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(54) **INFORMATION PROCESSING APPARATUS, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD**

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(57) **ABSTRACT**

An information processing apparatus is connected to and communicates with a terminal connected to a first communication network and a second communication network based on a predetermined communication protocol. The first and the second communication network are operable using the predetermined communication protocol. The second communication network is a closed communication network. The information processing apparatus includes first and second communication units. The first communication unit communicates with the terminal via the first communication network based on the predetermined communication protocol. The second communication unit communicates with the terminal based on the predetermined communication protocol via a relay unit arranged in a communication line between the second communication network and the information processing apparatus. The first and the second communication units have the same IP address having an anycast relation as an IP address of the predetermined communication protocol.

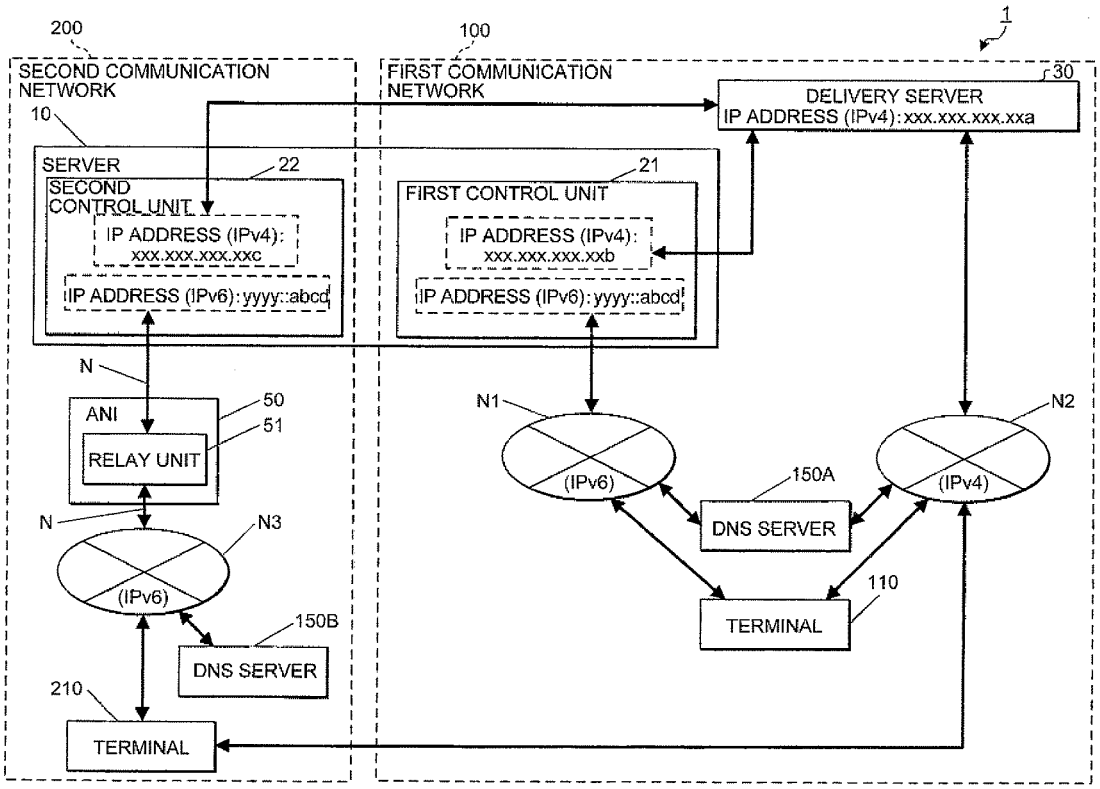


FIG.1

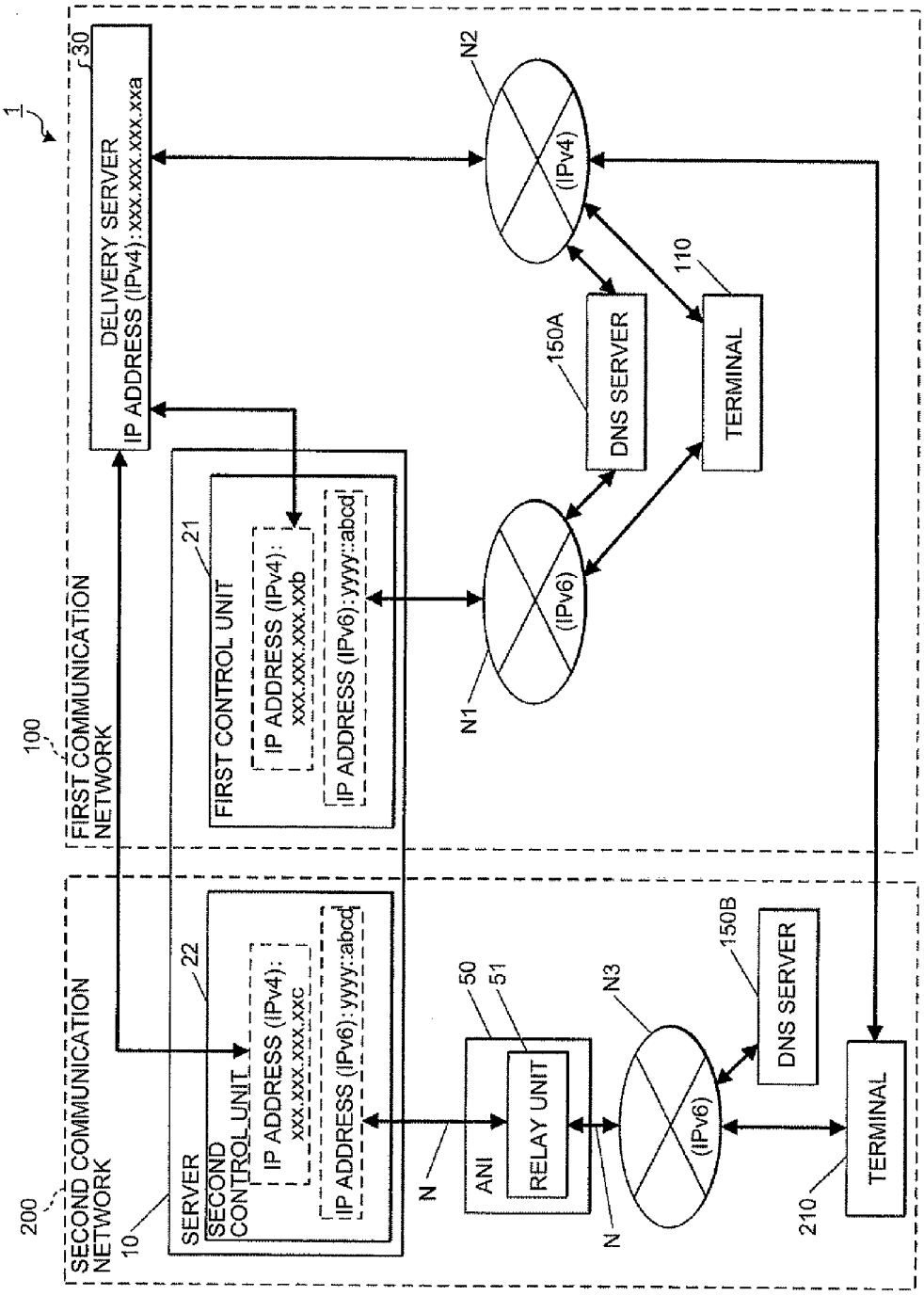

1
100
FIRST COMMUNICATION NETWORK
200
SECOND COMMUNICATION NETWORK
30
DELIVERY SERVER
IP ADDRESS (IPv4):xxx.xxx.xxx.xxa
21
FIRST CONTROL UNIT
IP ADDRESS (IPv4): xxx.xxx.xxx.xxb
IP ADDRESS (IPv6):yyyy::abcd
10
SERVER
22
SECOND CONTROL UNIT
IP ADDRESS (IPv4): xxx.xxx.xxx.xxc
IP ADDRESS (IPv6):yyyy::abcd
N
50
ANI
51
RELAY UNIT
N
N1
(IPv6)
N2
(IPv4)
N3
(IPv6)
150A
DNS SERVER
150B
DNS SERVER
110
TERMINAL
210
TERMINAL

FIG.2

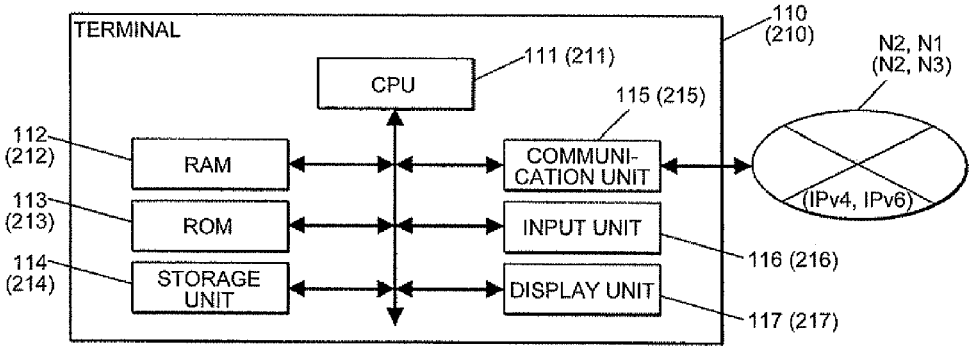

TERMINAL
110
(210)
CPU
111 (211)
115 (215)
N2, N1
(N2, N3)
112
(212)
RAM
COMMUNI-
CATION UNIT
(IPv4, IPv6)
113
(213)
ROM
INPUT UNIT
116 (216)
114
(214)
STORAGE
UNIT
DISPLAY UNIT
117 (217)

FIG.3

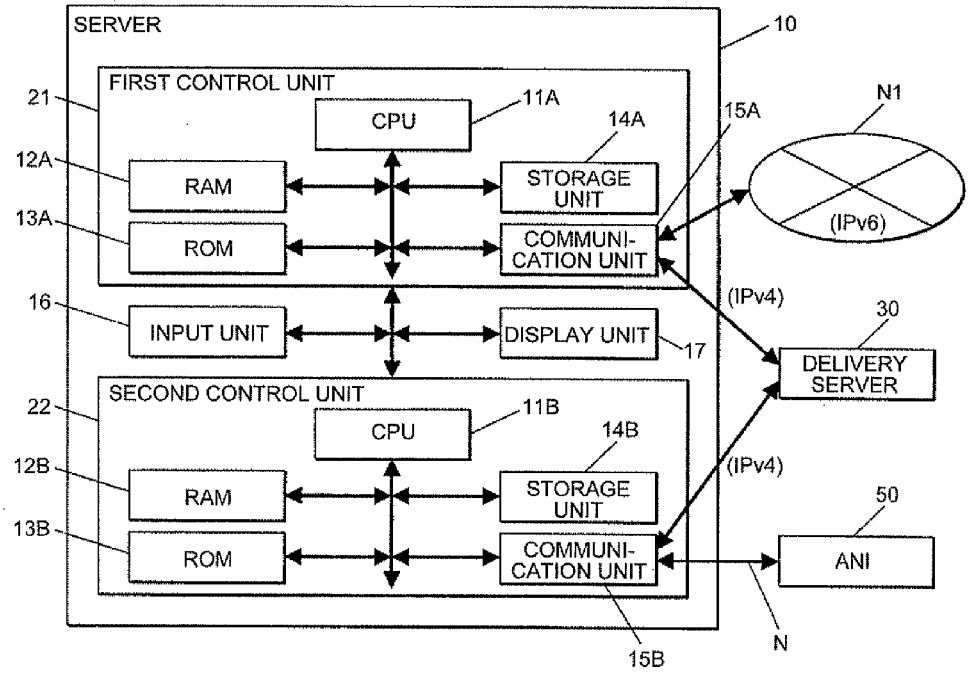

SERVER
10
FIRST CONTROL UNIT
21
CPU
11A
14A
15A
N1
12A
RAM
STORAGE
UNIT
13A
ROM
COMMUNI-
CATION UNIT
(IPv6)
(IPv4)
16
INPUT UNIT
DISPLAY UNIT
17
30
DELIVERY
SERVER
SECOND CONTROL UNIT
22
CPU
11B
14B
(IPv4)
12B
RAM
STORAGE
UNIT
50
13B
ROM
COMMUNI-
CATION UNIT
ANI
N
15B

FIG.4

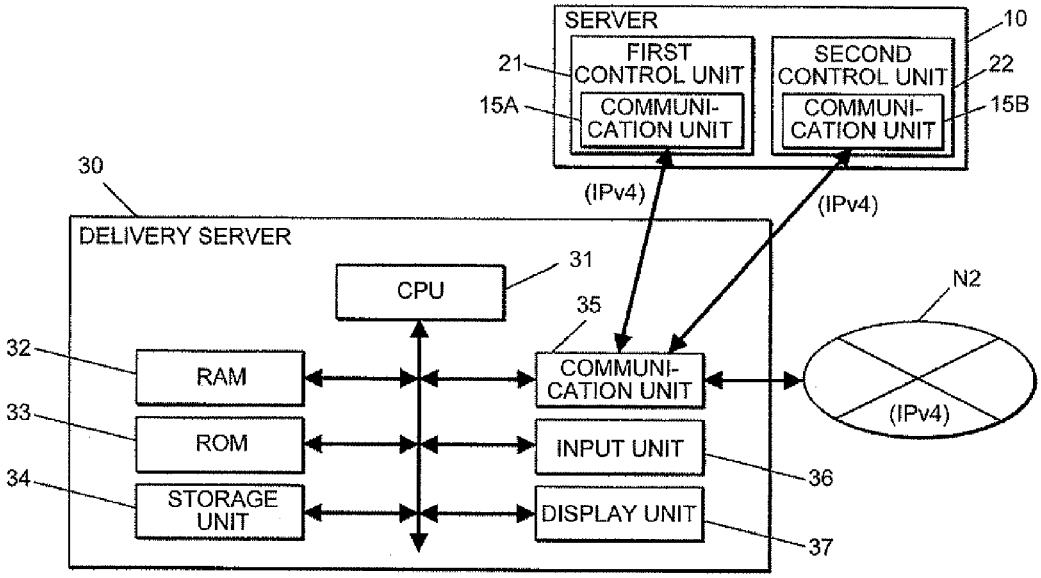

SERVER
10
FIRST CONTROL UNIT
21
SECOND CONTROL UNIT
22
COMMUNI-CATION UNIT
15A
COMMUNI-CATION UNIT
15B
(IPv4)
(IPv4)
30
DELIVERY SERVER
CPU
31
35
N2
32
RAM
COMMUNI-CATION UNIT
(IPv4)
33
ROM
INPUT UNIT
36
34
STORAGE UNIT
DISPLAY UNIT
37

FIG.5

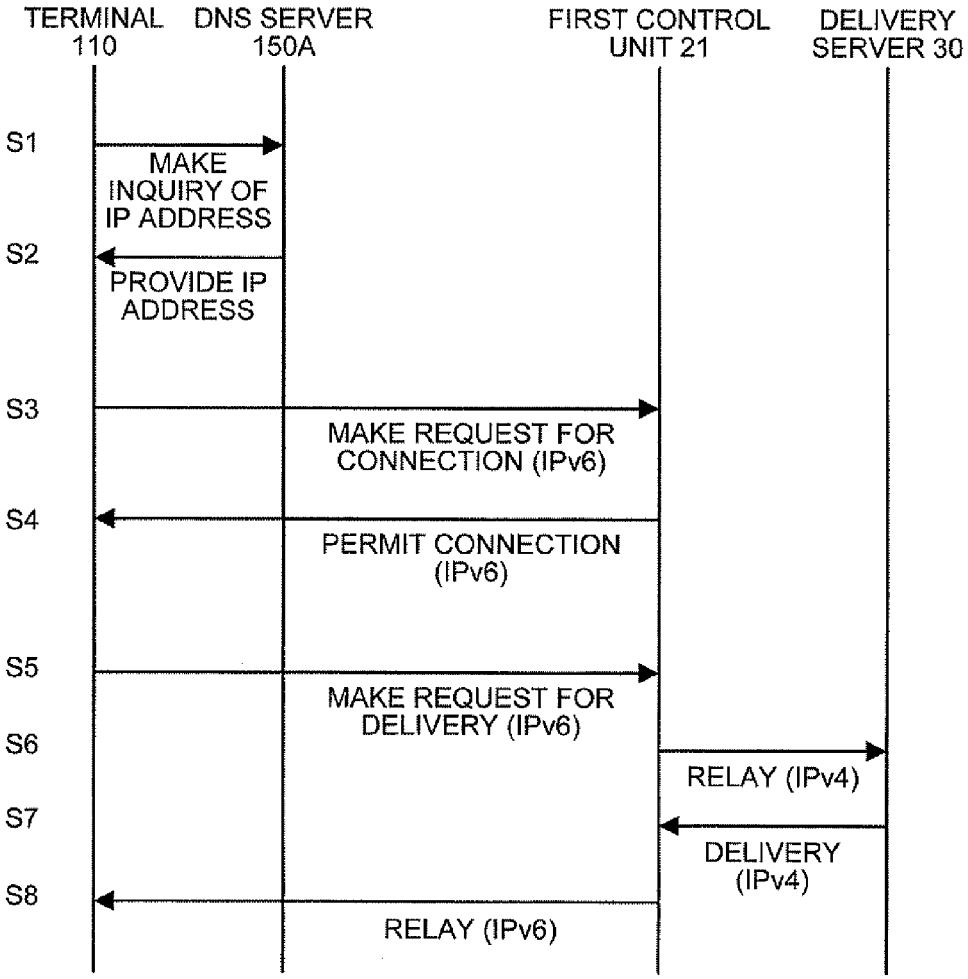

TERMINAL 110
DNS SERVER 150A
FIRST CONTROL UNIT 21
DELIVERY SERVER 30
S1
MAKE INQUIRY OF IP ADDRESS
S2
PROVIDE IP ADDRESS
S3
MAKE REQUEST FOR CONNECTION (IPv6)
S4
PERMIT CONNECTION (IPv6)
S5
MAKE REQUEST FOR DELIVERY (IPv6)
S6
RELAY (IPv4)
S7
DELIVERY (IPv4)
S8
RELAY (IPv6)

FIG.6

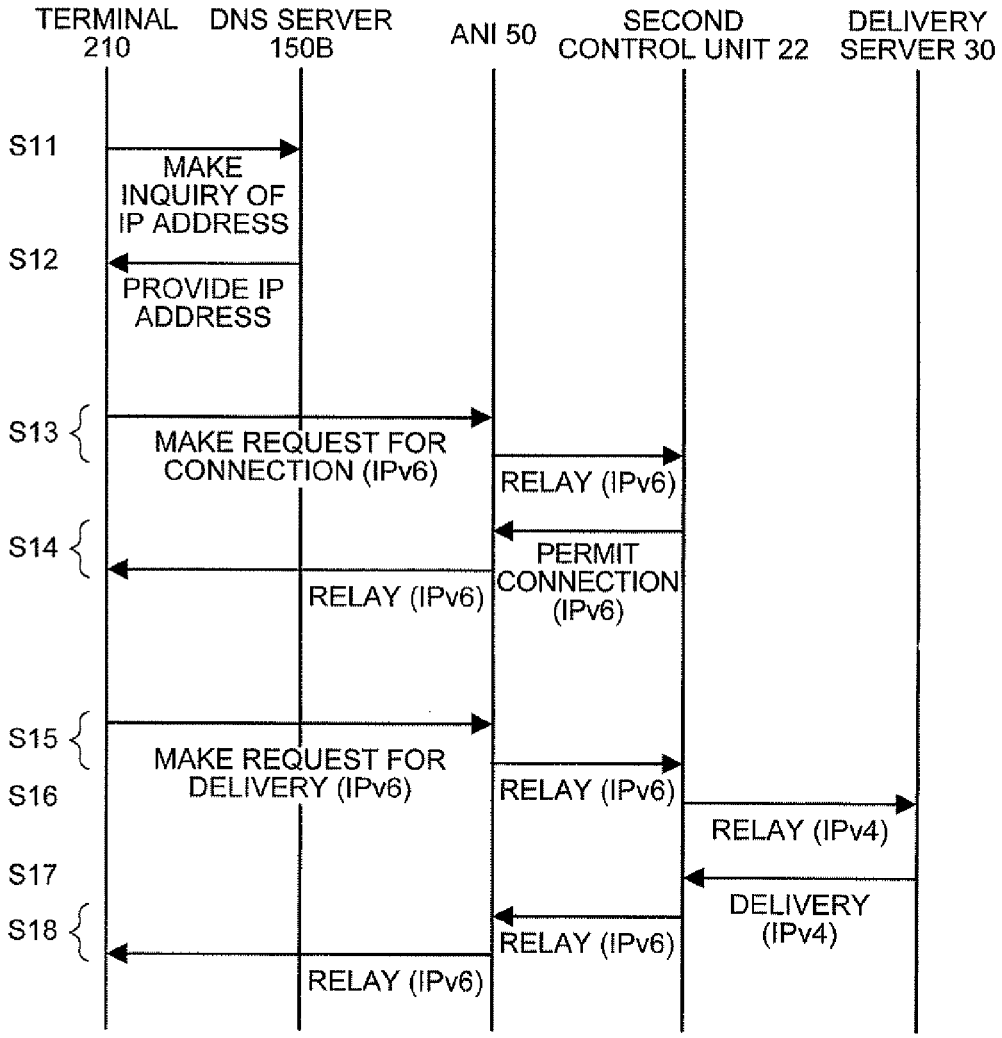

TERMINAL 210
DNS SERVER 150B
ANI 50
SECOND CONTROL UNIT 22
DELIVERY SERVER 30
S11
MAKE INQUIRY OF IP ADDRESS
S12
PROVIDE IP ADDRESS
S13
MAKE REQUEST FOR CONNECTION (IPv6)
RELAY (IPv6)
S14
PERMIT CONNECTION (IPv6)
RELAY (IPv6)
S15
MAKE REQUEST FOR DELIVERY (IPv6)
RELAY (IPv6)
S16
RELAY (IPv4)
S17
DELIVERY (IPv4)
S18
RELAY (IPv6)
RELAY (IPv6)

FIG.7

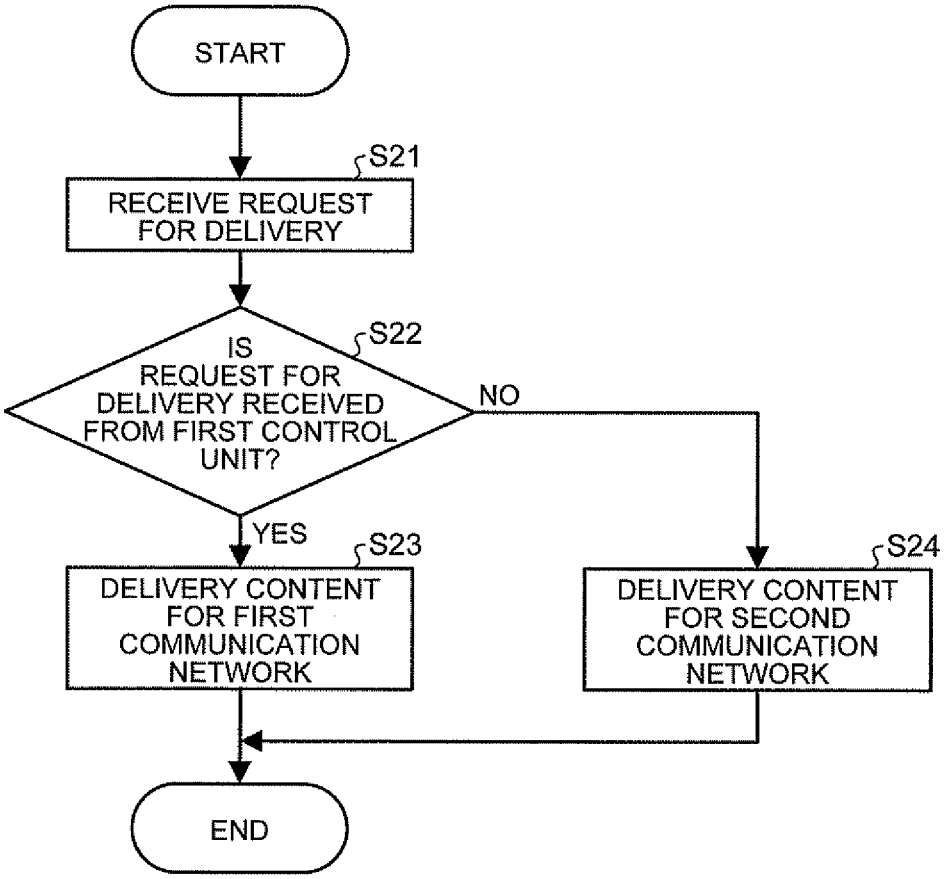

START
S21
RECEIVE REQUEST FOR DELIVERY
S22
IS REQUEST FOR DELIVERY RECEIVED FROM FIRST CONTROL UNIT?
NO
YES
S23
DELIVERY CONTENT FOR FIRST COMMUNICATION NETWORK
S24
DELIVERY CONTENT FOR SECOND COMMUNICATION NETWORK
END

FIG.8

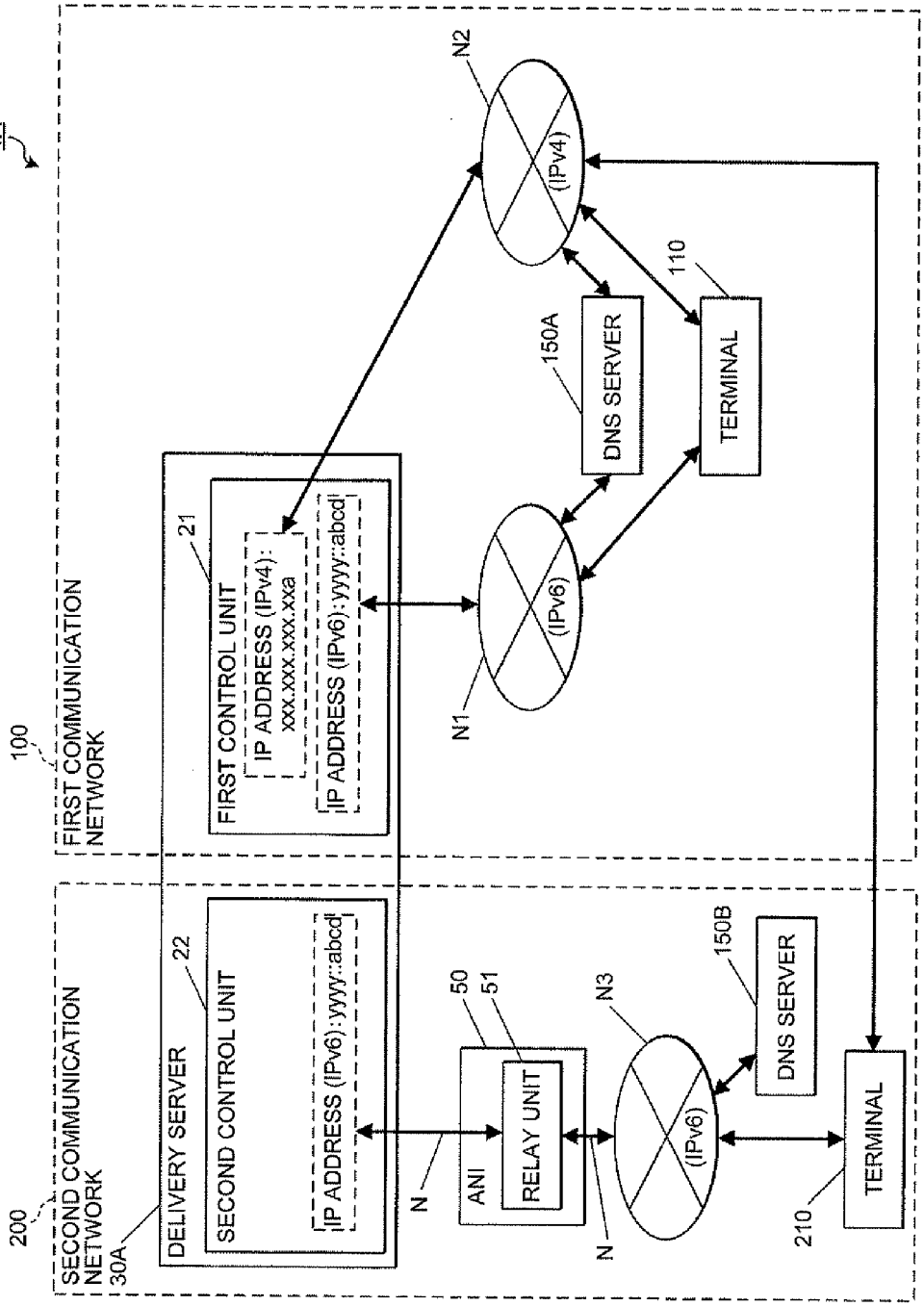
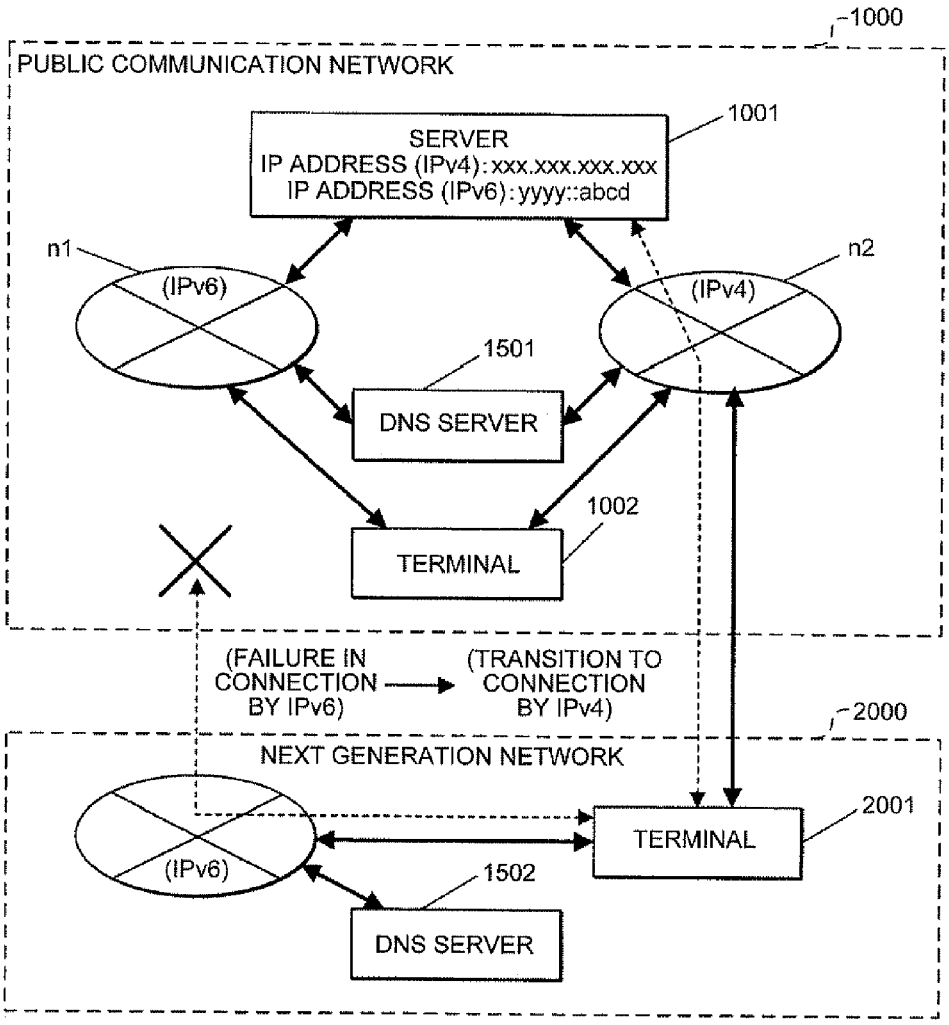

1A
100
FIRST COMMUNICATION NETWORK
21
FIRST CONTROL UNIT
IP ADDRESS (IPv4): xxx.xxx.xxx.xxa
IP ADDRESS (IPv6): yyyy::abcd
N2
(IPv4)
110
TERMINAL
150A
DNS SERVER
N1
(IPv6)
200
SECOND COMMUNICATION NETWORK
30A
DELIVERY SERVER
22
SECOND CONTROL UNIT
IP ADDRESS (IPv6): yyyy::abcd
N
50
51
ANI
RELAY UNIT
N3
(IPv6)
150B
DNS SERVER
N
210
TERMINAL

FIG.9


1000
PUBLIC COMMUNICATION NETWORK
SERVER
IP ADDRESS (IPv4): xxx.xxx.xxx.xxx
IP ADDRESS (IPv6): yyyy::abcd
1001
n1
(IPv6)
n2
(IPv4)
1501
DNS SERVER
1002
TERMINAL
(FAILURE IN CONNECTION BY IPv6)
(TRANSITION TO CONNECTION BY IPv4)
2000
NEXT GENERATION NETWORK
(IPv6)
TERMINAL
2001
1502
DNS SERVER

# INFORMATION PROCESSING APPARATUS, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** The present application claims priority to and incorporates by reference the entire contents of Japanese Patent Application No. 2012-121456 filed in Japan on May 29, 2012.

## BACKGROUND OF THE INVENTION

**[0002]** 1. Field of the Invention

**[0003]** The present invention relates to an information processing apparatus, a communication system, and a communication method.

**[0004]** 2. Description of the Related Art

**[0005]** Conventionally, a method for connecting a plurality of communication networks via an ANI (Application Server Network Interface) is known (for example, see Japanese Laid-open Patent Publication No. 2010-178178). According to the conventional method, separate communication networks are connected with each other via the ANI and an inter-network communication is realized. The ANI is sometimes called an SNI.

**[0006]** Meanwhile, IPv6 (Internet Protocol version 6) is known as a communication protocol to resolve the problem of the IP address exhaustion in IPv4 (Internet Protocol version 4), which is a widely-used communication protocol for a communication network such as the Internet. In recent years, Next Generation Networks (NGN) using IPv6 are constructed. In connecting the NGN to a server that provides various communication services, the method using the ANI is employed.

**[0007]** When the IPv6 is introduced into an existing network of IPv4, usually a network using IPv6 and a network using IPv4 are built side by side. To realize the communication in both IPv4 and IPv6, a computer to which an IP address of IPv4 is assigned is further assigned with an IP address of IPv6.

**[0008]** However, when IP addresses of IPv6 are merely assigned to computers of an existing communication network, a problem may occur in communication between computers via an NGN in some cases.

**[0009]** FIG. **9** is a schematic diagram illustrating an example in which communication cannot be established by an NGN using IPv6.

**[0010]** In the example of FIG. **9**, a public communication network **1000** employs IPv4 as its communication protocol. Then, a server **1001** of the public communication network **1000** is newly assigned with an IP address of the IPv6, so that IPv6 can additionally be used as the communication protocol. In this case, the server **1001** has both the IP address of IPv4 and the IP address of IPv6. A communication network n**1** illustrated in FIG. **9** is a communication network of IPv6 serving as the public communication network **1000** and a communication network n**2** is a communication network of IPv4.

**[0011]** As illustrated in FIG. **9**, a Next Generation Network **2000** in which IPv6 is used as an internal communication protocol is present aside from the public communication network **1000**. Here, the Next Generation Network **2000** based on IPv6 is a communication network independent from the IPv6 communication network in the public communication network **1000**. That is, the Next Generation Network **2000** is a closed communication network. In other words, a terminal **2001** connected to the Next Generation Network **2000**, which is independent from the public communication network **1000**, cannot perform communication using IPv6 with the server **1001** to which the IP address of IPv6 is assigned in the public communication network **1000**.

**[0012]** On the other hand, the terminal **2001** is configured to be connectable to the public communication network **1000** through communication of IPv4.

**[0013]** In the general communication network, a DNS (Domain Name System) server is provided. For example, in the example of FIG. **9**, a DNS server **1501** is provided in the public communication network **1000** and a DNS server **1502** is provided in the Next Generation Network **2000**. When the DNS server receives an inquiry of an IP address by designation of an URL (Uniform Resource Locator) from each terminal, the DNS server **1500** transmits information indicating an IP address corresponding to a host name of the designated URL to the terminal having queried the IP address. Here, when the designated URL is a URL of a server to which both an IP address of IPv4 and an IP address of IPv6 are assigned, the DNS server transmits both the IP address of IPv4 and the IP address of IPv6 to the terminal.

**[0014]** Each terminal makes a request for establishing communication using the IP address transmitted from the DNS server **1500**. When both the IP address of IPv4 and the IP address of IPv6 are transmitted from the DNS server, the terminal first performs a process of establishing communication of IPv6. When the communication of IPv6 is not established, the terminal performs a process of establishing communication of IPv4. In the example of FIG. **9**, a terminal **1002** connected to the public communication network **1000** by both IPv4 and IPv6, can establish a communication of IPv6 with the server **1001** without a problem.

**[0015]** On the other hand, as described above, the terminal **2001** first attempts to perform communication of IPv6 with the server **1001** though the communication cannot be established by IPv6 between the server **1001** of the public communication network **1000** and the terminal **2001**. Therefore, a waiting time from confirmation of a failure of the communication of IPv6 to transition to the communication of IPv4 may occur. A series of processes in which the waiting time occurs is called "fallback." Since the fallback causes deterioration in a response in use of a communication service from the terminal **2001** inside the Next Generation Network **2000**, the fallback is a problem.

**[0016]** To prevent the fallback, it is possible to provide another, separate server connected to the Next Generation Network **2000**. However, in this case, since both the server **1001** of the public communication network **1000** and the other server inside the Next Generation Network **2000** are provided, installations and administration cost may be doubled, thereby resulting in considerable ineffectiveness.

**[0017]** Alternatively, it may be possible to distinguish the terminal **1002** connected to the public communication network **1000** from the terminal **2001** connected to the Next Generation Network **2000** based on the IP address assigned to each terminal, and to control the terminal **2001** such that the terminal **2001** does not perform a process of establishing connection of IPv6 when trying to establish connection with the public communication network **1000**. However, this method has problems in that an additional mechanism is

required to identify each terminal and the fallback may not be prevented in a terminal of which a connection path is unclear.

**[0018]** Accordingly, when the communication of IPv6 is performed, a mechanism is required to establish the connection of IPv6 between mutually independent communication networks, such as the public communication network **1000** and a closed communication network such as the Next Generation Network **2000**.

**[0019]** The problems described above in relation to the IPv6 are not problems peculiar to IPv6. Similar problems may occur when communication realized by any new communication protocol is introduced into an existing communication network.

## SUMMARY OF THE INVENTION

**[0020]** According to one aspect of an embodiment, an information processing apparatus is connected to and communicates with a terminal. The terminal is connected to at least one of a first communication network and a second communication network using a predetermined communication protocol. The first communication network is operable using the predetermined communication protocol. The second communication network is a closed communication network independent from the first communication network and operable using the predetermined communication protocol. The information processing apparatus includes a first communication unit, and a second communication unit. The first communication unit communicates with the terminal via the first communication network based on the predetermined communication protocol. The second communication unit communicates with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus. The first and the second communication units have the same IP address having an anycast relation as an IP address of the predetermined communication protocol.

**[0021]** According to another aspect of an embodiment, a communication system includes a terminal and a server. The terminal is connected to at least one of a first communication network and a second communication network using a first communication protocol. The first communication network is operable using the first communication protocol, and the second communication network is a closed communication network independent from the first communication network and operable using the first communication protocol. The server is configured to communicate with the terminal. The server includes a first communication unit and a second communication unit. The first communication unit communicates with the terminal via the first communication network based on the first communication protocol. The second communication unit communicates with the terminal based on the first communication protocol via a relay unit that is arranged in a communication line between the second communication network and the server and relays communication between the second communication network and the server. The first and the second communication units have the same IP address having an anycast relation as an IP address of the first communication protocol.

**[0022]** According to still another aspect of an embodiment, a communication method of an information processing apparatus that is connected to and communicates with a terminal, the terminal being connected to at least one of a first communication network and a second communication network using a predetermined communication protocol, the first communication network being operable using the predetermined communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the predetermined communication protocol, the communication method includes firstly communicating with the terminal via the first communication network based on the predetermined communication protocol, and secondly communicating with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus, wherein IP addresses of the predetermined communication protocol of the information processing apparatus used in the firstly communicating and the secondly communicating are the same IP address having an anycast relation.

**[0023]** The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0024]** FIG. **1** is a diagram illustrating an example of a configuration of a communication system;

**[0025]** FIG. **2** is a block diagram illustrating an example of a configuration of a terminal;

**[0026]** FIG. **3** is a block diagram illustrating an example of a configuration of a server;

**[0027]** FIG. **4** is a block diagram illustrating an example of a configuration of a delivery server;

**[0028]** FIG. **5** is a time chart illustrating an example of flow of a process relevant to communication from a terminal connected to a first communication network;

**[0029]** FIG. **6** is a time chart illustrating an example of flow of a process relevant to communication from a terminal connected to a second communication network;

**[0030]** FIG. **7** is a flowchart illustrating an example of control of the delivery server relevant to delivery of content;

**[0031]** FIG. **8** is a diagram illustrating an example of a configuration of a delivery server including first and second control units; and

**[0032]** FIG. **9** is a schematic diagram illustrating an example in which communication cannot be established by an NGN using IPv6.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0033]** Hereinafter, a communication system **1** according to an embodiment of the invention will be described in detail with reference to the drawings. The embodiment is provided by way of an example and does not limit the invention.

### 1. Configuration of Communication System

**[0034]** FIG. **1** is a diagram illustrating an example of a configuration of a communication system **1**.

**[0035]** A communication system **1** includes terminals **110** and **210**, a server **10**, and a delivery server **30**. The terminals **110** and **210** are connected to one of a first communication network **100** and a second communication network **200** based on a first communication protocol (for example, IPv6). The first communication network **100** is configured so that the first communication protocol is usable. The second communication network **200**, which is a closed communication network configured independently from the first communication network **100**, uses the first communication protocol as a communication protocol. The server **10** is configured to communicate with the terminals **110** and **210**. The delivery server **30** is connected to the first communication network **100** and the second communication network **200** via the server **10**.

**[0036]** The first communication network **100** is, for example, a public communication network such as the Internet. In the first communication network **100** according to the embodiment, IPv4 and IPv6 are used as communication protocols by which personal computers (PC) such as the terminal **110**, portable terminals, servers, and other various apparatuses connected to the first communication network **100** are connected to communicate with each other. In the embodiment, as described above, IPv6 may be referred to as "the first communication protocol" or "a predetermined communication protocol". Further in the embodiment, IPv4 may be referred to as "a second communication protocol."

**[0037]** The second communication network **200** is, for example, a Next Generation Network and a closed communication network realized by the communication protocol IPv6. The second communication network **200** is configured independently from a communication network of IPv6 of the first communication network **100**.

**[0038]** In the embodiment, various information apparatuses such as the terminal **210** connected to the second communication network **200** are connected to communicate with various apparatuses connected to the first communication network **100** by the communication protocol, IPv4.

**[0039]** The IPv6 communication network according to the embodiment may be any communication network of any form in which IP address-based connection is realized based on the IPv6 addresses. For example, a tunneling technology for passing packets by communication of IPv6 in the communication network of IPv4 may be used; a native system entirely in conformity with IPv6 may be used for connecting the terminals mutually performing communication; or any system may be used.

**[0040]** The first communication network **100** and the second communication network **200** may have any configuration as far as they are operable as a communication network. For example, the first communication network **100** and the second communication network **200** may include a telephone network, an ISDN line network, an optical fiber, a mobile communication network, a communication satellite line, a CATV line network, or various communication networks such as a dedicated line and an Internet service provider connected thereto. Further, the first communication network **100** and the second communication network **200** may be a collective communication network in which various communication networks such as a LAN (Local Area Network), a WAN (Wide Area Network), a WiFi (Wireless Fidelity), a Bluetooth (registered trademark), and a NFC (Near Field Communication) are connected to communicate with each other. Any form of connection can be employed, such as a wired connection, a wireless connection, and a mixture of the wired and wireless connections.

**[0041]** In FIG. **1**, an IPv6 communication network N**3** in the second communication network **200** is illustrated to distinguish from an IPv6 communication network N**1** and an IPv4 communication network N**2** in the first communication network **100**.

2. Terminal

**[0042]** The terminals **110** and **210** are stationary computers such as PCs or workstations, but not limited thereto. For example, the terminals **110** and **210** may be portable terminals such as portable telephones or PDAs (Personal Digital Assistants). Alternatively, the terminals **110** and **210** may be any kinds of information processing apparatuses configured to perform communication.

**[0043]** FIG. **2** is a block diagram illustrating an example of a configuration of the terminals **110** and **210**.

**[0044]** First, the terminal **110** will be described.

**[0045]** For example, the terminal **110** includes a CPU (Central Processing Unit) **111**, a RAM (Random Access Memory) **112**, a ROM (Read Only Memory) **113**, a storage unit **114**, a communication unit **115**, an input unit **116**, and a display unit **117**.

**[0046]** The CPU **111** reads and processes various programs, data, and the like stored in the ROM **113** or the storage unit **114** and controls various processes of the terminal **110**.

**[0047]** The RAM **112** stores various programs and data read by the CPU **111** or temporarily generated parameters or the like.

**[0048]** The ROM **113** and the storage unit **114** store various programs, data, and the like read by the CPU **111**. The storage unit **114** is configured by, for example, a hard disk, flash memory, or a combination thereof and also has a function of storing data newly generated by the CPU **111** or data acquired via the communication unit **115**.

**[0049]** The communication unit **115** includes, for example, a network interface card (NIC) and has various functions relevant to communication.

**[0050]** The communication unit **115** is connected to the first communication network **100** by the communication protocol, IPv4, and the communication protocol, IPv6. Here, the communication protocol used by the communication unit **115** can be arbitrarily changed. In the embodiment, however, the communication unit **115** prioritizes communication of IPv6 by performing communication of IPv6 rather than communication of IPv4 when possible.

**[0051]** The input unit **116** includes, for example, an input device such as a keyboard, a mouse, or a touch panel. The input unit **116** outputs information to the CPU **111** in response to an instruction input via the input device. The CPU **111** performs a process in response to an instruction input via the input unit **116**.

**[0052]** The display unit **117** includes, for example, a display device such as a liquid crystal display, an organic electroluminescence (EL) display, or a CRT (Cathode Ray Tube). The display unit **117** displays information corresponding to the process performed by the CPU **111**.

**[0053]** The terminal **210** is a computer that has the same configuration as the terminal **110** except that a communication network connected to communicate based on the communication protocol, IPv6, is the second communication network **200**; and thus the detailed description thereof will not be made. The terminal **210** includes, for example, a CPU **211**, a

RAM **212**, a ROM **213**, a storage unit **214**, a communication unit **215**, an input unit **216**, and a display unit **217** (see FIG. **2**). The terminal **210** is different from the terminal **110** in that the communication unit **215** of the terminal **210** is connected to the second communication network **200** based on the communication protocol, IPv6. The communication unit **215** of the terminal **210** is also connected to the first communication network **100** based on the communication protocol, IPv4. In other respects, each element of the terminal **210** operates and functions in a similar manner to those of the terminal **110**.

**[0054]** The CPUs **111** and **211** of the terminals **110** and **210** perform a process of acquiring content from the delivery server **30** in response to a user's instruction input via the input units **116** and **216**, respectively. That is, the CPUs **111** and **211** establish communication with the delivery server **30** via the communication units **115** and **215**, respectively, to acquire the content of the delivery server **30** through the communication.

## 3. Server

**[0055]** FIG. **3** is a block diagram illustrating an example of a configuration of the server **10**.

**[0056]** The server **10** is, for example, an information processing apparatus that includes a CPU **11**A, a RAM **12**A, a ROM **13**A, a storage unit **14**A, a communication unit **15**A, an input unit **16**, and a display unit **17**.

**[0057]** The CPU **11**A reads and processes various programs, data, and the like stored in the ROM **13**A or the storage unit **14**A and controls various processes of the server **10**.

**[0058]** The RAM **12**A stores various programs and data read by the CPU **11**A or temporarily generated parameters or the like.

**[0059]** The ROM **13**A and the storage unit **14**A store various programs, data, and the like read by the CPU **11**A.

**[0060]** The storage unit **14**A is configured by, for example, a hard disk, flash memory, or a combination thereof and also has a function of storing data newly generated by the CPU **11**A or data acquired via the communication unit **15**A.

**[0061]** The storage unit **14**A according to the embodiment is installed as one element of the server **10**, but this configuration is merely one example. The invention is not limited thereto. For example, an externally installed storage apparatus (for example, a DB (database) server or the like having a database) may be connected to the server **10** and a storage region of the storage apparatus may be used.

**[0062]** The communication unit **15**A includes, for example, a network interface card and has various functions relevant to communication.

**[0063]** The input unit **16** includes, for example, an input device such as a keyboard, a mouse, or a touch panel. The input unit **16** outputs information to the CPU **11**A in response to an instruction input via the input device. The CPU **11**A performs a process in response to an instruction input via the input unit **16**.

**[0064]** The display unit **17** includes, for example, a display device such as a liquid crystal display, an organic electroluminescence display, or a CRT. The display unit **17** displays information corresponding to the process performed by the CPU **11**A.

**[0065]** Here, as illustrated in FIG. **3**, the server **10** according to the embodiment has two sets of CPUs, RAMs, ROMs, storage units, and communication units; that is, CPUs **11**A and **11**B, RAMs **12**A and **12**B, ROMs **13**A and **13**B, storage units **14**A and **14**B, and communication units **15**A and **15**B. Specifically, for example, the server **10** is a server that includes a plurality of blade servers or rack-mount servers each corresponding to one set of the CPU, the RAM, the ROM, the storage unit, and the communication unit. The server **10** may be configured with two sets of blade servers or rack-mount servers, but is merely an example. The invention is not limited thereto.

**[0066]** The communication unit **15**A in one set is connected to a different communication network from the one connected to the communication unit **15**B of the other set. Specifically, the communication unit **15**A is connected to the first communication network **100** and the other communication unit **15**B is connected to the second communication network **200**.

**[0067]** Hereinafter, a set of the CPU **11**A, the RAM **12**A, the ROM **13**A, the storage unit **14**A, and the communication unit **15**A which is connected to the IPv6 communication network N**1** of the first communication network **100** will be referred to as a first control unit **21**; and a set of the CPU **11**B, the RAM **12**B, the ROM **13**B, the storage unit **14**B, and the communication unit **15**B which is connected to the IPv6 communication network N**3** of the second communication network **200** will be referred to as a second control unit **22**.

**[0068]** The communication unit **15**A of the first control unit **21** is connected to the first communication network **100** based on the communication protocol, IPv6.

**[0069]** The communication unit **15**B of the second control unit **22** is connected to the second communication network **200** based on the communication protocol, IPv6.

**[0070]** Both the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** are connected to the delivery server **30** based on the communication protocol, IPv4.

**[0071]** In the embodiment, the communication unit **15**B of the second control unit **22** is independent from the first communication network **100**. That is, communication between the communication unit **15**B of the second control unit **22** and an apparatus such as the terminal **110** connected to the first communication network **100** is not established.

**[0072]** The first control unit **21** may include two communication units, one connected to the first communication network **100** and the other connected to the delivery server **30**. Likewise, the second control unit may include two communication units, one connected to the second communication network **200** and the other connected to the delivery server **30**.

## 4. ANI

**[0073]** As illustrated in FIG. **1**, an ANI **50** is present on a communication line N between the second communication network **200** and the server **10**. The ANI **50** relays communication between the second communication network **200** and the server **10**.

**[0074]** Specifically, the ANI **50** includes a relay unit **51** that performs communication in conformity with various communication standards including IPv6 based on the OSI reference model. The relay unit **51** relays communication of IPv6 between the second communication network **200** and the server **10**.

**[0075]** Specifically, the ANI **50** passes data transmitted from the terminal **210** to the communication unit **15**B of the second control unit **22** of the server **10** present outside the second communication network **200** which is a closed communication network in the IPv6 communication network. The ANI **50** also passes data transmitted from the communication unit **15**B of the second control unit **22** to the terminal **210**. The ANI **50** relays data transmission between a computer which is

not limited to the terminal **210** and is connected to the second communication network **200** and the communication unit **15**B of the second control unit **22**.

**[0076]** The communication line N on which the ANI **50** is provided between, the second communication network **200** and the server **10** is a dedicated line. Specifically, the communication line N is, for example, a communication line in which an optical fiber is used, but not limited thereto. A communication line having any configuration can be used as the communication line N.

5. Delivery Server

**[0077]** The delivery server **30** is an information processing apparatus that is connected to the first communication network **100** and the second communication network **200** via the server **10**. The delivery server **30** delivers content in response to a request for acquiring content from various apparatuses (for example, the terminals **110** and **210**) connected to the first communication network **100** and the second communication network **200**.

**[0078]** FIG. **4** is a block diagram illustrating an example of a configuration of the delivery server **30**.

**[0079]** For example, the delivery server **30** includes a CPU **31**, a RAM **32**, a ROM **33**, a storage unit **34**, a communication unit **35**, an input unit **36**, and a display unit **37**. The functions of the CPU **31**, the RAM **32**, the ROM **33**, the storage unit **34**, the communication unit **35**, the input unit **36**, and the display unit **37** are the same as the functions of the CPU **11**A, the RAM **12**A, the ROM **13**A, the storage unit **14**A, the communication unit **15**A, the input unit **16**, and the display unit **17** in the server **10**. Therefore, only those features of the delivery server **30** different from those of the server **10** will be described below.

**[0080]** The storage unit **34** of the delivery server **30** stores data of content to be delivered by the delivery server **30**. Specifically, the storage unit **34** stores, for example, HTML (HyperText Markup Language) files, still image files, moving image files, scripts, Flash®, and other data forming a portal site.

**[0081]** The contents delivered by the delivery server **30** are not particularly limited and may include any data transmitted via the communication line.

**[0082]** The delivery server **30** according to the embodiment has a function of delivering different contents to an apparatus (for example, the terminal **110**) connected to the first communication network **100** of IPv6, from contents delivered to an apparatus (for example, the terminal **210**) connected to the second communication network **200**. That is, the storage unit **34** stores the contents delivered to the first communication network **100** and the contents delivered to the second communication network **200** separately.

**[0083]** The communication unit **35** of the delivery server **30** is connected to the first communication network **100** based on the communication protocol, IPv4. That is, the communication unit **35** has an IP address of IPv4, and is connected to and capable of communicating with apparatuses which are connected to the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** or to the IPv4 communication network N**2** of the first communication network **100**, using IPv4.

6. IP Address

**[0084]** Hereinafter, communication between the server **10**, and the first communication network **100** and the second communication network **200** will be described. In particular, an IP address will be described.

**[0085]** The communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have the same IP address having an anycast relation as an IP address of the first communication protocol (IPv6). That is, in regard to the communication performed based on IPv6, according to the embodiment, an IP address of the server **10** used in a connection process when the terminal **110** establishes the communication with the communication unit **15**A of the first control unit **21** via the first communication network **100** is the same as an IP address of the server **10** used in a connection process when the terminal **210** establishes communication with the communication unit **15**B of the second control unit **22** via the second communication network **200**, the communication line N, and the ANI **50**.

**[0086]** In FIG. **1** and the like, an IP address of IPv6 is described as "yyyy :: abcd." However, in practice, addresses in which 128-bit addresses are partitioned in a 16-bit unit by colons (:) are IP addresses of IPv6. For example, the address is described as "aaaa : bbbb : cccc : dddd : 1111 : 2222 : 3333 : 4444."

**[0087]** The terminals **110** and **210** can communicate with DNS servers **150**A and **1508** (hereinafter collectively referred to as DNS server **150**), respectively. In the embodiment, one DNS server is provided in each of the first communication network **100** and the second communication network **200**. However, the DNS server may be connected to any communication network as far as the communication between the terminals **110** and **210** and the DNS servers **150**A and **150**B can be realized.

**[0088]** The DNS server **150** provides each terminal with information indicating an IP address in response to an inquiry of the IP address corresponding to the host name of each terminal.

**[0089]** Here, the DNS server **150** provides at least an IP address of IPv6 as an IP address corresponding to the host name. In this embodiment, the DNS server **150** provides, for example, an IP address of IPv4 and an IP address of IPv6.

**[0090]** An IP address and a host name used in the DNS server **150** have a one-to-one correspondence relation. That is, when the plurality of DNS servers **150** are present and the DNS server **150** to which each terminal makes an inquiry is a different DNS server **150**, but when the host name to which the terminal makes an inquiry is the same, the IP address of IPv4 and the IP address of IPv6 provided in response to the inquiry by each DNS server **150** is the same as each other.

**[0091]** In the embodiment, the DNS server **150** causes the host name of the delivery server **30** to correspond to the IP address of IPv6 which the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have. That is, when the terminals **110** and **210** make an inquiry of the IP address to the DNS servers **150**A and **150**B, respectively, using the host name of the delivery server **30**, the DNS server **150**A and **150**B provide the terminals **110** and **210** with information indicating the IP address of IPv6 which the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have, respectively.

**[0092]** The terminals **110** and **210** perform a process of establishing connection with a host to be connected using the IP address provided from the DNS servers **150**A and **150**B, respectively. Accordingly, in the embodiment, when an attempt to be connected to the delivery server **30** is made according to the communication protocol, IPv6, the terminals **110** and **210** are connected to the server **10**.

7. Communication Establishment and Delivery

**[0093]** The server **10** establishes a communication with the terminals **110** and **210** according to IPv6 and relays the communication between each of the terminals **110** and **210** and the delivery server **30**.

**[0094]** Hereinafter, the flow of a process relevant to the establishment of the communication between each terminal **110**, **210** and the delivery server **30** and the delivery of the content from the delivery server **30** will be described with reference to FIGS. **5** and **6**.

**[0095]** First, the flow of a process relevant to the communication from the terminal **110** connected to the first communication network **100** will be described with reference to the time chart illustrated in FIG. **5**.

**[0096]** First, the terminal **110** makes an inquiry of the IP address to the DNS server **150**A using the host name of the delivery server **30** (step S**1**). In response to the inquiry, the DNS server **150**A provides the terminal **110** with the IP address of IPv6 which the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have (step S**2**).

**[0097]** The terminal **110** makes a request for connection to a unit which has the IP address of IPv6 provided from the DNS server **150**A, that is, the first control unit **21** of the server **10** (step S**3**). Here, the terminal **110** makes a request for the establishment of the communication to the first control unit **21**, since the communication unit **15**B of the second control unit **22** is not present within the communication network from the viewpoint of the terminal **110** connected to the first communication network **100** according to the communication protocol, IPv6. When receiving the request, the CPU **11**A of the first control unit **21** makes a response indicating permission of the connection to the terminal **110** (step S**4**). Thus, the communication with the delivery server **30** according to the communication protocol, IPv6, is established from the viewpoint of the terminal **110**.

**[0098]** The terminal **110** makes a request for delivery of the content to the delivery server **30** (step S**5**). When receiving the request, the first control unit **21** relays the request (step S**6**). That is, the first control unit **21** makes the request for the delivery of the content to the delivery server **30** according to the communication protocol, IPv4. The delivery server **30** transmits data of the requested content in response to the request from the server **10** (step S**7**). When the data of the content is transmitted, the first control unit **21** relays the data (step S**8**) and transmits the data to the terminal **110** according to the communication protocol, IPv6. Through the above-described process, the terminal **110** can establish the communication according to the communication protocol, IPv6, and acquire the content from the delivery server **30**.

**[0099]** Next, the flow of a process relevant to communication from the terminal **210** connected to the second communication network **200** will be described with reference to the time chart illustrated in FIG. **6**.

**[0100]** First, the terminal **210** makes an inquiry of the IP address to the DNS server **150**B using the host name of the delivery server **30** (step S**11**). In response to the inquiry, the DNS server **150**B provides the terminal **210** with the IP address of IPv6 which the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have (step S**12**).

**[0101]** The terminal **210** makes a request for connection to a unit which has the IP address of IPv6 provided from the DNS server **150**B, that is, the second control unit **22** of the server **10** (step S**13**). Here, the terminal **210** makes a request for the establishment of the communication to the second control unit **22**, since the communication unit **15**A of the first control unit **21** is not present within the communication network from the viewpoint of the terminal **210** connected to the second communication network **200** according to the communication protocol, IPv6. Further, the ANI **50** on the communication line N relays the communication between the terminal **210** and the communication unit **15**B of the second control unit **22**. When receiving the request for the establishment of the communication from the terminal **210**, the CPU **11**B of the second control unit **22** makes a response indicating permission of the connection to the terminal **210** (step S**14**). Thus, the communication with the delivery server **30** according to the communication protocol, IPv6, is established from the viewpoint of the terminal **210**.

**[0102]** The terminal **210** makes a request for delivery of the content to the delivery server **30** (step S**15**). When receiving the request, the second control unit **22** relays the request (step S**16**). That is, the second control unit **22** makes a request for the delivery of the content to the delivery server **30** according to the communication protocol, IPv4. The delivery server **30** transmits data of the requested content in response to the request from the server **10** (step S**17**). When the data of the content is transmitted, the second control unit **22** relays the data (step S**18**) and transmits the data to the terminal **210** according to the communication protocol, IPv6. Through the above-described process, the terminal **210** can establish the communication according to the communication protocol, IPv6, and acquire the content from the delivery server **30**.

**[0103]** When receiving an inquiry of the IP address using the host name of the delivery server **30** from each terminal, the DNS servers **150**A, **150**B deliver the IP address of IPv6 which the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** of the server **10** have and the IP address of IPv4 which the delivery server **30** has. Thus, a computer which does not correspond to the communication protocol, IPv6, among the computers connected to the first communication network **100** can establish communication with the delivery server **30** and acquire content. The terminals **110** and **210** can also communicate with the delivery server **30** intentionally based on the communication protocol, IPv4.

8. Identification of Delivery Destination of Content

**[0104]** The delivery server **30** may set content to be delivered to a terminal (for example, the terminal **110**) communicating with the first control unit **21** to be different from content to be delivered to a terminal (for example, the terminal **210**) communicating with the second control unit **22**. In this case, the delivery server **30** identifies which of the first control unit **21** and the second control unit **22** the terminal communicates with, and determines the content to be delivered according to the identification result.

**[0105]** Hereinafter, control of the delivery server **30** relevant to the delivery of the content will be described with reference to the flowchart of FIG. **7**.

**[0106]** When the delivery server **30** receives the request for the delivery of the content via the communication unit **35** (step S**21**), the CPU **31** determines from which of the first control unit **21** and the second control unit **22** the request is received. For example, the CPU **31** determines whether the request is received from the first control unit **21** (step S**22**). Here, when the CPU **31** determines that the request is received from the first control unit **21** (YES in step S**22**), the CPU **31** reads the content to be delivered to the first communication network **100** from the storage unit **34** and transmits the content to the server **10** (step S**23**). Conversely, when the CPU **31** determines that the request is not received from the first control unit **21** (NO in step S**22**), that is, when the CPU **31** determines that the request is received from the second control unit **22**, the CPU **31** reads the content to be delivered to the second communication network **200** from the storage unit **34** and transmits the content to the server **10** (step S**24**).

**[0107]** In the control relevant to the delivery of the content in the above description and FIG. **7**, the CPU **31** determines whether the request for the delivery of the content is received from the first control unit **21**, and thus the delivery server **30** determines from which of the first control unit **21** and the second control unit **22** the request is received. The embodiment, however, is provided by way of example only and the invention is not limited thereto. For example, it may be determined whether the request for the delivery of the content is received from the second control unit **22**. Further, the process of step S**22** may be a branch conditionally executed depending on a relay source of the request of the delivery of the content.

**[0108]** In the embodiment, the IP addresses of IPv4 which the first control unit **21** and the second control unit **22** have in order to communicate with the delivery server **30** are different from each other. Accordingly, for example, the delivery server **30** can identify the first control unit **21** and the second control unit **22** according to the IP address of IPv4 which the first control unit **21** has and the IP address of IPv4 which the second control unit **22** has. The IP address is merely an example of information which can be used for identifying the relay source. Any information can be used for identifying the first control unit **21** and the second control unit **22**.

**[0109]** Alternatively, the delivery server **30** may deliver the same content to both a terminal (for example, the terminal **110**) communicating with the first control unit **21** and a terminal (for example, the terminal **210**) communicating with the second control unit **22**.

## 9. Advantages of Embodiment

**[0110]** In the communication system **1** according to the embodiment, as described above, the server **10** includes the first control unit **21** that communicates with the terminal **110** via the first communication network **100** based on the communication protocol, IPv6, and the second control unit **22** that is installed in the communication line N between the second communication network **200** and the server **10** and communicates with the terminal **210** based on the communication protocol, IPv6, via the ANI **50** relaying the communication between the second communication network **200** and the server **10**. Since the communication of the communication protocol, IPv6, with the second communication network **200** which is the closed communication network with respect to the first communication network **100** can be established via the ANI **50** and the second control unit **22**, the fallback can be prevented from occurring. Therefore, it is possible to provide a more comfortable communication environment in which the communication protocol, IPv6, is used.

**[0111]** Since the communication unit **15**A of the first control unit **21** and the communication unit **15**B of the second control unit **22** have the same IP address having an anycast relation as the IP address of IPv6, the IP addresses of IPv6 used when the terminal **110** is connected to the communication unit **15**A of the first control unit **21** and when the terminal **210** is connected to the communication unit **15**B of the second control unit **22** are the same as each other. Hence, the DNS servers **150**A, **150**B can make the host name uniquely corresponds to the IP address of IPv6 both in connecting to the server **10** from the first communication network **100** and in connecting to the server **10** from the second communication network **200**. Accordingly, when the terminal **110** is connected to the server **10** and when the terminal **210** is connected to the server **10**, a connection destination viewed from each terminal is seemingly the same. Thus, a user of the terminal can use various communication services provided by the delivery server **30** or the like of the communication system **1** without noticing which of the first communication network **100** and the second communication network **200** his/her terminal is being connected. In other words, the usability of the communication system **1** is the same no matter which terminal is used to connect to the server **10**. Thus, even when the first communication network **100** is working as an IPv4 communication network to which the server **10** is connected, another protocol, i.e., IPv6 can be introduced. Further, a communication can be established between the second communication network **200**, which is an independent IPv6 communication network, and the server **10**. Thus, an IPv6 communication network provided in an existing IPv4 communication network and another independent IPv6 communication network can operate simultaneously.

**[0112]** In addition, it is not necessary to separately provide the DNS server **150**A used in the first communication network **100** and the DNS server **150**B used in the second communication network **200**. Further, both the connection from the terminal **110** to the server **10** and the connection from the terminal **210** to the server **10** can be realized without special setting on a process relevant to identification of an IP address in response to an inquiry to the DNS server **150**A, **1508**. Therefore, it is possible to reduce load relevant to administration of the IP addresses of the communication system **1**.

**[0113]** Since content of the delivery server **30** can be delivered to an apparatus (for example, the terminal **210**) of the second communication network **200** without separately providing another delivery server connected to the second communication network **200**, it is not necessary to separately provide a delivery server in the second communication network **200** and it is possible to reduce load relevant to the administration of the delivery server **30**.

**[0114]** Further, it is not necessary to use a conventional method such as a method of determining a communication network to which each terminal is connected by an IP address or the like assigned to each terminal and restricting a communication protocol. It is possible to further simplify the control relevant to the establishment of the communication. Therefore, it is possible to further reduce the load of the administration in the communication system **1**.

**[0115]** Since the delivery server **30** can be provided which delivers the content to the terminals **110** and **210** or the like through the communication by the communication unit **15**A of the first control unit **21** or the communication unit **158** of the second control unit **22** of the server **10**, it is possible to provide a service by the delivery of the content to each terminal. Therefore, the user of the terminal can have various experiences by the content, and it is possible to provide various business opportunities through the content.

**[0116]** Since the server **10** relays the communication between the terminal or the like and the delivery server **30**, the service provided by the delivery of the content from the delivery server **30** can be provided to the side of the second communication network **200** even when the communication is not established directly by IPv6 between the delivery server **30** and a computer such as the terminal **210** connected to the second communication network **200**.

**[0117]** Further, the delivery server **30** identifies which of the first control unit **21** and the second control unit **22** communicates with the terminal. Then, the delivery server **30** delivers different contents to a terminal (for example, the terminal **110**) communicating with the first control unit **21** from the contents delivered to a terminal (for example, the terminal **210**) communicating with the second control unit **22** according to the identification result. Thus, different services can be provided to each communication network. For example, when it is expected that contents (e.g., advertisement) would be changed for each area or for each group of users depending on their tendency, it is possible to select and deliver most suitable contents for each communication network. The manner and advantageous effect of contents delivery described herein are merely examples, and the invention is not limited thereto. When service provided by contents delivery is changed for each communication network, various additional advantageous effects may be obtained.

**[0118]** Since the communication line N between the second communication network **200** and the server **10** is a dedicated line, higher performance requirements can be set regarding communication quality such as establishment of communication, period the communication is maintained, and communication rate for the communication between the second communication network **200** and the server **10**.

**[0119]** Since the communication protocol is IPv6 in the communication between the server **10** and the terminals **110** and **210**, additional apparatuses can be connected to the communication system **1** using a large number of IP addresses.

**[0120]** Since the communication protocol used in the communication between the server **10** and the delivery server **30** is different from the communication protocol in the communication between the server **10** and the terminals **110** and **210**, the communication protocol of the communication network to which the delivery server **30** is connected is not limited to the communication protocol between the server **10** and the first communication network **100** and the second communication network **200**.

**[0121]** Specifically, for example, a communication network using IPv6 can be connected to the delivery server **30** which is connected to the communication network of IPv4. The manner and advantageous effects of delivery as described above are mere examples and not limiting. Still more advantageous effects may be obtained by expansion of choices of the communication protocol.

**[0122]** Since the first control unit **21** and the second control unit **22** each include a separate control unit, the process load of the communication between each communication network and the server **10** can be distributed to each communication network. Further, the performance design for the connection of each communication network and the server **10** can be done more easily, and the system can be constructed more flexibly based on the performance requirement set according to the scale of each communication network.

## 10. Others

**[0123]** The embodiment described herein is a mere example in all respects and the invention is not considered to be limited thereto. The scope of the invention is not defined by the above description, but is defined by the claims and is intended to include the meanings equivalent to the scope of the claims and all of the modifications within the scope.

**[0124]** For example, the first communication protocol (predetermined protocol) and the second communication protocol are not limited to IPv6 and IPv4, and cover other communication protocols.

**[0125]** Further, the IPv4 communication network N**2** may be omitted from the embodiment. Even when a communication line of IPv4 is not provided, the server **10**, and the first communication network **100** and the second communication network **200** can establish communication of IPv6.

**[0126]** The first communication network **100** and the second communication network **200** are not limited to a public communication network and a Next Generation Network, but communication networks of other forms may be used. As far as the second communication network **200** is an independent, closed communication network with respect to the first communication network **100** in the predetermined communication protocol, any communication networks can be employed as the first and the second communication networks **100** and **200**.

**[0127]** The plurality of second communication networks **200** independent from each other may be constructed as communication networks of the predetermined communication protocol. In this case, the server **10** includes more than one second control unit **22** corresponding to the number of second communication networks **200**, and each of the plurality of second communication networks may be connected to one of the plurality of second control units. Alternatively, the plurality of second communication networks **200** may be connected to one second control unit **22**.

**[0128]** When the plurality of second communication networks **200** are present, content to be delivered to each of the second communication networks **200** may be set as in the case of the content to be delivered to the first communication network **100** and the content to be delivered to the second communication network **200**. For example, the content to be delivered to each of the plurality of second communication networks **200** may be different from each other, or the same content may be delivered to some or all of the second communication networks **200**.

**[0129]** The number of control units included in the server **10** may be one. For example, the control unit may logically function as a plurality of control units by a program (software). One server **10** may include more than one control unit. Alternatively, one information processing apparatus which functions as the first control unit **21** may be provided separately from one information processing apparatus which functions as the second control unit **22**; and both information

processing apparatuses may function as separate independent hardware which realizes the function as described above in the embodiment.

**[0130]** In the above-described embodiment, the server **10** and the delivery server **30** are separately installed. However, one information processing apparatus may have the functions of the first control unit **21**, the second control unit **22**, and the delivery server **30** as a first communication unit, a second communication unit, and a delivery unit. In this case, communication among the first communication unit, the second communication unit, and the delivery unit can be done in one apparatus. Further, as in the delivery server **30**, the information processing apparatus may include a control unit that identifies which of the first communication unit and the second communication unit a terminal communicates with and delivers different contents to a terminal communicating with the first communication unit from the contents delivered to a terminal communicating with the second communication unit according to the identification result. For example, the information processing apparatus functions as each of the units by executing a software program functioning to correspond to each of the units by a computer. Alternatively, dedicated hardware corresponding to each unit may be installed.

**[0131]** FIG. **8** illustrates an example of a communication system **1**A where a delivery server **30**A is arranged in place of the server **10** of FIG. **1**. The delivery server **30**A has a function of delivering contents and includes the first control unit **21** and the second control unit **22** of the server **10**. As in the delivery server **30**A, the function of the server **10** and the function of the delivery server **30** may be integrated into one information processing apparatus. As illustrated in FIG. **8**, the first control unit **21** may control the connection to the IPv4 communication network N**2** of the first communication network **100**. Further, in the example of FIG. **8**, communication between the first control unit **21** or the second control unit **22** and the functional unit of the delivery server **30** that delivers the contents as illustrated in FIG. **1** is not necessary. Hence, in the example of FIG. **8**, the second control unit **22** does not need to have an IP address of IPv4.

**[0132]** In the configuration illustrated in FIG. **8**, the delivery server **30**A may further be connected to and communicate with various servers or storages such as a DB server storing content to be delivered, and the delivery server **30**A may use the function of the server or the storage.

**[0133]** In the embodiment described above and illustrated in FIG. **1**, the delivery server **30** is directly connected to IPv4 communication network N**2** based on the communication protocol, IPv4. However, the first control unit **21** may relay the communication of the delivery server **30** by the communication protocol, IPv4.

**[0134]** In the above-described embodiment, the communication unit **15**B of the second control unit **22** is independent from the first communication network **100**, but this configuration is merely an example. The invention is not limited thereto. As far as the second control unit **22** can communicate with the second communication network **200** using the first communication protocol (predetermined communication protocol), any form of connection can be employed.

**[0135]** Besides, the number of nodes such as each terminal, the delivery server, and the DNS server according to the above-described embodiment is merely an example and can appropriately be modified.

**[0136]** Each element in the claims may be a section, a module, a unit, or the like or may be a circuit corresponding to each element. Each element may not necessarily be independent hardware. Single hardware may logically function as two or more units through a software process or the like.

**[0137]** Thus, according to an embodiment, it is possible to establish communication between mutually independent communication networks.

**[0138]** Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

## 11. Note

**[0139]** In addition to the embodiments as described above, some notes are provided below.

Note 1. An information processing apparatus that is connected to and communicates with a terminal, the terminal being connected to at least one of a first communication network and a second communication network using a predetermined communication protocol, the first communication network being operable using the predetermined communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the predetermined communication protocol, the information processing apparatus comprising:

**[0140]** a first communication unit that communicates with the terminal via the first communication network based on the predetermined communication protocol; and

**[0141]** a second communication unit that communicates with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus,

**[0142]** wherein the first and the second communication units have the same IP address having an anycast relation as an IP address of the predetermined communication protocol.

Note 2. The information processing apparatus according to note 1, further comprising:

**[0143]** a delivery unit that delivers content to the terminal through the communication performed by one of the first and the second communication units.

Note 3. The information processing apparatus according to note 2, further comprising:

**[0144]** an identification unit that identifies which of the first communication unit and the second communication unit the terminal communicates with; and

**[0145]** a control unit that sets content to be delivered to a terminal communicating with the first communication unit to be different from content to be delivered to a terminal communicating with the second communication unit according to an identification result obtained by the identification unit.

Note 4. The information processing apparatus according to any one of notes 1 to 3, wherein the communication line between the second communication network and the information processing apparatus is a dedicated line.

Note 5. The information processing apparatus according to any one of notes 1 to 4, wherein the predetermined communication protocol is IPv6.

Note 6. A communication system comprising:

**[0146]** a terminal that is connected to at least one of a first communication network and a second communication network using a first communication protocol, the first communication network being operable using the first communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the first communication protocol; and

**[0147]** a server that is configured to communicate with the terminal,

**[0148]** the server including:

**[0149]** a first communication unit that communicates with the terminal via the first communication network based on the first communication protocol; and

**[0150]** a second communication unit that communicates with the terminal based on the first communication protocol via a relay unit that is arranged in a communication line between the second communication network and the server and relays communication between the second communication network and the server, and

**[0151]** wherein the first and the second communication units have the same IP address having an anycast relation as an IP address of the first communication protocol.

Note 7. The communication system according to note 6, further comprising:

**[0152]** a delivery server that is connected to the first and the second communication networks via the server and delivers content to the terminal,

**[0153]** wherein the server relays communication between the terminal and the delivery server.

Note 8. The communication system according to note 7, wherein a communication protocol used in communication between the server and the delivery server is a second communication protocol different from the first communication protocol.

Note 9. The communication system according to any one of notes 6 to 8, wherein the first and the second communication units each include a separate control unit.

Note 10. The communication system according to any one of notes 6 to 9, wherein the first communication protocol is IPv6.

Note 11. A communication method of an information processing apparatus that is connected to and communicates with a terminal, the terminal being connected to at least one of a first communication network and a second communication network using a predetermined communication protocol, the first communication network being operable using the predetermined communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the predetermined communication protocol, the communication method comprising:

**[0154]** firstly communicating with the terminal via the first communication network based on the predetermined communication protocol; and

**[0155]** secondly communicating with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus,

**[0156]** wherein IP addresses of the predetermined communication protocol of the information processing apparatus used in the firstly communicating and the secondly communicating are the same IP address having an anycast relation.

Note 12. A communication method between a terminal and a server in a communication system, the terminal being connected to at least one of a first communication network and a second communication network using a first communication protocol, the first communication network being operable using the first communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the first communication protocol, and the server being configured to communicate with the terminal, the communication method comprising:

**[0157]** firstly causing the server and the terminal to communicate with each other via the first communication network based on the predetermined communication protocol; and

**[0158]** secondly causing the server and the terminal to communicate with each other based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the server and relays communication between the second communication network and the server,

wherein IF addresses of the predetermined communication protocol of the server used in the firstly causing and the secondly causing are the same IF address having an anycast relation.

What is claimed is:

**1**. An information processing apparatus that is connected to and communicates with a terminal, the terminal being connected to at least one of a first communication network and a second communication network using a predetermined communication protocol, the first communication network being operable using the predetermined communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the predetermined communication protocol, the information processing apparatus comprising:

a first communication unit that communicates with the terminal via the first communication network based on the predetermined communication protocol; and

a second communication unit that communicates with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus,

wherein the first and the second communication units have the same IP address having an anycast relation as an IP address of the predetermined communication protocol.

**2**. The information processing apparatus according to claim **1**, further comprising:

a delivery unit that delivers content to the terminal through the communication performed by one of the first and the second communication units.

**3**. The information processing apparatus according to claim **2**, further comprising:

an identification unit that identifies which of the first communication unit and the second communication unit the terminal communicates with; and

a control unit that sets content to be delivered to a terminal communicating with the first communication unit to be

different from content to be delivered to a terminal communicating with the second communication unit according to an identification result obtained by the identification unit.

**4**. The information processing apparatus according to claim **1**, wherein the communication line between the second communication network and the information processing apparatus is a dedicated line.

**5**. The information processing apparatus according to claim **1**, wherein the predetermined communication protocol is IPv6.

**6**. A communication system comprising:

a terminal that is connected to at least one of a first communication network and a second communication network using a first communication protocol, the first communication network being operable using the first communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the first communication protocol; and

a server that is configured to communicate with the terminal,

the server including:

a first communication unit that communicates with the terminal via the first communication network based on the first communication protocol; and

a second communication unit that communicates with the terminal based on the first communication protocol via a relay unit that is arranged in a communication line between the second communication network and the server and relays communication between the second communication network and the server, and

wherein the first and the second communication units have the same IP address having an anycast relation as an IP address of the first communication protocol.

**7**. The communication system according to claim **6**, further comprising:

a delivery server that is connected to the first and the second communication networks via the server and delivers content to the terminal,

wherein the server relays communication between the terminal and the delivery server.

**8**. The communication system according to claim **7**, wherein a communication protocol used in communication between the server and the delivery server is a second communication protocol different from the first communication protocol.

**9**. The communication system according to claim **6**, wherein the first and the second communication units each include a separate control unit.

**10**. The communication system according to claim **6**, wherein the first communication protocol is IPv6.

**11**. A communication method of an information processing apparatus that is connected to and communicates with a terminal, the terminal being connected to at least one of a first communication network and a second communication network using a predetermined communication protocol, the first communication network being operable using the predetermined communication protocol, and the second communication network being a closed communication network independent from the first communication network and operable using the predetermined communication protocol, the communication method comprising:

firstly communicating with the terminal via the first communication network based on the predetermined communication protocol; and

secondly communicating with the terminal based on the predetermined communication protocol via a relay unit that is arranged in a communication line between the second communication network and the information processing apparatus and relays communication between the second communication network and the information processing apparatus,

wherein IP addresses of the predetermined communication protocol of the information processing apparatus used in the firstly communicating and the secondly communicating are the same IP address having an anycast relation.

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