CLAIMS

1. A relay communication system comprising:

a first network;

a second network;

a first relay server connected to the first network;

a second relay server connected to the second network, and configured to communicate with the first relay server via a third network;

a client terminal connected to the first relay server via the first network; and

a client terminal connected to the second relay server via the second network; wherein

each of the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server includes:

a relay group information storage unit configured to store relay group information that indicates the first relay server, the second relay server, and the client terminal connected to the first relay server, and the client terminal connected to the second relay server constitute a relay group;

a relay server information storage unit configured to store relay server information that includes activation information of the first relay server, activation information of the second relay server, activation/registration information of the client terminal connected to the first relay server, and activation/registration information of

the client terminal connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server, to share the relay group information and the relay server information;

a VLAN group information control unit configured to allow VLAN client terminals constituting a VLAN group in the relay group to share VLAN group information, at least two client terminals among the client terminal connected to the first relay server and the client terminal connected to the second relay server being the VLAN client terminals, and the VLAN group information including hub information having identification information of the first relay server and identification information of the second relay server to which the VLAN client terminal is connected, session information that indicates a connecting-side and a connected-side of a session established between the first relay server and the second relay server, and identification information that identifies the VLAN client terminal,

each of the first relay server and the second relay server further includes:

an activation command control unit configured to transmit a response signal including address information of a VLAN device that can be activated as a VLAN client terminal in a case of receiving an

activation instruction of the VLAN group; and

a VLAN session control unit configured to establish a hub session as a VLAN session between the first relay server and the second relay server based on the session information, and establish a device session as a VLAN session between the VLAN devices connected to the first relay server or the second relay server;

each of the client terminal connected to the first relay server and the client terminal connected to the second relay server further includes a virtual address control unit configured to create virtual address information that includes virtual addresses given to the VLAN devices based on the response signal, and transmit the virtual address information to the VLAN device,

if the client terminal connected to the first relay server or the client terminal connected to the second relay server is a VLAN device, the client terminal is configured to set the given virtual address into a VLAN interface of the client terminal, and communicate with other VLAN device using the virtual address information and the VLAN session.

2. The relay communication system according to claim 1, wherein each of the first relay server and the second relay server further includes a relay server communication control unit configured to control communication between the VLAN devices,

the relay server communication control unit is configured to, in a case of receiving a communication packet, analyze the received

communication packet to confirm whether or not the communication packet includes the virtual address,

if the analyzed communication packet includes the virtual address, the relay server communication control unit is configured to refer to the virtual address and transmit the communication packet via the hub session to the first relay server or the second relay server, which is connected to the VLAN device to which the virtual address is given, or refer to the virtual address and transmit the communication packet via the device session to the VLAN device to which the virtual address is given.

3. The relay communication system according to claim 1 or 2, wherein each of the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server further includes a VLAN group information update unit configured to update the VLAN group information in accordance with change of connection state of the VLAN client terminal.

4. The relay communication system according to claim 3, further comprising a third relay server configured to communicate with the first relay server and the second relay server via a third network, and constitute the relay group, wherein

each of the relay group information and the relay server information further includes information of the third relay server,

if the VLAN client terminal is connected to the third relay server,

rather than the first relay server or the second relay server indicated in the hub information in a case of receiving an activation instruction of the VLAN group, the VLAN group information update unit is configured to update the VLAN group information by adding identification information of the third relay server to the hub information of the VLAN group and by creating a session information including the third relay server.

5. The relay communication system according to any of claims 1 to 4, wherein the virtual address includes a virtual IP address and a virtual MAC address given to the VLAN device.

6. A relay server configured to serve as a second relay server connected to a second network, and communicate with a first relay server connected to a first network, the relay server comprising:

a relay group information storage unit configured to store relay group information indicating that the first relay server, the second relay server, a client terminal connected to the first relay server, and a client terminal connected to the second relay server constitute a relay group;

a relay server information storage unit configured to store relay server information including activation information of the first relay server, activation information of the second relay server, activation/registration information of the client terminal connected to the first relay server, and activation/registration information of the client terminal connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server, to share the relay group information and the relay server information;

a VLAN group information control unit configured to share VLAN group information among VLAN client terminals constituting a VLAN group in the relay group, at least two client terminals among the client terminals connected to the first relay server and the second relay server being the VLAN client terminals, and the VLAN group information including hub information having identification information of the first relay server and the second relay server to which the VLAN client terminal is connected, session information that indicates a connecting-side and a connected-side in a session established between the first relay server and the second relay server, and identification information that identifies the VLAN client terminal;

an activation command control unit configured to transmit, in a case of receiving an activation instruction of the VLAN group, a response signal including address information of a VLAN device that can be activated as a VLAN client terminal;

a virtual address control unit configured to transmit the virtual address information to the VLAN device, when receiving virtual address information that includes virtual addresses given to the VLAN devices and is created based on the response signal;

a VLAN session control unit configured to establish a hub session as

a VLAN session with the first relay server based on the session information, and establish a device session as a VLAN session with the VLAN device connected to the relay server; and

a relay server communication control unit configured to control communication among the VLAN devices using the virtual address information and the VLAN session.

7. The relay server according to claim 6, wherein in a case of receiving a communication packet, the relay server communication control unit (137) is configured to analyze the received communication packet to confirm whether or not the communication packet includes a virtual address, and

if the communication packet includes the virtual address, the relay server communication control unit is configured to refer to the virtual address and transmit the communication packet via the hub session to the first relay server connected to the VLAN device to which the virtual address is given, or refer to the virtual address and transmit the communication packet via the device session to the VLAN device to which the virtual address is given.

8. The relay server according to claim 6 or 7, further comprising a VLAN group information update unit configured to update the VLAN group information in accordance with a change of the connection state of the VLAN client terminal.

9. The relay server according to claim 6, wherein in a case of the VLAN group information update unit receives an activation instruction of the VLAN group, if the VLAN client terminal is connected to a third relay sever constituting the relay group, rather than the first relay server or the second relay server indicated by the hub information, the VLAN group information update unit is configured to update the VLAN group information by adding identification information of the third relay sever to the hub information of the VLAN group and by creating a session information including the third relay server.

10. The relay server according to any of claims 5 to 9, wherein the virtual address includes a virtual IP address and a virtual MAC address given to the VLAN device.

CLAIMS

1. A relay communication system comprising:

a first network;

a second network;

a first relay server connected to the first network;

a second relay server connected to the second network, and configured to communicate with the first relay server via a third network;

a client terminal connected to the first relay server via the first network; and

a client terminal connected to the second relay server via the second network; wherein

each of the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server includes:

a relay group information storage unit configured to store relay group information that indicates the first relay server, the second relay server, and the client terminal connected to the first relay server, and the client terminal connected to the second relay server constitute a relay group;

a relay server information storage unit configured to store relay server information that includes activation information of the first relay server, activation information of the second relay server, activation/registration information of the client terminal connected to the first relay server, and activation/registration information of the client terminal connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server, to share the relay group information and the relay server information;

a VLAN group information control unit configured to allow VLAN client terminals constituting a VLAN group in the relay group to share VLAN group information, at least two client terminals among the client terminal connected to the first relay server and the client terminal connected to the second relay server being the VLAN client terminals, and the VLAN group information including hub information having identification information of the first relay server and identification information of the second relay server to which the VLAN client terminal is connected, session information that indicates a connecting-side and a connected-side of a session established

between the first relay server and the second relay server, and identification information that identifies the VLAN client terminal,

each of the first relay server and the second relay server further includes:

an activation command control unit configured to transmit a response signal including address information of a VLAN device as a VLAN client terminal that can be activated in a case of receiving an activation instruction of the VLAN group; and

a VLAN session control unit configured to establish a hub session as a VLAN session between the first relay server and the second relay server based on the session information, and establish a device session as a VLAN session between the first relay server or the second relay server and the VLAN device connected to the first relay server or the second relay server;

each of the client terminal connected to the first relay server and the client terminal connected to the second relay server further includes a virtual address control unit configured to create virtual address information that includes virtual addresses given to the VLAN devices based on the response signal, and transmit the virtual address information to the VLAN device,

if the client terminal connected to the first relay server or the client terminal connected to the second relay server is a VLAN device, the client terminal is configured to set the given virtual address into a VLAN interface of the client terminal, and communicate with other VLAN device using the virtual address information and the VLAN session.

2. The relay communication system according to claim 1, wherein each of the first relay server and the second relay server further includes a relay server communication control unit configured to control communication between the VLAN devices,

the relay server communication control unit is configured to, in a case of receiving a communication packet, analyze the received communication packet to confirm whether or not the communication packet includes the virtual address,

if the analyzed communication packet includes the virtual address, the relay server communication control unit is configured to refer to the virtual address and transmit the communication packet via the hub session to the first relay server or the second relay server, which is connected to the VLAN device to which the virtual address is given, or refer to the virtual address and transmit the communication packet via the device session to the VLAN device to which the virtual address is given.

3. The relay communication system according to any one of claims 1 and 2, wherein each of the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server further includes a VLAN group information update unit configured to update the VLAN group information in accordance with change of connection state of the VLAN client terminal.

4. The relay communication system according to claim 3, further comprising a third relay server configured to communicate with the first relay server and the second relay server via a third network, and constitute the relay group, wherein

each of the relay group information and the relay server information further includes information of the third relay server,

in a case that the VLAN group information update unit receives an activation instruction of the VLAN group, if the VLAN client terminal is connected to the third relay server, rather than the first relay server or the second relay server indicated in the hub information, the VLAN group information update unit is configured to update the VLAN group information by adding identification information of the third relay server to the hub information of the VLAN group and by creating a session information including the third relay server.

5. The relay communication system according to any of claims 1 to 4, wherein the virtual address includes a virtual IP address and a virtual MAC address given to the VLAN device.

6. A relay server configured to serve as a second relay server connected to a second network, and communicate with a first relay server connected to a first network, the relay server comprising:

a relay group information storage unit configured to store relay group information indicating that the first relay server, the second relay server, a client terminal connected to the first relay server, and a client terminal connected to the second relay server constitute a relay group;

a relay server information storage unit configured to store relay server information including activation information of the first relay server, activation information of the second relay server, activation/registration information of the client terminal connected to the first relay server, and activation/registration information of the

client terminal connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the client terminal connected to the first relay server, and the client terminal connected to the second relay server, to share the relay group information and the relay server information;

a VLAN group information control unit configured to share VLAN group information among VLAN client terminals constituting a VLAN group in the relay group, at least two client terminals among the client terminals connected to the first relay server and the second relay server being the VLAN client terminals, and the VLAN group information including hub information having identification information of the first relay server and the second relay server to which the VLAN client terminal is connected, session information that indicates a connecting-side and a connected-side in a session established between the first relay server and the second relay server, and identification information that identifies the VLAN client terminal;

an activation command control unit configured to transmit a response signal including address information of a VLAN device as a VLAN client terminal that can be activated in a case of receiving an activation instruction of the VLAN group;

a virtual address control unit configured to transmit virtual address information to the VLAN device, when receiving the virtual address information that includes virtual addresses given to the VLAN devices and is created based on the response signal;

a VLAN session control unit configured to establish a hub session as a VLAN session with the first relay server based on the session information, and establish a device session as a VLAN session with the VLAN device connected to the second relay server; and

a relay server communication control unit configured to control communication among the VLAN devices using the virtual address information and the VLAN session.

7. The relay server according to claim 6, wherein in a case of receiving a communication packet, the relay server communication control unit (137) is configured to analyze the received communication packet to confirm whether or not the communication packet includes a virtual address, and

if the communication packet includes the virtual address, the relay server communication control unit is configured to refer to the virtual address and transmit the communication packet via the hub session to the first relay server connected to the VLAN device to which the virtual address is given, or refer to the virtual address and

transmit the communication packet via the device session to the VLAN device to which the virtual address is given.

8. The relay server according to any one of claims 6 and 7, further comprising a VLAN group information update unit configured to update the VLAN group information in accordance with a change of the connection state of the VLAN client terminal.

9. The relay server according to claim 8, wherein in a case of the VLAN group information update unit receives an activation instruction of the VLAN group, if the VLAN client terminal is connected to a third relay sever constituting the relay group, rather than the first relay server or the second relay server indicated by the hub information, the VLAN group information update unit is configured to update the VLAN group information by adding identification information of the third relay sever to the hub information of the VLAN group and by creating a session information including the third relay server.

10. The relay server according to any of claims 6 to 9, wherein the virtual address includes a virtual IP address and a virtual MAC address given to the VLAN device.