OPTICAL FIBER CONNECTION DETECTION METHOD AND RELATED DEVICE

[0001] ~~This application claims priority to Chinese Patent Application No. 202010018687.7, filed with the China National Intellectual Property Administration on January 8, 2020 and entitled "OPTICAL FIBER CONNECTION DETECTION METHOD AND RELATED DEVICE ", which is incorporated herein by reference in its entirety~~.

TECHNICAL FIELD

[0002] This application relates to optical fiber communications, and in particular, to an optical fiber connection detection method and a related device.

BACKGROUND

[0003] An optical fiber communications system is a communications system in which light serves as a carrier, an optical fiber serves as a transmission medium, and light is used to transmit information through photoelectric conversion. The optical fiber communications system includes different network devices, and a large quantity of optical fibers are required between the different network devices to transmit an optical signal.

[0004] To manage and maintain the optical fiber communications system, an optical fiber connection relationship between the different network devices needs to be manually identified. Then the identified optical fiber connection relationship is manually input to a network management device.

[0005] However, because the optical fiber connection relationship is manually identified, there is a high probability that the identified optical fiber connection relationship is incorrect. For example, a single-point four-dimensional reconfigurable optical add/drop multiplexer (reconfigurable optical add drop multiplexer, ROADM) has nearly 70 optical ports. Each optical port is connected to an optical fiber. If the optical fiber communications system includes many ROADMs, manually identifying an optical fiber connection relationship of each optical port in each ROADM results in very heavy workload and is cumbersome. This greatly reduces efficiency

first label information and second label information to the processor 1201. The processor 1201 is configured to perform step 712.

[00235] The term "and/or" in this application may describe only an association relationship for describing associated objects and represents that three relationships may exist. For example, A and/or B may represent the following three cases: Only A exists, both A and B exist, and only B exists. In addition, the character "/" in this application generally indicates an "or" relationship between the associated objects.

[00236] In the specification, claims, and accompanying drawings of this application, the terms such as "first" and "second" are intended to distinguish between similar objects but do not necessarily indicate a specific order or sequence. It should be understood that data used in such a way is interchangeable in proper circumstances, so that embodiments described herein can be implemented in other orders than the order illustrated or described herein. In addition, the terms "include", "have", and any other variants are intended to cover non-exclusive inclusions, for example, a process, method, system, product, or device including a series of steps or modules is not necessarily limited to those clearly listed steps or modules, but may include other steps or modules that are not clearly listed or are inherent to such a process, method, product, or device.

[00237] The foregoing embodiments are merely intended for describing the technical solutions of the present invention, but not for limiting the present invention. Although the present invention is described in detail with reference to the foregoing embodiments, persons of 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 ~~spirit and~~ scope of the technical solutions of embodiments of the present invention.

CLAIMS

~~What is claimed is:~~

1. An optical fiber connection detection method, wherein the method comprises:

obtaining, by a first network device, first label information, wherein the first label information is used to indicate a target optical output interface, the first network device has at least one optical output interface, and the target optical output interface is one of the at least one optical output interface;

generating, by the first network device, an optical signal, wherein a wavelength of the optical signal is within a wavelength range corresponding to the target optical output interface;

modulating, by the first network device, the first label information onto the optical signal, to generate a modulated optical signal; and

sending, by the first network device, the modulated optical signal from the target optical output interface to a target optical input interface of a second network device, to detect an optical fiber connection relationship between the target optical output interface and the target optical input interface.

2. The method according to claim 1, wherein the generating, by the first network device, an optical signal comprises:

obtaining, by the first network device, wavelength indication information, wherein the wavelength indication information is used to indicate the wavelength range of the target optical output interface; and

generating, by the first network device, the optical signal based on the wavelength indication information.

3. The method according to claim 2, wherein the first label information comprises at least the wavelength indication information.

4. The method according to any one of claims 1 to 3, wherein the first network device is connected to a network management device, and the obtaining, by a first network device, first label information comprises:

receiving, by the first network device, the first label information from the network management device.

5. The method according to any one of claims 1 to 3, wherein the first network device is

connected to a network management device, and before the obtaining, by a first network device, first label information, the method further comprises:

receiving, by the first network device, indication information from the network management device, wherein the indication information is used to trigger detection on an optical fiber connection of the first network device; and

the obtaining, by a first network device, first label information comprises:

generating, by the first network device, the first label information based on the indication information.

6. The method according to claim 5, wherein the generating, by the first network device, the first label information based on the indication information comprises:

detecting, by the first network device, whether the target optical output interface is occupied by an optical service signal; and

generating, by the first network device, the first label information based on the indication information if the target optical output interface is not occupied by an optical service signal.

~~7. The method according to any one of claims 1 to 6, wherein the modulating, by the first network device, the first label information onto the optical signal, to generate a modulated optical signal comprises:~~

~~changing, by the first network device, power intensity of the optical signal based on the first label information, to generate the modulated optical signal.~~

~~8. The method according to any one of claims 1 to 7, wherein the first network device comprises a plurality of optical output interfaces, different optical output interfaces are coupled to different lasers, and the generating, by the first network device, an optical signal comprises:~~

~~determining, by the first network device, a target laser coupled to the target optical output interface; and~~

~~generating, by the first network device, the optical signal by using the target laser.~~

~~9. The method according to any one of claims 1 to 8, wherein after the sending, by the first network device, the modulated optical signal from the target optical output interface to a target optical input interface, the method further comprises:~~

~~receiving, by the first network device, optical fiber connection indication information, wherein the optical fiber connection indication information is used to indicate the optical fiber connection relationship between the target optical output interface and the target optical input~~

~~interface of the second network device.~~

~~10. The method according to any one of claims 1 to 9, wherein the first label information comprises a first field and a second field, the first field comprises an identifier of the target optical output interface, and the second field comprises an identifier of the first network device.~~

~~11~~7. An optical fiber connection detection method, wherein the method comprises:

receiving, by a second network device from a target optical input interface, a modulated optical signal that is from a target optical output interface of a first network device, wherein the target optical input interface is one of at least one optical input interface of the second network device;

obtaining, by the second network device, first label information from the modulated optical signal, wherein the first label information is used to indicate the target optical output interface; and

obtaining, by the second network device, second label information, wherein the second label information is used to indicate the target optical input interface, and the first label information and the second label information are used to detect an optical fiber connection relationship between the target optical input interface and the target optical output interface.

~~12~~8. The method according to claim ~~11~~7, wherein the second network device is connected to a network management device, and the method further comprises:

sending, by the second network device, the first label information and the second label information to the network management device.

~~13~~9. The method according to claim ~~11~~7, wherein the method further comprises:

detecting, by the second network device, the optical fiber connection relationship between the target optical input interface and the target optical output interface based on the first label information and the second label information.

~~14~~10. The method according to claim ~~13~~9, wherein the method further comprises:

sending, by the second network device, optical fiber connection indication information to the first network device, wherein the optical fiber connection indication information is used to indicate the optical fiber connection relationship between the target optical input interface and the target optical output interface.

~~15~~11. The method according to claim ~~13~~9, wherein the second network device is connected to a network management device, and the method further comprises:

sending, by the second network device, optical fiber connection indication information to the

network management device, wherein the optical fiber connection indication information is used to indicate the optical fiber connection relationship between the target optical input interface and the target optical output interface.

~~16~~12. The method according to any one of claims ~~11~~ 7 to ~~15~~11, wherein the obtaining, by the second network device, first label information from the modulated optical signal comprises:

obtaining, by the second network device, the first label information based on a change of power intensity of the modulated optical signal.

~~17. An optical fiber connection detection method, comprising:~~

~~receiving, by a network management device, first label information and second label information from a second network device, wherein the first label information is used to indicate a target optical output interface of a first network device, and the second label information is used to indicate a target optical input interface of the second network device; and~~

~~detecting, by the network management device, an optical fiber connection relationship between the target optical input interface and the target optical output interface based on the first label information and the second label information.~~

~~18. The method according to claim 17, wherein before the receiving, by a network management device, first label information and second label information from a second network device, the method further comprises:~~

~~sending, by the network management device, the first label information to the first network device.~~

~~19. The method according to claim 18, wherein the first label information comprises wavelength indication information, and the wavelength indication information is used to indicate a wavelength range of the target optical output interface.~~

~~20. The method according to claim 17, wherein before the receiving, by a network management device, first label information and second label information from a second network device, the method further comprises:~~

~~sending, by the network management device, indication information to the first network device, wherein the indication information is used to trigger detection on an optical fiber connection of the first network device.~~

~~21. The method according to claim 18, wherein before the sending, by the network management device, indication information to the first network device, the method further~~

~~comprises:~~

~~determining, by the network management device, that the target optical output interface is not occupied by an optical service signal.~~

~~22~~13. A first network device, comprising a label loader, a laser, a demultiplexer, and at least one optical output interface that are sequentially coupled, wherein

the label loader is configured to obtain first label information, wherein the first label information is used to indicate a target optical output interface, and the target optical output interface is one of the at least one optical output interface;

the laser is configured to generate an optical signal, wherein a wavelength of the optical signal is within a wavelength range corresponding to the target optical output interface, and the laser is further configured to modulate the first label information onto the optical signal, to generate a modulated optical signal; and

the demultiplexer is configured to send the modulated optical signal from the target optical output interface to a target optical input interface of a second network device, to detect an optical fiber connection relationship between the target optical output interface and the target optical input interface.

14. The first network device according to claim 13, wherein:

the label loader is configured to obtain wavelength indication information, wherein the wavelength indication information is used to indicate the wavelength range of the target optical output interface; and

the laser is configured to generate the optical signal based on the wavelength indication information.

~~23~~15. A second network device, comprising a plurality of optical input interfaces and a label receiver that are sequentially coupled, wherein the label receiver is configured to:

receive, from a target optical input interface, a modulated optical signal that is from a target optical output interface of a first network device, wherein the target optical input interface is one of the plurality of optical input interfaces of the second network device;

obtain first label information from the modulated optical signal, wherein the first label information is used to indicate the target optical output interface; and

obtain second label information, wherein the second label information is used to indicate the target optical input interface, and the first label information and the second label information are

used to detect an optical fiber connection relationship between the target optical input interface and the target optical output interface.

~~24. A network management device, comprising a network interface, a processor, and a memory that are sequentially connected by using a bus, wherein~~

~~the network interface is configured to receive first label information and second label information from a second network device, wherein the first label information is used to indicate a target optical output interface of a first network device, and the second label information is used to indicate a target optical input interface of the second network device; and~~

~~the processor is configured to detect an optical fiber connection relationship between the target optical input interface and the target optical output interface based on the first label information and the second label information.~~