card. Besides, to use an electrical apparatus, a user has to purchase a prepaid card and carry the prepaid card, which is troublesome for the user. Furthermore, there is a possibility that an electrical apparatus is used fraudulently by using a forged or copied prepaid card.

[0004] In view of the above, one non-limiting and exemplary embodiment provides a remote monitoring method that allows it to perform charging depending on use of an electrical apparatus of a user without using a prepaid card in a manner that suppresses a possibility that the electrical apparatus is used fraudulently without payment. Additional benefits and advantages of the disclosed embodiments will be apparent from the specification and Figures. The benefits and/or advantages may be individually provided by the various embodiments and features of the specification and drawings disclosure, and need not all be provided in order to obtain one or more of the same.

SUMMARY

[0004a] According to a first aspect, remote monitoring method

in a remote monitoring system comprising a first communicator connected to a server that performs a charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus, the remote monitoring method comprising:

starting, by the first communicator, the charging process in the server, to charge the user of the electrical apparatus the fee, when the first communicator receives on-information from the second communicator via the wireless communication network, the on information indicating that the electric power supply to the electrical apparatus is switched from an off state to an on-state;

ending, by the first communicator, the charging process in the server, after the charging process is started, and when the first communicator detects an interruption of the wireless communication between the first communicator and the second

communicator;

transmitting, by the second communicator, the on-information to the first communicator via the wireless communication network, when the second communicator detects that the electric power supply to the electrical apparatus is switched from the off-state to the on-state;

maintaining, by the second communicator, the electric power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the second communicator and the first communicator continues; and

switching, by the second communicator, the electric power supply to the electrical apparatus from the on-state to the off-state, when the second communicator detects an interruption of the wireless communication between the second communicator and the first communicator.

[0004b] According to a second aspect, a remote monitoring system comprising a first communicator connected to a server that performs a charging process, in which a fee is charged to a

user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus,

wherein the first communicator starts a charging process in the server, to charge the user of the electrical apparatus the fee, when the first communicator receives on-information from the second communicator via the wireless communication network, and the first communicator ends the charging process in the server, after the charging process is started, and when the first communicator detects an interruption of the wireless communication between the first communicator and the second communicator, the on-information indicating that the electric power supply to the electrical apparatus is switched from an off-state to an on-state, and wherein

the second communicator transmits the on-information to the first communicator via the wireless communication network, when the second communicator detects that the electric power supply to the electrical apparatus is switched from an off-state to an on-state, and the second communicator maintains the electric power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the second communicator and the first communicator continues, andthe second communicator switches the electric power supply to the electrical apparatus from the on-state to the off-state, when the second communicator detects an interruption of the wireless communication between the second communicator and the first communicator.

[0004c] According to a third aspect, first communication apparatus connected to a server that performs a charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, the first communication apparatus comprising:

a wireless communicator connected to a second communicator

that monitors the state of the electric power supply to the electrical apparatus, the wireless communicatorreceiving on-information from the second communicator via a wireless communication network, the on-information indicating that the electric power to the electrical apparatus is switched from an off-state to an on-state;

a detector that detects a communication interruption in the wireless communication network; and

control circuitry that transmits a start signal to the server to start the charging process in the server, to charge the user of the electrical apparatus the fee, when the wireless communicator receives the on-information, and transmits an end signal to the server to end the charging process in the server, after the start signal istransmitted to the server, and when the detector detects an interruption of the wireless communication between the wireless communicator and the second communicator.

[0004d] According to a fourth aspect, a second communication apparatus comprising:

a wireless communicator that communicates with a first communicator connected to a server that performs a charging process, in which a fee is charged to a user ofan electrical apparatus depending on a state of electric power supply to the electrical apparatus;

a power monitor that monitors the state of the electric power supply to the electrical apparatus; and

power supply control circuitry that controls the state of the electric power supply to the electrical apparatus,

wherein, when the power monitor detects that the electric power supply to the electrical apparatus is switched from an off-state to an on-state, the wireless communicator transmits, to the first communicator, on-information indicating that the electric power supply to the electrical apparatus is switched from the off-state to the on-state, the on information causing the first communicator to start the charging process in the server, to charge the user of the electrical apparatus the fee, and

wherein the power supply control circuitry maintains the electric

power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the wireless communicator and the first communicator continues, and the power supply control circuitry switches the electric power supply to the electrical apparatus from the on-state to the off-state, when the wireless communicator detects an interruption of the wireless communication between the wireless communicator and the first communicator.

[0004e] According to a fifth aspect, a server apparatus that remotely monitors a state of electric power supply to an electrical apparatus via a wireless communication network, the server comprising:

a communicator connected to a communication system including the wireless communication network; and

a monitor that monitors the state of the electric power supply to the electrical apparatus via the wireless communication network and the communicator,

wherein the monitor starts a charging process, in which a fee is charged to a user of an electrical apparatus depending on

the state of the electric power supply to the electrical apparatus, when the monitor detects that the electric power supply to the electrical apparatus is switched from an off state to an on-state via the wireless communication network and the communicator, and

the monitor continues the charging process for a period in which the monitor detects, via the wireless communication network and the communicator, that the electric power supply to the electrical apparatus is in the on-state, and

the monitor ends the charging process when the monitor detects that the electric power supply to the electrical apparatus is switched from the on-state to the off-state via the wireless communication network and the communicator.

[0005] The present disclosure provides a remote monitoring

What is claimed is:

1. A remote monitoring method in a remote monitoring system comprising a first communicator connected to a server that performs a charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus, the remote monitoring method comprising:

starting, by the first communicator, the charging process in the server, to charge the user of the electrical apparatus the fee, when the first communicator receives on-information from the second communicator via the wireless communication network, the on information indicating that the electric power supply to the electrical apparatus is switched from an off state to an on-state;

ending, by the first communicator, the charging process in the server, after the charging process is started, and when the first communicator detects an interruption of the wireless communication between the first communicator and the second communicator;

transmitting, by the second communicator, the on-information to the first communicator via the wireless communication network, when the second communicator detects that the electric power supply to the electrical apparatus is switched from the off-state to the on-state;

maintaining, by the second communicator, the electric power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the second communicator and the first communicator continues; and

switching, by the second communicator, the electric power supply to the electrical apparatus from the on-state to the off-state, when the second communicator detects an interruption of the wireless communication between the second communicator and the first communicator.

2. The remote monitoring method according to claim 1, wherein when the second communicator detects that the electric power supply to the electrical apparatus is switched from the on-state to the off-state in a period in which the wireless communication between the second communicator and the first communicator continues, the second communicator transmits off-information, indicating that the electric power supply to the electrical apparatus is switched from the on-state to the off-state, to the first communicator,

and when the first communicator receives the off-information from the second communicator in a period in which the wireless communication between the first communicator and the second communicator continues, the first communicator ends the charging process in the server.

3. The remote monitoring method according to claim 1, wherein the first communicator determines whether an interruption time of the wireless communication elapsed since a start of the interruption of the wireless communication 35 between the first communicator and the second communicator is equal to or longer than a first threshold value, and

when it is not determined that the interruption time is equal to or longer than the first threshold value, the first communicator continues the charging process in the server, and

when it is determined that the interruption time is equal to or longer than the first threshold value, the first communicator ends the charging process in the server.

4. The remote monitoring method according to claim 3, wherein the first threshold value is greater than a mean value of duration time of wireless communication interruptions that occur in a wireless communication in a normal operation state.

5. The remote monitoring method according to claim 3, so wherein the first threshold value is smaller than a minimum charge time corresponding to a minimum unit in the charging process.

6. The remote monitoring method according to claim 1, wherein the second communicator determines whether an interruption time of the wireless communication elapsed since a start of the interruption of the wireless communication between the first communicator and the second wireless communicator is equal to or longer than a second threshold value, and

when it is not determined that the interruption time is equal to or longer than the second threshold value, the second communicator maintains the electric power supply to the electrical apparatus in the on-state, and

when it is determined that the interruption time is equal to or longer than the second threshold value, the second communicator switches the electric power supply to the electrical apparatus from the on-state to the off-state.

7. The remote monitoring method according to claim 6, wherein the second threshold value is greater than a mean value of duration time of wireless communication interruptions that occur in wireless communication in a normal operation state.

8. The remote monitoring method according to claim 6, wherein the second threshold value is smaller than a minimum charge time corresponding to a minimum unit in the charging process.

9. The remote monitoring method according to claim 1, wherein

the electrical apparatus is an air-conditioning system,

and wherein the server performs the charging process for a period in which an electric power supply to the air-conditioning system is in an on-state.

10. A remote monitoring system comprising a first communicator connected to a server that performs a charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus, and a second communicator connected to the first communicator via a wireless communication network and that monitors the state of the electric power supply to the electrical apparatus,

wherein the first communicator starts a charging process in the server, to charge the user of the electrical

apparatus the fee, when the first communicator receives on-information from the second communicator via the wireless communication network, and the first communicator ends the charging process in the server, after the charging process is started, and when the first communicator detects an interruption of the wireless communication between the first communicator and the second communicator, the on-information indicating that the electric power supply to the electrical apparatus is switched from an off-state to an on-state, and

wherein the second communicator transmits the on-information to the first communicator via the wireless communication network, when the second communicator detects that the electric power supply to the electrical apparatus is switched from an off-state to an on state, and the second communicator maintains the electric power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the second communicator and the first communicator continues, and the second communicator switches the electric power supply to the electrical apparatus from the on-state to the off-state, when the second communicator detects an interruption of the wireless communication between the second communicator and the first communicator.

11. A first communication apparatus connected to a server that performs a charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus, the first communication apparatus comprising:

a wireless communicator connected to a second communicator that monitors the state of the electric power supply to the electrical apparatus, the wireless communicator receiving on-information from the second communicator via a wireless communication network, the on-information indicating that the electric power to the electrical apparatus is switched from an off-state to an on-state;

a detector that detects a communication interruption in the wireless communication network; and

control circuitry that transmits a start signal to the server to start the charging process in the server, to charge the user of the electrical apparatus the fee, when the wireless communicator receives the on-information, and transmits an end signal to the server to end the charging process in the server, after the start signal is transmitted to the server, and when the detector detects an interruption of the wireless communication between the wireless communicator and the second communicator.

12. The first communication apparatus according to claim 11, wherein when the wireless communicator receives an

off-information, indicating that the electric power supply to the electrical apparatus is switched from an on-state to an off-state, in a period in which the wireless communication with the second communicator continues, the control circuitry transmits the end signal to the server.

13. The first communication apparatus according to claim 11, wherein the control circuitry determines whether the wireless communication interruption time elapsed since the detector detects the interruption of the wireless communication, is equal to or longer than a first threshold value, and

when it is not determined that the wireless communication interruption time is equal to or longer than the first threshold value, the control circuitry continues the charging process in the server without transmitting the end signal, and

when it is determined that the wireless communication interruption time is equal to or longer than the first threshold value, the control circuitry transmits the end signal to the server.

14. A second communication apparatus comprising:

a wireless communicator that communicates with a first communicator connected to a server that performs a

charging process, in which a fee is charged to a user of an electrical apparatus depending on a state of electric power supply to the electrical apparatus;

a power monitor that monitors the state of the electric power supply to the electrical apparatus; and

power supply control circuitry that controls the state of the electric power supply to the electrical apparatus,

wherein, when the power monitor detects that the electric power supply to the electrical apparatus is switched from an off-state to an on-state, the wireless communicator transmits, to the first communicator, on-information indicating that the electric power supply to the electrical apparatus is switched from the off-state to the on-state, the on information causing the first communicator to start the charging process in the server, to charge the user of the electrical apparatus the fee, and

wherein the power supply control circuitry maintains the electric power supply to the electrical apparatus in the on-state for a period in which the wireless communication between the wireless communicator and the first communicator continues, and the power supply control circuitry switches the electric power supply to the electrical apparatus from the on-state to the off-state,

when the wireless communicator detects an interruption of the wireless communication between the wireless communicator and the first communicator.

15. The second communication apparatus according to claim 14, wherein when the power monitor detects that the electric power supply to the electrical apparatus is switched from the on-state to the off-state, the wireless communicator transmits, to the first communicator, off-information, indicating that the electric power supply to the electrical apparatus is switched from the on-state to the off-state, to cause the first communicator end the charging process in the server associated with the electrical apparatus.

16. The second communication apparatus according to claim 14, wherein the wireless communicator determines whether a wireless communication interruption time elapsed since the interruption of the wireless communication is detected, is equal to or longer than second threshold value, and

the power supply control circuitry maintains the electric power supply to the electrical apparatus in the on-state, when it is not determined that the wireless communication interruption time is equal to or longer than second threshold value, and

the power supply control circuitry switches the electric power supply to the electrical apparatus from the on-state to the off-state, when it is determined that the wireless communication interruption time is equal to or longer than second threshold value.

17. A server apparatus that remotely monitors a state of electric power supply to an electrical apparatus via a wireless communication network, the server comprising:

a communicator connected to a communication system including the wireless communication network; and

a monitor that monitors the state of the electric power supply to the electrical apparatus via the wireless communication network and the communicator,

wherein the monitor starts a charging process, in which a fee is charged to a user of an electrical apparatus depending on the state of the electric power supply to the electrical apparatus, when the monitor detects that the electric power supply to the electrical apparatus is switched from an off state to an on-state via the wireless communication network and the communicator, and

the monitor continues the charging process for a period in which the monitor detects, via the wireless communication network and the communicator, that the electric power

supply to the electrical apparatus is in the on-state, and

the monitor ends the charging process when the monitor detects that the electric power supply to the electrical apparatus is switched from the on-state to the off-state via the wireless communication network and the communicator.