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;

one or more client terminals connected to the first relay server via the first network ;

one or more client terminals connected to the second relay server via the second network ;

each of the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server, and

activation/registration information of the one or more client terminals connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server and the one or more client terminals 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:

a VLAN session control unit configured to, if the VLAN group is not activated in a case of receiving an activation

instruction of the VLAN group, 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 a VLAN device as an activatable VLAN client terminal and the first relay server or the second relay server to which the VLAN device is connected; and

an activation command control unit configured to, if the VLAN group is activated in a case of receiving an activation instruction of the VLAN group, transmit a join-in-progress signal for allowing a join-in-progress to a VLAN group to a join-in-progress VLAN client terminal as a transmission source of the activation instruction; wherein

each of the one or more client terminals connected to the first relay server and the one or more client terminals connected to the second relay server further includes a virtual address control unit configured to, if the client terminal is the join-in-progress VLAN client terminal and receives the join-in-progress signal, update the virtual address information by adding virtual address for a client terminal created based on the virtual address information including virtual address assigned to the VLAN device constituting the VLAN group in active state, and transmit the updated virtual address information to the VLAN device,

the VLAN session control unit is configured to establish a VLAN session that is related to the join-in-progress VLAN client terminal and has not been established yet, and

the join-in-progress VLAN client terminal and the VLAN device are configured to communicate with each other, using the updated virtual address information and the established VLAN session including the hub session and the device session.

2. The relay communication system according to claim 1, wherein the activation command control unit is configured to determine whether or not the virtual address is assigned to the VLAN device of the VLAN group in active state, and transmit the join-in-progress signal to the join-in-progress VLAN client terminal if the virtual address is assigned.

3. The relay communication system according to claim 1 or claim 2, wherein the virtual address control unit is configured to determine whether or not virtual address can be created referring to the virtual address information, and finish a process of join-in progress to the VLAN group if it is determined that the virtual address can not be created.

4. The relay communication system according to any of claims 1 through 3, wherein the virtual address includes a virtual IP address and a virtual MAC address.

5. 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 that indicates that the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server, and activation/registration information of the one or more client terminals connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server and the one or more client terminals 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 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;

a VLAN session control unit configured to, if the VLAN group is not in active state in a case of receiving activation instruction of the VLAN group, establish a hub session as aVLAN session with the first relay server based on the session information, and establish a device session as a VLAN session with a VLAN device as an activatable VLAN client terminal among the VLAN client terminals connected to the relay server;

an activation command control unit configured to, if the VLAN group is in active state in a case of receiving activation instruction related to the VLAN group, transmit join-in progress signal for permitting join-in-progress to the VLAN group to a join-in-progress VLAN client terminal as a transmission source of the activation instruction; and

a relay server communication control unit configured to control communication of the VLAN group; wherein

the VLAN session control unit is configured to, in response to the join-in-progress signal, if receiving the virtual address information updated by adding a virtual address of the join-in-progress VLAN client terminal to a virtual address assigned to the VLAN device constituting the activated VLAN group, establish a VLAN session that is related to the join-in-progress VLAN client terminal and has not been established yet,

the relay server communication control unit is configured to control

communication between the join-in-progress VLAN client terminal and the VLAN device, the communication being performed using the updated virtual address information and the established VLAN session including the hub session and the device session.

6. The relay server according to claim 5, wherein the activation command control unit is configured to determine whether or not virtual address has been assigned to the VLAN device of the VLAN group, and transmit the join-in-progress signal to the join-in-progress VLAN client terminal if the virtual address is assigned.

7. The relay server according to claim 5 or 6, wherein the virtual address includes a virtual IP address and a virtual MAC address.

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;

one or more client terminals connected to the first relay server via the first network ;

one or more client terminals connected to the second relay server via the second network ;

each of the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server, and activation/registration information of the one or more client terminals connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server and the one or more client terminals 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:

a VLAN session control unit configured to, if the VLAN group is not activated in a case of receiving an activation instruction of the VLAN group, 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 a VLAN device as an activatable VLAN client terminal and the first relay server or the second relay server to which the VLAN device is connected; and

an activation command control unit configured to, if the VLAN group is activated in a case of receiving an activation instruction of the VLAN group, transmit a join-in-progress signal for allowing a join in-progress with a VLAN group to a join-in-progress VLAN client terminal as a transmission source of the activation instruction; wherein

each of the one or more client terminals connected to the first relay server and the one or more client terminals connected to the second relay server further includes a virtual address control unit configured to, if the client terminal is the join-in-progress VLAN client terminal and receives the join-in-progress signal, update the virtual address information by adding virtual address for a client terminal created based on the virtual address information including virtual address assigned to the VLAN device constituting the VLAN group in active state, and transmit the updated virtual address information to the VLAN device,

the VLAN session control unit is configured to establish a VLAN session that is related to the join-in-progress VLAN client terminal and has not been established yet, and

the join-in-progress VLAN client terminal and the VLAN device are configured to communicate with each other, using the updated virtual address information and the established VLAN session including the hub session and the device session.

2. The relay communication system according to claim 1, wherein the activation command control unit is configured to determine whether or not the virtual address is assigned to the VLAN device of the VLAN group in active state, and transmit the join-in-progress signal to the join-in-progress VLAN client terminal if the virtual address is assigned.

3. The relay communication system according to any one of claims 1 and claim 2, wherein the virtual address control unit is configured to determine whether or not virtual address for a client terminal can be created referring to the virtual address information, and finish a process of join-in progress to the VLAN group if it is determined that the virtual address can not be created.

4. The relay communication system according to any of claims 1 through 3, wherein the virtual address includes a virtual IP address and a virtual MAC address.

5. 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 that indicates that the first relay server, the second relay server, one or more client terminals connected to the first relay server, and one or more client terminals 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 one or more client terminals connected to the first relay server, and activation/registration information of the one or more client terminals connected to the second relay server;

an information sharing unit configured to allow the first relay server, the second relay server, the one or more client terminals connected to the first relay server, and the one or more client terminals 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 one or more client terminals connected to the first relay server and the one or more client terminals 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 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;

a VLAN session control unit configured to, if the VLAN group is not in active state in a case of receiving activation instruction of the VLAN group, establish a hub

session as aVLAN session with the first relay server based on the session information, and establish a device session as a VLAN session with a VLAN device as an activatable VLAN client terminal among the VLAN client terminals connected to the second relay server;

an activation command control unit configured to, if the VLAN group is in active state in a case of receiving activation instruction of the VLAN group, transmit join-in progress signal for permitting join in-progress with the VLAN group to a join-in-progress VLAN client terminal as a transmission source of the activation instruction; and

a relay server communication control unit configured to control communication of the VLAN group; wherein

the VLAN session control unit is configured to, in response to the join-in-progress signal, if receiving the virtual address information updated by adding a virtual address of the join-in-progress VLAN client terminal to a virtual address assigned to the VLAN device constituting the activated VLAN group, establish a VLAN session that is related to the join-in-progress VLAN client terminal and has not been established yet,

the relay server communication control unit is configured to control communication between the join-in-progress VLAN client terminal and the VLAN device, the communication being performed using the updated virtual address information and the established VLAN session including the hub session and the device session.

6. The relay server according to claim 5, wherein the activation command control unit is configured to determine whether or not virtual address has been assigned to the VLAN device of the activated VLAN group, and transmit the join-in-progress signal to the join-in-progress VLAN client terminal if the virtual address is assigned.

7. The relay server according to any one of claims 5 and 6, wherein the virtual address includes a virtual IP address and a virtual MAC address.