6 GPON ONU Abnormal State

About This Chapter

This topic describes how to troubleshoot common faults in ONU abnormal state, including ONU fail to go online, fail to recover ONU configurations, mismatch of ONU profile, fail to auto discover an ONU, and ONU frequently goes offline. ONU includes HG series ONT and MDU.

6 GPON ONU Abnormal State

This topic describes how to troubleshoot common faults in ONU abnormal state, including ONU fail to go online, fail to recover ONU configurations, mismatch of ONU profile, fail to auto discover an ONU, and ONU frequently goes offline. ONU includes HG series ONT and MDU.

6.1 GPON ONU Abnormal State

This topic describes how to troubleshoot common faults in ONU abnormal state, including ONU fail to go online, fail to recover ONU configurations, mismatch of ONU profile, fail to auto discover an ONU, and ONU frequently goes offline. ONU includes HG series ONT and MDU.

6.1 GPON ONU Abnormal State

This topic describes how to troubleshoot common faults in ONU abnormal state, including ONU fail to go online, fail to recover ONU configurations, mismatch of ONU profile, fail to auto discover an ONU, and ONU frequently goes offline. ONU includes HG series ONT and MDU.

6.1.1 Failure to Go Online of a GPON ONU

A failure to go online is also called a registration failure. An ONU connected to a GPON port of an OLT fails to go online normally, but the queried **Run state** of the ONU is displayed as **offline** by running the **display ont info** command on the OLT.

6.1.1.1 Fault Identification and Demarcation

A failure to go online is also called a registration failure. An ONU connected to a GPON port of an OLT fails to go online normally, but the queried **Run state** of the ONU is displayed as **offline** by running the **display ont info** command on the OLT.

Context

Going online refers to a process that after being powered on, an ONU registers with an OLT and sets up a management channel with the OLT. An ONU can be managed by the OLT and be configured with services only after going online. You can check whether an ONU goes online by querying its **Run state** in the **display ont info** command output.

- offline: Indicates that the ONU is offline, which means that the ONU does not exist for the OLT.

- online: Indicates that the ONU is online.

📖**NOTE**

You can also check whether an ONU goes online by observing its indicators. Indicator status varies with ONUs. For details, see the matched ONU manuals.

Location Method

When an ONU fails to go online, locate the fault based on the following fault symptoms and possible causes.

Fault Scope	Symptom	Possible Cause
OLT	A single ONU or some ONUs connected to an OLT fail to go online.	● The SN or password configured on the OLT is different from the actual SN or password of the ONU; hence, the ONU fails to pass authentication and go online. ● The actual distance between the ONU and OLT exceeds the ranging compensation distance configured on the OLT. ● The OLT deactivates the ONU.
	All the ONUs connected to a PON port of an OLT fail to go online.	● The laser on the PON port is disabled. ● The pluggable optical module of the PON is faulty. ● The PON port is faulty.
	All the ONUs connected to a board of an OLT fail to go online.	● The board or the slot is faulty.

Fault Scope	Symptom	Possible Cause
ODN	The PON port reports alarms described in ODN-Related Alarms, including: ● **0x2e11a001 The feeder fiber is broken or OLT can not receive any expected optical signals(LOS)** ● **0x2e112007 The distribute fiber is broken or the OLT cannot receive expected optical signals from the ONT(LOSi/LOBi)**	ODN failures are generally caused by large reflection and attenuation caused by improper optical components, design, or construction. For details, see . ● If a single ONU or multiple ONUs fail to go online, the branch fiber and the optical component may have faults. ● If all ONUs fail to go online, the backbone fiber and the optical component may have faults.
ONU	A single ONU or some ONUs connected to an OLT fail to go online.	● The ONU is not powered on. ● The information (including SN and password) for ONU authentication conflicts; hence, the later power-on ONU fails to go online. ● A rogue ONU exists on the network and affects other ONUs. ● The ONU hardware is faulty. ● The optical module of the ONU is faulty. ● The patch cord of the ONU is broken or bent excessively. ● The ONU is incorrectly connected to another PON port.

⚠ NOTICE

The parameters of the optical module in this topic comply with Class B+. Note that such parameters are slightly different from the parameters in Class C.

6.1.1.2 Alarming Handling

Procedure

Query the related alarms to locate the fault scope.

1. Run the **display alarm active alarmparameter** *frameid/slotid/portid* command to query OLT PON port alarms that are not cleared.

2. In GPON mode, run the **display ont alarm-state** command to query ONU alarms that are not cleared.

3. If an ONU can go online but fails to go online later, run the **display ont info** command to query its **Last down cause**.

If an ONU fails to go online, the following alarms may be generated:

Fault Scope	Alarms
ODN	ODN-Related Alarms, including: ● **0x2e11a001 The feeder fiber is broken or OLT can not receive any expected optical signals(LOS)** ● **0x2e112007 The distribute fiber is broken or the OLT cannot receive expected optical signals from the ONT(LOSi/LOBi)**
ONT	● **0x2e305015 The authentication information about the ONT is invalid** ● **0x2e314021 There are illegal incursionary rogue ONTs under the port** ● **0x2e314022 The ONT is rogue ONT** ● **0x2e11a00b The dying-gasp of GPON ONTi (DGi) is generated**

6.1.1.3 OLT Fault

Procedure

Check for the possible causes on the OLT and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The SN configured on the OLT is different from the actual SN of the ONU; hence, the ONU fails to pass authentication and to go online.	Run the **display ont info** command to query the ONU information. It is found that the SN in the result is different from the actual ONU SN.	Run the **ont modify** command to modify the configured SN or password to be the correct one.

Possible Cause	Judgment Criterion	Troubleshooting Method
The actual distance between the ONU and OLT exceeds the ranging compensation distance configured on the OLT.	Run the **display port info** command to query the minimum logical reach (**Min distance**) and maximum logical reach (**Max distance**) configured for the GPON port. It is found that the actual distance between the ONU and OLT exceeds the ranging compensation distance. For example, the actual length of the optical fiber between the ONU and OLT is about 25 km, which exceeds the ranging compensation distance of 0-20 km.	Run the **port range** command to adjust the minimum logical reach and maximum logical reach so that the actual distance between the ONU and OLT is within the ranging compensation distance. **NOTE** - By default, the ranging compensation distance of a GPON port is from 0 km to 20 km. - According to Class B+, the maximum logical reach of a GPON port must not exceed 60 km, and the difference between the minimum logical reach and maximum logical reach must not exceed 20 km.
The OLT deactivates the ONU.	Run the **display ont info** command to query the ONU information. It is found that **Control flag** is displayed as **deactivated**.	Run the **ont activate** command to activate an ONU. **NOTE** When an ONU is activated, its optical module only receives optical signals but does not transmit optical signals.
The laser on the PON port is disabled.	Run the **display port info** command to query the information about the PON port. It is found that **Admin State** is in the **Off** state.	Run the **port laser-switch** command to enable the laser on the PON port. **NOTE** By default, the laser on a GPON port is enabled.

Possible Cause	Judgment Criterion	Troubleshooting Method
The PON port is faulty.	If either of the following two situations occurs, the PON pot is faulty. ● Run the **display port state** command to query the status of the PON port. It is found that abnormal items exist in the query result. For example, the laser status (**Laser state**) is abnormal and the transmit optical power (**TX power**) exceeds the normal range (1.5-5.0 dBm). ● Migrate the service to another port. It is found that the ONU goes online normally.	Replace the optical module of the PON port or replace the board.
The board or the slot is faulty.	All the ONUs connected to the board fail to go online.	Change the board to another slot. If the fault persist, replace the board.

6.1.1.4 ODN Fault

Procedure

Check for the possible causes on the ODN and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical fiber connector is not clean. **NOTE** An unclean optical fiber connector will cause excessive attenuation and abnormal reflection.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that the reflection and return loss are abnormal. 2. Check the optical fiber connector on site by using the optical fiber endface detector. It is found that the optical fiber connector is not clean.	Clean the optical fiber connector. For details about how to clean the connector, see .

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical fiber is bent excessively. **NOTE** Optical signals attenuate seriously on an optical fiber with an excessively small bending radius.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber on site. It is found that the optical fiber is bent excessively.	Route and bundle the optical fiber in a proper manner.
The quality of optical fiber splicing is poor. For example, the splicing point has air bubbles. **NOTE** Poor optical fiber splicing leads to unstable transmission of optical signals. As a result, packet loss occurs.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber splicing points by using the magnifying glass on site. It is found that the splicing points have quality problems, for example, air bubbles exist.	Splice the optical fiber again.
The optical fiber is not firmly connected or different types of optical fiber connectors are interconnected. **NOTE** If the optical fiber is not firmly connected or different types of optical fiber connectors are interconnected, the attenuation and reflection will be excessively large.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber connectors on site. It is found that the optical fiber is not firmly connected or PC connector (blue) and APC connector (green) are interconnected.	• If the optical fiber is not firmly connected, reconnect the optical fiber firmly. • If different types of optical fiber connectors are interconnected, replace the incompatible connector with a compatible one or replace relevant devices, such as the optical splitter. **NOTE** In the scenario of the CATV service, it is recommended that you use APC connectors (green) only.

Possible Cause	Judgment Criterion	Troubleshooting Method
The multi-mode optical fiber is used as the backbone or branch optical fiber. **NOTE** If the multi-mode optical fiber is used as the backbone or branch optical fiber, the optical signal attenuates quickly and the return loss increases.	1. Check the backbone fiber and branch fiber by using the OTDR. It is found that optical signals attenuate seriously. 2. Check the optical path on site. It is found that the multi-mode optical fiber is used. The multi-mode optical fiber can be recognized by its physical features such as its color.	Replace the multi-mode optical fiber with the single-mode optical fiber.
The optical attenuation of the optical path is excessively small. **NOTE** ● If the optical attenuation of the optical path is excessively small, the optical power received by the ONU will exceed the overload optical power of the ONU. ● Such a situation occurs usually in labs, where the OLT and ONU may be directly connected to each other through a short optical fiber.	If either of the following two situations occurs, the optical attenuation of the optical path is excessively small. ● Measure the receive optical power of the ONU by using the optical power meter. It is found that the actual receive optical power of the ONU is greater than -8 dBm. ● Check the optical path between the OLT and ONU. It is found that the optical attenuation of the optical path is excessively small. The normal attenuation range is 10-25 dB.	Add an optical attenuator on the optical path between the OLT and ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ODN is not properly planned. **NOTE** - The split ratio of the ODN link is not determined by the number of ONTs connected but by the split ratio of optical splitters. When an optical splitter is connected to the ODN, attenuation occurs and the split ratio of the optical splitter needs to be calculated. - The differences between the OLT-received optical power from the two adjacent ONUs must be smaller than or equal to 15 dB.	The ODN does not meet the requirements of the ODN link plan or GPON Class B+. - Three-level splitting exists in the ODN. - The network coverage of the ODN exceeds 20 km by far. - The split ratio exceeds the maximum split ratio that the board allows. Assuming that the maximum split ratio of a board is 1:64. If the first-level split ratio is 1:8 and the second-level split ratio is 1:16, the actual split ratio is 1:128, which exceeds the maximum split ratio of the board. - The optical attenuation difference of two optical paths exceeds 15 dB.	Optimize the ODN to meet Huawei's ODN planning requirements and protocol requirements.
The optical splitter is faulty or the connectors on the optical splitter are not clean.	Measure the input and output optical power of the optical splitter by using the optical power meter. It is found that the actual attenuation exceeds the theoretical attenuation. **NOTE** The faults in the optical splitter cannot be located by the OTDR because the OTDR cannot penetrate the optical splitter.	Replace the faulty optical splitter or clean the connectors on the optical splitter.
A backbone fiber break occurs.	1. Check the backbone fiber by using the OTDR. It is found that a backbone fiber break occurs. 2. Check the optical fiber on site. It is found that the optical fiber is broken or not connected.	Reconnect the branch optical fiber.

Possible Cause	Judgment Criterion	Troubleshooting Method
A branch fiber break occurs.	1. Check the branch fiber by using the OTDR. It is found that a branch fiber break occurs. 2. Check the optical fiber on site. It is found that the optical fiber is broken or not connected.	Reconnect the branch optical fiber.

6.1.1.5 ONU Fault

Procedure

Check for the possible causes on the ONU and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ONU is not powered on.	If either of the following two situations occurs, the ONU is not powered on. ● The **0x2e11a00b The dying-gasp of GPON ONTi (DGi) is generated** alarm is generated on the OLT, but the corresponding recovery alarm is not generated. ● Check the power supply of the ONU. It is found that the power supply of the ONU fails or is turned off.	Restore the power supply of the ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
A rogue ONU exists on the network and affects other ONUs. **NOTE** If a rogue ONU exists, the ONU that fails to go online may be a normal one and the ONU that can go online may be a rogue one.	If either of the following two situations occurs, a rogue ONU exists. ● The **0x2e314021 There are illegal incursionary rogue ONTs under the port** alarm is generated on the OLT. ● The **0x2e314022 The ONT is rogue ONT** alarm is generated on the OLT. ● Remove the optical fiber from the OLT port and connect the optical fiber to the optical power meter for measurement. If a value can be read from the optical power meter, a continuous-mode ONU or irregular-mode ONU exists. **NOTICE** Measuring the optical power interrupt services, Therefore, it is recommended that you measure the optical power when a PON port does not run any services, such as deployment.	Replace the rogue ONU with a normal one.
The information (SN) for ONU authentication conflicts; therefore, the power-on ONU fails to go online.	The **0x2e10a10b The GPON ONT is discovered by the OLT** alarm is generated on the OLT. The alarm cause is that the authentication information (such as the SN and password) about the newly connected ONU conflicts with that of the current ONU.	Replace the ONU with conflicted SN.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ONU is incorrectly connected to another PON port. **NOTE** After being configured on the OLT, the ONU can only be connected to the corresponding PON port. If being connected to another PON port, the ONU fails to go online.	The ONU is incorrectly connected to another PON port if either of the following symptoms occurs: ● The **0x2e10a10b The GPON ONT is discovered by the OLT** event is generated on the OLT and the authentication information (such as the SN and password) about the ONU automatically discovered on the PON port is the same as that about the ONU connected to another PON port. ● The **0x2e305015 The authentication information about the ONT is invalid** event is generated on the OLT and the alarm cause is that the SN of the newly connected ONU is the same as that of the ONU configured.	Select one of the following two ways: ● Retain the connection between the ONU and the PON port. On the OLT, run the **ont delete** command to delete ONU configurations and then run the **ont confirm** command to confirm the ONU on the PON port that automatically discovers the ONU. ● Retain the configurations. Connect the ONU to the PON port that is configured with the ONU.
The ONU hardware is faulty.	If either of the following two situations occurs, the ONU hardware is faulty. ● The LEDs of the ONU are off when the ONU is powered on. ● After the ONU is replaced with another ONU, the new ONU is auto discovered by the OLT.	Replace the faulty ONU or the optical module of the ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical module of the ONU is abnormal. For example, the transmit optical power of the optical module is excessively small or its receiver sensitivity is low.	Replace the faulty ONU with a normal one. It is found that the new ONU is auto discovered by the OLT. An alternative is to locate the fault as follows: ● Set the optical module of the ONU to the continuous mode, and measure the transmit optical power by using the optical power meter. It is found that the actual transmit optical power is beyond the normal range (0.5 dBm to 5.0 dBm). ● Measure the receive optical power of the ONU by using the optical power meter. It is found that the actual receive optical power is within the normal range (-27 dBm to -8 dBm).	Replace the faulty ONU or the optical module of the ONU.
The patch cord of the ONU is broken or bent excessively.	Check the Patch cord of the ONU. It is found that the Patch cord is broken or bent excessively.	Replace the Patch cord of the ONU.

6.1.2 Failure to Recover GPON ONU Configurations

An ONU connected to a GPON port of an OLT can go online successfully, but the queried **Config state** of the ONU is displayed as **failed** by running the **display ont info** command on the OLT.

6.1.2.1 Fault Identification and Demarcation

An ONU connected to a GPON port of an OLT can go online successfully, but the queried **Config state** of the ONU is displayed as **failed** by running the **display ont info** command on the OLT.

Context

The ONU configuration status indicates whether the configuration restoration is enabled and whether the configuration restoration is complete. Configuration recovery refers to a process in which, after an ONU goes online, the OLT issues configurations to the ONU and then the ONU adjusts its operating parameters based on the issued configurations.

The ONU configuration status has the following states: initial, normal, configuring (config), and configuration failure (failed). When an ONU goes online, the ONU is in the configuration restoration stage.

- The first status is initial. Soon the initial is complete and the ONU enters the config state.
- In the config state, the ONU capability and configuration data are restored. The duration of the config state is determined by the amount of the data configured on the ONU.
- If the configuration restoration is successful, the ONU transitions from the config state to the normal state.
- If the configuration restoration fails, the ONU transits from the config state to the failed state. Then the service is probably not carried forward.

Location Method

Fault Scope	Judgment Criterion	Possible Cause
OLT	ONUs of the same type fail to recover their configurations.	• The configurations issued by the OLT mismatch the actual ONU capabilities.
ONU	A single ONU fails to recover its configurations.	• The ONU functions improperly or is faulty. • The ONU has been configured at local and the configurations conflict with configurations issued by the OLT.

6.1.2.2 Alarming Handling

Procedure

When **Config state** of the ONU is displayed as **failed**, check whether the OLT generates the following alarm. If such an alarm is generated, clear it and check whether the fault is rectified.

0x2e21a102 The GPON ONT configuration recovery fails.

6.1.2.3 OLT Fault

Procedure

Check for the possible causes on the OLT and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The configurations issued by the OLT mismatch the actual ONU capabilities.	Check configurations issued to the ONU by the OLT. It is found that some configurations are not supported by the ONU. For example, the number of GEM ports exceeds the number supported by the ONU.	Modify OLT configurations based on actual ONU capabilities.

6.1.2.4 ONU Fault

Procedure

Check for the possible causes on the ONU and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ONU has been configured at local and the configurations conflict with configurations issued by the OLT.	The management-related ONU configurations such as IP address and management mode are configured on the web page.	Delete the web page configurations and issue configurations to the ONU by the OLT.
The ONU functions improperly or is faulty.	Run the **ont reset** command to reset the ONU. It is found that the ONU fails to recover its configurations.	Replace the faulty ONU with a functional one.

6.1.3 GPON ONU Profile Match state is Mismatch

An ONU connected to a GPON port of an OLT can go online successfully, but the queried **Match state** of the ONU is displayed as **mismatch** by running the **display ont info** command on the OLT.

6.1.3.1 Fault Identification and Demarcation

An ONU connected to a GPON port of an OLT can go online successfully, but the queried **Match state** of the ONU is displayed as **mismatch** by running the **display ont info** command on the OLT.

Context

The ONU matching status indicates whether the actual ONU capability is the same as the service profile bound to the ONU. The status includes: initial, mismatch, and match. To some extent, the matching status is determined by the ONU running status and configuration status.

- The matching status of the ONU can be queried only when the ONU running status is online. The matching status is match when the actual hardware capability of ONU is the same as the ONU service profile bound with the ONU. Otherwise, the status is mismatch.

- In other configuration states, the matching status is initial.

- The ONU matching status does not affect the normal forwarding of the service flow, and only indicates whether the actual ONU capability is the same as the service profile bound to the ONU.

In practice, ONUs in the offline state are bulk pre-configured on the OLT to facilitate service provisioning. An ONU service profile and an ONU line profile are specified during such configurations. The ONU profiles together can be regarded as a virtual ONU. Subsequent services are configured based on this virtual ONU. Inconsistency between the capability set configured in the ONU profiles and the actual ONU capabilities involves the following two situations:

- The configured capability set outmatches the actual ONU capabilities. If the ONU is bound to such ONU profiles, ONU configurations will fail to match when the ONU goes online.

- The configured capability set undermatches the actual ONU capabilities. In this case, the ONU capabilities that are not covered by the ONU profiles will fail to be configured or applied.

Location Method

When the queried **Match state** of the ONU is displayed as **mismatch**, locate the fault according to the following procedure:

1. Check whether the capability set configured in the ONU service profile matches the actual ONU capabilities.

6.1.3.2 Fault of a Single ONU

Procedure

Run the **display ont capability** command to query the actual ONU capabilities. According to the data plan, modify the current ONU profiles, or bind matching ONU profiles to the ONU.

If this problem occurs on all the ONUs of the same type, the configurations of the ONU profiles may be incorrect.

- If the OLT works in the distributed mode, the profiles that are bound to the ONU cannot be modified or deleted. In this case, bind matching ONU profiles to the ONU.

- If the OLT works in the profile mode:

  a. Run the **display ont-srvprofile** command to query the information about the ONU service profile and run the **display ont-lineprofile** command to query the information about the ONU line profile.

  b. Modify the ONU profiles by referring to **Configuring a GPON ONT Profile** in the *Commissioning and Configuration Guide*.

6.1.3.3 Fault of All ONUs

Procedure

Run the **display ont capability** command to query the actual ONU capabilities. According to the data plan, modify the current ONU profiles, or bind matching ONU profiles to the ONU.

If this problem occurs on only one ONU, it is suggested to bind matching ONU profiles to the ONU.

- If the OLT works in the distributed mode:

  a. Run the **display ont-profile** command to query the current ONU profiles that are configured on the OLT.

  b. If the OLT does not have matching ONU profiles, run the **ont-profile add** command to add matching ONU profiles.

  c. Run the **ont modify** command to bind the ONU profiles to the ONU.

- If the OLT works in the profile mode:

  a. Run the **display ont-srvprofile** command to query the information about the ONU service profile and run the **display ont-lineprofile** command to query the information about the ONU line profile.

  b. If the OLT does not have matching ONU profiles, add matching ONU profiles by referring to **Configuring a GPON ONT Profile** in the *Commissioning and Configuration Guide*.

  c. In the GPON mode of the OLT, run the **ont modify** command to bind the ONU profiles to the ONU.

6.1.4 Failure to Auto Discover a GPON ONU

The ONU auto discovery failure is a fault in which an OLT fails to auto discover an ONU after the ONU is powered on.

6.1.4.1 Fault Identification and Demarcation

The ONU auto discovery failure is a fault in which an OLT fails to auto discover an ONU after the ONU is powered on.

Location Method

◻NOTE

The ONU auto discovery is a feature in which a pre-configured ONU automatically registers with an OLT after the ONU is powered on; if the OLT does not pre-configure the ONU, the ONU enters the auto discovery state and waits to be configured by the OLT.

When an OLT fails to auto discover an ONU, locate the fault based on the following fault symptoms and possible causes.

Fault Scope	Symptom	Possible Cause
OLT	A single ONU or some ONUs connected to an OLT fail to be auto discovered by the OLT.	The actual distance between the ONU and OLT exceeds the ranging compensation distance configured on the OLT.

Fault Scope	Symptom	Possible Cause
	All the ONUs connected to a PON port on an OLT fail to be auto discovered by the OLT.	- The ONU auto discovery function is disabled on the PON port. - The laser on the PON port is disabled. - The PON port is faulty.
	All the ONUs connected to a board on an OLT fail to be auto discovered by the OLT.	The board or the slot is faulty.
ODN	The PON port reports alarms described in ODN-Related Alarms, including **0x2e11a001 The feed fiber is broken or OLT can not receive any expected optical signals(LOS)** and etc.	ODN failures are generally caused by large reflection and attenuation caused by improper optical components, design, or construction. For details, see . - If a single ONU or multiple ONUs connected to an OLT fail to be auto discovered by the OLT, the branch fiber and the optical component may have faults. - If all ONUs connected to a PON port on an OLT fail to be auto discovered by the OLT, the backbone fiber and the optical component may have faults.
ONU	A single ONU or some ONUs connected to an OLT fail to be auto discovered by the OLT.	- The ONU is not powered on. - A rogue ONU exists on the network and affects other ONUs. - The ONU hardware is faulty. - The optical module of the ONU is faulty. - The Patch cord of the ONU is broken or bent excessively.

⚠ **NOTICE**

The parameters of the optical module in this topic comply with Class B+. Note that such parameters are slightly different from the parameters in Class C.

6.1.4.2 OLT Fault

Procedure

Check for the possible causes on the OLT and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ONU auto discovery function is disabled on the PON port.	Run the **display port info** command to query the information about the PON port. It is found that **Autofind** is in the **Disable** state.	Run the **port ont-auto-find** command to enable the auto discovery function of the PON port. **NOTE** By default, the ONU auto discovery function is disabled on a PON port.
The actual distance between the ONU and OLT exceeds the ranging compensation distance configured on the OLT.	Run the **display port info** command to query the minimum logical reach (**Min distance**) and maximum logical reach (**Max distance**) configured for the PON port. It is found that the actual distance between the ONU and OLT exceeds the ranging compensation distance. For example, the actual length of the optical fiber between the ONU and OLT is about 25 km, which exceeds the ranging compensation distance of 0-20 km.	Run the **port range** command to adjust the minimum logical reach and maximum logical reach so that the actual distance between the ONU and OLT is within the ranging compensation distance. **NOTE** ● By default, the ranging compensation distance of a GPON port is from 0 km to 20 km. ● According to Class B+, the maximum logical reach of a GPON port must not exceed 60 km, and the difference between the minimum logical reach and maximum logical reach must not exceed 20 km.
The laser on the PON port is disabled.	Run the **display port info** command to query the information about the PON port. It is found that **Admin State** is in the **Off** state.	Run the **port laser-switch** command to enable the laser on the PON port. **NOTE** By default, the laser on a GPON port is enabled.

Possible Cause	Judgment Criterion	Troubleshooting Method
The PON port is faulty.	If either of the following two situations occurs, the PON port is faulty. ● Run the **display port state** command to query the status of the PON port. It is found that abnormal items exist in the query result. For example, the laser status (**Laser state**) is abnormal and the transmit optical power (**TX power**) exceeds the normal range (1.5-5.0 dBm). ● Migrate the service to another port. It is found that the ONU is auto discovered by the OLT.	Replace the optical module of the PON port or replace the board.
The type of the optical module of the PON port is incorrect.	Run the **display port state** command to query the port status. xxx NRZ indicates that the optical module is of the GPON type. xxx 10BBB indicates that the optical module is of the EPON type.	Replace the optical module.
The board or the slot is faulty.	Run the **display board** command to query the status of the board. It is found that the board status is not **Normal**.	Run the **board reset** command to reset the board or change the board to another slot. If the fault persist, replace the board.

6.1.4.3 ODN Fault

Procedure

Check for the possible causes on the ODN and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical fiber connector is not clean. **NOTE** An unclean optical fiber connector will cause excessive attenuation and abnormal reflection.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that the reflection and return loss are abnormal. 2. Check the optical fiber connector on site by using the optical fiber endface detector. It is found that the optical fiber connector is not clean.	Clean the optical fiber connector. For details about how to clean the connector, see .
The optical fiber is bent excessively. **NOTE** Optical signals attenuate seriously on an optical fiber with an excessively small bending radius.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber on site. It is found that the optical fiber is bent excessively.	Route and bundle the optical fiber in a proper manner.
The optical fiber is not firmly connected or different types of optical fiber connectors are interconnected. **NOTE** If the optical fiber is not firmly connected or different types of optical fiber connectors are interconnected, the attenuation and reflection will be excessively large.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber connectors on site. It is found that the optical fiber is not firmly connected or PC connector (blue) and APC connector (green) are interconnected.	● If the optical fiber is not firmly connected, reconnect the optical fiber firmly. ● If different types of optical fiber connectors are interconnected, replace the incompatible connector with a compatible one or replace relevant devices, such as the optical splitter. **NOTE** In the scenario of the CATV service, it is recommended that you use APC connectors (green) only.

Possible Cause	Judgment Criterion	Troubleshooting Method
The multi-mode optical fiber is used as the backbone or branch optical fiber. **NOTE** If the multi-mode optical fiber is used as the backbone or branch optical fiber, the optical signal attenuates quickly and the return loss increases.	1. Check the backbone fiber and branch fiber by using the OTDR. It is found that optical signals attenuate seriously. 2. Check the optical path on site. It is found that the multi-mode optical fiber is used. The multi-mode optical fiber can be recognized by its physical features such as its color.	Replace the multi-mode optical fiber with the single-mode optical fiber.
The optical attenuation of the optical path is excessively small. **NOTE** - If the optical attenuation of the optical path is excessively small, the optical power received by the ONU will exceed the overload optical power of the ONU. - Such a situation occurs usually in labs, where the OLT and ONU may be directly connected to each other through a short optical fiber.	If either of the following two situations occurs, the optical attenuation of the optical path is excessively small. - Measure the receive optical power of the ONU by using the optical power meter. It is found that the actual receive optical power of the ONU is greater than -8 dBm. - Check the optical path between the OLT and ONU. It is found that the optical attenuation of the optical path is excessively small. The normal attenuation range is 10-25 dB.	Add an optical attenuator on the optical path between the OLT and ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ODN is not properly planned. **NOTE** - The split ratio of the ODN link is not determined by the number of ONTs connected but by the split ratio of optical splitters. When an optical splitter is connected to the ODN, attenuation occurs and the split ratio of the optical splitter needs to be calculated. - The differences between the OLT-received optical power from the two adjacent ONUs must be smaller than or equal to 15 dB.	The ODN does not meet the requirements of the ODN link plan or GPON Class B+. - Three-level splitting exists in the ODN. - The network coverage of the ODN exceeds 20 km by far. - The split ratio exceeds the maximum split ratio that the board allows. Assuming that the maximum split ratio of a board is 1:64. If the first-level split ratio is 1:8 and the second-level split ratio is 1:16, the actual split ratio is 1:128, which exceeds the maximum split ratio of the board. - The optical attenuation difference of two optical paths exceeds 15 dB.	Optimize the ODN to meet Huawei's ODN planning requirements and protocol requirements.
The optical splitter is faulty or the connectors on the optical splitter are not clean.	Measure the input and output optical power of the optical splitter by using the optical power meter. It is found that the actual attenuation exceeds the theoretical attenuation. **NOTE** The faults in the optical splitter cannot be located by the OTDR because the OTDR cannot penetrate the optical splitter.	Replace the faulty optical splitter or clean the connectors on the optical splitter.
A backbone fiber break occurs.	1. Check the backbone fiber by using the OTDR. It is found that a backbone fiber break occurs. 2. Check the optical fiber on site. It is found that the optical fiber is broken or not connected.	Reconnect the backbone optical fiber.

Possible Cause	Judgment Criterion	Troubleshooting Method
A branch fiber break occurs.	1. Check the branch fiber by using the OTDR. It is found that a branch fiber break occurs. 2. Check the optical fiber on site. It is found that the optical fiber is broken or not connected.	Reconnect the branch optical fiber.

6.1.4.4 ONU Fault

Procedure

Check for the possible causes on the ONU and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ONU is not powered on.	Check the power supply of the ONU. It is found that the power supply of the ONU fails or is turned off.	Restore the power supply of the ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
A rogue ONU exists on the network and affects other ONUs. **NOTE** If a rogue ONU exists, the ONU that fails to go online may be a normal one and the ONU that can go online may be a rogue one.	If either of the following two situations occurs, a rogue ONU exists. ● The **0x2e314021 There are illegal incursionary rogue ONTs under the port** alarm is generated on the OLT. ● The **0x2e314022 The ONT is rogue ONT** alarm is generated on the OLT. ● Remove the optical fiber from the OLT port and connect the optical fiber to the optical power meter for measurement. If a value can be read from the optical power meter, a continuous-mode ONU or irregular-mode ONU exists. **NOTICE** Measuring the optical power interrupt services, Therefore, it is recommended that you measure the optical power when a PON port does not run any services, such as deployment.	Replace the rogue ONU with a normal one.
The ONU hardware is faulty.	If either of the following two situations occurs, the ONU hardware is faulty. ● The LEDs of the ONU are off when the ONU is powered on. ● After the ONU is replaced with another ONU, the new ONU is auto discovered by the OLT.	Replace the faulty ONU or the optical module of the ONU.

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical module of the ONU is abnormal. For example, the transmit optical power of the optical module is excessively small or its receiver sensitivity is low.	Replace the faulty ONU with a normal one. It is found that the new ONU is auto discovered by the OLT. An alternative is to locate the fault as follows: ● Set the optical module of the ONU to the continuous mode, and measure the transmit optical power by using the optical power meter. It is found that the actual transmit optical power is beyond the normal range (0.5 dBm to +5 dBm). ● Measure the receive optical power of the ONU by using the optical power meter. It is found that the actual receive optical power is within the normal range (-27 dBm to -8 dBm). **NOTE** The transmit optical power of a 10G GPON optical module ranges from 2 dBm to 7 dBm, and the receive optical power ranges from -29.5 dBm to -9 dBm.	Replace the faulty ONU or the optical module of the ONU.
The Patch cord of the ONU is broken or bent excessively.	Check the Patch cord of the ONU. It is found that the Patch cord is broken or bent excessively.	Replace the Patch cord of the ONU.

6.1.5 GPON ONU Frequently Goes Online and Offline

ONUs connected to a GPON port frequently go online and offline and therefore the OLT reports a large number of ONU LOS alarms and relevant recovery alarms.

6.1.5.1 Fault Identification and Demarcation

ONUs connected to a GPON port frequently go online and offline and therefore the OLT reports a large number of ONU LOS alarms and relevant recovery alarms.

Location Method

An ONU frequently goes online and offline because the OLT receives weak ONU signals. As a result, packets exchanged between the OLT and the ONU are lost.

- If an ONU frequently goes online and offline, such as every several seconds, the ODN may has a fault.
- If an ONU goes offline every one hour or longer, the ONU may be faulty.

When an ONU frequently goes online and offline, locate the fault based on the following fault symptoms and possible causes.

Fault Scope	Symptom	Possible Cause
OLT	All the ONUs connected to a PON port on an OLT frequently go online and offline.	The PON port is faulty.
	All the ONUs connected to a board frequently go online and offline.	The board or the slot is faulty.
ODN	The PON port reports alarms described in ODN-Related Alarms, including: ● **0x2e112002 The loss of GEM channel delineation (LCDGi) occurs** ● **0x2e112003 The signal degrade of ONTi (SDi) occurs** ● **0x2e112004 The signal fail of ONTi (SFi) occurs** ● **0x2e112006 The loss of frame of ONTi (LOFi) occurs**	The quality of the optical line is poor. ODN failures are generally caused by large reflection and attenuation caused by improper optical components, design, or construction. For details, see . ● If a single ONU or multiple ONUs frequently go online and offline, the branch fiber and the optical component may have faults. ● If all ONUs frequently go online and offline, the backbone fiber and the optical component may have faults.
ONU	A single ONU or some ONUs connected to an OLT frequently go online and offline.	● A rogue ONU exists on the network and affects other ONUs. ● The ONU is restarted repeatedly.

⚠️ NOTICE

The parameters of the optical module in this topic comply with Class B+. Note that such parameters are slightly different from the parameters in Class C.

6.1.5.2 Alarming Handling

Procedure

When the "ONU frequently goes online and offline" alarm is generated, run the **display ont info** command to query the **last down cause** of the ONU. Check whether the OLT generates the following alarms. If such alarms are generated, clear them and check whether the fault is rectified.

When an ONU frequently goes online and offline, the following alarms may be generated:

Fault Scope	Alarms
ODN	ODN-Related Alarms, including: **0x2e112002 The loss of GEM channel delineation (LCDGi) occurs** **0x2e112003 The signal degrade of ONTi (SDi) occurs** **0x2e112004 The signal fail of ONTi (SFi) occurs Description** **0x2e112006 The loss of frame of ONTi (LOFi) occurs** **0x2e11a001 The feed fiber is broken or OLT can not receive any expected optical signals(LOS)** **0x2e112007 The distribute fiber is broken or the OLT cannot receive expected optical signals from the ONT(LOSi/LOBi)**
ONT	**0x2e314021 There are illegal incursionary rogue ONTs under the port** **0x2e314022 The ONT is rogue ONT**

6.1.5.3 OLT Fault

Procedure

Check for the possible causes on the OLT and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The PON port is faulty.	If either of the following two situations occurs, the PON port is faulty. ● Run the **display port state** command to query the status of the PON port. It is found that abnormal items exist in the query result. For example, the laser status (**Laser state**) is abnormal and the transmit optical power (**TX power**) exceeds the normal range (1.5-5.0 dBm). ● Migrate the service to another port. It is found that the ONU functions properly.	Replace the optical module of the PON port or replace the board.
The board or the slot is faulty.	All the ONUs connected to a board frequently go online and offline.	Change the board to another slot. If the fault persist, replace the board.

6.1.5.4 ODN Fault

Procedure

Check for the possible causes on the ODN and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical fiber connector is not clean. **NOTE** An unclean optical fiber connector will cause excessive attenuation and abnormal reflection.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that the reflection and return loss are abnormal. 2. Check the optical fiber connector on site by using the optical fiber endface detector. It is found that the optical fiber connector is not clean.	Clean the optical fiber connector. For details about how to clean the connector, see .

Possible Cause	Judgment Criterion	Troubleshooting Method
The optical fiber is bent excessively. **NOTE** Optical signals attenuate seriously on an optical fiber with an excessively small bending radius.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber on site. It is found that the optical fiber is bent excessively.	Route and bundle the optical fiber in a proper manner.
The optical fiber is not firmly connected or different types of optical fiber connectors are interconnected. **NOTE** If the optical fiber is not firmly connected or different types of optical fiber connectors are interconnected, the attenuation and reflection will be excessively large.	1. Test the backbone fiber and branch fiber by using the OTDR. It is found that abnormal return loss points exist on the optical fiber. 2. Check the optical fiber connectors on site. It is found that the optical fiber is not firmly connected or PC connector (blue) and APC connector (green) are interconnected.	● If the optical fiber is not firmly connected, reconnect the optical fiber firmly. ● If different types of optical fiber connectors are interconnected, replace the incompatible connector with a compatible one or replace relevant devices, such as the optical splitter. **NOTE** In the scenario of the CATV service, it is recommended that you use APC connectors (green) only.
The multi-mode optical fiber is used as the backbone or branch optical fiber. **NOTE** If the multi-mode optical fiber is used as the backbone or branch optical fiber, the optical signal attenuates quickly and the return loss increases.	1. Check the backbone fiber and branch fiber by using the OTDR. It is found that optical signals attenuate seriously. 2. Check the optical path on site. It is found that the multi-mode optical fiber is used. The multi-mode optical fiber can be recognized by its physical features such as its color.	Replace the multi-mode optical fiber with the single-mode optical fiber.
The optical splitter is faulty or the connectors on the optical splitter are not clean.	Measure the input and output optical power of the optical splitter by using the optical power meter. It is found that the actual attenuation exceeds the theoretical attenuation. **NOTE** The faults in the optical splitter cannot be located by the OTDR because the OTDR cannot penetrate the optical splitter.	Replace the faulty optical splitter or clean the connectors on the optical splitter.

Possible Cause	Judgment Criterion	Troubleshooting Method
The ODN is not properly planned. **NOTE** - The split ratio of the ODN link is not determined by the number of ONTs connected but by the split ratio of optical splitters. When an optical splitter is connected to the ODN, attenuation occurs and the split ratio of the optical splitter needs to be calculated. - The differences between the OLT-received optical power from the two adjacent ONUs must be smaller than or equal to 15 dB.	The ODN does not meet the requirements of the ODN link plan or GPON Class B+. - Three-level splitting exists in the ODN. - The network coverage of the ODN exceeds 20 km by far. - The split ratio exceeds the maximum split ratio that the board allows. Assuming that the maximum split ratio of a board is 1:64. If the first-level split ratio is 1:8 and the second-level split ratio is 1:16, the actual split ratio is 1:128, which exceeds the maximum split ratio of the board. - The optical attenuation difference of two optical paths exceeds 15 dB.	Optimize the ODN to meet Huawei's ODN planning requirements and protocol requirements.

6.1.5.5 ONU Fault

Procedure

Check for the possible causes on the ONU and troubleshoot the faults accordingly.

Possible Cause	Judgment Criterion	Troubleshooting Method
A rogue ONU exists on the network and affects other ONUs. **NOTE** If a rogue ONU exists, the ONU that fails to go online may be a normal one and the ONU that can go online may be a rogue one.	If either of the following two situations occurs, a rogue ONU exists. ● The **0x2e314021 There are illegal incursionary rogue ONTs under the port** alarm is generated on the OLT. ● The **0x2e314022 The ONT is rogue ONT** alarm is generated on the OLT. ● Remove the optical fiber from the OLT port and connect the optical fiber to the optical power meter for measurement. If a value can be read from the optical power meter, a continuous-mode ONU or irregular-mode ONU exists. **NOTICE** Measuring the optical power interrupt services, Therefore, it is recommended that you measure the optical power when a PON port does not run any services, such as deployment.	Replace the rogue ONU with a normal one.
The ONU is restarted repeatedly.	Check whether the ONU is faulty or whether the power voltage is unstable.	Replace the ONU or ensure that the power supply of the ONU is normal.