CLAIMS

1. A wavelength configuration method for a multi-wavelength passive optical network PON, comprising:

scanning, by an optical network unit ONU, a downstream receiving wavelength within a maximum receiving wavelength range of a wavelength-tunable downstream optical receiver of the ONU, and receiving, during the process of scanning the downstream receiving wavelength, downstream wavelength information of each downstream wavelength channel that is broadcast by an optical line terminal OLT separately through each downstream wavelength channel of a multi-wavelength PON system, wherein multiple downstream wavelength channels between the OLT and ONUs of the multi-wavelength PON system share an optical transmission medium of a optical distribution network ODN in a wavelength division multiplexing WDM manner, ONUs of the multi-wavelength PON system that work on a same downstream wavelength channel shares a downstream wavelength channel in a time division multiple access TDMA manner, the downstream wavelength information that is broadcast by the OLT separately through the each wavelength channel is channel identifier information of the downstream wavelength channel;

establishing, by the ONU, a downstream receiving wavelength mapping table according to the downstream wavelength information, wherein an entry of the downstream receiving wavelength mapping table comprises downstream receiving wavelength information, drive current information of a downstream optical receiver, and a receiving optical physical parameter of the ONU; and

selecting, by the ONU, one downstream wavelength from the downstream wavelength information broadcast by the OLT, and setting, according to the drive current information of the downstream optical receiver recorded in a related entry of the downstream receiving wavelength mapping table, an operating wavelength of the downstream optical receiver to the selected downstream wavelength.

2. The wavelength configuration method according to claim 1, wherein the establishing, by the ONU, a downstream receiving wavelength mapping table according to the downstream

wavelength information comprises:

detecting, by the ONU, a receiving optical current of the ONU, or receiving optical power of the ONU, or a received signal strength indication RSSI during the process of scanning the downstream receiving wavelength, and searching for a peak value of the receiving optical current of the ONU, or a peak value of the receiving optical power of the ONU, or an RSSI peak value; and

when the peak value of the receiving optical current of the ONU, or the peak value of the receiving optical power of the ONU, or the RSSI peak value is searched out, recording, by the ONU, a current drive current of the downstream optical receiver and downstream wavelength information of a downstream wavelength channel corresponding to the peak value of the receiving optical current of the ONU, or the peak value of the receiving optical power of the ONU, or the RSSI peak value, and establishing a downstream receiving wavelength mapping entry according to the foregoing three parameters.

3. The wavelength configuration method according to claim 1 or 2, further comprising:

scanning, by the ONU, an upstream sending wavelength, and sending a registration request to the OLT in a registration authorization timeslot allocated by the OLT; and

determining whether an ONU identifier allocation message sent by the OLT is received, and if no, sending, in a next registration authorization timeslot allocated by the OLT, the registration request to the OLT again until the ONU identifier allocation message is successfully received.

4. The wavelength configuration method according to claim 3, wherein the scanning, by the ONU, an upstream sending wavelength, and sending a registration request to the OLT in a registration authorization timeslot allocated by the OLT comprises:

selecting, by the ONU, one boundary value from a value range of drive currents supported by an upstream optical transmitter of the ONU as an initial current value, and adjusting a drive current of the upstream optical transmitter by using a preset variation so as to perform a progressive increase or decrease; and

sending, by the ONU and within the registration authorization timeslot provided by the OLT for the ONU, the ONU registration request to the OLT according to an upstream sending wavelength corresponding to a drive current value to which the drive current of the upstream

optical transmitter is currently adjusted.

5. The wavelength configuration method according to any one of claims 1 to 4, further comprising: detecting, by the ONU according to the downstream receiving wavelength mapping table, whether a drift occurs on a downstream receiving wavelength of the downstream optical receiver of the ONU, and calibrating the downstream receiving wavelength when the drift occurs.

6. The wavelength configuration method according to any one of claims 1 to 5, further comprising:

receiving, by the ONU, an upstream sending wavelength adjustment instruction sent by the OLT, and fine-tuning an upstream sending wavelength of an upstream optical transmitter according to the upstream sending wavelength adjustment instruction, so that the OLT detects a receiving optical physical parameter of the OLT and establishes an upstream receiving wavelength mapping table, wherein an entry of the upstream receiving wavelength mapping table comprises upstream receiving wavelength information, ONU sequence number information, and the receiving optical physical parameter of the OLT.

7. The wavelength configuration method according to claim 6, further comprising:

receiving, by the ONU, upstream receiving wavelength information delivered by the OLT after the upstream receiving wavelength mapping table is established, and establishing an upstream sending wavelength mapping table according to the upstream receiving wavelength information, wherein the upstream sending wavelength mapping table comprises upstream sending wavelength information and drive current information of the upstream optical transmitter.

8. The wavelength configuration method according to claim 7, wherein when receiving the downstream wavelength information broadcast by the OLT, the ONU further receives upstream wavelength information that is broadcast by the OLT separately through each downstream wavelength channel and is available for ONU registration.

9. The wavelength configuration method according to claim 8, further comprising:

querying, by the ONU according to the upstream wavelength information that is available for ONU registration, the drive current information of the upstream optical transmitter recorded in a related entry of the upstream sending wavelength mapping table, and

setting the upstream sending wavelength of the upstream optical transmitter according to the drive current information.

10. The wavelength configuration method according to any one of claims 6 to 9, further comprising: monitoring, by the OLT according to the upstream receiving wavelength mapping table, whether a drift occurs on an upstream sending wavelength of the ONU, and instructing the ONU to calibrate the upstream sending wavelength when the drift occurs.

11. A wavelength configuration apparatus for a multi-wavelength passive optical network PON, comprising:

a receiving module, configured to scan a downstream receiving wavelength within a maximum receiving wavelength range of a wavelength-tunable downstream optical receiver of the apparatus, and receive, during the process of scanning the downstream receiving wavelength, downstream wavelength information of each downstream wavelength channel that is broadcast by an optical line terminal OLT separately through each downstream wavelength channel of a multi-wavelength PON system, wherein multiple downstream wavelength channels between the OLT and ONUs of the multi-wavelength PON system share an optical transmission medium of a optical distribution network ODN in a wavelength division multiplexing WDM manner, ONUs of the multi-wavelength PON system that work on a same downstream wavelength channel shares a downstream wavelength channel in a time division multiple access TDMA manner, the downstream wavelength information that is broadcast by the OLT separately through the each wavelength channel is channel identifier information of the downstream wavelength channel;

a wavelength mapping table establishing module, configured to establish a downstream receiving wavelength mapping table according to the downstream wavelength information, wherein an entry of the downstream receiving wavelength mapping table comprises downstream receiving wavelength information, drive current information of a downstream optical receiver, and a receiving optical physical parameter of an ONU; and

a wavelength configuration module, configured to select one downstream wavelength from the downstream wavelength information broadcast by the OLT, and set, according to the drive current information of the downstream optical receiver recorded in a related entry of the downstream receiving wavelength mapping table, an operating wavelength of the downstream

optical receiver to the selected downstream wavelength.

12. The wavelength configuration apparatus according to claim 11, wherein the wavelength mapping table establishing module comprises:

a peak value searching unit, configured to search for a peak value of a receiving optical current of the ONU, or a peak value of receiving optical power of the ONU, or an RSSI peak value from detected receiving optical current of the ONU, or receiving optical power of the ONU, or received signal strength indication during the process of scanning the downstream receiving wavelength; and

an entry establishing module, configured to: when the peak value searching unit searches out the peak value of the receiving optical current of the ONU, or the peak value of the receiving optical power of the ONU, or the RSSI peak value, record a current drive current of the downstream optical receiver and downstream wavelength information of a downstream wavelength channel corresponding to the peak value of the receiving optical current of the ONU, or the peak value of the receiving optical power of the ONU, or the RSSI peak value, and establish a downstream receiving wavelength mapping entry according to the foregoing three parameters.

13. The wavelength configuration apparatus according to claim 11 or 12, further comprising:

a sending module, configured to scan an upstream sending wavelength, and send a registration request to the OLT in a registration authorization timeslot allocated by the OLT; and

a control module, configured to: determine whether the receiving module receives an ONU identifier allocation message sent by the OLT; and if no, control the sending module to send the registration request to the OLT again in a next registration authorization timeslot allocated by the OLT, until the receiving module successfully receives the ONU identifier allocation message.

14. The wavelength configuration apparatus according to claim 13, wherein the sending module comprises:

a drive current adjusting unit, configured to select one boundary value from a value range of drive currents supported by an upstream optical transmitter as an initial current value,

and adjust a drive current of the upstream optical transmitter by using a preset variation so as to perform a progressive increase or decrease; and

a sending unit, configured to send, within the registration authorization timeslot provided by the OLT for the ONU, an ONU registration request to the OLT according to an upstream sending wavelength corresponding to a drive current value to which the drive current of the upstream optical transmitter is currently adjusted.

15. The wavelength configuration apparatus according to any one of claims 11 to 14, further comprising:

a wavelength calibrating module, configured to detect, according to the downstream receiving wavelength mapping table, whether a drift occurs on a downstream receiving wavelength of the downstream optical receiver of the ONU, and calibrate the downstream receiving wavelength when the drift occurs.

16. The wavelength configuration apparatus according to claim 14, wherein,

the receiving module is further configured to receive an upstream sending wavelength adjustment instruction sent by the OLT; and

the sending module is further configured to fine-tune the upstream sending wavelength of the upstream optical transmitter according to the upstream wavelength adjustment instruction, so that the OLT detects a receiving optical current of the OLT and establishes an upstream receiving wavelength mapping table.

17. The wavelength configuration apparatus according to claim 16, wherein,

the receiving module is further configured to receive upstream receiving wavelength information delivered by the OLT after the upstream receiving wavelength mapping table is established; and

the wavelength mapping table establishing module is further configured to establish an upstream sending wavelength mapping table according to the upstream receiving wavelength information, wherein the upstream sending wavelength mapping table comprises upstream sending wavelength information and drive current information of the upstream optical transmitter.

18. The wavelength configuration apparatus according to claim 17, wherein,

the receiving module is further configured to: when the downstream wavelength

information broadcast by the OLT is received, receive upstream wavelength information that is broadcast by the OLT separately through each downstream wavelength channel and is available for ONU registration.

19. The wavelength configuration apparatus according to claim 18, wherein,

the wavelength configuration module is further configured to query, according to the upstream wavelength information that is available for ONU registration, the drive current information of the upstream optical transmitter recorded in a related entry of the upstream sending wavelength mapping table, and set the upstream sending wavelength of the upstream optical transmitter according to the drive current information.

20. A multi-wavelength passive optical network PON system, comprising at least one optical line terminal OLT and multiple optical network units ONUs, wherein the at least one OLT is connected to the multiple ONUs in a point-to-multipoint manner by using an optical distribution network, and the ONUs comprise the wavelength configuration apparatus for a multi-wavelength PON according to any one of claims 11 to 19.