CLAIMS

1. A method for establishing a communication connection in a relay communication system, the relay communication system comprising a control node and a plurality of relay nodes, the method comprising:

receiving, with a first relay node, a connection request message transmitted by a first terminal, the connection request message carrying a first user identifier logging in to the first terminal and a second user identifier logging in to a second terminal;

determining, with the first relay node, a second relay node corresponding to the second user identifier according to a correspondence between a user identifier and a relay node, the second relay node being a relay node communicatively connected to the second terminal;

transmitting, with the first relay node, the connection request message to the second relay node through a relay path to the second relay node, so that the second relay node transmits the connection request message to the second terminal; and

upon reception of a connection confirmation message returned by the second terminal, transmitting, with the first relay node, the connection confirmation message to the first terminal, so that the first terminal establishes a communication connection with the second terminal based on the connection confirmation message, the communication connection is established via a relay path between the first relay node and the second relay node; and

establishing, with the first relay node, a correspondence between the first user identifier and the first relay node, so that the first terminal keeps using the communication connection to communicate with the second terminal regardless of change of address information of the first terminal.

2. The method according to claim 1, wherein the transmitting the connection request message to the second relay node through a relay path to the second relay node comprises:

selecting a target relay node from a plurality of next-hop relay nodes of the first relay node; and

transmitting the connection request message to the target relay node, so that the target relay node transmits the connection request message to the second relay node through a relay path to the second relay node.

3. The method according to claim 2, wherein the selecting a target relay node from a plurality of next-hop relay nodes of the first relay node comprises at least one of the following operations:

selecting a target relay node meeting a speed condition from the plurality of next-hop relay nodes of the first relay node, the speed condition being that a data transmission speed between the first relay node and the target relay node is greater than a data transmission speed between the first relay node and another next-hop relay node; and

selecting a target relay node meeting a load condition from the plurality of next-hop relay nodes of the first relay node, the load condition being that a load amount of the target relay node is less than a load amount of another next-hop relay node.

4. The method according to claim 1, wherein the first relay node is a node in a blockchain system, and the method further comprises:

generating a communication connection record after the first terminal and the second terminal establish the communication connection, and storing the communication connection record in the blockchain system, the communication connection record comprising the first user identifier and the second user identifier.

5. The method according to claim 1, wherein before the receiving a connection request message transmitted by a first terminal, the method further comprises:

receiving a first login request transmitted by the first terminal, the first login request carrying the first user identifier;

controlling the first terminal to perform login based on the first user identifier; and

establishing a correspondence between the first user identifier and the first relay node.

6. The method according to claim 2, wherein the connection request message carries a token identifier, and after the selecting a target relay node from a plurality of next-hop relay nodes of the first relay node, the method further comprises:

correspondingly storing the token identifier and identification information of the target relay node.

7. The method according to claim 6, wherein after the transmitting, upon reception of a connection confirmation message returned by the second terminal, the connection confirmation message to the first terminal, the method further comprises:

receiving a communication request message transmitted by the first terminal, the communication request message carrying the token identifier and communication data;

obtaining the identification information of the target relay node that is stored corresponding to the token identifier; and

transmitting the communication request message to the target relay node based on the identification information, so that the target relay node transmits the communication request message to the second relay node through the relay path to the second relay node, and the second relay node transmits the communication request message to the second terminal.

8. A method for establishing a communication connection in a relay communication system, the relay communication system comprising a control node and a plurality of relay nodes, the method comprising:

receiving, with the control node, a path request transmitted by a first relay node, the path request being transmitted by the first relay node upon reception of a connection request message transmitted by a first terminal, the connection request message carrying a first user identifier for logging in to the first terminal and a second user identifier for logging in to a second terminal, and the path request carrying identification information of the first relay node and the second user identifier;

determining, with the control node, a second relay node corresponding to the second user identifier according to a correspondence between a user identifier and a relay node, the second relay node being a relay node connected to the second terminal; and

transmitting, with the control node, information about a relay path between the first relay node and the second relay node to the first relay node based on the identification information, so that the first relay node transmits the connection request message to the second relay node according to the information about the relay path, and the second relay node transmits the connection request message to the second terminal, and the first relay node transmits a connection confirmation message returned by the second terminal to the first terminal, so that the first terminal establishes a communication connection with the second terminal based on the connection confirmation message, the communication connection is established via the relay path between the first relay node and the second relay node, where a correspondence between the first user identifier and the first relay node is established by the first relay node, so that the first terminal keeps using the communication connection to communicate with the second terminal regardless of change of address information of the first terminal.

9. The method according to claim 8, wherein before the transmitting information about a relay path between the first relay node and the second relay node to the first relay node, the method

further comprises:

selecting a target relay node from a plurality of next-hop relay nodes of the first relay node; and

using identification information of the target relay node as the information about the relay path.

10. The method according to claim 9, wherein the selecting a target relay node from a plurality of next-hop relay nodes of the first relay node comprises at least one of the following operations:

selecting a target relay node meeting a speed condition from the plurality of next-hop relay nodes of the first relay node, the speed condition being that a data transmission speed between the first relay node and the target relay node is greater than a data transmission speed between the first relay node and another next-hop relay node; and

selecting a target relay node meeting a load condition from the plurality of next-hop relay nodes of the first relay node, the load condition being that a load amount of the target relay node is less than a load amount of another next-hop relay node.

11. The method according to claim 9, wherein after the transmitting information about a relay path between the first relay node and the second relay node to the first relay node, the method further comprises:

receiving a path request transmitted by a third relay node, the path request being transmitted by the third relay node upon reception of the connection request message, the path request carrying identification information of the third relay node and the second user identifier, and the third relay node being different from the first relay node;

determining the second relay node corresponding to the second user identifier according to the correspondence;

selecting a target relay node from a plurality of next-hop relay nodes of the third relay node;

using identification information of the target relay node as information about the relay path; and

transmitting, based on the identification information of the third relay node, the information about the relay path to the third relay node, so that the third relay node transmits the connection request message to the target relay node according to the information about the relay path, the target relay node transmits the connection request message to the second relay node, and the second relay node transmits the connection request message to the second terminal.

12. The method according to claim 8, wherein before the receiving a path request transmitted by a first relay node, the method further comprises:

receiving a second login request transmitted by the first terminal, the second login request carrying a network identifier of the first terminal;

obtaining a relay node list corresponding to the network identifier, the relay node list comprising identification information of at least one relay node, and the at least one relay node being connected to a network corresponding to the network identifier; and

transmitting the relay node list to the first terminal, so that the first terminal selects the identification information of the first relay node from the relay node list, and transmits a first login request to the first relay node based on the identification information, the first login request carrying the first user identifier.

13. The method according to claim 12, wherein after the transmitting the relay node list to the first terminal, the method further comprises:

receiving a registration request transmitted by the first relay node, the registration request carrying the first user identifier, the identification information of the first relay node, and address information of the first terminal; and

correspondingly storing the first user identifier, the identification information of the first relay node, and the address information of the first terminal.

14. The method according to claim 13, wherein after the correspondingly storing the first user identifier, the identification information of the first relay node, and the address information of the first terminal, the method further comprises:

deleting the first user identifier, the identification information of the first relay node, and the address information of the first terminal in a case that an interruption duration of a connection relationship between the first terminal and the first relay node exceeds a target duration.

15. The method according to claim 13, wherein the control node is a node in a blockchain system, and the method further comprises:

storing the first user identifier, the identification information of the first relay node, and the address information of the first terminal in the blockchain system.

16. A method for establishing a communication connection in a relay communication system, the relay communication system comprising a control node and a plurality of relay nodes, the method comprising:

receiving, with a third relay node, a connection request message transmitted by a previous-hop relay node, the connection request message being transmitted by a first terminal to a first relay node and then being forwarded by the first relay node, and the connection request message carrying a first user identifier for logging in to the first terminal and a second user identifier for logging in to a second terminal;

determining, with the third relay node, a second relay node corresponding to the second user identifier according to a correspondence between a user identifier and a relay node, the second relay node being a relay node connected to the second terminal;

selecting, with the third relay node, a target relay node from a plurality of next-hop relay nodes of the third relay node;

transmitting, with the third relay node, the connection request message to the target relay node, so that the target relay node transmits the connection request message to the second relay node through a relay path to the second relay node, and the second relay node transmits the connection request message to the second terminal; and

upon reception of a connection confirmation message returned by the second terminal, transmitting, with the third relay node, the connection confirmation message to the previous-hop relay node, so that the previous-hop relay node transmits the connection confirmation message to the first terminal, and the first terminal establishes a communication connection with the second terminal based on the connection confirmation message, the communication connection is established via a relay path between the first relay node and the second relay node, where a correspondence between the first user identifier and the first relay node is established by the first relay node, so that the first terminal keeps using the communication connection to communicate with the second terminal regardless of change of address information of the first terminal.

17. The method according to claim 16, wherein the connection request message carries a token identifier, and after the selecting a target relay node from a plurality of next-hop relay nodes of the third relay node, the method further comprises:

correspondingly storing the token identifier and identification information of the target relay node.

18. The method according to claim 17, wherein after the transmitting, upon reception of a connection confirmation message returned by the second terminal, the connection confirmation message to the previous-hop relay node, the method further comprises:

receiving a communication request message transmitted by the previous-hop relay node, the

communication request message being transmitted by the previous-hop relay node upon reception of a communication request message transmitted by the first terminal, and the communication request message carrying the token identifier and communication data;

obtaining the identification information of the target relay node that is stored corresponding to the token identifier; and

transmitting the communication request message to the target relay node based on the identification information, so that the target relay node transmits the communication request message to the second relay node through the relay path to the second relay node, and the second relay node transmits the communication request message to the second terminal.

19. A computer device, comprising: a processor and a memory, the memory storing at least one instruction, the instruction being loaded and executed by the processor to implement operations performed in the method for establishing a communication connection according to any one of claims 1 to 7, or to implement operations performed in the method for establishing a communication connection according to any one of claims 8 to 15, or to implement operations performed in the method for establishing a communication connection according to any one of claims 16 to 18.

20. A computer-readable storage medium, storing at least one instruction, the instruction being loaded and executed by a processor to implement operations performed in the method for establishing a communication connection according to any one of claims 1 to 7, or to implement operations performed in the method for establishing a communication connection according to any one of claims 8 to 15, or to implement operations performed in the method for establishing a communication connection according to any one of claims 16 to 18.