

DESCRIPTION

HOME DELIVERY BOX, HOME DELIVERY SYSTEM, PORTABLE
TERMINAL, COMMUNICATION METHOD, AND INFORMATION

5

PROCESSING METHOD

TECHNICAL FIELD

[0001]

The present invention relates to a home delivery box, a home delivery
10 system, a portable terminal, a communication method, and an information
processing method.

BACKGROUND ART

[0002]

In recent years, the number of packages handled by home delivery
15 services is rising sharply with an increase in mail-order sales of goods, and the
incidence of re-deliveries due to recipients' absence has become a social problem.
To address this problem, a conceivable countermeasure is to install a home
delivery locker (hereinafter, also referred to as a "home delivery box") in which
delivery staff of delivery companies is able to put packages in the case of
20 recipients' absence. As one of techniques related to the receipt of packages,
Patent Literature 1 (PTL 1) discloses a package receiving method convenient
for consignees.

Citation List

Patent Literature

25 [0003]

PTL 1: Japanese Unexamined Patent Application Publication No.
2005-267565

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0004]

Embodiments of the present invention provide a home delivery box, a home delivery system, a portable terminal, a communication method, and an information processing method that enable managing service conditions of the home delivery box via an information terminal such as a server device.

SOLUTION TO PROBLEM

[0005]

According to a first aspect of the present invention, there is provided a home delivery box including a housing unit configured to house a package, a locking device configured to lock and unlock a door of the housing unit, a detecting unit configured to detect opening and closing of the door, a control unit configured to perform control to cause the locking device to lock the door when closing of the door is detected, and a wireless communication unit configured to transmit, through short-distance wireless communication, one of package arrival information and package receipt information to a portable terminal when closing of the door is detected, the package arrival information indicating that a package has been housed in the housing unit, and the package receipt information indicating that a package housed in the housing unit has been received.

[0006]

According to a second aspect of the present invention, there is provided a home delivery system including a storage unit configured to store management information indicating whether or not a home delivery box is available, a receiving unit configured to receive a permission-to-use request asking for use of the home delivery box from a first portable terminal, a transmission unit configured to transmit first authentication information for unlocking a door of the home delivery box to the first portable terminal when the home delivery box is determined to be available based on the management

information, and an information processing unit configured to update the management information when the receiving unit has received, via a wide-area communication network, package arrival information transmitted from the home delivery box to the first portable terminal through short-distance wireless communication, and indicating that a package has been housed in the home delivery box from the first portable terminal after transmission of the first authentication information.

[0007]

According to a third aspect of the present invention, there is provided a portable terminal including a first communication unit configured to receive authentication information transmitted from a server device, the authentication information being information for unlocking a door of a home delivery box, a second communication unit configured to transmit the authentication information received, to the home delivery box, and a terminal control unit configured to, when the second communication unit has received, through short-distance wireless communication, one of package arrival information and package receipt information from the home delivery box, the package arrival information indicating that a package has been housed in the home delivery box, and the package receipt information indicating that a package housed in the home delivery box has been received, cause the first communication unit to transmit via a wide-area communication network, to the server device, information corresponding to the one of the package arrival information and the package receipt information that has been received.

[0008]

According to a fourth aspect of the present invention, there is provided a communication method that includes detecting opening and closing of a door of a housing unit of a home delivery box, and locking the door when closing of the door is detected, and transmitting via a wide-area communication network one of package arrival information and package receipt information to a portable terminal, the package arrival information indicating that a package has been housed in the housing unit, and the package receipt information

indicating that a package housed in the housing unit has been received, through short-distance wireless communication.

[0009]

According to a fifth aspect of the present invention, there is provided a program for causing a computer to execute the communication method described above.

[0010]

According to a sixth aspect of the present invention, there is provided an information processing method that includes receiving a permission-to-use request asking for use of a home delivery box from a first portable terminal, when the home delivery box is determined to be available based on management information, transmitting via a wide-area communication network first authentication information for unlocking a door of the home delivery box to the first portable terminal, the management information indicating whether or not the home delivery box is available, and updating the management information when package arrival information indicating that a package has been housed in the home delivery box has been received, through short-distance wireless communication, from the first portable terminal after transmission of the first authentication information.

[0011]

According to a seventh aspect of the present invention, there is provided a program for causing a computer to execute the information processing method described above.

[0012]

According to an eighth aspect of the present invention, there is provided a communication method that includes receiving authentication information transmitted from a server device, the authentication information being information for unlocking a door of a home delivery box, transmitting the authentication information received, to the home delivery box, and when one of package arrival information and package receipt information has been received through short-distance wireless communication from the home delivery box,

transmitting via a wide-area communication network, to the server device, information corresponding to the one of the package arrival information and the package receipt information that has been received, the package arrival information indicating that a package has been housed in the home delivery box, and the package receipt information indicating that the package housed in the home delivery box has been received.

[0013]

According to a ninth aspect of the present invention, there is provided a program for causing a computer to execute the communication method described above.

ADVANTAGEOUS EFFECT OF INVENTION

[0014]

According to embodiments of the present invention, it is possible to manage service conditions of the home delivery box via an information terminal such as a server device.

BRIEF DESCRIPTION OF DRAWINGS

[0015]

FIG. 1 is a diagram illustrating an overview of a home delivery system according to an embodiment.

FIG. 2 is a block diagram illustrating a functional configuration of the home delivery system according to the embodiment.

FIG. 3 is a diagram showing one example of management information.

FIG. 4 is a diagram showing one example of customer information.

FIG. 5 is a sequence diagram of exemplary operation 1 of the home delivery system according to the embodiment.

FIG. 6 shows one example of an image that indicates the position of a

vacant housing unit.

FIG. 7 is a sequence diagram of exemplary operation 2 of the home delivery system according to the embodiment.

FIG. 8 is a sequence diagram of exemplary operation 3 of the home
5 delivery system according to the embodiment.

FIG. 9 is a sequence diagram of exemplary operation 4 of the home delivery system according to the embodiment.

FIG. 10 is a sequence diagram of exemplary operation 5 of the home delivery system according to the embodiment.

10 FIG. 11 is a sequence diagram of exemplary operation 6 of the home delivery system according to the embodiment.

FIG. 12 shows one example of management information that includes reserved-period information.

15 FIG. 13 is a diagram showing one example of criterion information for determining a reserved period depending on each delivery company.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0016]

Hereinafter, an embodiment will be described in detail with reference to the drawings. Note that the embodiment described below illustrates a generic
20 or specific example. Numerical values, shapes, materials, constituent elements, positions of the constituent elements in the arrangement, forms of connection of the constituent elements, steps, a sequence of steps, and so on in the following embodiment are mere examples and do not intend to limit the scope of the present invention. Among the constituent elements described in
25 the following embodiment, those that are not recited in any independent claim are described as optional constituent elements.

[0017]

Note that each drawing is a schematic diagram and does not necessarily provide precise depiction. Substantially the same constituent elements are given the same reference signs throughout the drawings, and their detailed description may be omitted or simplified.

5 [0018]

EMBODIMENT

Overview

First, a configuration of a home delivery system according to an embodiment will be described. FIG. 1 is a diagram illustrating an overview of the home delivery system according to the embodiment. FIG. 2 is a block diagram illustrating a functional configuration of the home delivery system according to the embodiment.

[0019]

Home delivery system 10 according to the embodiment is a system for managing service conditions of home delivery box 30 via server device 20. Home delivery box 30 includes a plurality of housing units 32 (plurality of sections). As illustrated in (a) of FIG. 1, for example, package delivery staff operates first portable terminal 40 to transmit a permission-to-use request asking for the use of home delivery box 30 from first portable terminal 40 to server device 20.

[0020]

Server device 20 manages service conditions of home delivery box 30 in accordance with management information stored in storage unit 23. Upon receiving a permission-to-use request, server device 20 references the management information and transmits the number of available housing unit 32 among the plurality of housing units 32 of home delivery box 30 and an unlock token for unlocking the door of available housing unit 32 to first

portable terminal 40. The unlock token is stored in storage unit 45 of first portable terminal 40. As illustrated in (b) of FIG. 1, the delivery staff is able to use first portable terminal 40 as a key for unlocking the door of housing unit 32 described above. Specifically, first portable terminal 40 is used as a hands-free key, and the delivery staff who wears first portable terminal 40 is able to unlock the door of housing unit 32 through a simple operation of just pressing buttons (part of operation accepting unit 31).

[0021]

As illustrated in FIG. 2, home delivery system 10 includes server device 20, home delivery box 30, first portable terminal 40, and second portable terminal 50. Details of each device included in home delivery system 10 will be described hereinafter with reference to FIGS. 1 and 2.

[0022]

Server Device

First, server device 20 will be described. Server device 20 is a device that manages service conditions of home delivery box 30. Server device 20 includes server communication unit 21, information processing unit 22, and storage unit 23.

[0023]

Server communication unit 21 is a communication circuit (in other words, communication module) for allowing server device 20 to perform communication with first portable terminal 40 and second portable terminal 50 via a wide-area communication network such as Internet 80. Server communication unit 21 includes receiving unit 24 (in other words, receiving circuit) and transmission unit 25 (in other words, transmission circuit). Communication standards of the communication performed by server communication unit 21 is not particularly limited.

[0024]

Information processing unit 22 performs information processing for managing service conditions of home delivery box 30. For example, information processing unit 22 may be implemented by a microcomputer, or
5 may be implemented by a processor.

[0025]

Storage unit 23 is a storage device that stores control programs for use in information processing performed by information processing unit 22 to manage service conditions of home delivery box 30, and various types of
10 information for use in that information processing. For example, storage unit 23 is implemented by a semiconductor memory.

[0026]

Storage unit 23 stores, for example, management information indicating service conditions of home delivery box 30. FIG. 3 is a diagram
15 showing one example of the management information.

[0027]

As illustrated in FIG. 3, the management information associates the ID of the home delivery box with the installation place of the home delivery box (e.g., the address of a collective house or a stand-alone house in which the home
20 delivery box is installed) and the service conditions of housing units included in the home delivery box. The service conditions include, for example, three conditions, namely, “vacant,” “reserved,” and “in service”. “Vacant” means that the housing unit concerned stores no packages (i.e., is not being used) and is not reserved for use. “Reserved” means that the housing unit concerned stores no
25 packages but has been reserved for use. “In service” means that the housing unit concerned stores a package (i.e., is being used).

[0028]

Storage unit 23 also stores customer information. FIG. 4 is a diagram showing one example of the customer information.

[0029]

As illustrated in FIG. 4, the customer information is information including, for example, second portable terminal ID, address, name, telephone number, and e-mail address. The customer information is stored in storage unit 23 by, for example, a general user who wants to use home delivery system (hereinafter, also referred to as a consignee) performing registration processing in advance by operating second portable terminal 50.

[0030]

Storage unit 23 further stores, for example, a plurality of unlock tokens for unlocking the doors of the home delivery box managed by the management information.

[0031]

Home Delivery Box

Next, home delivery box 30 will be described. Home delivery box 30 is a device that enables delivery staff of delivery companies to leave packages when recipients are absence in a facility where home delivery box 30 is installed (e.g., housing such as a collective house or a stand-alone house). In other words, home delivery box 30 is a home delivery locker. Home delivery box 30 reduces the incidence of re-deliveries of packages. As illustrated in FIG. 1, home delivery box 30 includes the plurality of housing units 32. For each one housing unit 32, home delivery box 30 includes operation accepting unit 31, locking device 33, detecting unit 34, control unit 35, wireless communication unit 36, storage unit 37, and battery housing unit 38. In FIG. 2, only one set of these constituent elements is illustrated in order to simplify the description, but home delivery box 30 includes a plurality of sets of these constituent

elements depending on the number of housing units 32.

[0032]

Operation accepting unit 31 is a user interface that accepts operation from a consignee or delivery staff of a delivery company. For example,
5 operation accepting unit 31 is a hardware button that accepts operation from delivery staff or a consignee, but it may be a touch panel.

[0033]

Housing unit 32 is a structure that defines one section for housing a package and is, in other words, a storehouse. Home delivery box 30 includes
10 the plurality of housing units 32, but may include at least one housing unit 32. Each housing unit 32 has a door that is opened or closed by delivery staff or a consignee.

[0034]

Locking device 33 is an electric lock for locking or unlocking the door of
15 housing unit 32. Locking device 33 is controlled by control unit 35 and operates using a battery housed in battery housing unit 38 as a power source.

[0035]

Detecting unit 34 is a sensor that detects opening and closing of the door of housing unit 32. For example, detecting unit 34 may be a magnetic
20 sensor (i.e., a magnet sensor), or may be an optical sensor.

[0036]

Control unit 35 is a control device that controls locking device 33 and wireless communication unit 36. For example, control unit 35 may be implemented by a microcomputer, or may be implemented by a processor. For
25 example, when detecting unit 34 has detected closing of the door of housing unit 32, control unit 35 performs control to cause locking device 33 to lock or unlock the door of housing unit 32.

[0037]

Wireless communication unit 36 is a communication circuit that allows home delivery box 30 to perform communication with first portable terminal 40 or second portable terminal 50. More specifically, wireless communication
5 unit 36 performs short-distance wireless communication, and the communication performed by wireless communication unit 36 uses communication standards such as Bluetooth (registered trademark) or Wi-Fi (registered trademark).

[0038]

10 Home delivery box 30 does not communicate directly with server device 20, and communicates with server device 20 via a portable terminal using short-distance wireless communication implemented by wireless communication unit 36. This simplifies the configuration of home delivery box 30 related to communication.

15 [0039]

Storage unit 37 is a storage device that stores, for example, control programs to be executed by control unit 35. For example, storage unit 37 is implemented by a semiconductor memory.

[0040]

20 Battery housing unit 38 is a battery holder for housing a battery and is provided, for example, for each of housing units 32. Home delivery box 30 operates on direct-current power supplied from the battery housed in battery housing unit 38, instead of operating on alternating-current power supplied from a power system. This eliminates the need for electric work that is done
25 to install home delivery box 30. The battery housed in battery housing unit 38 may be a primary battery (in other words, dry battery), or may be a secondary battery.

[0041]

First Portable Terminal and Second Portable Terminal

First portable terminal 40 is a portable information terminal such as a smartphone or a tablet terminal operated by delivery staff. First portable
5 terminal 40 includes operation accepting unit 41, terminal control unit 42, first communication unit 43, second communication unit 44, storage unit 45, and display unit 46.

[0042]

Operation accepting unit 41 accepts operation from delivery staff. For
10 example, operation accepting unit 41 may be implemented by a touch panel and hardware buttons.

[0043]

Terminal control unit 42 performs various types of information processing on first portable terminal 40 in accordance with the operation
15 accepted by operation accepting unit 41. For example, terminal control unit 42 may be implemented by a microcomputer, or may be implemented by a processor.

[0044]

First communication unit 43 is a communication circuit (in other words, communication module) for allowing first portable terminal 40 to communicate
20 with server device 20 via a wide-area communication network such as Internet 80. For example, first communication unit 43 may be a wireless communication circuit that performs wireless communication using a mobile communication system. Communication standards of the communication
25 performed by first communication unit 43 is not particularly limited.

[0045]

Second communication unit 44 is a communication circuit for allowing

first portable terminal 40 to communicate with home delivery box 30. More specifically, second communication unit 44 performs short-distance wireless communication, and the communication performed by second communication unit 44 uses communication standards such as Bluetooth (registered
5 trademark) or Wi-Fi (registered trademark).

[0046]

Storage unit 45 is a storage device that stores, for example, control programs to be executed by terminal control unit 42. For example, storage unit 45 may be implemented by a semiconductor memory.

10 [0047]

Display unit 46 displays an image under the control of terminal control unit 42. Specifically, display unit 46 is a display including a display device such as a liquid crystal panel or an organic EL panel.

[0048]

15 Second portable terminal 50 is a portable information terminal such as a smartphone or a tablet terminal operated by a consignee. Second portable terminal 50 includes operation accepting unit 51, terminal control unit 52, first communication unit 53, second communication unit 54, storage unit 55, and display unit 56. Second portable terminal 50 is similar in configuration to
20 first portable terminal 40, except that the second portable terminal is operated by a consignee, not by delivery staff. Thus, a detailed description thereof shall be omitted.

[0049]

Exemplary Operation 1: Operation for Reserving Home Delivery Box

25 Next, exemplary operation 1 of home delivery system 10 will be described. FIG. 5 is a sequence diagram of exemplary operation 1 of home delivery system 10. FIG. 5 illustrates an operation performed by delivery staff

when reserving home delivery box 30.

[0050]

First, operation accepting unit 41 of first portable terminal 40 accepts a reservation request operation for reservation of home delivery box 30 from
5 delivery staff (S11). For example, the delivery staff inputs the address of a consignee via operation accepting unit 41. For example, the reservation request operation is accepted during execution of a dedicated application program for reservation of home delivery box 30 by terminal control unit 42.

[0051]

10 Based on the reservation request operation of the delivery staff accepted by operation accepting unit 41, terminal control unit 42 causes first communication unit 43 to transmit a permission-to-use request asking for the use of home delivery box 30. That is, based on the reservation request operation, first communication unit 43 transmits a permission-to-use request to
15 server device 20 (S12). The permission-to-use request includes the address of the consignee that has been input in step S11 as position information indicating the installation position of home delivery box 30.

[0052]

Receiving unit 24 of server device 20 receives the permission-to-use
20 request asking for the use of home delivery box 30 from first communication unit 43 (S13). On the basis of the received permission-to-use request and the customer information stored in storage unit 23, information processing unit 22 identifies second portable terminal 50 of the consignee (S14).

[0053]

25 Specifically, information processing unit 22 references the customer information stored in storage unit 23 and identifies the second portable terminal ID that is associated with substantially the same address as the

address indicated by the position information included in the permission-to-use request, as the ID of second portable terminal 50.

[0054]

Information processing unit 22 also determines whether or not to
5 permit the use of home delivery box 30 on the basis of the received permission-to-use request, and the management information stored in storage unit 23 (S15).

[0055]

Specifically, information processing unit 22 references the management
10 information stored in storage unit 23, identifies the home delivery box ID that is associated with substantially the same installation place as the position indicated by the position information included in the permission-to-use request (i.e., the same, except for a building name and a room number), and determines the service condition associated with the identified home delivery box ID as the
15 service condition of home delivery box 30. If there is any housing unit 32 whose service condition is “vacant,” information processing unit 22 determines that home delivery box 30 is available, whereas if there are no housing units 32 whose service conditions are “vacant”, information processing unit 22 determines that home delivery box 30 is unavailable.

20 [0056]

When having determined that home delivery box 30 is available, information processing unit 22 causes transmission unit 25 to transmit housing-unit position information that indicates the position of housing unit 32 whose service condition is “vacant” (S16).

25 [0057]

When first communication unit 43 of first portable terminal 40 has received the housing-unit position information (S17), terminal control unit 42

causes display unit 46 to display an image that indicates the position of housing unit 32 whose service condition is “vacant”, on the basis of the received housing-unit position information (S18). FIG. 6 shows one example of such an image.

5 [0058]

During display of the image as illustrated in FIG. 6, operation accepting unit 41 accepts a reservation securing operation for securing the reservation of home delivery box 30 from delivery staff (S19). Based on the reservation securing operation received from the delivery staff and accepted by operation
10 accepting unit 41, terminal control unit 42 causes first communication unit 43 to transmit a reservation securing request to secure the reservation of home delivery box 30 (S20).

[0059]

When receiving unit 24 of server device 20 has received the reservation
15 securing request for home delivery box 30 (S21), information processing unit 22 updates the management information (S22). Specifically, information processing unit 22 changes the service condition of reserved housing unit 32 into “reserved” and associates reserved housing unit 32 with the ID of first portable terminal 40 included in the permission-to-use request or the
20 reservation securing request and the ID of second portable terminal 50 identified in step S14 in the management information. Information processing unit 22 also acquires an unlock token for unlocking the door of reserved housing unit 32 from storage unit 23 and causes transmission unit 25 to transmit the acquired unlock token as a first unlock token. That is,
25 transmission unit 25 transmits the first unlock token for unlocking the door of home delivery box 30 (S23). The first unlock token is one example of first authentication information and is transmitted from server device 20 in

response to the permission-to-use request and the reservation securing request.

[0060]

First communication unit 43 of first portable terminal 40 receives the first unlock token (S24), and terminal control unit 42 stores the received first
5 unlock token in storage unit 45 (S25).

[0061]

Exemplary Operation 2: Operation for Putting Package in Home Delivery Box

Next, exemplary operation 2 of home delivery system 10 will be
10 described. FIG. 7 is a sequence diagram of exemplary operation 2 of home delivery system 10. In FIG. 7, an operation performed when delivery staff puts a package in reserved housing unit 32 is illustrated.

[0062]

The delivery staff who holds first portable terminal 40 having the first
15 unlock token stored in storage unit 45 presses hardware buttons (part of operation accepting unit 31) provided on the door of reserved housing unit 32. Then, operation accepting unit 31 accepts this operation as an unlock operation (S26). When the unlock operation is accepted, control unit 35 actuates wireless communication unit 36 that is in a dormant state and causes wireless
20 communication unit 36 to transmit a beacon signal (S27).

[0063]

Upon receiving the beacon signal (S28), second communication unit 44 of first portable terminal 40 transmits an unlock request as a response to the received beacon signal (S29). The unlock request includes the first unlock
25 token. That is, second communication unit 44 transmits the first unlock token received in step S24 to home delivery box 30.

[0064]

Wireless communication unit 36 of home delivery box 30 receives the unlock request including the first unlock token from second communication unit 44 (S30). Control unit 35 performs authentication processing (S31) and determines whether or not the first unlock token is correct. For example,
5 control unit 35 references criterion information stored in advance in storage unit 37 to determine whether or not the first unlock token is correct.

[0065]

When the first unlock token included in the unlock request received in step S30 is determined to be correct, control unit 35 performs control to cause
10 locking device 33 to unlock the door of reserved housing unit 32 (S32).

[0066]

In this way, if first portable terminal 40 having the first unlock token stored in storage unit 45 is positioned within the range of reach of the beacon signal, the delivery staff is able to unlock the door of reserved housing unit 32
15 by pressing hardware buttons provided on the door.

[0067]

Wireless communication unit 36 of home delivery box 30 is normally in the dormant state and is actuated with a press of hardware buttons by the delivery staff so as to start communication between wireless communication
20 unit 36 and first portable terminal 40. This reduces power consumption in home delivery box 30, and this configuration is particularly useful in battery-driven home delivery box 30 (i.e., home delivery box 30 whose battery may run out).

[0068]

25 When the door is unlocked, the delivery staff houses a package in housing unit 32 and closes the door (S33). Detecting unit 34 detects the closing of the door (S34). When the closing of the door is detected, control unit

35 performs control to cause locking device 33 to lock the door (S35) and cause wireless communication unit 36 to transmit package arrival information indicating that the package has been housed in housing unit 32. That is, when the closing of the door is detected, wireless communication unit 36 transmits
5 the package arrival information to first portable terminal 40 (S36).
[0069]

When second communication unit 44 of first portable terminal 40 has received the package arrival information, terminal control unit 42 causes first communication unit 43 to transmit the received package arrival information to
10 server device 20. That is, first portable terminal 40 relays the package arrival information (S37). At this time, the ID of first portable terminal 40 is included in the package arrival information.
[0070]

When receiving unit 24 of server device 20 has received the package
15 arrival information (S38), information processing unit 22 updates the management information on the basis of the package arrival information (S39). Specifically, information processing unit 22 identifies housing unit 32 associated with the ID of first portable terminal 40 included in the package arrival information (i.e., housing unit 32 reserved by first portable terminal 40)
20 and changes the service condition of identified housing unit 32 from “reserved” into “in service” in the management information.
[0071]

Next, information processing unit 22 acquires an unlock token for unlocking the door of housing unit 32 from storage unit 23 and causes
25 transmission unit 25 to transmit the acquired unlock token as a second unlock token. A second portable terminal that servers as a transmission destination is second portable terminal 50 that is associated with first portable terminal 40

in the management information. That is, when receiving unit 24 has received the package arrival information from first portable terminal 40, transmission unit 25 transmits the second unlock token for unlocking the door of housing unit 32 to second portable terminal 50 (S40).

5 [0072]

First communication unit 53 of second portable terminal 50 receives the second unlock token (S41), and terminal control unit 52 stores the received second unlock token in storage unit 55 (S42).

[0073]

10 Although not shown, in step S41, for example, information such as the fact that the package has arrived at the place of the consignee, and the place of housing unit 32 in which the package is housed is also notified via e-mail or a push notification.

[0074]

15 Exemplary Operation 3: Operation for Taking Package out of Home Delivery Box

Next, exemplary operation 3 of home delivery system 10 will be described. FIG. 8 is a sequence diagram of exemplary operation 3 of home delivery system 10. In FIG. 8, an operation performed when the consignee
20 takes the package out of housing unit 32 is illustrated.

[0075]

For example, the consignee who holds second portable terminal 50 having the second unlock token stored in storage unit 55 presses hardware buttons (part of operation accepting unit 31) provided on the door of housing
25 unit 32 in which the package is housed. Upon this, operation accepting unit 31 accepts this operation as an unlock operation (S43). When the unlock operation is accepted, control unit 35 activates wireless communication unit 36

that is in a dormant state and causes wireless communication unit 36 to transmit a beacon signal (S44).

[0076]

Upon receiving the beacon signal (S45), second communication unit 54 of second portable terminal 50 transmits an unlock request as a response to the received beacon signal (S46). The unlock request includes a second unlock token. That is, second communication unit 54 transmits the second unlock token received in step S41 to home delivery box 30.

[0077]

Wireless communication unit 36 of home delivery box 30 receives the unlock request including the second unlock token from second communication unit 54 (S47). Control unit 35 performs authentication processing (S48) and determines whether or not the second unlock token is correct. For example, control unit 35 references the criterion information stored in advance in storage unit 37 and determines whether or not the second unlock token is correct.

[0078]

When having determined that the second unlock token included in the unlock request received in step S41 is correct, control unit 35 performs control to cause locking device 33 to unlock the door of housing unit 32 in which the package is housed (S49).

[0079]

In this way, if second portable terminal 50 having the second unlock token stored in storage unit 55 is positioned within the range of reach of the beacon signal, the consignee is able to unlock the door of housing unit 32 in which the package is housed, by pressing hardware buttons provided on the door.

[0080]

Wireless communication unit 36 of home delivery box 30 is normally in the dormant state and is activated with a press of hardware buttons by the consignee so as to start communication between wireless communication unit 36 and second portable terminal 50. This reduces power consumption in home delivery box 30, and this configuration is particularly useful in battery-driven home delivery box 30.

[0081]

When the door is unlocked, the consignee takes the package out of housing unit 32 and closes the door (S50). Detecting unit 34 detects the closing of the door (S51). When the closing of the door is detected, control unit 35 performs control to cause locking device 33 to lock the door (S52) and cause wireless communication unit 36 to transmit package receipt information indicating that the package has been taken out to housing unit 32. That is, when the closing of the door is detected, wireless communication unit 36 transmits the package receipt information to second portable terminal 50 (S53).

[0082]

When second communication unit 54 of second portable terminal 50 has received the package receipt information, terminal control unit 42 causes first communication unit 53 to transmit the received package receipt information to server device 20. That is, second portable terminal 50 relays the package receipt information (S54). At this time, the ID of second portable terminal 50 is included in the package receipt information.

[0083]

When receiving unit 24 of server device 20 has received the package receipt information (S55), information processing unit 22 changes the service condition of housing unit 32 associated with the ID of second portable terminal 50 included in the package receipt information (i.e., housing unit 32 which the

consignee has taken the package out of) from “in service” into “vacant” in the management information, on the basis of the package receipt information. That is, information processing unit 22 updates the management information (S56).

5 [0084]

Next, information processing unit 22 causes transmission unit 25 to transmit a completion-of-receipt notice for notifying the delivery staff that the package has been received by the consignee (S57). For example, the completion-of-receipt notice is in the form of an e-mail or a push notification.

10 The completion-of-receipt notice is received by, for example, first communication unit 43 of first portable terminal 40 (S58).

[0085]

When the closing of the door of housing unit 32 is detected, whether to transmit the package arrival information or the package receipt information from home delivery box 30 is determined by, for example, an identifier included in the unlock request. For example, server device 20 provides a first identifier, in addition to the first unlock token, to first portable terminal 40, and first portable terminal 40 includes the first unlock token and the first identifier in the unlock request. Similarly, server device 20 provides a second identifier, in addition to the second unlock token, to second portable terminal 50, and second portable terminal 50 includes the second unlock token and the second identifier in the unlock request. This allows home delivery box 30 to determine whether to transmit the package arrival information or the package receipt information, on the basis of the identifier included in the unlock request.

25 [0086]

In the case where home delivery box 30 includes a sensor (not shown) that detects the presence or absence of a package, home delivery box 30 can

determine whether to transmit the package arrival information or the package receipt information, on the basis of the result of detection obtained from this sensor.

[0087]

5 Alternatively, the package arrival information and the package receipt information may not be distinguished from each other at the time of transmission from home delivery box 30, and may be distinguished by server device 20. When the transmission source of information is first portable terminal 40, server device 20 may recognize the information as the package
10 arrival information, and when the transmission source of information is second portable terminal 50, server device 20 may recognize the information as the package receipt information.

[0088]

Exemplary Operation 4: Multiple Storage

15 In the case where housing unit 32 that has once been locked after insertion of a package still has a remaining space, delivery staff may want to additionally put in another package. However, if the unlock token is disabled after use by first portable terminal 40, the delivery staff is unable to unlock the door of housing unit 32 again.

20 [0089]

 In such a case, with permission of the consignee, delivery staff using home delivery system 10 is able to additionally put another package in housing unit 32 in which one package has already been housed (this operation is hereinafter also referred to as “multiple storage”). Hereinafter, exemplary
25 operation 4 like this will be described. FIG. 9 is a sequence diagram of exemplary operation 4 of home delivery system 10. The operation illustrated in FIG. 9 is performed after server device 20 has received the package arrival

information and before server device 20 receives the package receipt information. That is, this operation is performed after execution of the processing in FIG. 7 and before execution of the processing in FIG. 8.

[0090]

5 First, operation accepting unit 41 of first portable terminal 40 accepts a multiple-storage-request operation for requesting multiple storage in home delivery box 30 from delivery staff (S59). For example, the multiple-storage-request operation is accepted during execution of a dedicated application program by terminal control unit 42.

10 [0091]

 Terminal control unit 42 causes first communication unit 43 to transmit a multiple storage request asking for multiple storage in home delivery box 30 on the basis of a reservation operation of delivery staff accepted by operation accepting unit 41. That is, on the basis of the multiple-storage-request
15 operation, first communication unit 43 transmits the multiple storage request to the server device (S60).

[0092]

 When receiving unit 24 of server device 20 has received the multiple storage request (S61), information processing unit 22 causes transmission unit
20 25 to transmit an authorization-request notice asking for permission for multiple storage to a consignee (S62). Information processing unit 22 can identify the transmission destination of the authorization-request notice by identifying the ID of second portable terminal 50 that is associated with the ID of first portable terminal 40 included in the multiple storage request in the
25 management information. For example, the authorization-request notice is in the form of an e-mail or a push notification.

[0093]

When first communication unit 53 of second portable terminal 50 has received the authorization-request notice (S63), operation accepting unit 51 accepts an authorization operation from the consignee in response to the authorization-request notice (S64). The authorization operation is performed
5 based on the consignee's intention of permitting multiple storage. Terminal control unit 42 causes first communication unit 53 to transmit authorization information based on the authorization operation accepted by operation accepting unit 51 (S65). Note that the authorization information is not transmitted when the authorization operation has not been accepted.

10 [0094]

When receiving unit 24 of server device 20 has received the authorization information (S66), information processing unit 22 acquires an unlock token for unlocking the door of housing unit 32 that has already stored a package from storage unit 23 and causes transmission unit 25 to transmit the
15 acquired unlock token as a third unlock token. That is, transmission unit 25 transmits the third unlock token for unlocking the door of home delivery box 30 (S67). The third unlock token is one example of third authentication information and is transmitted from server device 20 in accordance with the authorization information.

20 [0095]

First communication unit 43 of first portable terminal 40 receives the third unlock token (S68), and terminal control unit 42 stores the received third unlock token in storage unit 45 (S69). In step S68, for example, information such as the fact that multiple storage has been permitted is also notified via
25 e-mail or a push notification. Subsequent processing is substantially the same as the processing from steps S26 to S42 in FIG. 7.

[0096]

According to exemplary operation 4 of home delivery system 10, the delivery staff is able to handle multiple storage with permission of the consignee.

[0097]

5 Exemplary Operation 5: Collection Request to Consignee

In the case where a delivered package contains perishable foods or the like, it is undesirable that the package has been left for a long period of time. In view of this, home delivery system 10 allows server device 20 to transmit a collection-request notice to second portable terminal 50, the collection-request
10 notice demanding collection of the package housed in home delivery box 30 when the package has been left for a long period of time. Hereinafter, exemplary operation 5 like this will be described. FIG. 10 is a sequence diagram of exemplary operation 5 of home delivery system 10. The operation illustrated in FIG. 10 is performed after server device 20 has received the
15 package arrival information and before server device 20 receives the package receipt information. That is, this operation is performed after execution of the processing in FIG. 7 and before execution of the processing in FIG. 8.

[0098]

Information processing unit 22 of server device 20 measures the
20 amount of time since the receipt of the package arrival information in step S38 in FIG. 7. For example, the measurement uses an instrument such as a real-time clock (not shown). When having determined that receiving unit 24 has not received the package receipt information even after a lapse of a predetermined period of time (S70), information processing unit 22 causes
25 transmission unit 25 to transmit a collection-request notice that demands collection of the package housed in home delivery box 30 (S71). The collection-request notice transmitted from transmission unit 25 is received by

first communication unit 53 of second portable terminal 50 (S72). For example, the collection-request notice is in the form of an e-mail or a push notification.

[0099]

5 When the consignee receives the package in response to this collection-request notice, substantially the same processing as the processing from steps S43 to S58 in FIG. 8 is performed.

[0100]

10 In this way, when a package has been left for a long period of time, home delivery system 10 can transmit a collection-request notice that demands collection of the package housed in home delivery box 30 to second portable terminal 50.

[0101]

Exemplary Operation 6: Collection Request to Delivery Staff

15 In home delivery system 10, server device 20 may transmit the collection-request notice to first portable terminal 40, the collection-request notice demanding collection of a package housed in home delivery box 30 when the package has been left for a long period of time. That is, server device 20 may demand the delivery staff to collect a package. Exemplary operation 6
20 like this will be described hereinafter. FIG. 11 is a sequence diagram of exemplary operation 6 of home delivery system 10. The operation illustrated in FIG. 11 is performed after server device 20 has received the package arrival information and before server device 20 receives the package receipt information. That is, this processing is performed after execution of the
25 processing in FIG. 7 and before execution of the processing in FIG. 8.

[0102]

Information processing unit 22 of server device 20 measures the

amount of time since the receipt of the package arrival information in step S38 in FIG. 7. For example, the measurement uses an instrument such as a real-time clock (not shown). When having determined that receiving unit 24 has not received the package receipt information even after the a lapse of a
5 predetermined period of time (S73), information processing unit 22 causes transmission unit 25 to transmit a collection-request notice demanding collection of the package housed in home delivery box 30 and a fourth unlock token (S74).

[0103]

10 The collection-request notice and the fourth unlock token transmitted by transmission unit 25 are received by first communication unit 43 of first portable terminal 40 (S75). For example, the collection-request notice is in the form of an e-mail or a push notification. Terminal control unit 42 stores the received fourth unlock token in storage unit 45 (S76).

15 [0104]

When the delivery staff collects the package in response to this collection-request notice, substantially the same processing as the processing from steps S26 to step S39 in FIG. 7 is performed, and the following processing is further performed.

20 [0105]

When having determined the receipt of the package arrival information after transmission of the collection-request notice, information processing unit 22 of server device 20 causes transmission unit 25 to transmit a completion-of-collection notice, instead of an unlock token (S77). First
25 communication unit 53 of second portable terminal 50 receives the completion-of-collection notice indicating that the package housed in housing unit 32 has already been collected (S78). For example, the

completion-of-collection notice is in the form of an e-mail or a push notification.
[0106]

In this way, when a package has been left for a long period of time, home delivery system 10 can transmit a collection-request notice demanding
5 collection of a package housed in home delivery box 30 to first portable terminal 40. Home delivery system 10 can also transmit, to second portable terminal 50, a completion-of-collection notice indicating that the package housed in housing unit 32 has already been collected.

[0107]

10 Note that exemplary operations 5 and 6 may be combined. For example, the collection-request notice may be transmitted in parallel to first portable terminal 40 and second portable terminal 50.

[0108]

Variations

15 In the management information, the period during which the service conditions of home delivery box 30 can be set to “reserved” (this period is hereinafter also referred to as a “reserved period”) is limited to, for example, a fixed period. The management information may include reserved-period information indicating such a reserved period. FIG. 12 shows one example of
20 the management information including the reserved-time information. Delivery staff who has reserved housing unit 32 via first portable terminal 40 is able to put a package in home delivery box 30 during the reserved period.

[0109]

This reserved period may be determined according to a delivery
25 company to which delivery staff belongs. FIG. 13 is a diagram showing one example of criterion information for determining the reserved period according to each delivery company. The criterion information is stored in advance in

storage unit 23.

[0110]

As illustrated in FIG. 13, the criterion information associates a delivery company ID that indicates each delivery company with the reserved period.

5 For example, the reserved period may be determined according to the contract made between each delivery company and a provider who provides services using home delivery system 10.

[0111]

For example, if the reservation request operation in step S11 described
10 above includes an operation of selecting a delivery company, it is possible to include the delivery company ID in the permission-to-use request transmitted in step S12. The operation of selecting a delivery company may be included in the reservation securing operation in step S19, and in this case, it is possible to include the delivery company ID in the reservation securing request
15 transmitted in step S20.

[0112]

In this way, if the delivery company ID is included in either the permission-to-use request or the reservation securing request, information processing unit 22 of server device 20 can determine the reserved period in the
20 management information on the basis of the criterion information stored in storage unit 23 and the delivery company ID. That is, information processing unit 22 can determine the length of the reserved period on the basis of the delivery company to which delivery staff belongs.

[0113]

25 Advantageous Effects

As described above, home delivery box 30 includes housing unit(s) 32 configured to house a package, locking device(s) 33 configured to lock and

unlock the door of housing unit 32, detecting unit(s) 34 configured to detect opening and closing of the door, control unit(s) 35 configured to perform control to cause locking device 33 to lock the door when closing of the door is detected, and wireless communication unit(s) 36 configured to transmit one of package arrival information and package receipt information to a portable terminal when closing of the door is detected, the package arrival information indicating that a package has been housed in housing unit 32, and the package receipt information indicating that a package housed in housing unit 32 has been received. The portable terminal as used herein refers to either first portable terminal 40 or second portable terminal 50.

[0114]

In such home delivery box 30, the portable terminal transmits the package arrival information and the package receipt information to server device 20 and thereby allows server device 20 to manage service conditions of home delivery box 30.

[0115]

For example, wireless communication unit 36 is further configured to receive an unlock request including authentication information from the portable terminal, and control unit 35 is further configured to perform control to cause locking device 33 to unlock the door when the authentication information included in the received unlock request is determined to be correct. The authentication information may, for example, be an unlock token, but is not particularly limited thereto.

[0116]

Such home delivery box 30 can determine whether or not to unlock the door on the basis of the authentication information.

[0117]

For example, home delivery box 30 further includes operation accepting unit(s) 31 configured to accept operation from a user via the portable terminal. When operation accepting unit 31 has accepted operation from a user, communication for receiving an unlock request starts between wireless
5 communication unit 36 and the portable terminal. The user as used herein refers to either delivery staff or a consignee.

[0118]

Such home delivery box 30 can put wireless communication unit 36 into a dormant state until operation accepting unit 31 accepts operation from a user.
10 By putting wireless communication unit 36 in the dormant state, it is possible to reduce power consumption.

[0119]

For example, home delivery box 30 further includes battery housing unit(s) 38. Locking device 33 operates using the battery housed in battery
15 housing unit 38 as a power source.

[0120]

Such home delivery box 30 can operate locking device 33 using the battery as a power source. This eliminates the need for electric work that is done to install home delivery box 30.

20 [0121]

For example, home delivery system 10 includes storage unit 23 configured to store the management information indicating whether home delivery box 30 is available, receiving unit 24 configured to receive a permission-to-use request asking for the use of home delivery box 30 from first
25 portable terminal 40, transmission unit 25 configured to transmit the first authentication information for unlocking the door of home delivery box 30 to first portable terminal 40 when home delivery box 30 is determined to be

available based on the management information, and information processing unit 22 configured to update the management information when receiving unit 24 has received the package arrival information indicating that a package has been housed in home delivery box 30 from first portable terminal 40 after
5 transmission of the first authentication information.

[0122]

Such home delivery system 10 can update the management information indicating whether home delivery box 30 is available, on the basis of the package arrival information received from first portable terminal 40. That is,
10 it is possible to manage the service conditions of home delivery box 30.

[0123]

For example, when receiving unit 24 has received the package arrival information from first portable terminal 40, transmission unit 25 transmits the second authentication information for unlocking the door of home delivery box
15 30 to second portable terminal 50, which is different from first portable terminal 40. Information processing unit 22 updates the management information after the first authentication information has been transmitted and when receiving unit 24 has received the package receipt information indicating that the package housed in home delivery box 30 has been received,
20 from second portable terminal 50.

[0124]

Such home delivery system 10 can update the management information indicating whether home delivery box 30 is available on the basis of the package receipt information received from second portable terminal 50. That
25 is, home delivery system 10 can manage the service conditions of home delivery box 30.

[0125]

For example, when receiving unit 24 has received authorization information indicating permission for multiple storage from home delivery box 30 after receipt of the package arrival information and before receipt of the package receipt information indicating that the package in home delivery box 30 has been received, transmission unit 25 transmits the third authentication information for unlocking the door of home delivery box 30 to first portable terminal 40.

[0126]

Such home delivery system 10 enables delivery staff, i.e., the user of first portable terminal 40, to handle multiple storage with permission of the consignee, i.e., the user of second portable terminal 50.

[0127]

For example, when receiving unit 24 has not received the package receipt information indicating receipt of the package housed in home delivery box 30 even after a lapse of a predetermined period of time since the receipt of the package arrival information, transmission unit 25 transmits a collection-request notice that demands collection of the package housed in home delivery box 30 to second portable terminal 50.

[0128]

Such home delivery system 10 can transmit a collection-request notice demanding collection of the package housed in home delivery box 30 to second portable terminal 50 when the package has been left for a long period of time.

[0129]

For example, when receiving unit 24 has not received the package receipt information indicating receipt of the package housed in home delivery box 30 even after a lapse of a predetermined period of time since the receipt of the package arrival information, transmission unit 25 transmits the fourth

authentication information for unlocking the door of home delivery box 30 and a collection-request notice that demands collection of the package housed in home delivery box 30 to first portable terminal 40.

[0130]

- 5 Such home delivery system 10 can transmit a collection-request notice demanding collection of the package housed in home delivery box 30 to first portable terminal 40 when the package has been left for a long period of time.

[0131]

- 10 For example, the management information includes reserved-period information indicating a reserved period during which the user of first portable terminal 40 can put in a package. Information processing unit 22 determines the length of the reserved period according to the delivery company to which the user belongs.

[0132]

- 15 Such home delivery system 10 can change the length of the reserved period for each delivery company.

[0133]

- 20 The portable terminal equivalent to either first portable terminal 40 or second portable terminal 50 includes the first communication unit configured to receive authentication information transmitted from server device 20 and for unlocking the door of home delivery box 30, the second communication unit configured to transmit the received authentication information to home delivery box 30, and the terminal control unit configured to, when the second communication unit has received from home delivery box 30 one of the package arrival information indicating that a package has been housed in home delivery box 30 and the package receipt information indicating that the package housed in home delivery box 30 has been received, cause the first communication unit

to transmit information corresponding to the received information to server device 20.

[0134]

Such a portable terminal is capable of relaying the package arrival
5 information and the package receipt information both received from home delivery box 30 to server device 20.

[0135]

The communication method to be executed by a computer included in home delivery box 30 includes detecting opening and closing of the door of each
10 housing unit 32 of home delivery box 30, locking the door when closing of the door is detected, and transmitting, to the portable terminal, one of the package arrival information indicating that a package has been housed in housing unit 32 and the package receipt information indicating that the package housed in housing unit 32 has been received. The present invention may be
15 implemented as a program for causing a computer to execute such a communication method.

[0136]

Such a communication method and a program as described above allow the portable terminal to transmit the package arrival information and the
20 package receipt information to server device 20 and thereby allow server device 20 to manage service conditions of home delivery box 30.

[0137]

The information processing method to be executed by a computer such as home delivery system 10 includes receiving a permission-to-use request
25 asking for the use of home delivery box 30 from first portable terminal 40, transmitting first authentication information for unlocking the door of home delivery box 30 to first portable terminal 40 when home delivery box 30 is

determined to be available based on the management information indicating whether or not home delivery box 30 is available, and updating the management information when the package arrival information indicating that the package has been housed in home delivery box 30 is received from first
5 portable terminal 40 after transmission of the first authentication information. The present invention may be implemented as a program for causing a computer to execute such an information processing method.

[0138]

Such an information processing method and a program as described
10 above enable updating the management information indicating whether or not home delivery box 30 is available on the basis of the package arrival information received from first portable terminal 40. That is, it is possible to manage service conditions of home delivery box 30.

[0139]

15 The communication method to be executed by a computer such as the portable terminal, which is equivalent to either first portable terminal 40 or second portable terminal 50, includes receiving the authentication information transmitted from server device 20 and for unlocking the door of home delivery box 30, transmitting the received authentication information to home delivery
20 box 30, and transmitting information corresponding to the received information to server device 20 when one of the package arrival information indicating that a package has been housed in home delivery box 30 and the package receipt information indicating that the package housed in home delivery box 30 has been received, from home delivery box 30. The present invention may be
25 implemented as a program for causing a computer to execute such a communication method (e.g., an application program installed on the portable terminal).

[0140]

Such a communication method and a program as described above allow server device 20 to manage service conditions of home delivery box 30 by transmitting information corresponding to the package arrival information and
5 the package receipt information to server device 20.

[0141]

Other Embodiments

While one embodiment has been described thus far, the present invention is not intended to be limited to the embodiment described above.

10 [0142]

For example, the above-described embodiment may use authentication processing using other known techniques, instead of the authentication processing using unlock tokens. For example, authentication processing using a onetime password may be performed. Alternatively, an authentication
15 processing using a method such as causing a user to input a password may be performed .

[0143]

In the above-described embodiment, other communication sequences may be used as the communication sequence between the portable terminal
20 and the home delivery box. For example, a beacon signal is transmitted from the home delivery box in the above-described embodiment, but the beacon signal may be transmitted from the portable terminal, instead of from the home delivery box.

[0144]

25 For example, in the above-described embodiment, processing that is executed by a specific processing unit may be executed by another processing unit. For example, part of the information processing performed by the server

device may be performed by the portable terminal or the home delivery box.

[0145]

The method of communication between devices in the above-described embodiment is not particularly limited. When two devices perform
5 communication in the above-described embodiment, a relay device (not shown) may be provided between the two devices.

[0146]

The sequences of processing described with reference to, for example, the sequence diagrams in the above embodiments are merely one examples.

10 The sequence of a plurality of processing may be changed, or a plurality of processing may be performed in parallel.

[0147]

In the above-described embodiment, each constituent element may be implemented by executing a software program suitable for the constituent
15 element. Each constituent element may be implemented by a program execution unit, such as a CPU or a processor, reading out and executing a software program recorded on a hard disk or a recording medium such as a semiconductor memory.

[0148]

20 Each constituent element may be implemented by hardware. For example, each constituent element may be implemented as a circuit (or an integrated circuit). These circuits may configure a single circuit as a whole, or may configure separate circuits. Each of these circuits may be a general-purpose circuit, or may be a dedicated circuit.

25 [0149]

It is to be noted that general or specific aspects of the present invention may be implemented as a system, a device, a method, an integrated circuit, a

computer program, or a computer-readable recording medium such as a CD-ROM, or may be implemented by any combination of a system, a device, a method, an integrated circuit, a computer program, or a recording medium. For example, the present invention may be implemented as a non-transitory
5 computer-readable recording medium that records a program described in the above-described embodiment.

[0150]

Although the home delivery system according to the above-described embodiment is implemented by a plurality of devices, the system may be
10 implemented as a single device. For example, the home delivery system may be implemented as a single device equivalent to the server device. When the home delivery system is implemented by a plurality of devices, constituent elements of the home delivery system may be divided in any way into the plurality of devices.

15 [0151]

The present invention also includes other variations such as embodiments obtained by applying various modifications conceivable by those skilled in the art to each embodiment, and embodiments implemented by any combination of constituent elements and functions of each embodiment without
20 departing from the scope of the present invention.

REFERENCE MARKS IN THE DRAWINGS

[0152]

10	home delivery system
20	server device
25	21 server communication unit
	22 information processing unit
	23 storage unit

	24	receiving unit
	25	transmission unit
	30	home delivery box
	31	operation accepting unit
5	32	housing unit
	33	locking device
	34	detecting unit
	35	control unit
	36	wireless communication unit
10	38	battery housing unit
	40	first portable terminal
	42	terminal control unit
	43	first communication unit
	44	second communication unit
15	50	second portable terminal
	52	terminal control unit
	53	first communication unit
	54	second communication unit

CLAIMS

1. A home delivery box, comprising:
a housing unit configured to house a package;
a locking device configured to lock and unlock a door of the housing unit;

a detecting unit configured to detect opening and closing of the door;
a control unit configured to perform control to cause the locking device to lock the door when closing of the door is detected; and

a wireless communication unit configured to transmit, through short-distance wireless communication, one of package arrival information and package receipt information to a portable terminal when closing of the door is detected, the package arrival information indicating that a package has been housed in the housing unit, and the package receipt information indicating that a package housed in the housing unit has been received.

2. The home delivery box according to claim 1,
wherein the wireless communication unit is further configured to receive an unlock request that includes authentication information from the portable terminal, and

the control unit is further configured to perform control to cause the locking device to unlock the door when the authentication information included in the unlock request received is determined to be correct.

3. The home delivery box according to claim 2, further comprising:
an operation accepting unit configured to accept operation from a user of the portable terminal,

wherein when the operation accepting unit has accepted operation from the user, communication for receiving the unlock request starts between the wireless communication unit and the portable terminal.

4. The home delivery box according to any one of claims 1 to 3, further comprising:

a battery housing unit,

wherein the locking device operates using a battery housed in the battery housing unit as a power source.

5. A home delivery system, comprising:

a storage unit configured to store management information indicating whether or not a home delivery box is available;

a receiving unit configured to receive a permission-to-use request asking for use of the home delivery box from a first portable terminal;

a transmission unit configured to transmit first authentication information for unlocking a door of the home delivery box to the first portable terminal when the home delivery box is determined to be available based on the management information; and

an information processing unit configured to update the management information when the receiving unit has received, via a wide-area communication network, package arrival information transmitted from the home delivery box to the first portable terminal through short-distance wireless communication, and indicating that a package has been housed in the home delivery box from the first portable terminal after transmission of the first authentication information.

6. The home delivery system according to claim 5,

wherein the transmission unit is configured to transmit second authentication information for unlocking the door of the home delivery box to a second portable terminal different from the first portable terminal when the receiving unit has received the package arrival information from the first portable terminal, and

the information processing unit is configured to update the management information when the receiving unit has received package receipt information from the second portable terminal after transmission of the first authentication information, the package receipt information indicating that a package housed in the home delivery box has been received.

7. The home delivery system according to claim 6,

wherein the transmission unit is configured to transmit third authentication information for unlocking the door of the home delivery box to the first portable terminal when the receiving unit has received authorization information indicating permission for multiple storage from the second portable terminal after receipt of the package arrival information and before receipt of package receipt information indicating that the package housed in the home delivery box has been received.

8. The home delivery system according to claim 6 or 7,

wherein the transmission unit is configured to, when the receiving unit has not received package receipt information indicating that a package housed in the home delivery box has been received, even after a lapse of a predetermined period of time since the receipt of the package arrival information, transmit a collection-request notice that demands collection of the

package housed in the home delivery box to the second portable terminal.

9. The home delivery system according to any one of claims 5 to 8,

wherein the transmission unit is configured to, when the receiving unit has not received package receipt information indicating that a package housed in the home delivery box has been received, even after a lapse of a predetermined period of time since the receipt of the package arrival information, transmit, to the first portable terminal, fourth authentication information for unlocking the door of the home delivery box and a collection-request notice that demands collection of the package housed in the home delivery box.

10. The home delivery system according to any one of claims 5 to 9,

wherein the management information includes reserved-period information indicating a reserved period during which a user of the first portable terminal is able to put in a package, and

the information processing unit is configured to determine a length of the reserved period according to a delivery company to which the user belongs.

11. A portable terminal, comprising:

a first communication unit configured to receive authentication information transmitted from a server device, the authentication information being information for unlocking a door of a home delivery box;

a second communication unit configured to transmit the authentication information received, to the home delivery box; and

a terminal control unit configured to, when the second communication unit has received, through short-distance wireless communication, one of

package arrival information and package receipt information from the home delivery box, the package arrival information indicating that a package has been housed in the home delivery box, and the package receipt information indicating that a package housed in the home delivery box has been received, cause the first communication unit to transmit via a wide-area communication network, to the server device, information corresponding to the one of the package arrival information and the package receipt information that has been received.

12. A communication method, comprising:

detecting opening and closing of a door of a housing unit of a home delivery box; and

locking the door when closing of the door is detected, and transmitting via a wide-area communication network one of package arrival information and package receipt information to a portable terminal, the package arrival information indicating that a package has been housed in the housing unit, and the package receipt information indicating that a package housed in the housing unit has been received, through short-distance wireless communication.

13. A program for causing a computer to execute the communication method according to claim 12.

14. An information processing method, comprising:

receiving a permission-to-use request asking for use of a home delivery box from a first portable terminal;

when the home delivery box is determined to be available based on

management information, transmitting via a wide-area communication network first authentication information for unlocking a door of the home delivery box to the first portable terminal, the management information indicating whether or not the home delivery box is available; and

updating the management information when package arrival information indicating that a package has been housed in the home delivery box has been received, through short-distance wireless communication, from the first portable terminal after transmission of the first authentication information.

15. A program for causing a computer to execute the information processing method according to claim 14.

16. A communication method, comprising:

receiving authentication information transmitted from a server device, the authentication information being information for unlocking a door of a home delivery box;

transmitting the authentication information received, to the home delivery box; and

when one of package arrival information and package receipt information has been received through short-distance wireless communication from the home delivery box, transmitting via a wide-area communication network, to the server device, information corresponding to the one of the package arrival information and the package receipt information that has been received, the package arrival information indicating that a package has been housed in the home delivery box, and the package receipt information indicating that the package housed in the home delivery box has been received.

17. A program for causing a computer to execute the communication method according to claim 16.