CLAIMS

What is claimed is:

1. A message sending method, wherein the method is applied to a control plane (CP) device in a communication system in which a CP and a user plane (UP) are separated, the communication system further comprises a UP device, and the method comprises:

generating, by the CP device, a first message, wherein the first message comprises route information and a control indication for the route information, and the route information is associated with the UP device; and

sending, by the CP device, the first message to the UP device, so that the UP device updates the route information based on the control indication, wherein

the first message is a packet forwarding control protocol (PFCP) message.

2. The method according to claim 1, wherein the first message is a node-level message or a session-level message.

3. The method according to claim 2, wherein the route information is a grouped information element in the node-level message or the session-level message.

4. The method according to any one of claims 1 to 3, wherein the control indication comprises at least one of an install indication or a remove indication, the install indication is used to indicate to install the route information, and the remove indication is used to indicate to remove the route information.

5. The method according to claim 4, wherein the route information comprises a destination address and a next-hop address.

6. The method according to claim 5, wherein the route information further comprises at least one of the following: an outbound interface index, a route flag, a route tag, a route cost, or a network instance, wherein

the outbound interface index is used to indicate path information associated with the route information;

the route flag is used to indicate a type of the route information, and the type of the route information comprises at least one of the following: a network segment route, a gateway route, a host route, or a frame route;

the route tag is used to indicate an identifier of the route information, and the route tag

corresponds to a route tag in a border gateway protocol;

the route cost is used to indicate a cost of a route associated with the route information; and

the network instance is used to identify a virtual private network, and the network instance corresponds to a network instance in a PFCP protocol.

7. The method according to claim 6, wherein at least one of the outbound interface index, the route flag, the route tag, or the network instance is an embedded information element in the route information.

8. The method according to any one of claims 1 to 7, wherein the route information comprises indication information, and the indication information is used to indicate the UP device to advertise the route information.

~~9. The method according to any one of claims 1 to 8, wherein the first message further comprises first type information, and the first type information indicates that the first message comprises the control indication.~~

~~10~~9. The method according to any one of claims 1 to ~~9~~8, wherein the route information comprises first route information and second route information.

~~11~~10. The method according to claim ~~10~~9, wherein the control indication comprises a first control indication for the first route information and a second control indication for the second route information, the first control indication is used to indicate to install or remove the first route information, and the second control indication is used to indicate to install or remove the second route information.

~~12~~11. The method according to any one of claims 1 to ~~11~~10, further comprising:

receiving, by the CP device, a second message from the UP device, wherein the second message comprises a response of the UP device to the first message.

~~13. The method according to claim 12, wherein the second message is a node-level message or a session-level message.~~

~~14~~12. The method according to claim ~~12~~11, wherein the second message further comprises identification information of the UP device.

~~15. The method according to claim 12, wherein the second message further comprises second type information, and the second type information indicates that the second message comprises the response.~~

~~16. The method according to claim 2 or 13, wherein the session-level message comprises one~~

~~of a session establishment request message, a session deletion request message, or a session modification request message.~~

~~17~~13. A message receiving method, wherein the method is applied to a user plane (UP) device in a communication system in which a UP and a control plane (CP) are separated, the communication system further comprises a CP device, and the method comprises:

receiving, by the UP device, a first message from the CP device, wherein the first message comprises route information and a control indication for the route information, and the route information is associated with the UP device; and

updating, by the UP device, the route information based on the control indication, wherein the first message is a packet forwarding control protocol (PFCP) message.

~~18~~14. The method according to claim ~~17~~13, wherein the first message comprises first type information, the first type information indicates that the first message comprises the control indication, and the receiving a first message from the CP device comprises:

obtaining, by the UP device, the control indication from the first message based on the first type information.

~~19~~15. The method according to claim ~~17~~ 13 or ~~18~~14, wherein updating the route information comprises at least one of the following:

installing, by the UP device, the route information based on the control indication; or

removing, by the UP device, the route information based on the control indication.

~~20~~16. The method according to any one of claims ~~17~~ 13 to ~~19~~15, wherein the route information comprises indication information, the indication information indicates the UP device to advertise the route information, and the method further comprises:

advertising, by the UP device, the route information based on the indication information.

17. A network device, wherein the network device is configured to implement the method according to any one of claims 1 to 12.

18. A network device, wherein the network device is configured to implement the method according to any one of claims 13 to 16.

19. A message sending method, wherein the method is applied to a communication system in which a control plane (CP) and a user plane (UP) are separated, the communication system comprises a CP device and a UP device, and the method comprises:

generating, by the CP device, a first message, wherein the first message comprises route

information and a control indication for the route information, and the route information is associated with the UP device; and

sending, by the CP device, the first message to the UP device;

updating, by the UP device, the route information based on the control indication, wherein the first message is a packet forwarding control protocol (PFCP) message.

~~21. The method according to any one of claims 17 to 20, further comprising:~~

~~generating, by the UP device, a second message, wherein the second message comprises a response to the first message; and~~

~~sending, by the UP device, the second message to the CP device.~~

~~22. The method according to claim 21, wherein the second message further comprises second type information, and the second type information indicates that the second message comprises the response.~~

~~23. A message sending apparatus, wherein the apparatus is applied to a control plane CP device in a communication system in which a CP and a user plane UP are separated, the communication system further comprises a UP device, and the apparatus comprises:~~

~~a first message generation unit, configured to generate a first message, wherein the first message comprises route information and a control indication for the route information, and the route information is associated with the UP device; and~~

~~a first message sending unit, configured to send the first message to the UP device, so that the UP device updates the route information based on the control indication, wherein~~

~~the first message is a packet forwarding control protocol PFCP message.~~

~~24. The apparatus according to claim 23, wherein the first message is a node level message or a session level message.~~

~~25. The apparatus according to claim 24, wherein the route information is a grouped information element in the node level message or the session level message.~~

~~26. The apparatus according to any one of claims 23 to 25, wherein the control indication comprises at least one of an install indication or a remove indication, the install indication is used to indicate to install the route information, and the remove indication is used to indicate to remove the route information.~~

~~27. The apparatus according to claim 23, wherein the route information comprises a destination address and a next hop address.~~

28. The apparatus according to claim 27, wherein the route information further comprises at least one of the following: an outbound interface index, a route flag, a route tag, a route cost, or a network instance, wherein

the outbound interface index is used to indicate path information associated with the route information;

the route flag is used to indicate a type of the route information, and the type of the route information comprises at least one of the following: a network segment route, a gateway route, a host route, or a frame route;

the route tag is used to indicate an identifier of the route information, and corresponds to a route tag in a border gateway protocol;

the route cost is used to indicate a cost of a route associated with the route information; and

the network instance is used to identify a virtual private network, and corresponds to a network instance in the PFCP protocol.

29. The apparatus according to claim 28, wherein at least one of the outbound interface index, the route flag, the route tag, or the network instance is an embedded information element in the route information.

30. The apparatus according to any one of claims 23 to 29, wherein the route information comprises indication information, and the indication information is used to indicate the UP device to advertise the route information.

31. The apparatus according to any one of claims 23 to 30, wherein the first message further comprises first type information, and the first type information indicates that the first message comprises the control indication.

32. The apparatus according to any one of claims 23 to 31, wherein the route information comprises first route information and second route information.

33. The apparatus according to claim 32, wherein the control indication comprises a first control indication for the first route information and a second control indication for the second route information, the first control indication is used to indicate to install or remove the first route information, and the second control indication is used to indicate to install or remove the second route information.

34. The apparatus according to any one of claims 23 to 33, further comprising:

a second message receiving unit, configured to receive a second message from the UP device,

wherein the second message comprises a response of the UP device to the first message.

35. The apparatus according to claim 34, wherein the second message is a node-level message or a session-level message.

36. The apparatus according to claim 34, wherein the second message further comprises identification information of the UP device.

37. The apparatus according to claim 34, wherein the second message further comprises second type information, and the second type information indicates that the second message comprises the response.

38. The apparatus according to claim 25 or 35, wherein the session-level message comprises one of a session establishment request message, a session deletion request message, or a session modification request message.

39. A message receiving apparatus, wherein the apparatus is applied to a user plane UP device in a communication system in which a control plane CP and a UP are separated, the communication system further comprises a CP device, and the apparatus comprises:

a first message receiving unit, configured to receive a first message from the CP device, wherein the first message comprises route information and a control indication for the route information, and the route information is associated with the UP device; and

an updating unit, configured to update the route information based on the control indication, wherein

the first message is a packet forwarding control protocol PFCP message.

40. The apparatus according to claim 39, wherein the first message comprises first type information, the first type information indicates that the first message comprises the control indication, and the first message receiving unit comprises:

an obtaining unit, configured to obtain the control indication from the first message based on the first type information.

41. The apparatus according to claim 39 or 40, wherein the updating unit comprises:

an installation unit, configured to install the route information based on the control indication; and

a removing unit, configured to remove the route information based on the control indication.

42. The apparatus according to any one of claims 39 to 41, wherein the route information comprises indication information, the indication information indicates the UP device to advertise

~~the route information, and the apparatus further comprises:~~

~~an advertising unit, configured to advertise the route information based on the indication information.~~

~~43. The apparatus according to any one of claims 39 to 42, further comprising:~~

~~a second message generation unit, configured to generate a second message, wherein the second message comprises a response to the first message; and~~

~~a second message sending unit, configured to send the second message to the CP device.~~

~~44. The apparatus according to claim 43, wherein the second message further comprises second type information, and the second type information indicates that the second message comprises the response.~~

~~45~~20. A communication system in which a control plane (CP) and a user plane (UP) are separated, comprising:

a CP device, wherein the CP device is configured to implement the method according to any one of claims 1 to 12~~comprises the apparatus according to any one of claims 23 to 38~~; and

a UP device, wherein the UP device is configured to implement the method according to any one of claims 12 to 16~~comprises the apparatus according to any one of claims 39 to 44~~.

~~46. A computer-readable storage medium, comprising machine-executable instructions, wherein when the machine-executable instructions are executed by a device, the device is enabled to perform the method according to any one of claims 1 to 22.~~