SERVICE CHAIN FAULT DETECTION METHOD AND APPARATUS

[0001] This application claims priority to Chinese Patent Application No. CN201410224672.0, filed with the Chinese Patent Office on May 26, 2014 and entitled "SERVICE CHAIN FAULT DETECTION METHOD AND APPARATUS", ~~which is incorporated herein by reference in its entirety~~.

TECHNICAL FIELD

[0002] The present invention relates to communications technologies, and in particular, to a service chain fault detection method, a service forwarding apparatus, a device for initiating fault detection, and a service function apparatus.

BACKGROUND

[0003] In addition to providing basic forwarding functions such as switching and routing, a general network device may further provide a value-added service (English full name: Value-Added Service, English abbreviation: VAS). For example, the VAS may be a service such as network address translation (English full name: Network Address Translation, English abbreviation: NAT) or a firewall.

[0004] In a network that provides a value-added service, a service chain (English name: service chain) includes a service classifier (English name: service classifier) and N service forwarding entities (English full name: service forwarding entity, English abbreviation: SFE). The SFEs included in the service chain are successively connected. The SFE may be connected to one or more service function (English full name: service function, English abbreviation: SF) nodes. According to a service to which a received packet belongs, the service classifier adds an identifier of the service chain to the packet, to obtain a service packet. The service classifier sends the service packet to an SFE connected to the service classifier. The SFE sends the received service packet to an SF node that is connected to the SFE and that belongs to the service chain, and the SF node performs service processing on the service packet.

[0005] To implement normal forwarding of the service packet, a detection device in the network may detect whether the SFE, the SF node, and the service classifier can forward the service packet. When the SFE can forward the service packet to the SF node that is connected to the SFE and that belongs to the service chain, the detection device cannot detect whether an order in which the SFE forwards the service packet to an SF node belonging to the service chain is correct, that is, the detection device cannot learn an SF node that the service packet passes through when being forwarded on the service chain.

EP 2 595 344 A2 discloses a method and an apparatus for detecting connectivity in a multi-protocol label switching ring network. The network comprises a plurality of nodes arranged in a ring structure. The detection of connectivity is based on the use of request packets comprising a ring identifier and node identifiers.

SUMMARY

[0006] In view of the foregoing, embodiments of the present invention provide a service chain fault detection method, a service forwarding apparatus, a device for initiating fault detection, and a service function apparatus, which are helpful to learn an SF node that a service packet passes through when being forwarded on a service chain. The present invention is defined in the attached claims.

[0007] The technical solutions provided in the embodiments of the present invention are as follows:

[0008] According to a first aspect, a service chain fault detection method is provided, including:

obtaining, by an SFE, a first fault tracing detection request packet, and then determining to communicate with a first SF node, where the first fault tracing detection request packet includes a path ID and an address of a device for initiating fault detection, and the path ID is used to identify a path of a service chain;

obtaining, by the SFE, an ID of the first SF node; and

sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, where the first fault tracing detection response packet includes the path ID, the ID of the first SF node, and the address of the device for initiating fault detection.

[0009] In a first possible implementation manner of the foregoing first aspect, the determining, by an SFE, to communicate with a first SF node on the service chain includes:

determining, by the SFE according to the path ID, to forward the first fault tracing detection request packet according to a first forwarding entry, where the first

disc.

[0309] Persons of ordinary skill in the art may understand that all or some of the steps of the foregoing method embodiments may be implemented by a program instructing relevant hardware. The foregoing program may be stored in a computer readable storage medium. When the program runs, the steps of the method embodiments are performed. The foregoing storage medium may be at least one of the following mediums: any medium that can store program code, such as a ROM, a RAM, a magnetic disk, or an optical disc.

[0310] Finally, it should be noted that the foregoing embodiments are merely intended for exemplarily describing the technical solutions of the present invention, but not for limiting the present invention. ~~Although the present invention and benefits of the present invention are described in detail with reference to the foregoing embodiments, persons of an ordinary skill in the art should understand that they may still make modifications to the technical solutions described in the foregoing embodiments or make equivalent replacements to some technical features thereof, without departing from the scope of the claims of the present invention.~~

~~**[0311]** Further embodiments of the present invention are provided in the following. It should be noted that the numbering used in the following section does not necessarily need to comply with the numbering used in the previous sections.~~

~~**[0312]** Embodiment 1, a service chain fault detection method, where the method includes:~~

~~obtaining, by a service forwarding entity SFE, a first fault tracing detection request packet, and then determining to communicate with a first service function SF node, where the first fault tracing detection request packet includes a path identifier ID and an address of a device for initiating fault detection, and the path ID is used to identify a path of a service chain;~~

~~obtaining, by the SFE, an ID of the first SF node; and~~

~~sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, where the first fault tracing detection response packet includes the path ID, the ID of the first SF node, and the address of the device for initiating fault detection.~~

~~**[0313]** Embodiment 2, the method according to embodiment 1, where the determining, by an SFE, to communicate with a first SF node on the service chain includes:~~

determining, by the SFE according to the path ID, to forward the first fault tracing detection request packet according to a first forwarding entry, where the first forwarding entry includes the path ID and an address of the first SF node;

sending, by the SFE, the first fault tracing detection request packet to the first SF node according to the address of the first SF node; and

receiving, by the SFE, a second fault tracing detection request packet from the first SF node, where the second fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection.

[0314] Embodiment 3, the method according to embodiment 2, where the first fault tracing detection request packet further includes a first parameter, the first parameter is used to identify the first SF node or is used to identify a previous hop SF node of the first SF node on the service chain, and the first forwarding entry further includes the first parameter; and

the determining, by the SFE according to the path ID, to forward the first fault tracing detection request packet according to a first forwarding entry includes: determining, by the SFE according to the first parameter and the path ID, to forward the first fault tracing detection request packet according to the first forwarding entry.

[0315] Embodiment 4, the method according to embodiment 3, where the first fault tracing detection request packet further includes a time to live TTL field;

after the receiving, by the SFE, a second fault tracing detection request packet from the first SF node, the method further includes: obtaining, by the SFE, a TTL parameter, where the TTL parameter is data obtained after a value of the TTL field in the first fault tracing detection request packet is updated; and

the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection further includes: when the TTL parameter is equal to a preset value, sending, by the SFE, the first fault tracing detection response packet to the device for initiating fault detection.

[0316] Embodiment 5, the method according to embodiment 4, where the method further includes:

when the TTL parameter is not equal to the preset value, obtaining, by the SFE, a third fault tracing detection request packet, where the third fault tracing detection request packet includes a second parameter, the path ID, the TTL field, and the address of the device for initiating fault detection, and the second parameter is used to identify a next hop SF node of an SF node, on the service chain, identified by using

the first parameter;

determining, by the SFE according to the second parameter and the path ID, to forward the third fault tracing detection request packet according to a second forwarding entry, where the second forwarding entry includes the path ID, the second parameter, and an address of a first device, the first device is a next hop SFE of the SFE on the service chain or a second SF node, and the second SF node is a next hop SF node of the first SF node on the service chain; and

sending, by the SFE, the third fault tracing detection request packet to the first device according to the address of the first device.

[0317] Embodiment 6, the method according to embodiment 3, where before the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, the method further includes:

sending, by the SFE, a second fault tracing detection response packet to the device for initiating fault detection, where the second fault tracing detection response packet includes the path ID, an ID of the SFE, and the address of the device for initiating fault detection.

[0318] Embodiment 7, the method according to embodiment 3 or 6, where after the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, the method further includes:

obtaining, by the SFE, a fourth fault tracing detection request packet, where the fourth fault tracing detection request packet includes a second parameter, the path ID, and the address of the device for initiating fault detection, and the second parameter is used to identify a next hop SF node of an SF node, on the service chain, identified by using the first parameter;

determining, by the SFE according to the second parameter and the path ID, to forward the fourth fault tracing detection request packet according to a second forwarding entry, where the second forwarding entry includes the path ID, the second parameter, and an address of a first device, the first device is a next hop SFE of the SFE on the service chain or a second SF node, and the second SF node is a next hop SF node of the first SF node on the service chain; and

sending, by the SFE, the fourth fault tracing detection request packet to the first device according to the address of the first device.

[0319] Embodiment 8, the method according to embodiment 7, where the first device is the second SF node, and the method further includes:

receiving, by the SFE, a fifth fault tracing detection request packet from the second SF node, where the fifth fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection;

obtaining, by the SFE, an ID of the second SF node according to the fifth fault tracing detection request packet; and

sending, by the SFE, a third fault tracing detection response packet to the device for initiating fault detection, where the third fault tracing detection response packet includes the path ID, the ID of the second SF node, and the address of the device for initiating fault detection.

[0320] Embodiment 9, the method according to any one of embodiment 2, embodiment 3, or embodiments 6 to 8, where the method further includes:

adding, by the SFE, at least one of the first parameter or the ID of the SFE to the first fault tracing detection response packet.

[0321] Embodiment 10, the method according to any one of embodiment 2, embodiment 3, or embodiments 6 to 8, where the first fault tracing detection request packet further includes a node list, and the node list includes an ID of the previous hop SF node of the first SF node on the service chain; and

before the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, the method further includes:

obtaining, by the SFE, an updated node list, where the updated node list is a list generated after the ID of the first SF node is added to the node list, and an order of all SF nodes included in the updated node list is the same as an order of all the SF nodes on the service chain; and

adding, by the SFE, the updated node list to the first fault tracing detection response packet.

[0322] Embodiment 11, the method according to any one of embodiment 2, embodiment 3, or embodiments 6 to 10, where the first fault tracing detection request packet further includes an ID of an SF node used as an end point; and

after the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection, the method further includes:

ending, by the SFE, detection on the service chain when the ID of the first SF node is the same as the ID of the SF node used as the end point.

[0323] Embodiment 12, the method according to any one of embodiments 1 to 11, where the obtaining, by an SFE, a first fault tracing detection request packet includes:

receiving, by the SFE, the first fault tracing detection request packet sent by the device for initiating fault detection; or

receiving, by the SFE, the first fault tracing detection request packet sent by a previous hop SFE of the SFE on the service chain; or

generating, by the SFE, the first fault tracing detection request packet.

[0324] Embodiment 13, the method according to any one of embodiments 1 to 12, where

the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection includes:

obtaining, by the SFE, a path ID of a reverse service chain of the service chain by using the path ID, where the reverse service chain and the service chain are opposite in direction; and

sending, by the SFE according to a forwarding entry corresponding to the path ID of the reverse service chain, the first fault tracing detection response packet to the device for initiating fault detection, where the forwarding entry corresponding to the path ID of the reverse service chain includes the path ID of the reverse service chain and the address of the device for initiating fault detection; or

the sending, by the SFE, a first fault tracing detection response packet to the device for initiating fault detection includes:

adding, by the SFE, the first fault tracing detection response packet to a unicast Internet Protocol IP packet, and sending the unicast IP packet to the device for initiating fault detection, where a destination IP address in the unicast IP packet is the address of the device for initiating fault detection.

[0325] Embodiment 14, a service chain fault detection method, where the method includes:

sending, by a device for initiating fault detection, a first fault tracing detection request packet to a service forwarding entity SFE, where the first fault tracing detection request packet includes a path identifier ID and an address of the device for initiating fault detection, and the path ID is used to identify a path of a service chain;

receiving, by the device for initiating fault detection, a first fault tracing detection response packet from the SFE, where the first fault tracing detection response packet includes the path ID, an ID of a first service function SF node, and the address of the device for initiating fault detection; and

after receiving the first fault tracing detection response packet, determining, by

the device for initiating fault detection, that the service chain passes through the first SF node, and forwarding between the SFE and the first SF node is normal.

[0326] Embodiment 15, the method according to embodiment 14, where the sending, by a device for initiating fault detection, a first fault tracing detection request packet to the SFE includes:

determining, according to the path ID by the device for initiating fault detection, to forward the first fault tracing detection request packet according to a forwarding entry, where the forwarding entry includes the path ID and an address of the SFE; and

sending, by the device for initiating fault detection, the first fault tracing detection request packet to the SFE according to the address of the SFE.

[0327] Embodiment 16, the method according to embodiment 14 or 15, where the first fault tracing detection request packet further includes a first parameter, and the first parameter is used to identify the first SF node or is used to identify a previous hop SF node of the first SF node on the service chain.

[0328] Embodiment 17, the method according to any one of embodiments 14 to 16, where the first fault tracing detection request packet further includes a time to live TTL field.

[0329] Embodiment 18, the method according to any one of embodiments 14 to 16, where the first fault tracing detection request packet further includes a node list, and the node list includes an ID of the previous hop SF node of the first SF node on the service chain; and the first fault tracing detection response packet further includes an updated node list, the updated node list is a list generated after the ID of the first SF node is added to the node list, and an order of all SF nodes included in the updated node list is the same as an order of all the SF nodes on the service chain.

[0330] Embodiment 19, the method according to any one of embodiments 14 to 16, where before the receiving, by the device for initiating fault detection, a first fault tracing detection response packet from the SFE, the method further includes:

receiving, by the device for initiating fault detection, a second fault tracing detection response packet from the SFE, where the second fault tracing detection response packet includes the path ID, an ID of the SFE, and the address of the device for initiating fault detection; and

after receiving the second fault tracing detection response packet, determining, by the device for initiating fault detection, that the service chain passes through the SFE, and forwarding between the SFE and the device for initiating fault detection is

normal.

[0331] Embodiment 20, the method according to any one of embodiments 14 to 19, where after the receiving, by the device for initiating fault detection, a first fault tracing detection response packet from the SFE, the method further includes:

receiving, by the device for initiating fault detection, a third fault tracing detection response packet from the SFE, where the third fault tracing detection response packet includes the path ID, an ID of a second SF node, and the address of the device for initiating fault detection, and the second SF node is a next hop SF node of the first SF node on the service chain; and

after receiving the third fault tracing detection response packet, determining, by the device for initiating fault detection, that the service chain passes through the second SF node, and forwarding between the SFE and the second SF node is normal.

[0332] Embodiment 21, a service chain fault detection method, where the method includes:

receiving, by a service function SF node, a first fault tracing detection request packet from a service forwarding entity SFE, where the first fault tracing detection request packet includes a path identifier ID and an address of a device for initiating fault detection, and the path ID is used to identify a path of a service chain; and

sending, by the SF node, a second fault tracing detection request packet to the SFE, where the second fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection.

[0333] Embodiment 22, the method according to embodiment 21, where the first fault tracing detection request packet and the second fault tracing detection request packet each further includes a time to live TTL field; and

before the sending, by the SF node, a second fault tracing detection request packet to the SFE, the method further includes:

obtaining, by the SF node, a TTL parameter, where the TTL parameter is data obtained after a value of the TTL field included in the first fault tracing detection request packet is updated; and

using, by the SF node, the TTL parameter as a value of the TTL field included in the second fault tracing detection request packet.

[0334] Embodiment 23, the method according to embodiment 21, where the first fault tracing detection request packet further includes a node list, and the node list includes an ID of a previous hop SF node of the SF node on the service chain; and

before the sending, by the SF node, a second fault tracing detection request packet to the SFE, the method further includes:

obtaining, by the SF node, an updated node list, where the updated node list is a list generated after an ID of the SF node is added to the node list, and an order of all SF nodes in the updated node list is the same as an order of all the SF nodes on the service chain; and

adding, by the SF node, the updated node list to the second fault tracing detection request packet.

[0335] Embodiment 24, the method according to any one of embodiments 21 to 23, where the first fault tracing detection request packet further includes a first parameter, the first parameter is used to identify the SF node or is used to identify the previous hop SF node of the SF node on the service chain, and the second fault tracing detection request packet further includes at least one of the first parameter or the ID of the SF node.

[0336] Embodiment 25, a service forwarding apparatus, where the service forwarding apparatus includes:

a first communications unit, configured to: obtain a first fault tracing detection request packet, and then determine to communicate with a first service function SF node, where the first fault tracing detection request packet includes a path identifier ID and an address of a device for initiating fault detection, and the path ID is used to identify a path of a service chain;

a first obtaining unit, configured to obtain an ID of the first SF node; and

a first sending unit, configured to send a first fault tracing detection response packet to the device for initiating fault detection, where the first fault tracing detection response packet includes the path ID, the ID of the first SF node, and the address of the device for initiating fault detection.

[0337] Embodiment 26, the service forwarding apparatus according to embodiment 25, where

the first communications unit is specifically configured to determine, according to the path ID, to forward the first fault tracing detection request packet according to a first forwarding entry, where the first forwarding entry includes the path ID and an address of the first SF node;

the first communications unit is specifically configured to send the first fault tracing detection request packet to the first SF node according to the address of the

first SF node; and

the first communications unit is specifically configured to receive a second fault tracing detection request packet from the first SF node, where the second fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection.

[0338] Embodiment 27, the service forwarding apparatus according to embodiment 26, where the first fault tracing detection request packet further includes a first parameter, the first parameter is used to identify the first SF node or is used to identify a previous hop SF node of the first SF node on the service chain, and the first forwarding entry further includes the first parameter; and

the first communications unit is further configured to determine, according to the first parameter and the path ID, to forward the first fault tracing detection request packet according to the first forwarding entry.

[0339] Embodiment 28, the service forwarding apparatus according to embodiment 27, where the first fault tracing detection request packet further includes a time to live TTL field;

the service forwarding apparatus further includes: a second obtaining unit;

the second obtaining unit is configured to obtain a TTL parameter, where the TTL parameter is data obtained after a value of the TTL field in the first fault tracing detection request packet is updated; and

the first sending unit is further configured to: when the TTL parameter is equal to a preset value, send the first fault tracing detection response packet to the device for initiating fault detection.

[0340] Embodiment 29, the service forwarding apparatus according to embodiment 28, where the service forwarding apparatus further includes: a third obtaining unit, a first determining unit, and a second sending unit, where

the third obtaining unit is configured to: when the TTL parameter is not equal to the preset value, obtain a third fault tracing detection request packet, where the third fault tracing detection request packet includes a second parameter, the path ID, the TTL field, and the address of the device for initiating fault detection, the second parameter is used to identify a next hop SF node of an SF node, on the service chain, identified by using the first parameter, and a value of the TTL field in the third fault tracing detection request packet is the TTL parameter;

the first determining unit is configured to determine, according to the second

parameter and the path ID, to forward the third fault tracing detection request packet according to a second forwarding entry, where the second forwarding entry includes the path ID, the second parameter, and an address of a first device, the first device is a next hop SFE of the service forwarding apparatus on the service chain or a second SF node, and the second SF node is a next hop SF node of the first SF node on the service chain; and

the second sending unit is configured to send the third fault tracing detection request packet to the first device according to the address of the first device.

[0341] Embodiment 30, the service forwarding apparatus according to embodiment 27, where the first sending unit is further configured to send a second fault tracing detection response packet to the device for initiating fault detection, where the second fault tracing detection response packet includes the path ID, an ID of the service forwarding apparatus, and the address of the device for initiating fault detection.

[0342] Embodiment 31, the service forwarding apparatus according to embodiment 27 or 30, where the service forwarding apparatus further includes:

a fourth obtaining unit, configured to obtain a fourth fault tracing detection request packet, where the fourth fault tracing detection request packet includes a second parameter, the path ID, and the address of the device for initiating fault detection, and the second parameter is used to identify a next hop SF node of an SF node, on the service chain, identified by using the first parameter;

a second determining unit, configured to determine, according to the second parameter and the path ID, to forward the fourth fault tracing detection request packet according to a second forwarding entry, where the second forwarding entry includes the path ID, the second parameter, and an address of a first device, the first device is a next hop SFE of the service forwarding apparatus on the service chain or a second SF node, and the second SF node is a next hop SF node of the first SF node on the service chain; and

a third sending unit, configured to send the fourth fault tracing detection request packet to the first device according to the address of the first device.

[0343] Embodiment 32, the service forwarding apparatus according to embodiment 31, where the first device is the second SF node, and the service forwarding apparatus further includes:

a receiving unit, configured to receive a fifth fault tracing detection request

packet from the second SF node, where the fifth fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection; and

a fifth obtaining unit, configured to obtain an ID of the second SF node according to the fifth fault tracing detection request packet; and

the first sending unit is further configured to send a third fault tracing detection response packet to the device for initiating fault detection, where the third fault tracing detection response packet includes the path ID, the ID of the second SF node, and the address of the device for initiating fault detection.

[0344] Embodiment 33, the service forwarding apparatus according to any one of embodiment 26, embodiment 27, or embodiments 30 to 32, where the first obtaining unit is further configured to add at least one of the first parameter or the ID of the service forwarding apparatus to the first fault tracing detection response packet.

[0345] Embodiment 34, the service forwarding apparatus according to any one of embodiment 26, embodiment 27, or embodiments 30 to 32, where the first fault tracing detection request packet further includes a node list, and the node list includes an ID of the previous hop SF node of the first SF node on the service chain;

the service forwarding apparatus further includes:

a first parameter updating unit, configured to obtain an updated node list, where the updated node list is a list generated after the ID of the first SF node is added to the node list, and an order of all SF nodes included in the updated node list is the same as an order of all the SF nodes on the service chain; and

the first obtaining unit is further configured to add the updated node list to the first fault tracing detection response packet.

[0346] Embodiment 35, the service forwarding apparatus according to any one of embodiment 26, embodiment 27, or embodiments 30 to 34, where the first fault tracing detection request packet further includes an ID of an SF node used as an end point; and

the service forwarding apparatus further includes:

a control unit, configured to: after the first sending unit sends the first fault tracing detection response packet to the device for initiating fault detection, determine that the ID of the first SF node is the same as the ID of the SF node used as the end point, and end detection on the service chain.

[0347] Embodiment 36, the service forwarding apparatus according to any one of embodiments 25 to 35, where

the first communications unit is specifically configured to receive the first fault tracing detection request packet sent by the device for initiating fault detection; or

the first communications unit is specifically configured to receive the first fault tracing detection request packet sent by a previous hop SFE of the service forwarding apparatus on the service chain; or

the first communications unit is specifically configured to generate the first fault tracing detection request packet.

[0348] Embodiment 37, the service forwarding apparatus according to any one of embodiments 25 to 36, where the first sending unit is specifically configured to obtain a path ID of a reverse service chain of the service chain by using the path ID, where the reverse service chain and the service chain are opposite in direction; and

the first sending unit is specifically configured to send, according to a forwarding entry corresponding to the path ID of the reverse service chain, the first fault tracing detection response packet to the device for initiating fault detection, where the forwarding entry includes the path ID of the reverse service chain and the address of the device for initiating fault detection; or

the first sending unit is specifically configured to: add the first fault tracing detection response packet to a unicast Internet Protocol IP packet, and send the unicast IP packet to the device for initiating fault detection, where a destination IP address in the unicast IP packet is the address of the device for initiating fault detection.

[0349] Embodiment 38, a device for initiating fault detection, where the device for initiating fault detection includes:

a sending unit, configured to send a first fault tracing detection request packet to a service forwarding entity SFE, where the first fault tracing detection request packet includes a path ID and an address of the device for initiating fault detection, and the path ID is used to identify a path of a service chain;

a first receiving unit, configured to receive a first fault tracing detection response packet from the SFE, where the first fault tracing detection response packet includes the path ID, an ID of a first service function SF node, and the address of the device for initiating fault detection; and

a first determining unit, configured to: after the first fault tracing detection response packet is received, determine that the service chain passes through the first SF node, and forwarding between the SFE and the first SF node is normal.

[0350] Embodiment 39, the device for initiating fault detection according to embodiment 38, where

the sending unit is specifically configured to determine, according to the path ID, to forward the first fault tracing detection request packet according to a forwarding entry, where the forwarding entry includes the path ID and an address of the SFE; and

the sending unit is specifically configured to send the first fault tracing detection request packet to the SFE according to the address of the SFE.

[0351] Embodiment 40, the device for initiating fault detection according to embodiment 38 or 39, where the first fault tracing detection request packet further includes a first parameter, and the first parameter is used to identify the first SF node or is used to identify a previous hop SF node of the first SF node on the service chain.

[0352] Embodiment 41, the device for initiating fault detection according to any one of embodiments 38 to 40, where the device for initiating fault detection further includes:

a first adding unit, configured to add a time to live TTL field to the first fault tracing detection request packet.

[0353] Embodiment 42, the device for initiating fault detection according to any one of embodiments 38 to 40, where the device for initiating fault detection further includes:

a second adding unit, configured to add a node list to the first fault tracing detection request packet, where the node list includes an ID of the previous hop SF node of the first SF node on the service chain; and

the first fault tracing detection response packet further includes an updated node list, the updated node list is a list generated after the ID of the first SF node is added to the node list, and an order of all SF nodes included in the updated node list is the same as an order of all the SF nodes on the service chain.

[0354] Embodiment 43, the device for initiating fault detection according to any one of embodiments 38 to 40, where the device for initiating fault detection further includes:

a second receiving unit, configured to receive a second fault tracing detection response packet from the SFE, where the second fault tracing detection response packet includes the path ID, an ID of the SFE, and the address of the device for initiating fault detection; and

the first determining unit is further configured to: after the second fault tracing

detection response packet is received, determine that the service chain passes through the SFE, and forwarding between the SFE and the fault detection is normal.

[0355] Embodiment 44, the device for initiating fault detection according to any one of embodiments 38 to 43, where the device for initiating fault detection further includes:

a third receiving unit, configured to receive a third fault tracing detection response packet from the SFE, where the third fault tracing detection response packet includes the path ID, an ID of a second SF node, and the address of the device for initiating fault detection, and the second SF node is a next hop SF node of the first SF node on the service chain; and

the first determining unit is further configured to: after the third fault tracing detection response packet is received, determine that the service chain passes through the second SF node, and forwarding between the SFE and the second SF node is normal.

[0356] Embodiment 45, a service function SF apparatus, where the SF apparatus includes:

a receiving unit, configured to receive a first fault tracing detection request packet from a service forwarding entity SFE, where the first fault tracing detection request packet includes a path identifier ID and an address of a device for initiating fault detection, and the path ID is used to identify a path of a service chain; and

a sending unit, configured to send a second fault tracing detection request packet to the SFE, where the second fault tracing detection request packet includes the path ID and the address of the device for initiating fault detection.

[0357] Embodiment 46, the SF apparatus according to embodiment 45, where the first fault tracing detection request packet further includes a first parameter, the first parameter is used to identify the SF apparatus or is used to identify a previous hop SF node of the SF apparatus on the service chain, and the second fault tracing detection request packet further includes at least one of the first parameter or an ID of the SF apparatus.

[0358] Embodiment 47, the SF apparatus according to embodiment 45 or 46, where the first fault tracing detection request packet and the second fault tracing detection request packet each further includes a time to live TTL field;

the SF apparatus further includes:

a first parameter updating unit, configured to obtain a TTL parameter, where the

~~TTL parameter is data obtained after a value of the TTL field included in the first fault tracing detection request packet is updated; and~~

~~the first parameter updating unit is configured to use the TTL parameter as a value of the TTL field included in the second fault tracing detection request packet.~~

~~**[0359]** Embodiment 48, the SF apparatus according to embodiment 45 or 46, where the first fault tracing detection request packet further includes a node list, and the node list includes an ID of the previous hop SF node of the SF apparatus on the service chain;~~

~~the SF apparatus further includes:~~

~~a second parameter updating unit, configured to obtain an updated node list, where the updated node list is a list generated after the ID of the SF apparatus is added to the node list, and an order of all SF nodes in the updated node list is the same as an order of all the SF nodes on the service chain; and~~

~~the second parameter updating unit is configured to add the updated node list to the second fault tracing detection request packet.~~