arranged at each site of a user. One or more user devices are connected to the CPE. Note that the CPE is an example of the communication control device. In each base, the CPE constitutes a user network.

[0016] In an example of FIG. 1, CPE 10a is arranged in a base A. A user device 21a, a user device 22a, and a user device 23a are connected to the CPE 10a. Furthermore, CPE 10b is arranged in a base B. A user device 21b, a user device 22b, and a user device 23b are connected to the CPE 10b.

[0017] In the following description, the CPE 10a and the CPE 10b may be referred to as pieces of CPE 10 without distinction. The CPE 10 is connected to both the fixed communication network N2 and the mobile communication network N3. Note that the number of pieces of CPE included in the network and the number of user devices connected to CPE are not limited to those illustrated in the figure.

[0018] Examples of a user device connected to the CPE 10 include a personal computer, a tablet user device, and a smartphone. The user device connected to the CPE 10 may be an IoT device such as a multifunction machine, a wearable user device, and a sensor. The CPE 10 and the user device are connected by wire or wirelessly.

[0019] Furthermore, a configuration server 30 provides setting information to the CPE 10. The CPE 10 can perform setup of the CPE 10 itself by using the provided setting information. The configuration server 30 is arranged in the ISP network N1. The position where the configuration server 30 is arranged is not limited to the illustrated position. The configuration server 30 is an example of the information providing device.

[0020] Here, the CPE 10 is first delivered to a site of a user who receives communication service such as a virtual private network (VPN) and

random access memory (NVSRAM).

[0030] The storage unit 13 stores an operating system (OS) and various programs executed by the CPE 10. The storage unit 13 stores a conversion table 131, configuration server information 132, and setting information 133.

[0031] The conversion table 131 is used for performing address conversion between a user device connected to the CPE 10 and a device outside the base. The conversion table 131 is a network address translation (NAT) table or a network address port translation (NAPT) table.

[0032] The configuration server information 132 is used for connection to the configuration server 30. For example, the configuration server information 132 is a fully qualified domain name (FQDN) or an Internet Protocol Address (IP address) of the configuration server 30. Furthermore, the configuration server information 132 includes identification information of the CPE 10 itself.

[0033] The setting information 133 is a value for each setting item of the CPE 10. In an initial state, values of some setting items included in the setting information 133 are not set. Here, it is assumed that route information is not set. The route information is a setting item necessary for the CPE 10 to function as a router.

[0034] The control unit 14 controls the entire CPE 10. The control unit 14 includes, for example, an electronic circuit and an integrated circuit. The electronic circuit includes a central processing unit (CPU), a micro processing unit (MPU), and a graphics processing unit (GPU). The integrated circuit includes an application specific integrated circuit (ASIC) and a field programmable gate array (FPGA).

[0035] Furthermore, the control unit 14 includes an

indicated in the received POST, and applies the difference therebetween to the setting of the CPE 10. For example, the setting unit 143 writes the route information indicated in the setting information received from the configuration server 30 in the setting information 133.

[0040] Furthermore, when the application of the setting fails or when it is determined that connection with the configuration server 30 is lost, the setting unit 143 waits for a certain period of time, autonomously discards the setting, and rolls back the CPE 10.

[0041] FIG. 3 illustrates a configuration example of the configuration server. As illustrated in FIG. 3, the configuration server 30 includes a communication unit 31, a storage unit 32, and a control unit 33.

[0042] The communication unit 31 communicates with other devices. The communication unit 31 is, for example, a network interface card (NIC).

[0043] The storage unit 32 is a storage device such as an HDD, an SSD, and an optical disk. Note that the storage unit 32 may be a data rewritable semiconductor memory such as a RAM, a flash memory, and an NVSRAM.

[0044] The storage unit 32 stores an OS and various programs executed by the configuration server 30. The storage unit 32 stores a setting information database (DB) 321.

[0045] The setting information DB 321 is provided to the CPE 10. The setting information DB 321 includes, for example, information input by the user in a service use application procedure or automatically generated information.

[0046] The control unit 33 controls the entire configuration server 30. The control unit 33 is, for example, an electronic circuit, such as a CPU, an MPU, and a GPU, or an integrated circuit, such as an ASIC and an

selected communication network.

[0077] For example, the SDN device 60a and the SDN device 60b relay communication between the housed user device and the fixed communication network N2, but do not relay communication between the housed user device and the mobile communication network N3.

[0078] In the first place, a service provider using the service providing network 80 merely provides connection service via the VPN. Therefore, the congestion situations of the ISP network N1, the fixed communication network N2, and the mobile communication network N3 cannot be acquired from the service providing network 80.

[0079] Furthermore, in the above-described embodiment, connection service having a function similar to that of the SD-WAN can be provided by performing software-defined (SD) processing on the ISP network N1. For example, in addition to the VPN and the breakout function, the SD-implemented ISP network N1 (hereinafter, underlay network system) can provide control of network quality using software, provision of a management portal, and a security function using deep packet inspection (DPI) and the like. The control of network quality includes switching of a connection form between a guarantee type and a best effort type, a band change, and the like. Furthermore, the configuration server 30 may be implemented by the underlay network system.

[0080] There is no need to use the VPN between each base and the underlay network system. Therefore, the communication control unit 141 transmits a packet transmitted from the user device to the fixed communication network N2 or the mobile communication network N3 without tunneling. Furthermore, the provision unit 332 transmits the setting information to the CPE 10 by transmitting a

CLAIMS

Claim 1. An information providing device comprising:

a generation unit configured to generate setting information for making a setting for a communication control device installed in a site of a user in accordance with a notification from the communication control device; and

a provision unit configured to transmit the setting information to the communication control device via a first communication network, and, when transmission of the setting information via the first communication network fails, transmit the setting information to the communication control device via a second communication network.

Claim 2. The information providing device according to claim 1, wherein the provision unit transmits the setting information to the communication control device via the first communication network, which is a fixed communication network, and, when transmission of the setting information via the first communication network fails, transmits the setting information to the communication control device via the second communication network, which is a mobile communication network.

Claim 3. An information providing method to be executed by an information providing device, comprising:

a generation process of generating setting information for making a setting for a communication control device installed in a site of a user in accordance with a notification from the communication control device; and

a provision process of transmitting the setting information to the communication control device via a first

communication network, and, when transmission via the first communication network fails, transmitting the setting information to the communication control device via a second communication network.

Claim 4. A computer-readable recording medium storing therein an information providing program that causes a computer to execute a process comprising:

a generation step of generating setting information for making a setting for a communication control device installed in a site of a user in accordance with a notification from the communication control device; and

a provision step of transmitting the setting information to the communication control device via a first communication network, and, when transmission via the first communication network fails, transmitting the setting information to the communication control device via a second communication network.

Claim 5. An information providing system comprising: a communication control device installed in a site of a user; and an information providing device connected to a fixed communication network and a mobile communication network,

wherein the communication control device includes:

a first communication unit configured to relay communication between a user device that is housed and a fixed communication network;

a second communication unit configured to relay communication between the user device and a mobile communication network;

a notification unit configured to notify the information providing device of information for identifying the communication control device; and

a setting unit configured to make a setting for the

communication control device by using setting information provided from the information providing device, and

the information providing device includes:

a generation unit configured to generate setting information for making a setting for the communication control device in accordance with a notification from the communication control device; and

a provision unit configured to transmit the setting information to the communication control device via the fixed communication network, and, when transmission of the setting information via the fixed communication network fails, transmit the setting information to the communication control device via the mobile communication network.

Claim 6. The information providing system according to claim 5,

wherein the provision unit transmits the setting information to the communication control device by transmitting a packet to the fixed communication network or the mobile communication network without tunneling.