and thus the status data may include information on an amount of power consumption of the each facility or device 110-1 to 110-3 and a total amount of power consumption (or energy consumption) thereof.

[211] The plurality of control regions 30 may include a local controller 100-1 to 100-3 configured to receive the status data from the facility or device 110-1 to 110-3.

[212] Furthermore, the local controller 100-1 to 100-3 may be also able to transmit data for remotely controlling or maintaining the facility or device 110-1 to 110-3 from the remote maintenance server 1 to the facility or device 110-1 to 110-3.

[213] The remote maintenance server 1 may be connected to the facility or device 110-1 to 110-3 to generate fault history data when the status data continues to be greater than a preset threshold value.

[214] Furthermore, the remote maintenance server 1 may display the fault history data for the user or administrator through a display device when the duration of the abnormal state passes a threshold time period.

[215] Accordingly, the remote maintenance server 1 may notify the occurrence of abnormal state of a facility or device within the control region to the user or administrator, thereby allowing the user or administrator to effectively maintain a plurality of control regions.

[216] Furthermore, the remote maintenance server 1 may also transmit the fault history data to an administrator server or a service center providing services associated with their maintenance or repair.

[217] Link between remote maintenance server and service center server

[218] FIG. 5 is a configuration diagram briefly illustrating the configuration of a remote maintenance system according to an embodiment disclosed in the present disclosure.

[219] As illustrated in FIG. 5, the remote maintenance server 1 may be connected to an input unit 1-1 and a display unit 1-2 as interface devices around a controller 1-4 for controlling the entire operation of the remote maintenance server 1, and may include a communication unit 1-3 for transmitting and receiving data to and from various external terminals or the like and a storage unit 1-5 for storing various data generated during the processing process of the controller 1-4.

[220] As illustrated in FIG. 6, a remote maintenance system according to an embodiment disclosed in the present disclosure may include a remote maintenance server 1 and a

service center server 2.

[221] As a server for remotely controlling various facilities 200, the remote maintenance server 1 may receive various control commands from a user through a terminal 40 connected to the remote maintenance server 1 or display the status of various facilities 200 as described above.

[222] Accordingly, the user or administrator may remotely maintain at least one control site (site A ~ site D) provided with the facilities 200.

[223] Here, the remote maintenance server 1 may be connected to various facilities 200 provided at a site in a communicable manner, but as described above, a gateway 100 may be connected between the remote maintenance server 1 and the facilities 200 to convert a communication protocol, thereby allowing communication between the facilities 200 and the remote maintenance server 1 around the gateway 100.

[224] As described above, the gateway 100 may be a local controller, and in this case, the gateway 100 may generate a control command to transmit it to the facilities 200 or transmit a control command received from the remote maintenance server 1 to the facilities 200.

[225] As a device for receiving various inputs from the user, the input unit 1-1 shown in FIG. 5 may receive individual or group-specific control commands (operation, stop, cooling, ventilation, target temperature (or set temperature), etc.) from the facilities 200 connected to the remote maintenance server 1 of FIG. 6, and as a device for displaying a result processed by the controller 1-4, the display unit 1-2 may display the status information (current temperature, humidity, operation mode, etc.) of the facility received from the facilities 200.

[226] As a device for communicating with the facilities 200, the communication unit 1-3 of FIG. 5 may directly communicate with the facilities 200 shown in FIG. 6, but as described above, preferably communicate with the facilities 200 through the local controller 100. Accordingly, the remote maintenance server 1 may transmit a control command to the facilities 200 through the communication unit 1-3 or receive status information from the facilities 200.

[227] Furthermore, the communication unit 1-3 of FIG. 5 may transmit and receive data to allow communication between the remote maintenance server 1 and the service center server 2 shown in FIG. 6. Here, communication between the remote maintenance server 1 and the service center server 2 may follow at least one communication mode or communication protocol of mobile communication network, Transmission Control Protocol/Internet Protocol (TCP/IP), Local Area Network (LAN), Wireless LAN, Wi-Fi, Wireless Broadband (Wibro) and World Interoperability for Microwave Access (Wimax).

[228] The controller 1-4 may determine whether or not the facility is abnormal based on

the status information of the facility received through the communication unit 1-3.

[229] A method of allowing the controller 1-4 to determine whether or not the facility is abnormal may be carried out in accordance with a publicly known method, but, for an example, a failure code received from the facilities 200 may be recognized to determine whether or not the relevant facility is in an abnormal state is in failure or can cause a failure. For example, a failure may be determined when various status information received from the facilities 200 are out of preset normal reference range values.

[230] Here, the controller 1-4 may transmit information on a facility determined to be in an abnormal state to the service center server 2 through the communication unit 1-3 or display information on the abnormal facility through the display unit 1-2 according to an administrator's request.

[231] On the other hand, the controller 1-4 may determine whether or not the facility 200 is in an abnormal state based on status information or a failure code received from the facility 200. Further, a facility may be selected by an external input from the administrator through the input unit 1-1 to be set to in an abnormal state. In other words, the administrator may determine whether or not the facility is in an abnormal state based on various status information received from other facilities received through the remote maintenance server 1 or by an onsite report. Thus, the administrators can set a facility to be an abnormal facility, and transmit that information with regard to that relevant facility to the service center server 2.

[232] The storage unit 1-5 may be a device for storing data received from the facility 200 through the communication unit 1-3, a result processed by the controller 1-4, and the like.

[233] Here, various status information on the facilities 200 may be stored in the local controller 100, but the local controller 100 may be typically implemented as a system having a limited resource, and thus there is a limit in the storage space, thereby having a problem in which status information history stored therein is restricted to a short period of time.

[234] However, the remote maintenance server 1 may receive and store various status information on the facilities 200 through the local controller 100 to archive status information history for a long period of time, and allow the controller 1-4 to determine whether or not the facility is abnormal based on a variation trend of the relevant status information for a long period of time or a comparison with the relevant status information in a similar environment in the past, thereby enhancing accuracy while determining whether or not there is abnormality.

[235] The service center server 2 in the related art may not be linked with the remote maintenance server 1, and thus an error may occur during the process of performing

service reception when a service receptionist receives a call from a user and directly listen to a location at which a failure occurs, a facility in which a failure occurs, a failure symptom or failure cause in order to receive a service, thereby causing difficulty in performing rapid post-processing.

[236] However, the service center server 2 according to an embodiment disclosed in the present disclosure may receive information on an abnormal facility in which a failure has occurred among the facilities 200 controlled by the remote maintenance server 1 from the remote maintenance server 1, in link with the remote maintenance server 1, and perform service registration based on information on an abnormal facility.

[237] In other words, the service center server 2 may of course automate a post-processing reception for an abnormal facility, and receive information on the abnormal facility required during the service reception from the remote maintenance server 1 controlling the abnormal facility, thereby receiving correct information quickly.

[238] Here, a failure occurred on the facility 200 may include a network error in which communication is not made between the remote maintenance server 1 and the facility 200 in addition to a failure for various modules within the facility 200 or sensors for allowing the facility 200 to collect status information on a control region.

[239] Furthermore, information on an abnormal facility received from the remote maintenance server 1 may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[240] Here, the site information may include a type of facility installed in the site, a number of facility installations for each type of facility or location information of the site. For an example, the site information may be information such as five outdoor units, 72 indoor units, 50 ventilators, five gateways or an address of site (or latitude/latitude of site), and specifically may include items shown in the following Table 1.

[241] [Table 1]

[242]

NO	DATA
1	Center ID
2	Center name
3	Site ID
4	Site name
5	Region code
6	Region name
7	No. of gateway installations
8	No. of output unit installations
9	No. of indoor unit installations
10	No. of ventilator installations
11	Site address
12	Latitude
13	Longitude
14	Site registration date
15	Contract
16	Contract number

[243] Furthermore, the product information of the abnormal facility may include a type of the abnormal facility (indoor unit, output unit, ventilator, etc.), a model name of the abnormal facility, an identifier (ID) of the abnormal facility or a name of the abnormal facility.

[244] Furthermore, the failure information of the abnormal facility comprises a failure code (C1: unstable supply power, C2: heat, C3, refrigerant overcharge, etc.) Here, when here are a multiple abnormalities for a facility, the failure information may further include a number of failures for each of the abnormal facilities (for example, one output unit, three indoor units, zero ventilator, zero gateway) or a number of failures for each facility with a network failure, and specifically may include items shown in the following Table 2.

[245] [Table 2]

[246]

NO	DATA
1	Center ID
2	Site ID
3	No. of output unit failures
4	No. of indoor unit failures
5	No. of ventilator failures
6	No. of gateway failures
7	No. of network-failed indoor units
8	No. of network-failed ventilators

[247] Hereinafter, the process of allowing the service center server 2 to perform service registration will be described with emphasis on an operation between the remote maintenance server 1 and the service center server 2.

[248] The remote maintenance server 1 performs control on the 200 to receive status information on the facility 200.

[249] Here, the remote maintenance server 1 may determine whether or not there is abnormality on at least one facility 200 based on either failure code or status information, or in another alternative set at least one facility 200 to an abnormal state due to an external input from a user.

[250] Then, the remote maintenance server 1 transmits information on the abnormal facility, namely, any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility, to the service center server 2.

[251] Here, in order to notify an administrator that there is an abnormal facility, the remote maintenance server 1 or service center server 2 may display an indicator for the abnormal facility on the maintenance server 1, service center server 2 or a terminal connected thereto.

[252] FIG. 7 is a view illustrating a screen provided to an administrator according to an embodiment disclosed in the present disclosure.

[253] As illustrated in FIG. 7, when notifying an administrator that there is an abnormal facility, the remote maintenance server 1 or service center server 2 may preferably provide the location of the abnormal facility at the same time, and more preferably provide a screen on which a location installed with the abnormal facility is displayed on a map.

[254] For an example, a screen on which there is no abnormal facility is provided for the site A, and a screen on which one of total three output units is failed, and three of 56 indoor units are failed is provided for the site B.

[255] Then, the administrator may perform a selection input for a specific site through the screen displayed with the abnormal facility to receive a list of items (or graphic objects (F1, F2)) corresponding to the facilities as illustrated in FIG. 8 from the remote maintenance server 1 or service center server 2.

[256] The graphic objects for a plurality of facilities may be displayed in a list format, and preferably displayed in a divided manner for each group. For an example, graphic objects corresponding to 10 indoor units in a first reading room and 10 indoor units in a second reading room may be divided according to their location, and each graphic object divided according to the location may be preferably displayed in a separate region within the screen.

[257] Here, the graphic object may be displayed in an icon format to allow the administrator to recognize a facility corresponding to this, and preferably displayed with any one or a combination of status information (operation or non-operation, operation mode, current temperature, target temperature, etc.) on the facility, whether or not the facility is abnormal, and a type of failure (indoor unit failure, output unit failure, network error, etc.) at the same time.

[258] On the other hand, the display unit 1-2 may provide a screen capable of selecting facilities for each group using a user's selection input (selection input through an "Fa" region), and display only graphic objects selected according to the user's selection input through this on the screen.

[259] Furthermore, the display unit 1-2 may preferably display (Fb) a number of facilities for each type of failure on the selected group in a portion of the screen, thereby providing various information to the user.

[260] Furthermore, in order to receive a control command from the user while individually or collectively controlling facilities corresponding to at least one graphic object selected according to a user selection input among graphic objects displayed on the display unit 1-2, icons or the like corresponding to various control commands may be disposed in one portion (CP) of the screen.

[261] As described above, the administrator may check status information, status information history or the like on the facility 200 through the screen as shown in FIGS. 7 and 8, thereby rechecking whether a failure alarm is normal.

[262] Accordingly, when a service provision request is received from the administrator, the remote maintenance server 1 may transmit a service registration request to the service center server 2 based on the service provision request, and the service center server 2 may perform service based on information on the abnormal facility according to the service registration request.

[263] At this time, the service center server 2 may perform service registration based on information on an abnormal facility received from the remote maintenance server 1 such

that the service center server 2 may perform service schedule management or provide information on the facility to a repairman based on this as will be described later, thereby preventing a problem in which the information on the abnormal facility is incorrectly received due to a human error during the service reception.

[264] On the other hand, prior to receiving a service provision request from the administrator, the remote maintenance server 1 may preferably perform user authentication for the administrator.

[265] As described above, the remote maintenance server 1 may prevent a service request from an unauthorized person to block the unauthorized person's intrusion on an abnormal facility, thereby preventing various crimes.

[266] Then, upon receiving the service registration request, the service center server 2 may transmit an alarm signal on the service registration act to at least one repairman's terminal. When the repairman's terminal is a mobile terminal, a message may be transmitted in an e-mail or SMS format, or an alarm may be generated using a specific signal or vibration.

[267] Here, when transmitting an alarm signal to a repairman's terminal, the service center server 2 may preferably transmit the alarm signal to the repairman's terminal according to a type of abnormal facility based on the information on the abnormal facility.

[268] In other words, in order to transmit an alarm signal to a repairman's terminal according to a type of abnormal facility, for an example, when the abnormal facility is an output unit, the service center server 2 may preferably transmit the alarm signal to only a repairman specialized in the output unit.

[269] Accordingly, the repairman may access the service center server 2 managing a service schedule, and thus the repairman may provide a repair service for the abnormal facility according to the determined schedule.

[270] Here, the service center server 2 may provide a service provision available time to a repairman using visit allowed time information and the repairman's service available time for the abnormal facility, but the service center server 2 may preferably store a type of components, an inventory of components, an available date of components, and the like, which are required to solve a failure cause, based on information on the abnormal facility received from the remote maintenance server 1, and allow a plurality of repairmen to share the stored information, thereby adjusting the service provision available time.

[271] Remote maintenance server including service unit

[272] The remote maintenance server 1 according to the foregoing embodiment may perform service registration in link with the service center server 2, but may include a service unit (not shown) within the remote maintenance server 1 itself.

[273] The service unit (not shown) is a device for performing the same function as the

foregoing service center server 2, and the detailed description thereof will be omitted, and substituted by the foregoing description.

[274] The service unit (not shown) may be implemented by hardware or software, and mounted on the remote maintenance server 1, but when the service unit (not shown) may be implemented by hardware, it may be preferably implemented with a module to be easily mounted on the remote maintenance server 1 in a detachable manner.

[275] Terminal connected to remote maintenance server

[276] Hereinafter, a remote maintenance function through an external terminal connected to a remote maintenance server according to an embodiment will be described in detail with reference to FIGS. 9 and 10.

[277] A remote maintenance function according to an embodiment disclosed herein may be implemented in part or a combination of the components or steps included in the foregoing embodiments or may be implemented in a combination of the foregoing embodiments, and hereinafter, overlapping portions may be omitted for clarity of the embodiment of a remote maintenance function through a terminal according to an embodiment.

[278] FIG. 9 is an exemplary view illustrating an external terminal connected to a remote maintenance server according to an embodiment disclosed in the present disclosure.

[279] Referring to FIG. 9, the remote maintenance server 1 according to an embodiment disclosed in the present disclosure may be connected to a terminal 40 in a wired or wireless manner.

[280] For the purpose of this, the remote maintenance server 1 may be connected to the terminal 500 through the foregoing terminal.

[281] The terminal 40 connected to the remote maintenance server 1 may receive various control commands for the facilities 200 from a user or display the status information of various facilities 200.

[282] Here, the type of the terminal 40 may not be necessarily limited, but hereinafter, it will be described by assuming that the terminal 40 is implemented in the form of a mobile terminal, and the mobile terminal is referred to as reference numeral 500 for easy explanation.

[283] FIG. 10 illustrates a configuration diagram illustrating the configuration of a terminal connected to a remote maintenance server disclosed in the present disclosure.

[284] The terminal 500 may include a wireless communication unit 110, an audio/video (A/V) input unit 520, a user input unit 530, a sensing unit 540, an output unit 550, a memory 560, an interface unit 570, a controller 580, a power supply unit 590, and the like. However, the constituent elements as illustrated in FIG. 9 are not necessarily required, and the mobile device may be implemented with greater or less number of elements than those illustrated elements.

[285] Hereinafter, the constituent elements will be described in sequence.

[286] The wireless communication unit 510 may typically include one or more elements allowing radio communication between the terminal 500 and a wireless communication system, between radio communication the terminal 500 and a network in which the terminal 500 is located, or between the terminal 500 and the central control device 100.

[287] For example, the wireless communication unit 510 may include a broadcast receiving module 511, a mobile communication module 512, a wireless Internet module 513, a short-range communication module 514, a location information module 515, and the like.

[288] The broadcast receiving module 511 receives broadcast signals and/or broadcast associated information from an external broadcast management server through a broadcast channel.

[289] The broadcast channel may include a satellite channel and/or a terrestrial channel. The broadcast management server may mean a server that generates and transmits a broadcast signal and/or broadcast associated information or a server that receives a previously generated broadcast signal and/or broadcast associated information and transmits to the terminal 500. The broadcast signal may include a TV broadcast signal, a radio broadcast signal and a data broadcast signal as well as a broadcast signal in a form that a data broadcast signal is coupled to the TV or radio broadcast signal.

[290] The broadcast associated information may mean information regarding a broadcast channel, a broadcast program, a broadcast service provider, and the like. The broadcast associated information may also be provided through a mobile communication network, and in this case, the broadcast associated information may be received by the mobile communication module 512.

[291] The broadcast associated information may exist in various forms. For example, it may exist in the form of an electronic program guide (EPG) of digital multimedia broadcasting (DMB), electronic service guide (ESG) of digital video broadcast-handheld (DVB-H), and the like.

[292] The broadcast receiving module 511 may receive a broadcast signal using various types of broadcast systems. In particular, the broadcast receiving module 511 may receive a digital broadcast signal using a digital broadcast system such as digital multimedia broadcasting-terrestrial (DMB-T), digital multimedia broadcasting-satellite (DMB-S), media forward link only (MediaFLO), digital video broadcast-handheld (DVB-H), integrated services digital broadcast-terrestrial (ISDB-T), and the like. The broadcast receiving module 511 is, of course, configured to be suitable for every broadcast system that provides a broadcast signal as well as the above-mentioned digital broadcast systems.

[293] The broadcast signal and/or broadcast-associated information received through the broadcast receiving module 511 may be stored in the memory 560.

[294] The mobile communication module 512 transmits and/or receives a radio signal to and/or from at least one of a base station, an external terminal and a server over a mobile communication network. Here, the radio signal may include a voice call signal, a video call signal and/or various types of data according to text and/or multimedia message transmission and/or reception.

[295] The wireless Internet module 513 means a module for supporting wireless Internet access. The wireless Internet module 513 may be built-in or externally installed to the terminal 500. Here, it may be used a wireless Internet access technique including a WLAN (Wireless LAN), Wi-Fi, Wibro (Wireless Broadband), Wimax (World Interoperability for Microwave Access), HSDPA (High Speed Downlink Packet Access), and the like.

[296] The short-range communication module 514 is a module for supporting a short-range communication. Here, it may be used a wireless short-range communication technology including Bluetooth, Radio Frequency IDentification (RFID), Infrared Data Association (IrDA), Ultra WideBand (UWB), ZigBee, and the like. Meanwhile, it may be used a wired short-range communication technology including Universal Serial Bus (USB), IEEE 1394, Thunderbolt TM, and the like.

[297] The wireless Internet module 513 or the short-range communication module 514 may establish data communication connection to the central control device 100.

[298] Through the established data communication, when there is an audio signal to be output while transmitting power in a wireless manner, the wireless Internet module 513 or the short-range communication module 514 may transmit the audio signal to the central control device 100 through the short-range communication module. Furthermore, through the established data communication, when there is information to be displayed, the wireless Internet module 513 or the short-range communication module 514 may transmit the information to the central control device 100. Otherwise, through the established data communication, the wireless Internet module 513 or the short-range communication module 514 may receive an audio signal entered through a microphone embedded in the central control device 100. Furthermore, the wireless Internet module 513 or the short-range communication module 514 may transmit the identification information (for instance, phone number or device name in case of a portable phone) of the mobile terminal 500 to the central control device 100 through the established data communication.

[299] The location information module 515 is a module for acquiring a location of the mobile device, and there is a global positioning system (GPS) module as an example.

[300] Referring to FIG. 10, the A/V (audio/video) input unit 520 receives an audio or video

signal, and the A/V (audio/video) input unit 520 may include a camera 521 and a microphone 522. The camera 521 processes an image frame, such as still picture or video, obtained by an image sensor in a video phone call or image capturing mode. The processed image frame may be displayed on a display unit 551.

[301] The image frames processed by the camera 521 may be stored in the memory 560 or transmitted to an external device through the wireless communication unit 510. Two or more cameras 521 may be provided according to the use environment of the mobile device.

[302] The microphone 522 receives an external audio signal through a microphone in a phone call mode, a recording mode, a voice recognition mode, and the like, and processes the audio signal into electrical voice data. The processed voice data may be converted and outputted into a format that is transmittable to a mobile communication base station through the mobile communication module 512 in the phone call mode. The microphone 522 may implement various types of noise canceling algorithms to cancel noise generated in a procedure of receiving the external audio signal.

[303] The user input unit 530 may generate input data to control an operation of the terminal. The user input unit 530 may be configured by including a keypad, a dome switch, a touch pad (pressure/capacitance), a jog wheel, a jog switch, and the like.

[304] The sensing unit 540 may include a proximity sensor 541, a pressure sensor 542, a motion sensor 543, and the like. The proximity sensor 541 detects an object approaching the mobile terminal 500, or the presence or absence of an object existing adjacent to the mobile terminal 500, and the like without any mechanical contact. The proximity sensor 541 may detect a proximity object using a change of the AC magnetic field or static magnetic field, a change rate of the electrostatic capacity, or the like. Two or more proximity sensors 541 may be provided according to the aspect of configuration.

[305] The pressure sensor 542 may detect whether or not a pressure is applied to the mobile terminal 500, a size of the pressure, and the like. The pressure sensor 542 may be provided at a portion where the detection of a pressure is required in the mobile terminal 500 according to the use environment. When the pressure sensor 542 is provided in the display unit 551, it may be possible to identify a touch input through the display unit 551 and a pressure touch input by which a pressure larger than the touch input is applied according to a signal outputted from the pressure sensor 542. Furthermore, it may be possible to know a size of the pressure applied to the display unit 551 during the input of a pressure touch.

[306] The motion sensor 543 detects the location or movement of the mobile terminal 500 using an acceleration sensor, a gyro sensor, and the like. The acceleration sensor that can be used in the motion sensor 543 is an element for converting an acceleration

change in any one direction into an electrical signal. The acceleration sensor is typically configured by providing two or three axes in a package, and according to the used circumstances there may be a case where only one z-axis is required. Accordingly, when the x-axis or y-axis acceleration sensor is used instead of the z-axis acceleration sensor due to any reason, the acceleration sensor may be provided to be placed upright on a main substrate using a separate piece of substrate. The gyro sensor as a sensor for measuring an angular velocity of the mobile terminal 500 performing a rotational movement may sense a rotated angle with respect to each reference direction. For instance, the gyro sensor may sense each rotated angle with reference to three directional axes, namely, azimuth, pitch and roll.

[307] The output unit 550 is configured to generate an output for visual, auditory or tactile sense, and the output unit 550 may include the display unit 551, an audio output module 552, an alarm unit 553, a haptic module 554, and the like.

[308] The display unit 551 may display (output) information processed in the terminal 500. For example, when the terminal 500 is in a phone call mode, the display unit 551 may display a User Interface (UI) or a Graphic User Interface (GUI) associated with a call. When the terminal 500 is in a video call mode or image capturing mode, the display unit 551 may display a captured image and/or received image, a UI or GUI.

[309] The display unit 551 may include at least one of a Liquid Crystal Display (LCD), a Thin Film Transistor-LCD (TFT-LCD), an Organic Light Emitting Diode (OLED) display, a flexible display, a three-dimensional (3D) display, and an e-ink display.

[310] Some of those displays may be configured with a transparent or optical transparent type to allow viewing of the exterior through the display unit, which may be called transparent displays. An example of the typical transparent displays may include a transparent LCD (TOLED), and the like. Under this configuration, a user can view an object positioned at a rear side of a mobile device body through a region occupied by the display unit 551 of the mobile device body.

[311] Two or more display units 551 may be implemented according to a configured aspect of the terminal 500. For instance, a plurality of the display units 551 may be arranged on one surface to be spaced apart from or integrated with each other, or may be arranged on different surfaces.

[312] When the display unit 551 and a touch sensitive sensor (hereinafter, referred to as a "touch sensor") have an interlayer structure (hereinafter, referred to as a "touch screen"), the display unit 551 may be used as an input device rather than an output device. The touch sensor may be implemented as a touch film, a touch sheet, a touch pad, and the like.

[313] The touch sensor may be configured to convert changes of a pressure applied to a specific part of the display unit 551, or a capacitance occurring from a specific part of

the display unit 551, into electric input signals. Also, the touch sensor may be configured to sense not only a touched position and a touched area, but also a touch pressure.

[314] When there is a touch input to the touch sensor, the corresponding signals are transmitted to a touch controller (not shown). The touch controller processes the received signals, and then transmits corresponding data to the controller 580. Accordingly, the controller 580 may sense which region of the display unit 551 has been touched.

[315] A proximity sensor 541 may be arranged at an inner region of the terminal 500 covered by the touch screen, or near the touch screen. The proximity sensor sense presence or absence of an object approaching to a surface to be sensed, or an object disposed near a surface to be sensed, by using an electromagnetic field or infrared rays without a mechanical contact. The proximity sensor has a longer lifespan and a more enhanced utility than a contact sensor.

[316] The proximity sensor may include an optical transmission type photoelectric sensor, a direct reflective type photoelectric sensor, a mirror reflective type photoelectric sensor, a high-frequency oscillation proximity sensor, a capacitance type proximity sensor, a magnetic type proximity sensor, an infrared rays proximity sensor, and so on. When the touch screen is implemented as a capacitance type, proximity of a pointer to the touch screen is sensed by changes of an electromagnetic field. In this case, the touch screen (touch sensor) may be categorized into a proximity sensor.

[317] Hereinafter, for the sake of convenience of brief explanation, a status that the pointer is positioned to be proximate onto the touch screen without contact will be referred to as 'proximity touch' whereas a status that the pointer substantially comes in contact with the touch screen will be referred to as 'contact touch' For the position corresponding to the proximity touch of the pointer on the touch screen, such position corresponds to a position where the pointer faces perpendicular to the touch screen upon the proximity touch of the pointer.

[318] The proximity sensor senses proximity touch, and proximity touch patterns (e.g., distance, direction, speed, time, position, moving status, etc.). Information relating to the sensed proximity touch and the sensed proximity touch patterns may be output onto the touch screen.

[319] The audio output module 552 may output audio data received from the wireless communication unit 510 or stored in the memory 560, in a call-receiving mode, a call-placing mode, a recording mode, a voice recognition mode, a broadcast reception mode, and so on. The audio output module 552 may output audio signals relating to functions performed in the terminal 500, e.g., sound alarming a call received or a message received, and so on. The audio output module 552 may include a receiver, a

speaker, a buzzer, and so on.

[320] The alarm 553 outputs signals notifying occurrence of events from the terminal 500. The events occurring from the terminal 500 may include call received, message received, key signal input, touch input, and so on. The alarm 553 may output not only video or audio signals, but also other types of signals such as signals notifying occurrence of events in a vibration manner. Since the video or audio signals can be output through the display unit 551 or the audio output unit 552, the display unit 551 and the audio output module 552 may be categorized into a part of the alarm 553.

[321] The haptic module 554 generates various tactile effects which a user can feel. A representative example of the tactile effects generated by the haptic module 554 includes vibration. Vibration generated by the haptic module 554 may have a controllable intensity, a controllable pattern, and so on. For instance, different vibration may be output in a synthesized manner or in a sequential manner.

[322] The haptic module 554 may generate various tactile effects, including not only vibration, but also arrangement of pins vertically moving with respect to a skin being touched, air injection force or air suction force through an injection hole or a suction hole, touch by a skin surface, presence or absence of contact with an electrode, effects by stimulus such as an electrostatic force, reproduction of cold or hot feeling using a heat absorbing device or a heat emitting device, and the like.

[323] The haptic module 554 may be configured to transmit tactile effects through a user's direct contact, or a user's muscular sense using a finger or a hand. The haptic module 554 may be implemented in two or more in number according to the configuration of the terminal 500.

[324] The memory 560 may store a program for processing and controlling the controller 580. Alternatively, the memory 560 may temporarily store input/output data (e.g., phonebook data, messages, audios, still images, videos, and the like). Also, the memory 560 may store data related to various patterns of vibrations and sounds outputted upon the touch input on the touch screen.

[325] In some embodiments, software components including an operating system (not shown), a module performing a function of the wireless communication unit 510, a module operated along with the user input unit 530, a module operated along with the A/V input unit 520, and a module operated along with the output unit 550. The operating system (for example, LINUX, UNIX, OS X, WINDOWS, Chrome, Symbian, iOS, Android, VxWorks, or other embedded systems) may include various software components and/or drivers for controlling system tasks such as memory management, power management, and the like.

[326] Furthermore, the memory 560 may store a program (for example, control program) associated with the control or maintenance of a facility. The program may be carried

out by the controller 580.

[327] Furthermore, the memory 560 may store an application associated with the control or maintenance of a facility downloaded from an application providing server (for example, app store).

[328] The memory 560 may be implemented using any type of suitable storage medium including a flash memory type, a hard disk type, a multimedia card micro type, a memory card type (e.g., SD or DX memory), Random Access Memory (RAM), Static Random Access Memory (SRAM), Read-Only Memory (ROM), Electrically Erasable Programmable Read-only Memory (EEPROM), Programmable Read-only Memory (PROM), magnetic memory, magnetic disk, optical disk, and the like. Also, the terminal 500 may operate a web storage which performs the storage function of the memory 560 on the Internet.

[329] The interface unit 570 may generally be implemented to interface the mobile device with external devices. The interface unit 570 may allow a data reception from an external device, a power delivery to each component in the terminal 500, or a data transmission from the terminal 500 to an external device. The interface unit 570 may include, for example, wired/wireless headset ports, external charger ports, wired/ wireless data ports, memory card ports, ports for coupling devices having an identification module, audio Input/Output (I/O) ports, video I/O ports, earphone ports, and the like.

[330] The identification module may be configured as a chip for storing various information required to authenticate an authority to use the terminal 500, which may include a User Identity Module (UIM), a Subscriber Identity Module (SIM), and the like. Also, the device having the identification module (hereinafter, referred to as 'identification device') may be implemented in a type of smart card. Hence, the identification device can be coupled to the terminal 500 via a port.

[331] The interface unit may serve as a path for power to be supplied from an external cradle to the terminal 500 when the terminal 500 is connected to the external cradle or as a path for transferring various command signals inputted from the cradle by a user to the terminal 500. Such various command signals or power inputted from the cradle may operate as signals for recognizing that the mobile device has accurately been mounted to the cradle.

[332] The controller 580 typically controls the overall operations of the terminal 500. For example, the controller 580 performs the control and processing associated with telephony calls, data communications, video calls, and the like. Furthermore, the controller 580 may include a multimedia module 581 which provides multimedia playback. The multimedia module 581 may be configured as part of the controller 580 or as a separate component.

[333] The controller 580 can perform a pattern recognition processing so as to recognize writing or drawing input on the touch screen as text or image.

[334] The power supply unit 590 receives external power and internal power under the control of the controller 580 to supply power required by various components.

[335] The power supply unit 590 may be provided with a battery 599 configured to supply power to various elements of the terminal 500, and may include a charger 598 for charging the battery 599 in a wired or wireless manner.

[336] Though the present disclosure discloses a mobile terminal connected to the central control device 100 as an example, it may be easily understood by those skilled in the art that the configuration according to the exemplary embodiments of this specification can also be applied to a stationary terminal such as a digital TV, a desktop computer and the like, excluding a case of being applicable only to the mobile terminal.

[337] The scope of the present invention may not be limited to those specific embodiments, and various modifications, variations, and improvements can be made without departing from the concept of the invention, and within the scope of the appended claims.

[338] Remote maintenance method

[339] FIG. 11 is a step-by-step flow chart illustrating a remote maintenance method according to an embodiment of the present disclosure.

[340] Hereinafter, the method will be described for each step, and their redundant description will be substituted by the earlier description, and the detailed description thereof will be omitted.

[341] As illustrated in FIG. 11, a remote maintenance method according to an embodiment disclosed in the present disclosure may include allowing the remote maintenance server 1 to receive the status information of the facility 200 from the facility 200 (S10), determining whether or not the facility 200 is an abnormal state based on the received status information of the facility (S20), transmitting information on an abnormal facility that has been determined by the remote maintenance server to a service center server 2 (S30), and the service center server 2 to performing service registration based on the information on the abnormal facility (S90).

[342] The step of the remote maintenance server 1 to receiving the status information of the facility 200 from the facility 200 (S10) may enable the remote maintenance server 1 to receive the status information of at least one facility 200 directly from at least one control region (site A ~ site D) or through the gateway 100.

[343] Here, the controller 1-4 may periodically receive the status of the facility 200 through the communication unit 1-3 in a predetermined time interval to display it on the display unit 1-2, but the predetermined time interval may be variably set according to an operation mode of the facility 200 or whether or not it is controlled, and the remote

maintenance server 1 may preferably store the status information of the facility 200.

[344] In other words, in order to reduce communication traffic between the remote maintenance server 1 and the facility 200, the remote maintenance server 1 may preferably receive status information with a longer period than that of cooling mode since there is little change in indoor temperature and power consumption for the control region when an indoor unit is not operated.

[345] On the other hand, the step of allowing the remote maintenance server 1 to receive status information (S10) may include allowing the gateway 100 to convert a protocol to transmit data received from the facility 200 to the remote maintenance server 1 (S11).

[346] As a device configured to enable communication between the remote maintenance server 1 to various facilities 200, the gateway 100 may convert a communication protocol to enable communication between the facilities 200 and the remote maintenance server 1.

[347] As described above, the gateway 100 may be a local controller, and in this case, the gateway 100 may generate a control command to transmit it to the facility 200, and transmit a control command received from the remote maintenance server 1 to the facility 200.

[348] Then, the remote maintenance server 1 determines whether or not the facility 200 is abnormal based on the received status information of the facility (S20).

[349] A method of allowing the controller 1-4 of the remote maintenance server 1 (refer to FIG. 6) to determine whether or not the facility is abnormal may be carried out in accordance with a publicly known method, but, for an example, a failure code received from the facilities 200 may be recognized to determine whether or not the relevant facility is abnormal or a cause of failure, and for another example, their failure may be determined when various status information received from the facilities 200 are out of preset normal reference range values.

[350] Here, the remote maintenance server 1 may transmit information on a facility determined to be in an abnormal state to the service center server 2 through the communication unit 1-3 or display information on the abnormal facility through the display unit 1-2 according to an administrator's request.

[351] The remote maintenance server 1 may determine whether or not at least one facility 200 is abnormal as described above, but according to another embodiment, the remote maintenance server 1 may set at least one facility 200 to an abnormal facility using a user input.

[352] Then, the remote maintenance server 1 transmits information on a facility determined to be an abnormal facility to the service center server 2 (S30).

[353] The service center server 2 may receive information on an abnormal facility in which

a failure has occurred among the facilities 200 controlled by the remote maintenance server 1 from the remote maintenance server 1, in link with the remote maintenance server 1, and perform service registration based on the information on the abnormal facility, and therefore, the service center server 2 may of course automate a post-processing reception for an abnormal facility, and receive information on the abnormal facility required during the service reception from the remote maintenance server 1 controlling the abnormal facility, thereby receiving correct information.

[354] Here, a failure occurred on the facility 200 may include a network error in which communication is not made between the remote maintenance server 1 and the facility 200 in addition to a failure for various modules within the facility 200 or sensors for allowing the facility 200 to collect status information on a control region.

[355] Furthermore, information on an abnormal facility received by the service center server 2 from the remote maintenance server 1 may be any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[356] Here, the site information may include a number of facility installations for each type of facility or location information of the site, and the product information of the abnormal facility may include a type of the abnormal facility, a model name of the abnormal facility, an identifier of the abnormal facility or a name of the abnormal facility, and the failure information of the abnormal facility may include a failure code of the abnormal facility, and when there are multiple abnormalities for a facility, the failure information may further include a number of failures for each of the abnormal facilities or a number of failures for each facility with which communication is not made.

[357] The detailed description of information on an abnormal facility will be substituted by the earlier description of the foregoing embodiment, and the redundant description will be omitted.

[358] Then, the service center server 2 performs service registration based on information on an abnormal facility (S90).

[359] At this time, the service center server 2 may perform service registration based on information on an abnormal facility received from the remote maintenance server 1 while performing the service registration, and the service center server 2 may perform service schedule management or provide information on the facility to a repairman based on this, thereby preventing a problem in which the information on the abnormal facility is incorrectly received due to a human error during the service reception.

[360] On the other hand, the service center server 2 according to an embodiment disclosed in the present disclosure may further providing the information on the abnormal facility to an administrator (S40), allowing the remote maintenance server 1 to receive

a service provision request for the abnormal facility from the administrator (S70), and allowing the remote maintenance server to transmit a service registration request to the service center server based on the service provision request (S80), and during the registration, the service center server 2 may perform service registration based on information on the abnormal facility according to the service registration request.

[361] For the step of allowing the service center server 2 to provide the information on the abnormal facility 200 to an administrator (S40), when notifying an administrator that there is an abnormal facility, the service center server 2 may preferably provide the location of the abnormal facility at the same time, and more preferably provide a screen on which a location installed with the abnormal facility is displayed on a map (refer to FIG. 7).

[362] Accordingly, the service center server 2 may provide detailed status information on an abnormal facility, whether or not the facility is abnormal, a type of facility failure (indoor unit failure, output unit failure, network error, etc.) or status information history to an administrator, thereby allowing the user to check whether or not a failure alarm is normal (refer to FIG. 8).

[363] Accordingly, the remote maintenance server 1 may receive a service provision request from the administrator (S70).

[364] At this time, the remote maintenance server 1 may transmit a service registration request to the service center server 2 based on the service provision request (S80), and the service center server 2 may perform service registration based on information on the abnormal facility according to the service registration request (S90).

[365] On the other hand, the remote maintenance server 1 may preferably further include performing user authentication on the administrator prior to receiving a service provision request from the administrator (S60).

[366] As described above, the remote maintenance server 1 may prevent a service request from an unauthorized person to block the unauthorized person's intrusion on an abnormal facility, thereby preventing various crimes.

[367] Upon receiving the service registration request, the service center server 2 may transmit an alarm signal on the service registration act to at least one repairman's terminal (S100). When the repairman's terminal is a mobile terminal, a message may be transmitted in an e-mail or SMS format, or an alarm may be generated using a specific signal or vibration.

[368] Here, when transmitting an alarm signal to a repairman's terminal, the service center server 2 may preferably transmit the alarm signal to the repairman's terminal according to a type of abnormal facility based on the information on the abnormal facility.

[369] In other words, in order to transmit an alarm signal to a repairman's terminal according to a type of abnormal facility, for an example, when the abnormal facility is

an output unit, the service center server 2 may preferably transmit the alarm signal to only a repairman specialized in the output unit.

[370] Accordingly, when the repairman accesses the service center server 2 managing a service schedule, and the service center server 2 may receive an inquiry request for a service schedule of the abnormal facility (S110), and the service center server 2 may provide a service schedule according to the inquiry request (S120).

[371] Here, the service center server 2 may provide a service provision available time to a repairman using visit allowed time information and the repairman's service available time for the abnormal facility, but the service center server 2 may preferably store a type of components, an inventory of components, an available date of components, and the like, which are required to solve a failure cause, based on information on the abnormal facility received from the remote maintenance server 1, and allow a plurality of repairmen to share the stored information, thereby adjusting the service provision available time.

[372] Computer-readable recording medium

[373] A remote maintenance method using the remote maintenance server according to an embodiment disclosed in the present disclosure as described above may be implemented in the form of program instructions that can be executed by various computer components, and may be stored on a computer-readable recording medium. The computer-readable recording medium may include program instructions, data files, data structures, and the like separately or in combination. The program instructions stored on the computer-readable recording medium may be specially designed and configured for the present invention, or may also be known and available to those skilled in the computer software field. Examples of the computer-readable recording medium include magnetic media such as hard disks, floppy disks, and magnetic tapes, optical media such as compact disk-read only memory (CD-ROM) and digital versatile disks (DVDs), magneto-optical media such as floptical disks, and hardware devices such as read-only memory (ROM), random access memory (RAM), and flash memory, which are specially configured to store and execute program instructions. Examples of the program instructions include not only machine language codes created by a compiler or the like, but also high-level language codes that can be executed by a computer using an interpreter or the like. The above hardware devices may be changed to one or more software modules to perform the operations of the present invention, and vice versa.

[374] The foregoing preferred embodiments of the present disclosure are disclosed to solve technical tasks, and it will be apparent to those skilled in this art that various modifications, variations and additions can be made thereto without departing from the spirit and scope of the present invention. Those modifications and the like should be

construed to be included in the following claims.

Claims

[Claim 1] A remote maintenance system, comprising:
a remote maintenance server configured to remotely control a plurality of facilities and receive status information from each of the facilities; and
a service center server configured to receive information on a facility in an abnormal state among the plurality of facilities from the remote maintenance server, and perform service registration based on the received information.

[Claim 2] The remote maintenance system of claim 1, wherein upon receiving a service provision request with regard to the abnormal facility, the remote maintenance server transmits a service registration request to the service center server based on the service provision request, and the service center server performs service registration based on the service provision request.

[Claim 3] The remote maintenance system of claim 1, wherein the remote maintenance server comprises:
a communication unit configured to receive the status information from the plurality of facilities; and
a controller configured to determine whether any of the plurality of facilities is in an abnormal state based on the received status information,
wherein the communication unit transmits information to the service center server on the abnormal facility determined by the controller.

[Claim 4] The remote maintenance system of claim 1, wherein the information on the abnormal facility is any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[Claim 5] The remote maintenance system of claim 4, wherein the site information includes a type of facility installed in the site, a number of facility installations for each type of facility or location information of the site.

[Claim 6] The remote maintenance system of claim 4, wherein the product information of the abnormal facility comprises a type of the abnormal facility, a model name of the abnormal facility, an identifier of the abnormal facility or a name of the abnormal facility.

[Claim 7] The remote maintenance system of claim 4, wherein the failure information of the abnormal facility comprises a failure code of the

abnormal facility, and when there are a multiple abnormalities for a facility, the failure information further comprises a number of failures for each of the abnormal facilities or a number of failures for each facility with which communication is not made.

[Claim 8] The remote maintenance system of claim 1, wherein upon receiving the service registration request, the service center server transmits an alarm signal to at least one repairman's terminal.

[Claim 9] A remote maintenance server for remotely controlling facilities, comprising:

a remote maintenance server configured to remotely control a plurality of facilities and receive status information from each of the facilities, wherein the remote maintenance server transmits information on an abnormal facility among the plurality of facilities to the service center server based on the status information; and

a service center server configured to receive information on a facility in an abnormal state among a plurality of facilities from the remote maintenance server, and perform service registration based on the received information.

[Claim 10] The remote maintenance server of claim 9, wherein the remote maintenance server can receive a service provision request for an abnormal facility and then the remote maintenance server transmits a service registration request to the service center server based on the service provision request.

[Claim 11] The remote maintenance server of claim 9, wherein the received information is any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[Claim 12] A remote maintenance server for remotely controlling facilities, the remote maintenance server comprising:

a communication unit configured to receive the status information from a plurality of facilities;

a controller configured to determine whether any of the plurality of facilities is in an abnormal state based on the received status information; and

a service unit configured to receive information on a facility in an abnormal state among the plurality of facilities from the remote maintenance server, and perform service registration based on the received information.

[Claim 13] A remote maintenance method for remotely controlling a plurality of facilities at a site using a remote maintenance server, the method comprising:
receiving status information into the remote server from the plurality of facilities;
determining in the remote maintenance server whether any of the plurality of facilities is in an abnormal state based on the received status information of the facility;
transmitting information on an abnormal facility from the remote maintenance server to a service center server; and
performing service registration in the service center based on the information on the abnormal facility.

[Claim 14] The method of claim 13, further comprising:
providing the information on the abnormal facility from the service center to an administrator;
receiving a service provision request for the abnormal facility from the remote maintenance server to; and
transmitting a service registration request to the service center server based on a service provision request to the remote maintenance server,
wherein the performing service registration in the service center based on the information on the abnormal facility is according to the service provision request.

[Claim 15] The method of claim 13, wherein the information on the abnormal facility is any one or a combination of site information to which the abnormal facility belongs, product information of the abnormal facility, and failure information of the abnormal facility.

[Claim 16] The method of claim 15, wherein the site information comprises a number of installations for the plurality facilities at the site or location information for the site.

[Claim 17] The method of claim 15, wherein the product information of the abnormal facility includes a type of the abnormal facility, a model name of the abnormal facility, an identifier of the abnormal facility or a name of the abnormal facility.

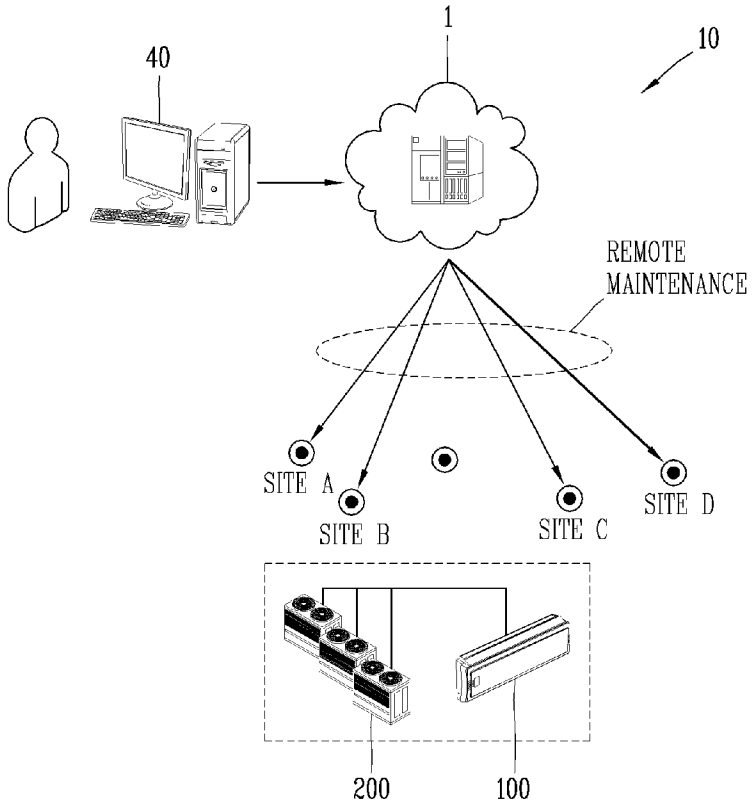
[Claim 18] The method of claim 15, wherein the failure information of the abnormal facility includes a failure code of the abnormal facility, and when there is a plurality of abnormal facilities, the failure information further includes a number of failures for each of the abnormal facilities or a number of failures for each facility with which communication is

not made.

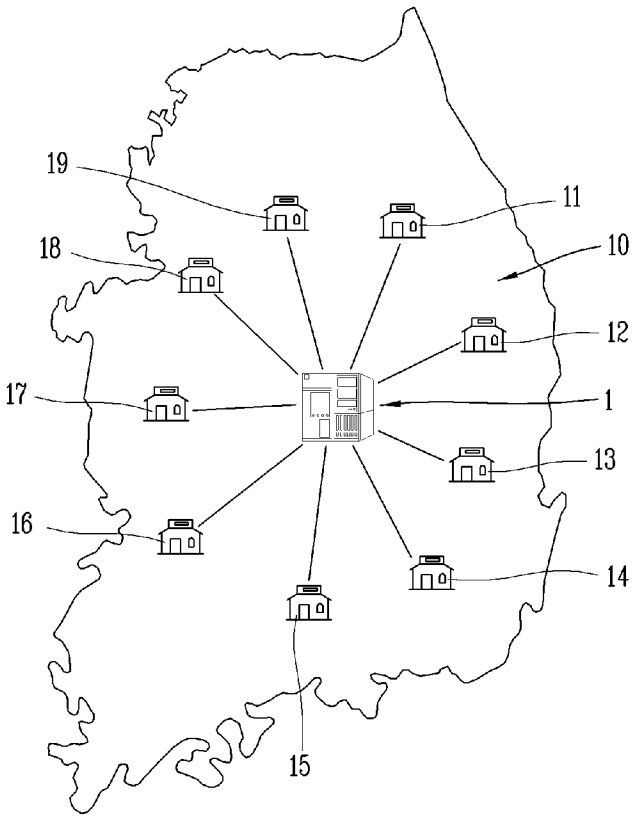
[Claim 19] The method of claim 13, further comprising:
transmitting an alarm signal from the service center to at least one repairman's terminal upon receiving the service registration request.

[Claim 20] The method of claim 13, further comprising:
receiving an inquiry request for a service schedule of the abnormal facility at the service center; and
providing a service schedule with the inquiry request at the service center.

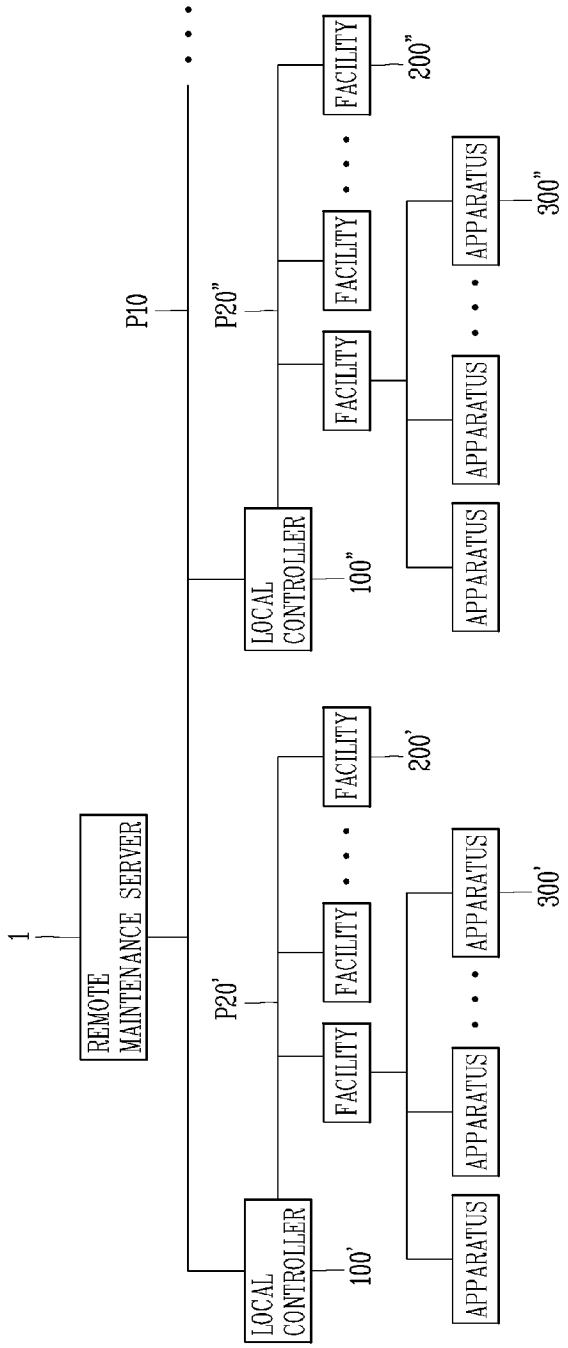
[Fig. 1a]


1
10
40
REMOTE
MAINTENANCE
SITE A
SITE B
SITE C
SITE D
200
100

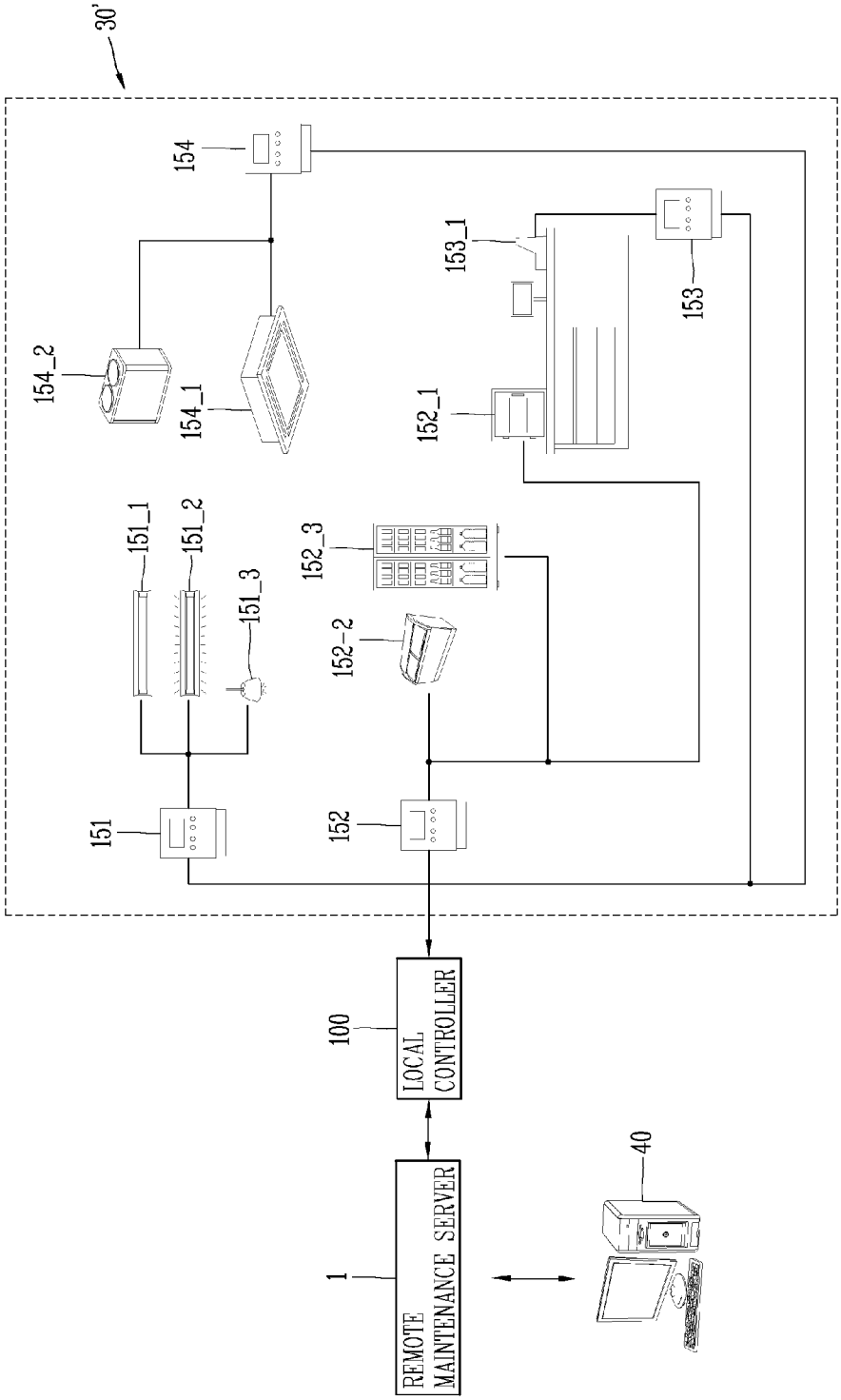
[Fig. 1b]


19
11
18
10
12
17
1
13
16
14
15

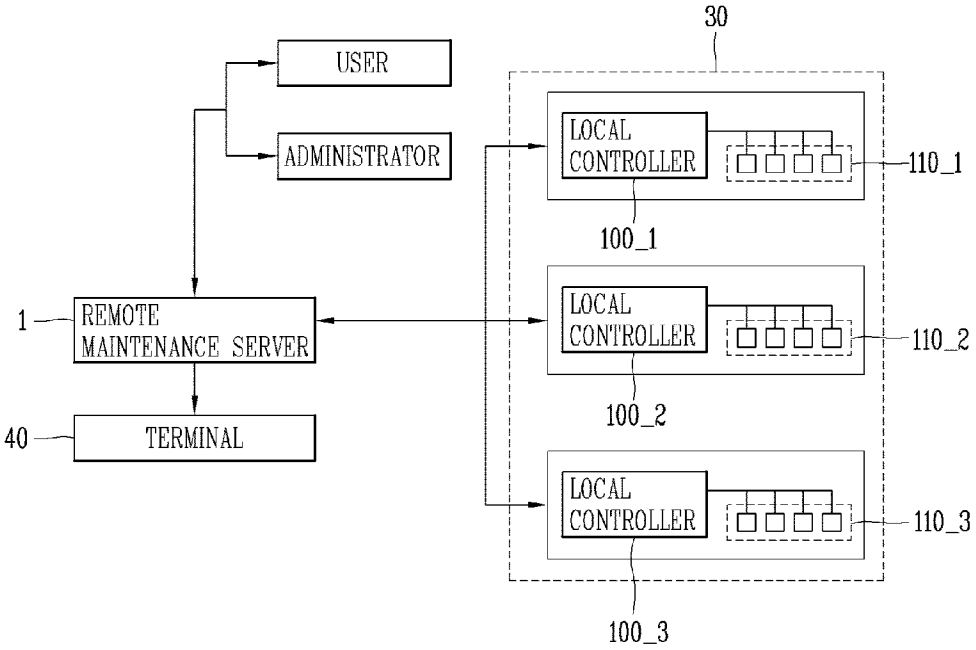
[Fig. 2]


1
REMOTE MAINTENANCE SERVER
P10
P20'
P20"
LOCAL CONTROLLER
100'
100"
FACILITY
200'
200"
APPARATUS
300'
300"

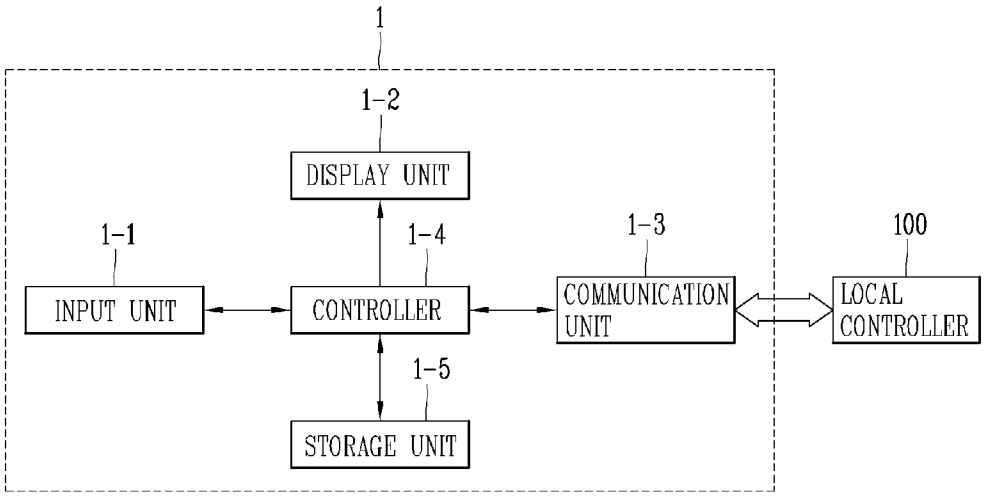
[Fig. 3]


30'
154
153_1
153
154_2
154_1
152_1
151_1
151_2
151_3
152_3
152-2
151
152
100
LOCAL CONTROLLER
1
REMOTE MAINTENANCE SERVER
40

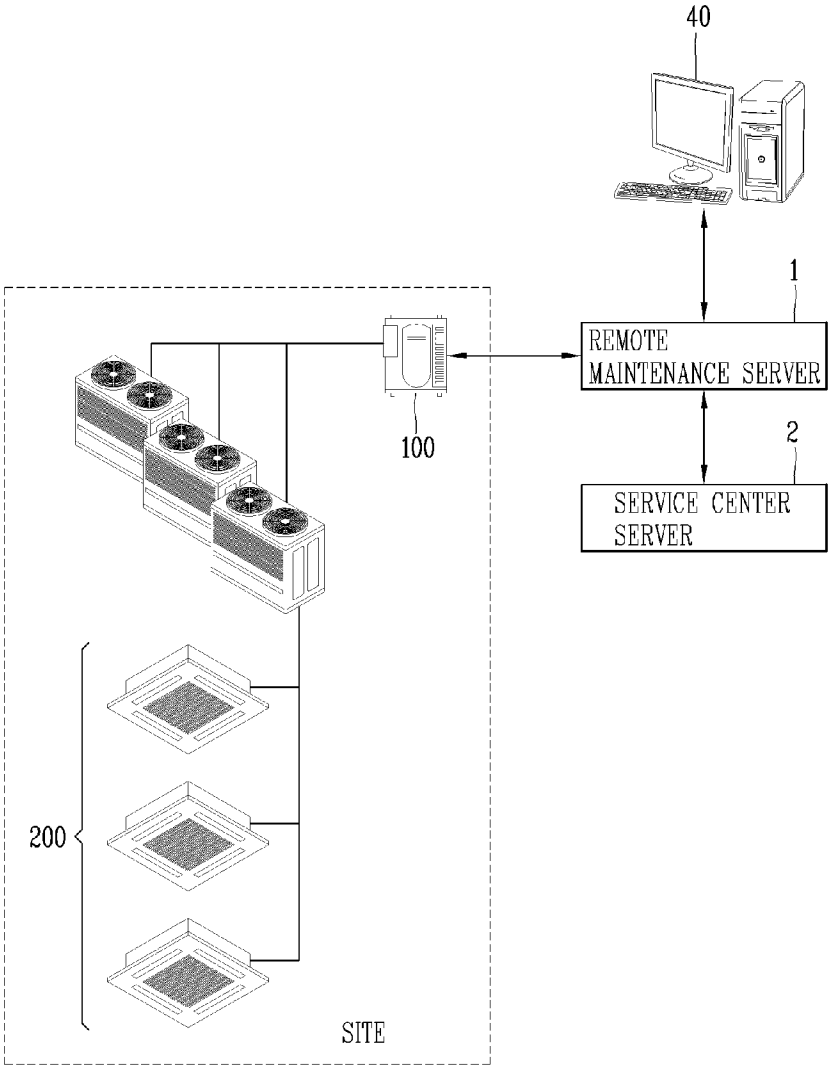
[Fig. 4]


30
USER
ADMINISTRATOR
LOCAL CONTROLLER
110_1
100_1
1
REMOTE MAINTENANCE SERVER
LOCAL CONTROLLER
110_2
100_2
40
TERMINAL
LOCAL CONTROLLER
110_3
100_3

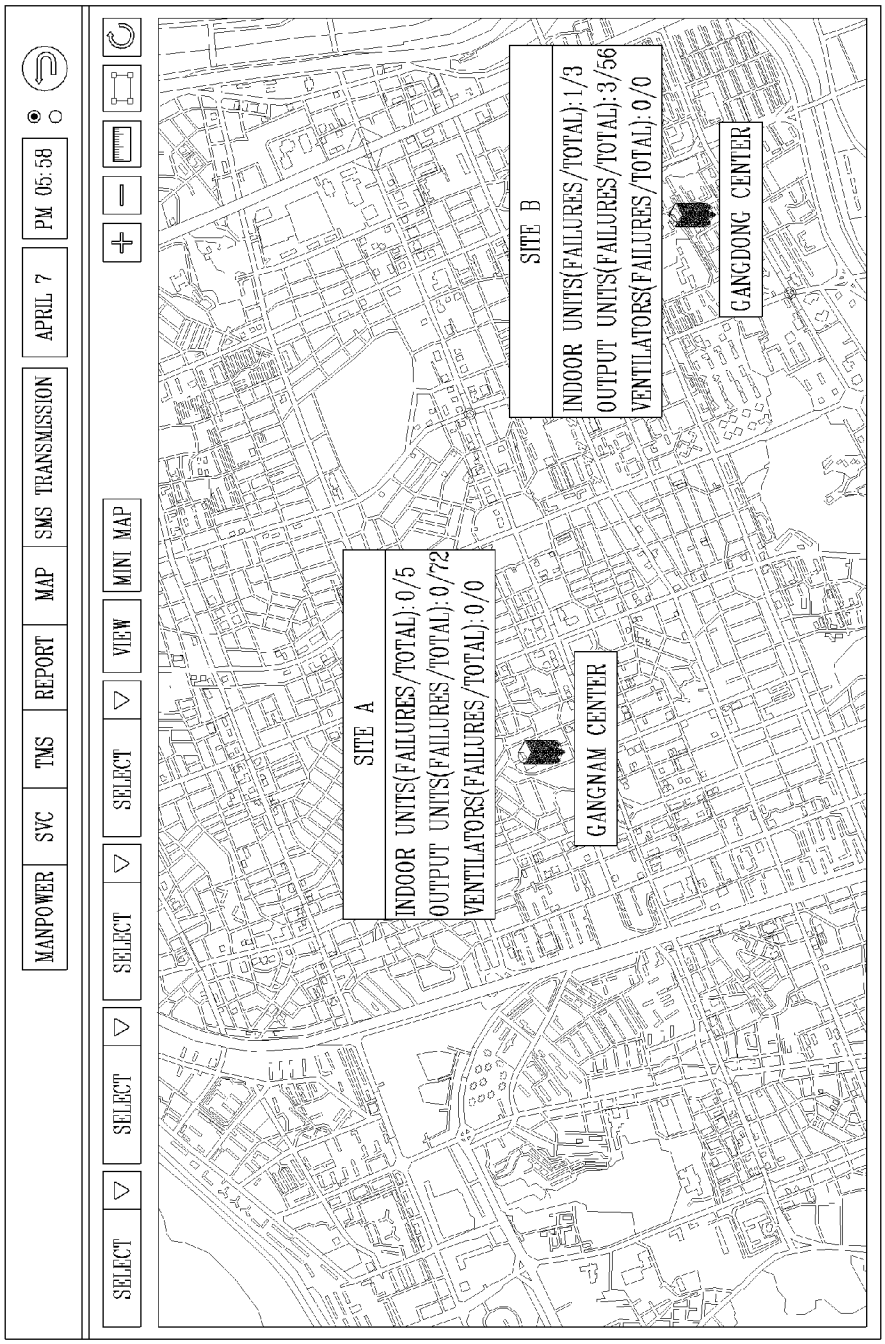
[Fig. 5]


1
1-2
DISPLAY UNIT
1-1
1-4
1-3
100
INPUT UNIT
CONTROLLER
COMMUNICATION UNIT
LOCAL CONTROLLER
1-5
STORAGE UNIT

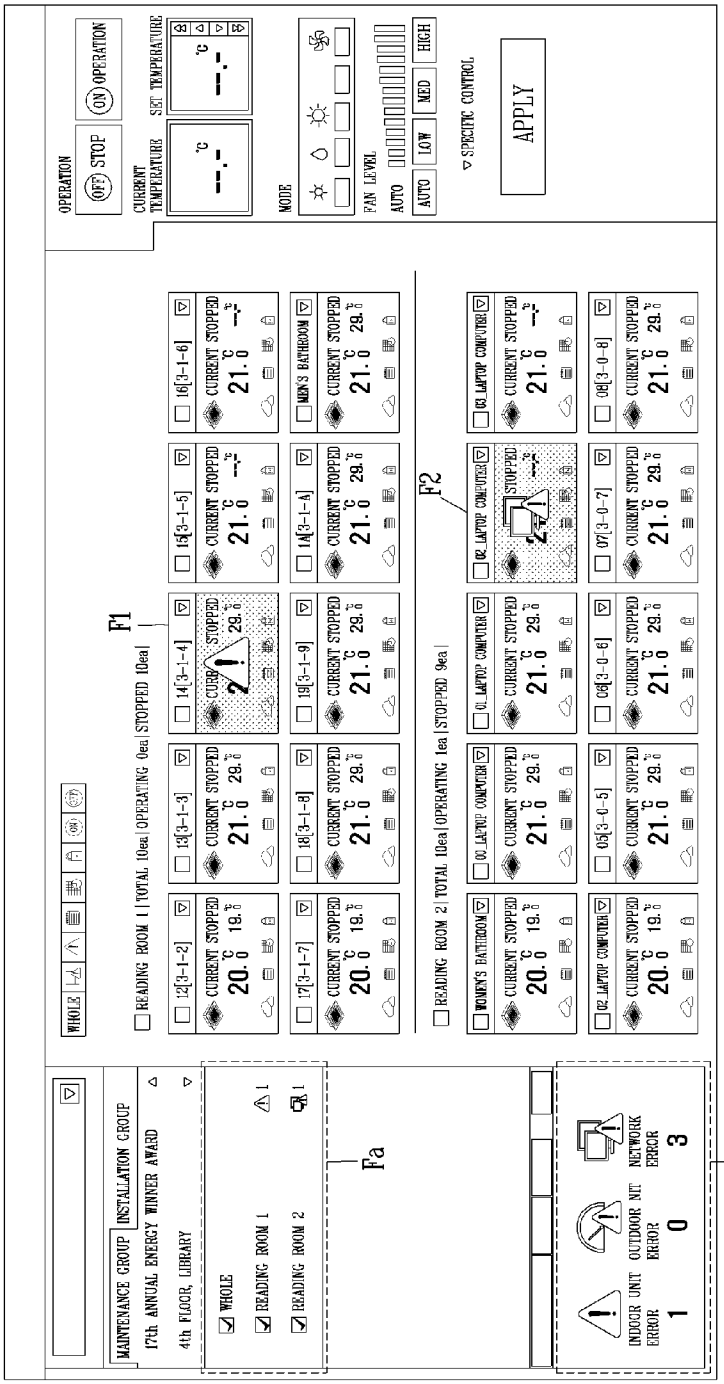
[Fig. 6]


40
1
REMOTE
MAINTENANCE SERVER
2
SERVICE CENTER
SERVER
100
200
SITE

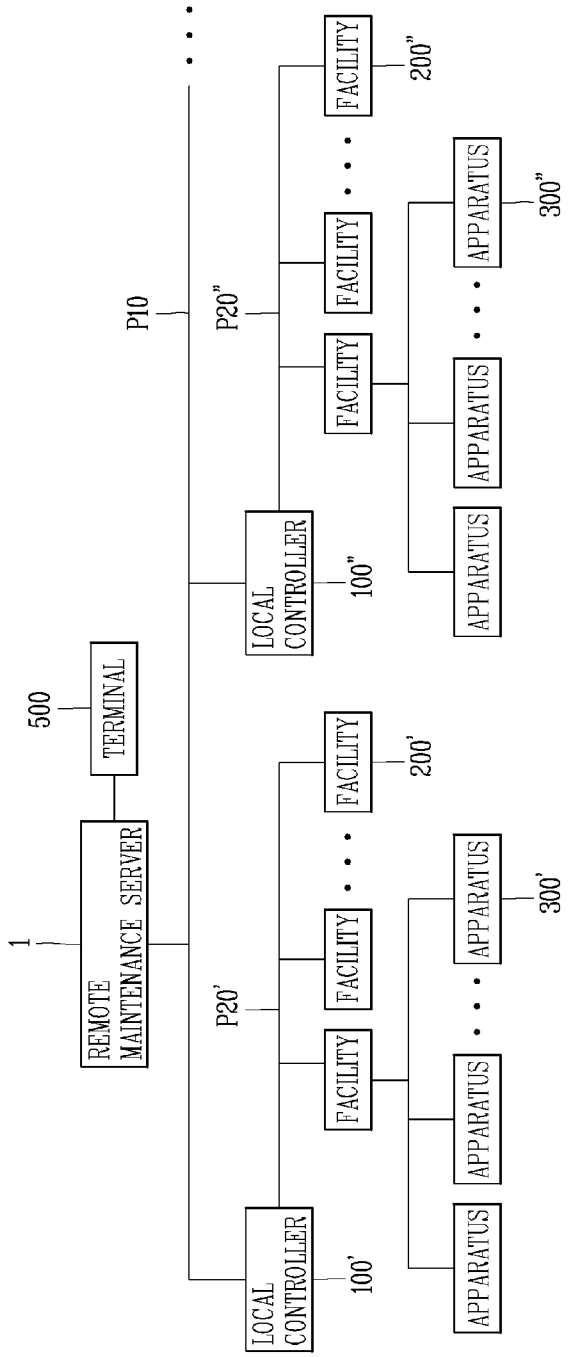
[Fig. 7]


MANPOWER
SVC
TMS
REPORT
MAP
SMS TRANSMISSION
APRIL 7
PM 05:58
SELECT
SELECT
SELECT
SELECT
VIEW
MINI MAP
SITE A
INDOOR UNITS(FAILURES/TOTAL): 0/5
OUTPUT UNITS(FAILURES/TOTAL): 0/72
VENTILATORS(FAILURES/TOTAL): 0/0
GANGNAM CENTER
SITE B
INDOOR UNITS(FAILURES/TOTAL): 1/3
OUTPUT UNITS(FAILURES/TOTAL): 3/56
VENTILATORS(FAILURES/TOTAL): 0/0
GANGDONG CENTER

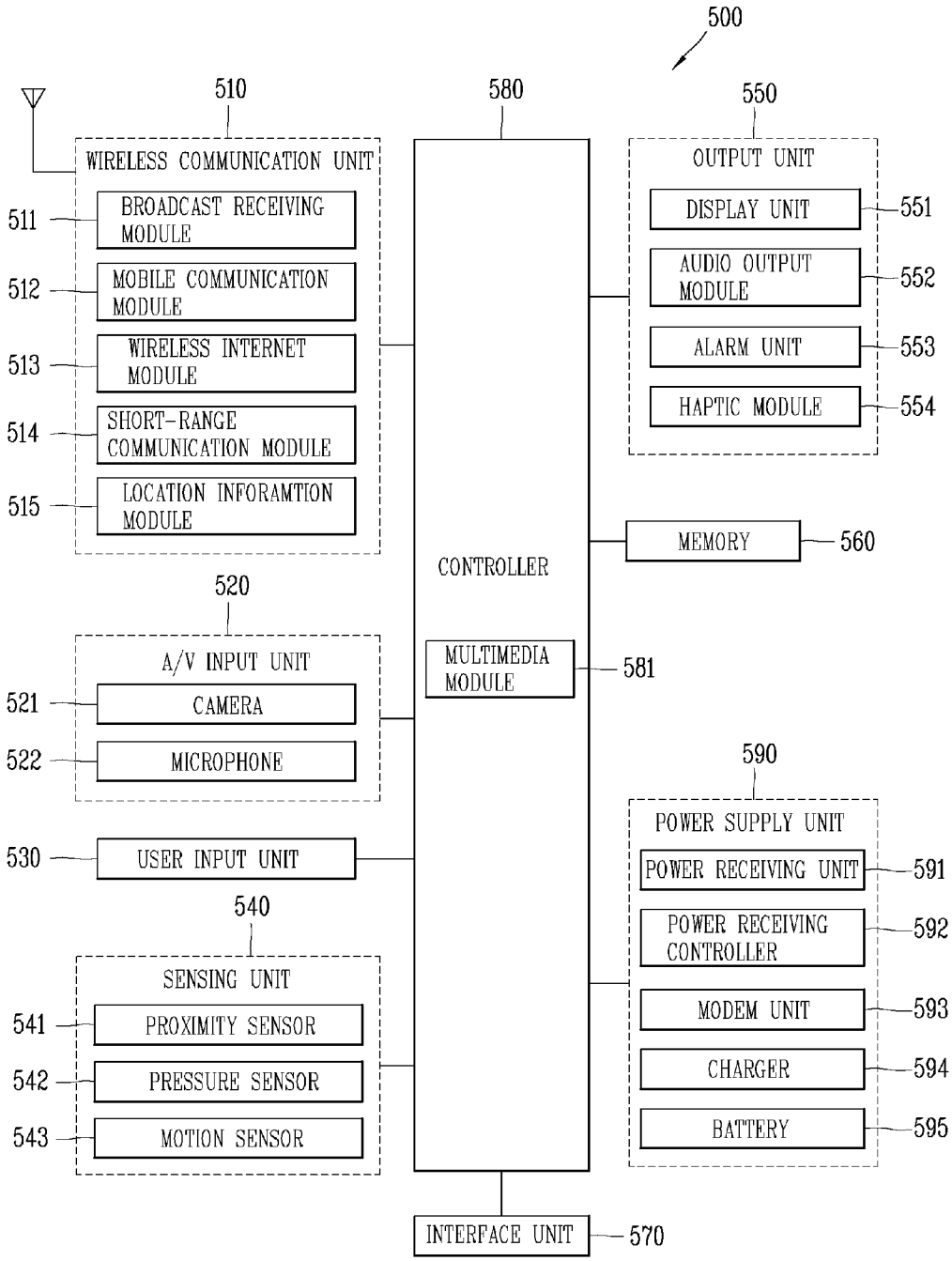
[Fig. 8]


OPERATION
STOP
OPERATION
CURRENT TEMPERATURE
SET TEMPERATURE
MODE
FAN LEVEL
AUTO
LOW
MED
HIGH
SPECIFIC CONTROL
APPLY
WHOLE
READING ROOM 1 | TOTAL 10ea | OPERATING 0ea | STOPPED 10ea
READING ROOM 2 | TOTAL 10ea | OPERATING 1ea | STOPPED 9ea
F1
F2
MAINTENANCE GROUP
INSTALLATION GROUP
17th ANNUAL ENERGY WINNER AWARD
4th FLOOR, LIBRARY
WHOLE
READING ROOM 1
READING ROOM 2
Fa
Fb
INDOOR UNIT ERROR
OUTDOOR NIT ERROR
NETWORK ERROR

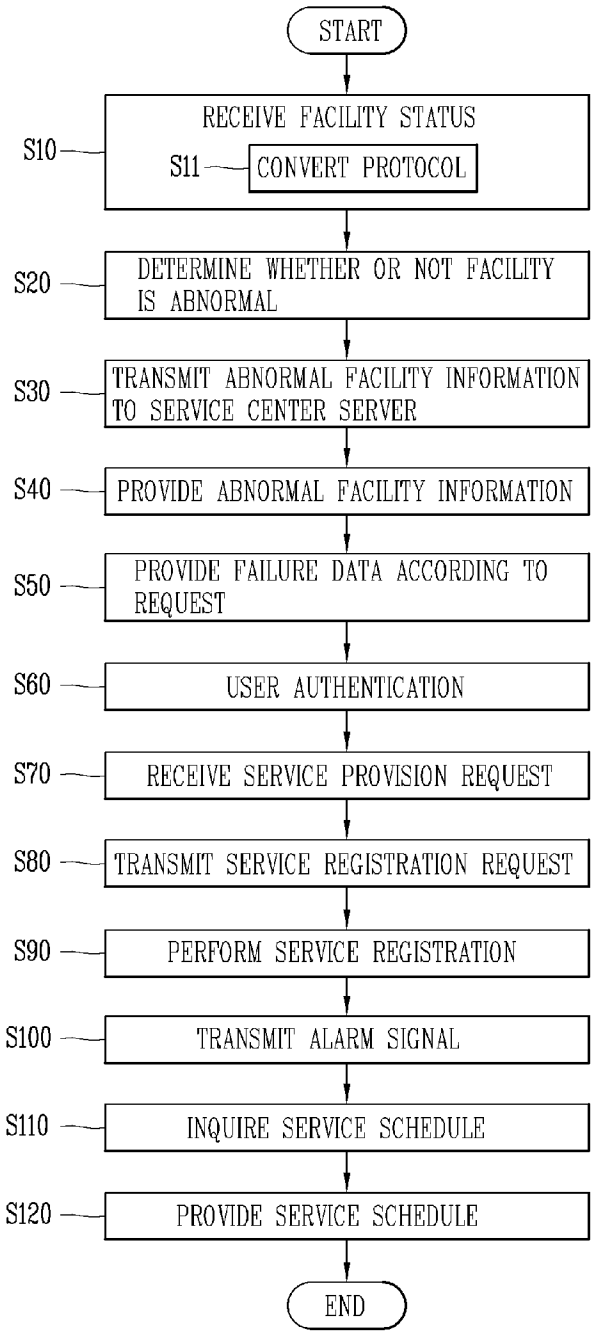
[Fig. 9]


1
REMOTE MAINTENANCE SERVER
500
TERMINAL
P10
P20'
P20"
LOCAL CONTROLLER
100'
100"
FACILITY
200'
200"
APPARATUS
300'
300"

[Fig. 10]


500
510
WIRELESS COMMUNICATION UNIT
511
BROADCAST RECEIVING MODULE
512
MOBILE COMMUNICATION MODULE
513
WIRELESS INTERNET MODULE
514
SHORT-RANGE COMMUNICATION MODULE
515
LOCATION INFORAMTION MODULE
520
A/V INPUT UNIT
521
CAMERA
522
MICROPHONE
530
USER INPUT UNIT
540
SENSING UNIT
541
PROXIMITY SENSOR
542
PRESSURE SENSOR
543
MOTION SENSOR
580
CONTROLLER
MULTIMEDIA MODULE
581
INTERFACE UNIT
570
550
OUTPUT UNIT
DISPLAY UNIT
551
AUDIO OUTPUT MODULE
552
ALARM UNIT
553
HAPTIC MODULE
554
MEMORY
560
590
POWER SUPPLY UNIT
POWER RECEIVING UNIT
591
POWER RECEIVING CONTROLLER
592
MODEM UNIT
593
CHARGER
594
BATTERY
595

[Fig. 11]


START
RECEIVE FACILITY STATUS
S10
S11
CONVERT PROTOCOL
S20
DETERMINE WHETHER OR NOT FACILITY IS ABNORMAL
S30
TRANSMIT ABNORMAL FACILITY INFORMATION TO SERVICE CENTER SERVER
S40
PROVIDE ABNORMAL FACILITY INFORMATION
S50
PROVIDE FAILURE DATA ACCORDING TO REQUEST
S60
USER AUTHENTICATION
S70
RECEIVE SERVICE PROVISION REQUEST
S80
TRANSMIT SERVICE REGISTRATION REQUEST
S90
PERFORM SERVICE REGISTRATION
S100
TRANSMIT ALARM SIGNAL
S110
INQUIRE SERVICE SCHEDULE
S120
PROVIDE SERVICE SCHEDULE
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2015/003432

A. CLASSIFICATION OF SUBJECT MATTER

G06Q 50/10(2012.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06Q 50/10; G05B 13/02; G05B 15/00; G06F 1/32; H04Q 9/00; G06N 5/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: remote, building, server, maintenance, service

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2012-0166007 A1 (YOUN KWAE JEONG et al.) 28 June 2012 See claims 1,6,13 and figure 4.	1-20
Y	US 2011-0178977 A1 (KIRK H. DREES) 21 July 2011 See paragraph [0058], claims 1,8 and figures 7A,8,11A,12.	1-20
Y	US 2012-0165988 A1 (CHANG-SIC CHOI et al.) 28 June 2012 See paragraph [0063], claims 1,8 and figure 4.	2,10,14
Y	JP 2003-299161 A (DAI-DAN CO., LTD.) 17 October 2003 See abstract and paragraph [0016].	3
Y	US 2013-0110295 A1 (SIEMENS CORPORATION) 02 May 2013 See abstract and claims 2,12-13.	20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2015 (30.06.2015)	**30 June 2015 (30.06.2015)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2015/003432

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2012-0165988 A1	28/06/2012	KR 10-2012-0087263 A	07/08/2012
JP 2003-299161 A	17/10/2003	None	
US 2013-0110295 A1	02/05/2013	WO 2013-056214 A1	18/04/2013