WHAT IS CLAIMED IS:

1. An automatic optical power reduction APR protection method, for two optical amplifier units at both ends of a transmission line, a preamplifier PA of each of the two optical amplifier units being connected to a boost amplifier BA of the other optical amplifier unit by means of an optical fiber, the method comprising:

in a case where a reception state of the PA of at least one of the two optical amplifier units is a loss of signal LOS state, and a switch chip of the present optical amplifier unit detects a link interruption signal, activating an APR protection state of the present optical amplifier unit, wherein the APR protection state is to turn off output of the BA of the present optical amplifier unit;

in a case where the switch chip of at least one of the two optical amplifier units detects a link conduction signal, deactivating the APR protection state of the present optical amplifier unit, so as to make a state of the BA of the present optical amplifier unit be restored to a state before the APR protection state is activated,

wherein N relay optical amplifier units are further provided between the two optical amplifier units, where N is a positive integer;

in a case where a reception state of a first optical line amplifier LA of at least one of the N relay optical amplifier units is the LOS state, and a switch chip of the present relay optical amplifier unit detects the link interruption signal, activating an APR protection state of the present relay optical amplifier unit, wherein the APR protection state is to turn off a second LA output of the present relay optical amplifier unit;

in a case where the switch chip of at least one of the N relay optical amplifier units detects the link conduction signal, deactivating the APR protection state of the present relay optical amplifier unit, so as to make a state of the second LA of the present relay optical amplifier unit be restored to a state before the APR protection state is activated.

2. The APR protection method of claim 1, wherein after the activation of the APR protection state of the present optical amplifier unit, the method further comprises:

triggering the BA of the present optical amplifier unit to send an encoded pulse signal with a lasting time of a first duration to the PA of the other optical amplifier unit according to a preset period; in a case where the PA of at least one of the two optical amplifier units detects the encoded pulse signal, marking the reception state of the PA of the present optical amplifier unit as a non-LOS state; in a case where a light state of the PA of at least one of the two optical amplifier units lasts for a second duration, deactivating the APR protection state of the present optical amplifier unit; and/or, in a case where the first LA of at least one of the N relay optical amplifier units detects the encoded pulse signal, marking the reception state of the second LA of the present relay optical amplifier unit as the non-LOS state; in a case where a light state of the first LA of at least one of the N relay optical amplifier units lasts for the second duration, deactivating the APR protection state of the present relay optical amplifier unit;

wherein the second duration is twice the first duration.

3. The APR protection method of claim 2, wherein the method further comprises:

in a case where the reception state of the PA of at least one of the two optical amplifier units is the non-LOS state, triggering the BA of the present optical amplifier unit to reduce output power to be below preset power; and/or, in a case where the reception state of the first LA of at least one of the N relay optical amplifier units is the non-LOS state, triggering the second LA of the present relay optical amplifier unit to reduce output power to be below preset power; and

in a case where the reception state of the PA of at least one of the two optical amplifier units is the LOS state, triggering the BA of the present optical amplifier unit to control a pump laser according to the preset period of the sent encoded pulse signal; and/or, in a case where the reception state of the first LA of at least one of the N relay optical amplifier units is the LOS state, triggering the second LA of the present relay optical amplifier unit to control the pump laser according to the preset period of the sent encoded pulse signal.

4. The APR protection method of claim 1, wherein the method further comprises:

in a case where the PA of at least one of the two optical amplifier units detects an optical signal with a lasting time of a third duration, deactivating the APR protection state of the present optical amplifier unit; and/or,

in a case where the first LA of at least one of the two optical amplifier units detects an optical signal with a lasting time of the third duration, deactivating the APR protection state of the present relay optical amplifier unit.

5. The APR protection method of claim 1, wherein

the switch chip is a chip with a remote fault notification function;

in a case where the switch chip of at least one of the two optical amplifier units detects the link interruption signal and/or the switch chip of at least one of the N relay optical amplifier units detects the link interruption signal, the link interruption signal is converted into an optical signal and then the optical signal is output to the other optical amplifier units or other relay optical amplifier units via an optical supervisory channel OSC module of the present optical amplifier unit, wherein the link interruption signal is an electrical signal.

6. The APR protection method of claim 2, wherein the encoded pulse signal is generated in the following mode: switching the pump laser according to the preset period so as to make the BA generate the encoded pulse signal.

7. An APR protection device, comprising: two amplifier modules, a logic control module, an OSC module and a switch chip, the logic control module, the OSC module and the switch chip being located between the two amplifier modules; wherein the amplifier module comprises the following amplifiers: a PA and a BA; or a PA, a BA and a LA;

the PA and the LA are used for detecting an optical signal and then marking a reception state based on a situation of the detected optical signal;

the switch chip is used for detecting whether a link interruption situation exists or not;

the OSC module is used for converting an electrical signal output by the switch chip into an optical signal and then outputting the optical signal;

the logic control module is used for performing logic processing based on a reception state and a link interruption situation of the PA and/or LA, and triggering the amplifier(s) in the amplifier module to complete the APR protection method of any of claims 1 to 6.

8. An APR protection device, comprising: a memory, a processor and a computer program which is stored in the memory and executed by the processor;

wherein the processor is used for implementing the APR protection method according to any of claims 1 to 6.

9. A computer storage medium, wherein the computer storage medium stores a computer program, and the computer program is capable to, when executed by a processor, implement the APR protection method of any one of claims 1 to 6.