FTTx GPON ONU Troubleshooting

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Objectives

- Upon completion of this course, you will be able to:

  - List the common fault of ONU

  - Able to analyze and locate ONU faults

  - Complete ONU troubleshooting

Contents

1. Categorized ONU Faults And Troubleshooting Methods

2. Case Study

Contents

1. Categorized ONU Faults And Troubleshooting Methods

   1.1 Check ONU Status

   1.2 ONU common faults

2. Case Study

Check ONU Status—LED

Indicator	state	Meaning and Processing
POWER	on	Power supply normal
	off	●check the power connection ●check the power adapter ●change another ONU
AUTH	on	pass the authentication
	off	fails to pass the authentication ●check whether OLT add the ONU ●check the SN of ONU
LINK	on	optical link normal
	off	check the connection of fiber
VOIP	on	VOIP service registered successfully
	off	VOIP service registered failed ●check the link to MGC, make sure can ping MGC ●check the VOIP service configuration

POWER ○ AUTH ○ LINK ○ LAN1 ○ LAN2 ○ LAN3 ○ LAN4 ○ VoIP ○

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Check MDU Status—LED

multiservice acces unit

multi dwelling unit

Indicator	state	Meaning
LINK	on	GPON interface detect optical signal
	off	GPON interface not detect optical signal
REG	blinking	registering
	off	fails to register

LINK REG

Check ONU Status—Command Line

- Check ONU Status online
    - Run command "display ont info" to check ONU information, mainly focus on the control flag, run state, SN, configure state and match state.
    - huawei(config-if-gpon-0/2)#**display ont info 0 all**

> - MA5600T(config-if-gpon-0/3)#display ont info 0 all
> - --
> - ONT-ID   SN   Control   Run   Config   Match   Protect
>   flag   state   state   state   side
> - --
> -   0   485754436471B642   active   online   normal   match   no
> - --
> - Description   : ONT_NO_DESCRIPTION
> - --
> -   1   323031312E396A41   active   online   normal   mismatch   no
> - --
> - Description   : ONT_NO_DESCRIPTION
> - --
> - In port 0, the total of ONTs are: 2

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Check ONU Status—Command Line

		Run State		Config State	
		Online	Offline	Normal	Initial
Control State	Activated	ONU online and pass the authentication	ONU offline but hardware normal	All the configuration data correct and can be supported by the ONU.	Configuration failed. Check the configuration or reboot ONU
	De-activated	Not permit registration, you need to run "ont activate" to enable the ONU.			

Contents

1. Categorized ONU Faults And Troubleshooting Methods

    1.1 Check ONU Status

    1.2 ONU common faults

2. Case Study

Categorized Common Faults

No.	Symptom	Possible causes
1	ONT failure to automatically find an ONU	1.ONU hardware fault 2.PON interface disable the "auto-find" function 3.Too much power attenuation 4.ONU beyond the maximum reachable distance
2	ONU registration failure	1.The number of ONU exceed the maximum permission of one PON interface 2.ONU hardware problem 3.Input SN or password incorrect 4.ONT ID has been occupied by other ONU 5.service board fault
3	ONU frequently goes online and offline	1.ONU hardware fault 2.Optical power attenuation lead to the receiving power around the minimum sensitivity 3.power supply not stable

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A Single ONU or Multiple ONUs Connected to a Port Fail to Register

- When a single ONU or multiple ONUs connected to a GPON port fail to register, locate the fault according to the following procedure:
  - □ Check major alarms
  - □ Check whether the ONU is correctly configured
  - □ Check the ONU status
  - □ Check whether the capability profile bound to the ONU matches the actual capability of the ONU
  - □ Check whether the authentication information (SN or the password) conflicts
  - □ Check whether there are a lot of ONUs are connected to a splitter
  - □ Check the maximum registered distance of the ONU

All the ONUs Connected to a Port Fail to Register

- When all the ONUs connected to a port fail to register, locate the fault according to the following procedure:

  □ Check major alarms

  □ Check whether the laser of the PON port of the OLT is enabled

  □ Check whether the optical transceiver is faulty

Failure to Automatically Find an ONU

Scope	Symptom	Possible Causes
OLT	A single ONU or some ONUs fail to be automatically found by the OLT	The actual distance between the ONU and OLT exceeds the ranging compensation distance configured on the OLT
	All the ONUs connected to a PON fail to be automatically found by the OLT	●The ONU auto-find 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 fail to be automatically found by the OLT	The board is in the abnormal state
ODN	A single ONU or some ONUs connected to an OLT fail to be automatically found by the OLT	●The branch fiber is bent excessively. ●The branch fiber connector is not clean. ●Different types of branch fiber connectors are interconnected. ●The multi-mode optical fiber is used as the branch fiber. ●The ODN is not properly planned. For example, the split ratio, network coverage and attenuation difference are not planned within the proper ranges. ●The optical attenuation of the optical path is excessively small. ●A branch fiber break occurs. ●The optical splitter is faulty or the connectors on the optical splitter are not clean.

Failure to Automatically Find an ONU

Scope	Symptom	Possible Causes
ODN	All the ONUs connected to a PON port on an OLT fail to be automatically found by the OLT	●The backbone fiber is bent excessively. ●The backbone fiber connector is not clean. ●Different types of backbone fiber connectors are interconnected. ●The multi-mode optical fiber is used as the backbone fiber. ●A backbone fiber break occurs. ●The optical splitter is faulty or the connectors on the optical splitter are not clean.
ONU	A single ONU or some ONUs connected to an OLT fail to be automatically found by the OLT	●The ONU is not powered on. ●A rogue ONU (such as a continuous-mode ONU) exists on the network and affects other ONUs. ●The ONU hardware is faulty. ●The optical transceiver of the ONU is faulty.

ONU Frequently Goes Online and Offline

Scope	Symptom	Possible Causes
OLT	All the ONUs connected to a PON frequently go online and offline.	The PON port is faulty.
	All the ONUs connected to a board frequently go online and offline.	The board is faulty.
ODN	A single ONU or some ONUs connected to an OLT frequently go online and offline.	● The branch fiber is bent excessively. ● The branch fiber connector is not clean. ● Different types of branch fiber connectors are interconnected. ● The multi-mode optical fiber is used as the branch fiber. ● The ODN is not properly planned. For example, the split ratio, network coverage and attenuation difference are not planned within the proper ranges. ● The optical splitter is faulty or the connectors on the optical splitter are not clean.

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ONU Frequently Goes Online and Offline

Scope	Symptom	Possible Causes
ODN	All the ONUs connected to a PON port on an OLT frequently go online and offline.	●The backbone fiber is bent excessively. ●The backbone fiber connector is not clean. ●Different types of backbone fiber connectors are interconnected. ●The multi-mode optical fiber is used as the backbone fiber. ●The optical splitter is faulty or the connectors on the optical splitter are not clean.
ONU	A single ONU or some ONUs connected to an OLT frequently go online and offline.	●A rogue ONU (such as a continuous-mode ONU) exists on the network and affects other ONUs. ●The ONU is restarted repeatedly.

Questions

conf in de sevr prof issue

- Q：What's the cause that ONT's status is "mismatch" ? How to deal with?

- A:

- Q：If all the ONUs belong to the same PON interface can't be auto found, what's the possible causes?   autofind is disable
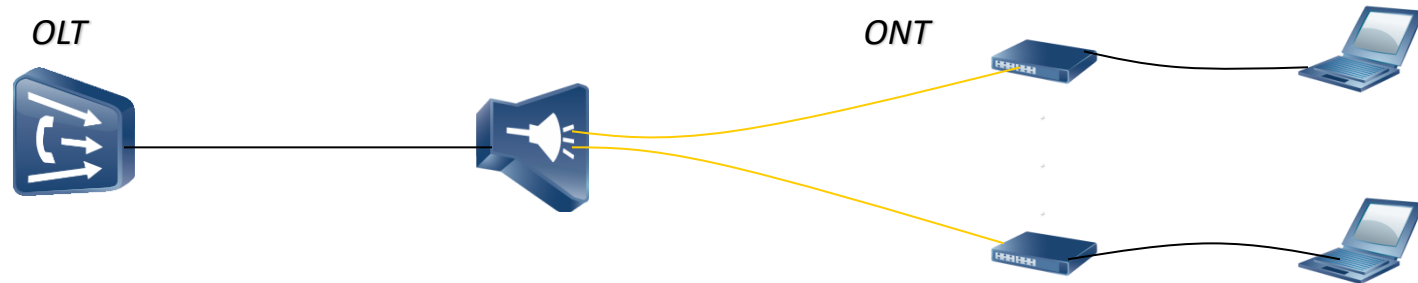
- A:

Contents

Case1 ONT fail to register

- Description：

  After an engineer install and add ONT manually, find that the LED indicator on the ONT kept blinking, can not registered to OLT. But other ONTs of the same PON interface normal.

  OLT   ONT

- Judge the range of fault:

  Single ONT fault, the cause possible happens on ONU, branch fiber, splitter or data configuration. We can exclude the checking of uplink, service card and PON interface.

Case1 ONT fail to register

- Check the fault

  - Optical Power

    （but no optical meter available）

    → Move the ONT to the splitter, fault persist

  - hardware fault

    → Reset NOT, fault persist

  - data configuration

    → Find that the inputted SN the last one incorrect

- Eliminate fault： modify the SN, ONT can be registered successfully

Experience & Conclusion：
  When we add ONT online, we can enable the "auto-find" function and use "copy" and "paste" to input the SN avoid of incorrect inputting. If we add ONT offline, we'd better check the inputted SN to ensure correctness.
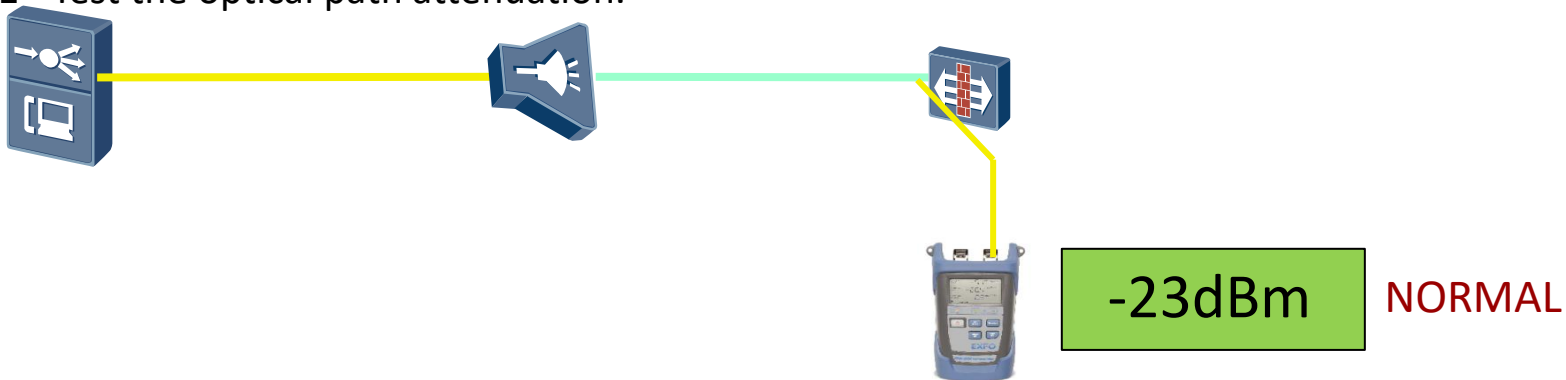
Case2 ONU Frequently Goes Online and Offline

- Description:

  - When an ONT is installed in the deployment, the optical path attenuation is -23 dB, which is within the normal attenuation range. After the optical fibers are connected, the LED of the PON port blinks. In addition, the ONT fails to register with the OLT normally, and the ONT goes online and offline frequently.

- Alarm:

  - The up and down alarms about the ONT (OT928) are generated on the OLT.

- Cause Analysis

  - The optical path attenuation is very large

  - The optical fiber connectors are not clean or not connected properly

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Case2 ONU Frequently Goes Online and Offline

- Troubleshooting Procedure
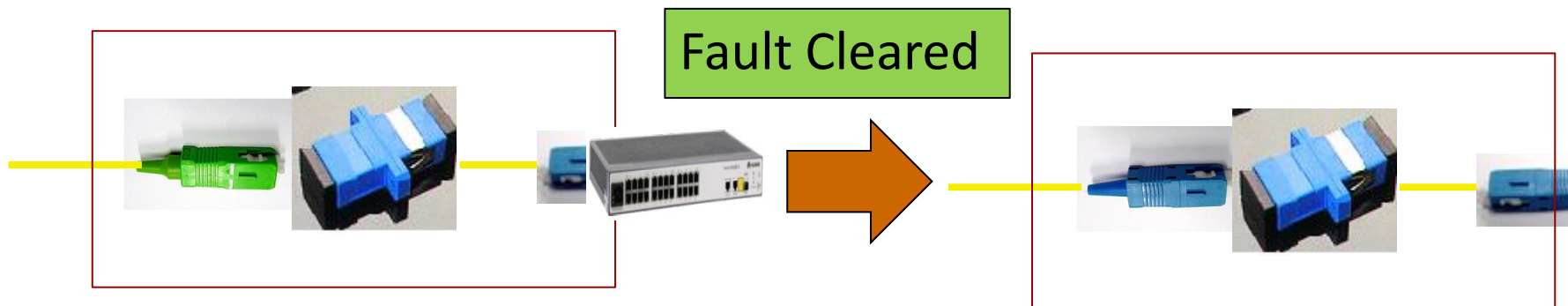
  - Test the optical path attenuation.

-23dBm   NORMAL

  - Clean the optical fiber connectors

Fault Persist

Case2 ONU Frequently Goes Online and Offline

- Troubleshooting Procedure

  - Replace the ONT with another ONT (OT928) to conduct a test

  - Check the fiber patch cord of the ONT

Fault Cleared

Case2 ONU Frequently Goes Online and Offline

Experience & Conclusion：
 Currently, the type of the fiber patch cord used in the ONT (OT928) is seldom used in China, but is mostly used abroad. Therefore, note that you should use the correct fiber patch cord.
The greatest difference between green and blue fiber patch cords is as follows: The interconnection section between the fiber patch cord with green connectors and the OT928 is oblique. The interconnection section between the fiber patch cord with blue connectors and the ONT is plane, which can result in 3-6 dB optical attenuation.

Case3 MDU Goes Online and Offline Repeatedly

- Description
  - In a remote countryside, a MDU connected to an OLT in an office goes online and offline repeatedly and irregularly
- Alarm
  - Alarms that the ONU goes online and offline repeatedly are generated on the OLT
- Cause Analysis
  - The optical fiber attenuation is very large
  - The hardware of the ONU is faulty
  - The boards on the OLT are faulty

Case3 MDU Goes Online and Offline Repeatedly

- Judge the range of fault
    - Single ONU fault, others MDU under the same PON interface normal. Thus we can exclude the problem of PON board, that must because of the part from splitter to user side.

- Causes Analysis
    - Test the optical path attenuation.

-20dBm   NORMAL

    - Replace the ONU with another ONU

Case3 MDU Goes Online and Offline Repeatedly

□ Check the environment

Log in to the ONU in the telnet mode, and then run the ***display alarm list all*** command to carefully view the alarms. It is found that the ONU resets in peak hours from 7:00 a.m. to 8:00 p.m. in four consecutive days. Therefore, it can be pr determined that the fault is caused by the voltage.

□ Check the environment

Use a multimeter to test the voltage on site. It is found that the ONU resets repeatedly due to unstable voltage. Replace the ONU with another ONU with the DC module. As a result, the fault is rectified.

Experience & Conclusion：
 If an ONU uses the AC power supply, the ONU resets repeatedly when the voltage is unstable. If the voltage is abnormal and the normal voltage cannot be guaranteed, it is recommended that you use an ONU with the DC module.

Case4 All the ONUs under the same PON interface service interrupted

- Description

  - On one site, under a PON interface of an OLT that has been running for a long time, all the subscribers complain all the services interrupted. But users of other PON interface not be affected.

- Causes Analysis

  - optical power budget

  - feed fiber fault

  - PON interface fault

  - ONT fault
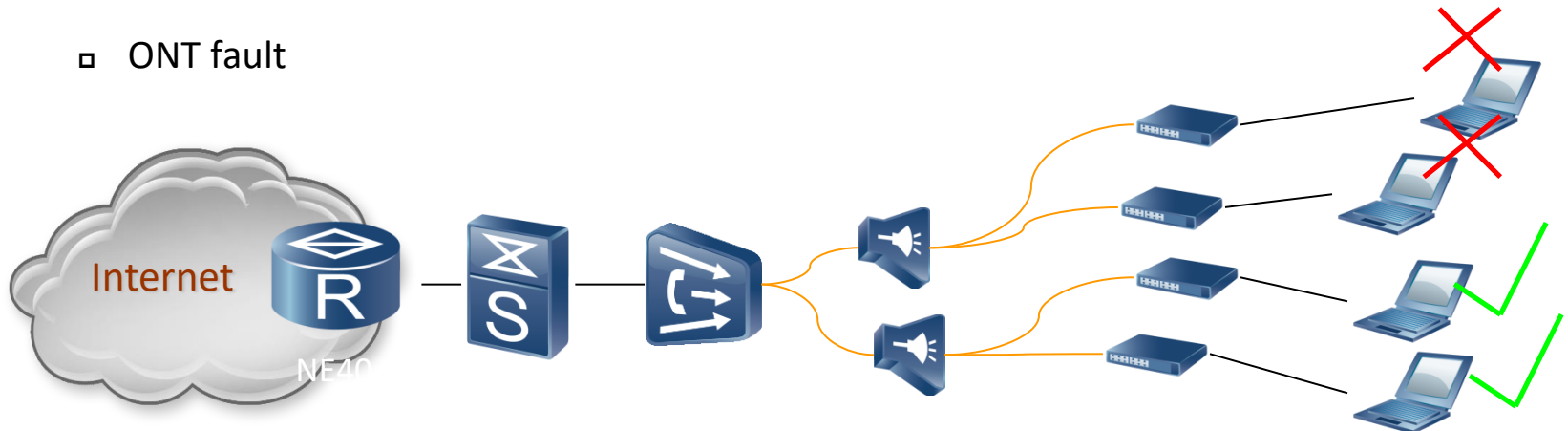
Case4 All the ONUs under the same PON interface service interrupted

- Judge the range of fault

  - According to the comparison to other PON interface, we can preliminary locate the fault happened between PON interface and ONT.

- Processing procedure

  - Check the board status

  - Check the ONU information in OLT, find that only one ONU online, others offline.

  - On the splitter plug out the fiber of the online ONU, other ONUs turn to normal.

- Troubleshooting

  - Notify the 1st line maintenance personnel, take the ONU back and find that that is a rogue ONU.

Experience & Conclusion：
 If the PON interface of the ONU fault and emit light all the time, indicate it occupy all the uplink timeslots, cause all the other ONUs belong to the same PON interface offline.

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Summary

- ONU status query and maintenance

- Category ONU common faults and the corresponding processing methods

- Analyze and troubleshoot ONU fault cases

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Thank you

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