

FTTx GPON VoIP Service Troubleshooting

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References

- SmartAX OLT&MA5603T Multi-service Access Module Product Documentation-(V800R008C01_03)



Objectives

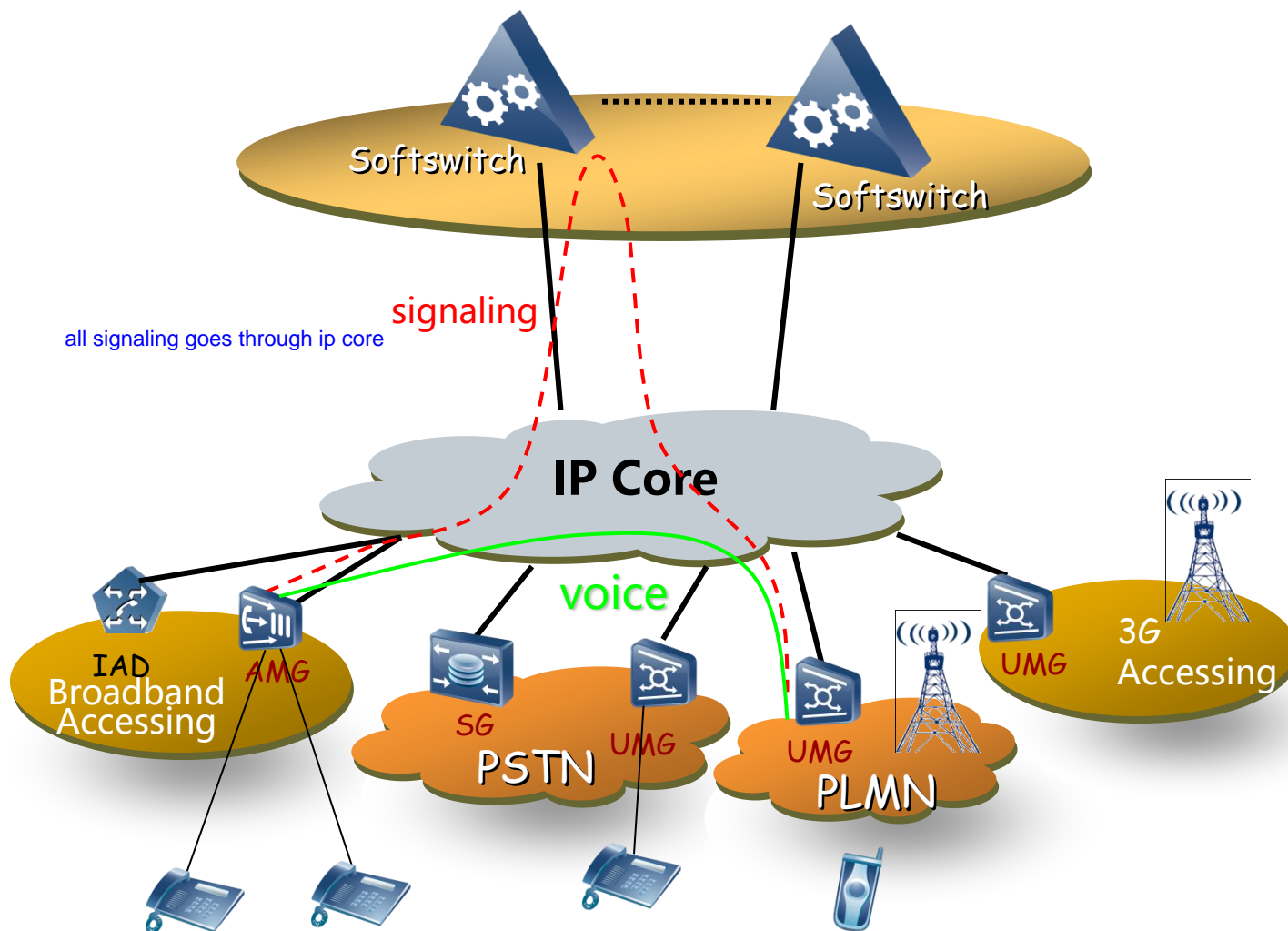
- Upon completion of this course, you will be able to:
 - Collect VoIP fault information
 - List VoIP common faults
 - Complete VoIP service troubleshooting



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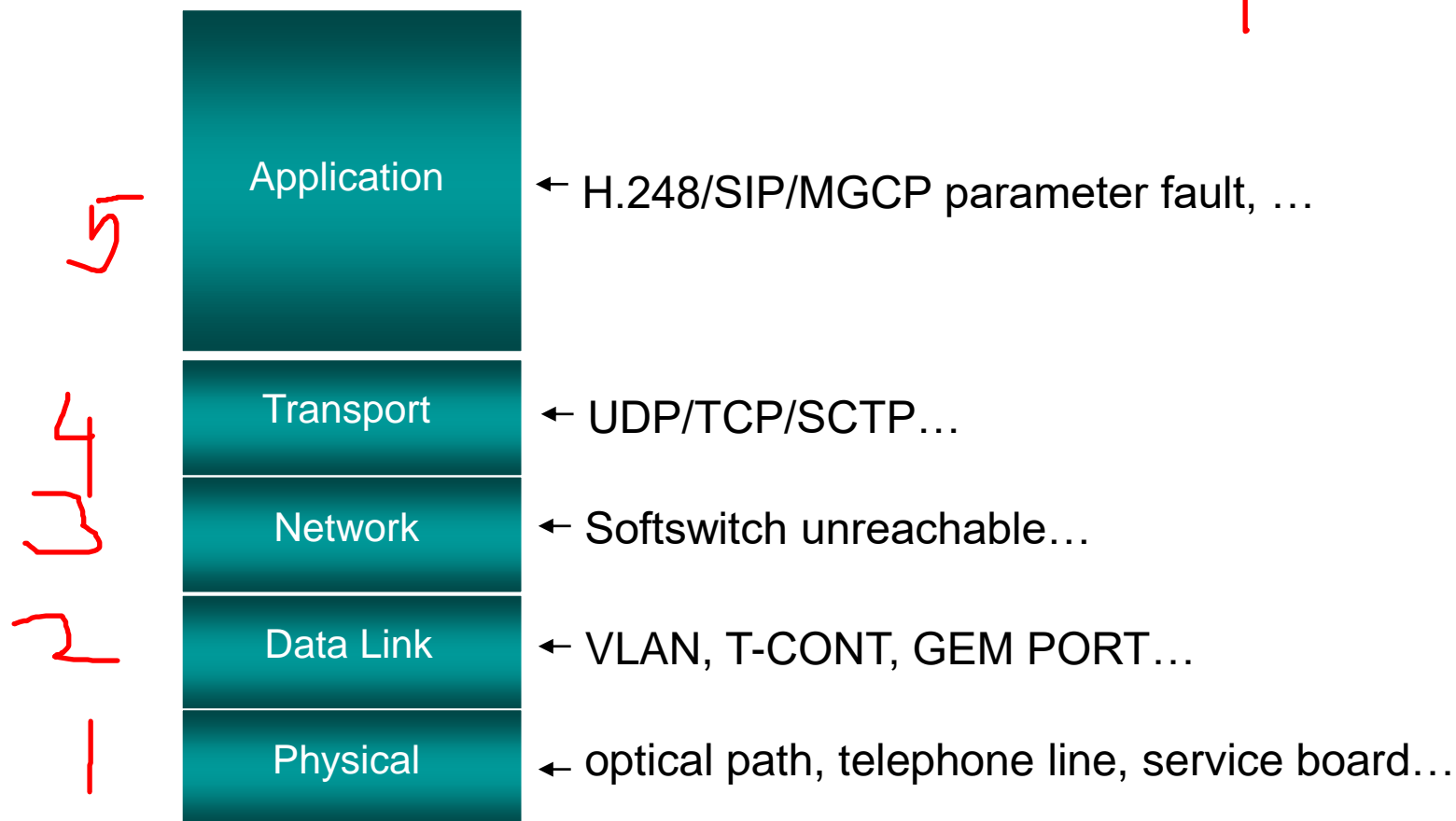
1. VoIP service fault analysis and locating
2. Categorized VoIP faults and troubleshooting
3. Case study

VoIP network structure

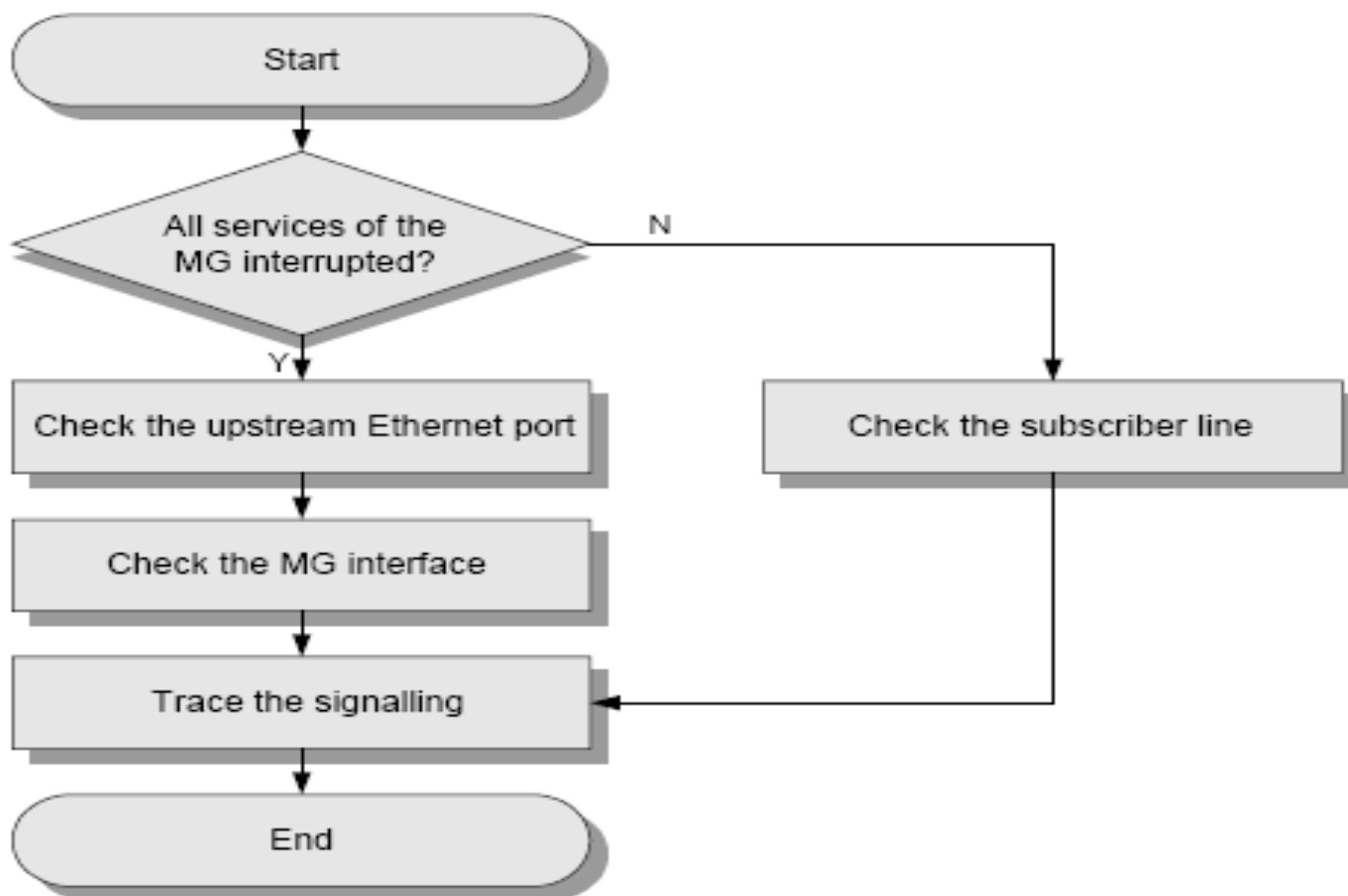


Layered Analysis

TCP/IP



Troubleshooting VoIP Service Flowchart



Check ONU Status

Indicator	Status	Description
POWER	ON	The HG850 is powered on.
	OFF	The HG850 is powered off.
LINK	Refer to HSI service troubleshooting slide	
AUTH/REG		
VoIP	ON	The VoIP function is enabled
	OFF	The VoIP function is disabled
TEL	ON	The TEL interface is in the call status.
	Blinking	The TEL interface is in the ringing status.
	OFF	The TEL interface is idle.

Check the Line

- Check telephone line
 - What parameters need to check?
 - voltage
 - resistance
 - capacitance
 - How to test telephone line?
 - make use of the professional test meter
 - line test function provided by MxU

Test Voice Interface Circuit

- MA5616(config-test)#**pots circuit-test**

- { mgid<K>|frameid/slotid/portid<S><1,15>|telno<K> }:**0/3/0**
- { <cr>|busy<K> }:**busy**
- {busyflag<E><0,1> }:**0**
- Command: pots circuit-test 0/3/0 busy 0 Frame 0 slot 3 port 0 (telno - mgid 0 terminalid A0) under testing, Please wait.....
- huawei(config-test)# Testing port: 0/3/0
- Telno : -
- MGid : 0
- Terminalid : A0

Test Loop Line

- **MA5616(config-test)#pots loop-line-test 2/3/0**

- { <cr>|busy<K> }:

Command:

pots loop-line-test 2/3/0

- Frame 2 slot 3 port 0 (telno 6560100 v5id 6 addr 100)
 - under testing, Please wait.....
 -
 - OLT(config-test)#
 - Testing port: 2/3/0
 - Telno : 6560100
 - V5id : 6
 - Addr : 100

Check MxU

NO.	content	how to check
1	internal circuit	run the command under test mode: <i>pots circuit-test</i>
2	system information	run the command under global configure mode: <i>display version/board/alarm/patch/language</i>
3	MG interface information	run the command under MG interface mode: <i>display if-h248 state / display if-mgcp state</i> <i>display if-h248 attribute / display if-mgcp attribute</i>
4	MG interface software parameter information	run the command under MG interface mode: <i>display mg-software parameter</i>

Check MxU (Cont.)

NO.	content	how to check
5	data configuration of MGC	check MGC server
6	DSP channel information	run the command under global configure mode : <i>display dsp state</i> <i>display dsp attribute</i>
7	user's port information	run the command in "ESL user" mode : <i>display pstn port state</i> <small>display pstnport electric</small> <i>display mgpstnuser</i>

Check Service Board

- check service board state
 - check whether the service board normal, make sure to get the board type and version and troubleshoot the board faults as soon as possible upon any abnormality.

■ OLT#display board 0

```
-----  
- SlotID  BoardName  Status   Sub0    Sub1  
-----  
- 4       H802SHLB   Normal  
- 9       H801SCUB   Standby_failed  
- .....  
- 11      ASRB     Failed
```

Check the Version

- Check software version

- **Query version**

- Huawei(config)#**display version**
 - { <cr>|backplane<K>|frameid/slotid<S><Length 1-15> }:
 -
 - Command:
 - display version
 -
 - VERSION : MA5600V800R008C01
 - PATCH : SPC100
 - PRODUCT MA5680T
 - Uptime is 2 day(s), 5 hour(s), 24 minute(s), 22 second(s)

Check Patch

- Check software patch

- OLT(config)#**display patch**
- { all<K>|patchname<S><Length 4-17> }:all
- Command:
- display patch all
- Software Version:MA5600V800R008C01
- SPC100
- -----
- Current Patch State:
- -----
- Patch Name Patch State Delivery Attribute Dependency
- -----
- SPC100 running common cold patch NO
- -----
- Total:1
- Patches in the system cannot be rolled back

Check Logs and Alarms

- Check system log
 - check the history operation information
- Check alarm information generated by the device
 - check alarm information

```
■ OLT(config)# display log all
```

```
■ OLT(config)#display alarm history
```

```
{ alarmsn<K>|all<K>|alarmid<K>|alarmlevel<K>|alarmtype<K>
```

```
|alarmclass<K>|alarmtime<K> }:all
```

Check MG Interface

- 1. Check all the MG interface configured in the system
 - check the configuration and current state information of the MG interface for the MxU that support H.248 protocol

- MA5616(config)#**display if-h248 all**

```

- -----
- MGID  protocol  codetype  transmode  Port  state  MGCIP/DomainName
- -----
- 0      H248      text      UDP        2944  Normal  10.71.37.20
- 1      H248      text      UDP        2944  Normal  10.71.50.37
- -----
```

Check MG Interface

- 2. Check the attributes of MG interface
 - check the state and configuration parameters for a specified MG interface
 - MA5616(config-if-h248-0)#**display if-h248 attribute**

```
-----  
- MGID 0  
- Protocol H248 Start Negotiate Version 3  
- Profile Negotiation Parameter Disable  
- Codetype Text  
- Transmode UDP  
- MG signalling IP 10.10.1.166 MG signalling Port 2944  
- MG media IP 10.10.1.166  
- Active MGC MGC Port :2944 MGC IP:10.10.1.168 Active MGC MGC Domain Name:  
- Standby MGC MGC Port :- MGC IP:- Standby MGC MGC Domain Name:  
-----
```

Check MG Interface

- 3. Check the state of the MG interface
 - check the state and configuration parameters for a specified MG interface

- MA5616(config-if-h248-0)# **display if-h248 state**

```
– -----  
– MGID 0  
  Protocol H248  
  .....  
– Interface state          Normal  
– ... ..  
– -----
```



Questions

- Q: What are the possible faults of each layer for layered VoIP fault analysis?
- Q: What's the general VoIP service fault troubleshooting procedure?



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3. Case study

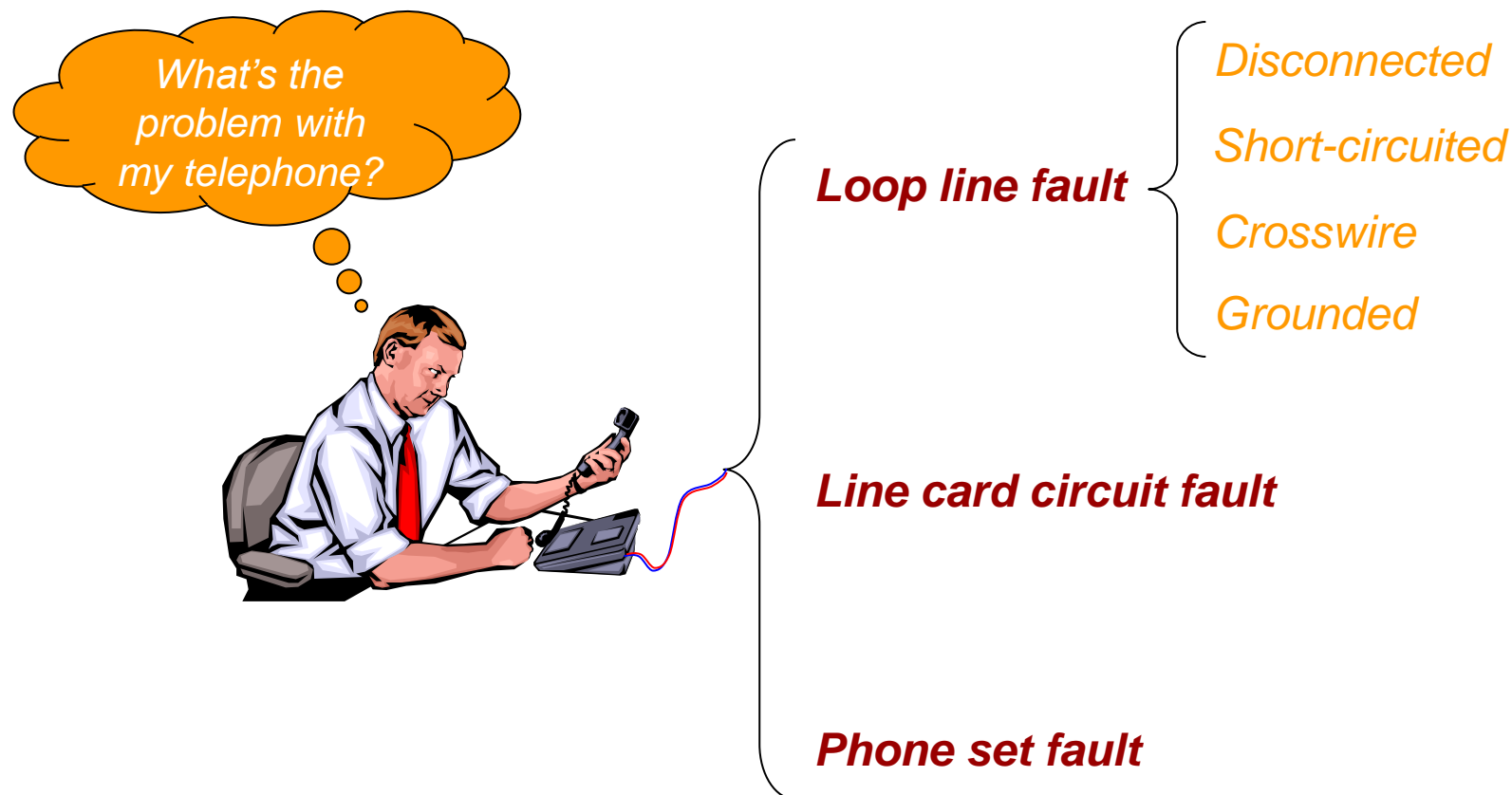
Category and Causes of Common Faults

S/N	Fault Category	Possible Causes
1	No feeding current on the phone	<ul style="list-style-type: none">•Subscriber loop line broken•Subscriber loop line short-circuited•Subscriber loop line mixed•Subscriber loop line grounded•Line card circuit fault•Phone set fault
2	Low quality of conversation (noise, discontinuity, or echo)	<ul style="list-style-type: none">•Loop line fault•Transmission clock source or grounding fault•Phone set fault•Wrong setting of voice gains
3	No-tone or busy tone when off-hook	<ul style="list-style-type: none">•User data error on the MGC or the ONU•Port fault
4	Call setup failure (one-way audio or no audio)	<ul style="list-style-type: none">•The quality of the bearer network does not meet the requirement.•The peer AG is faulty.•The ONU is faulty.

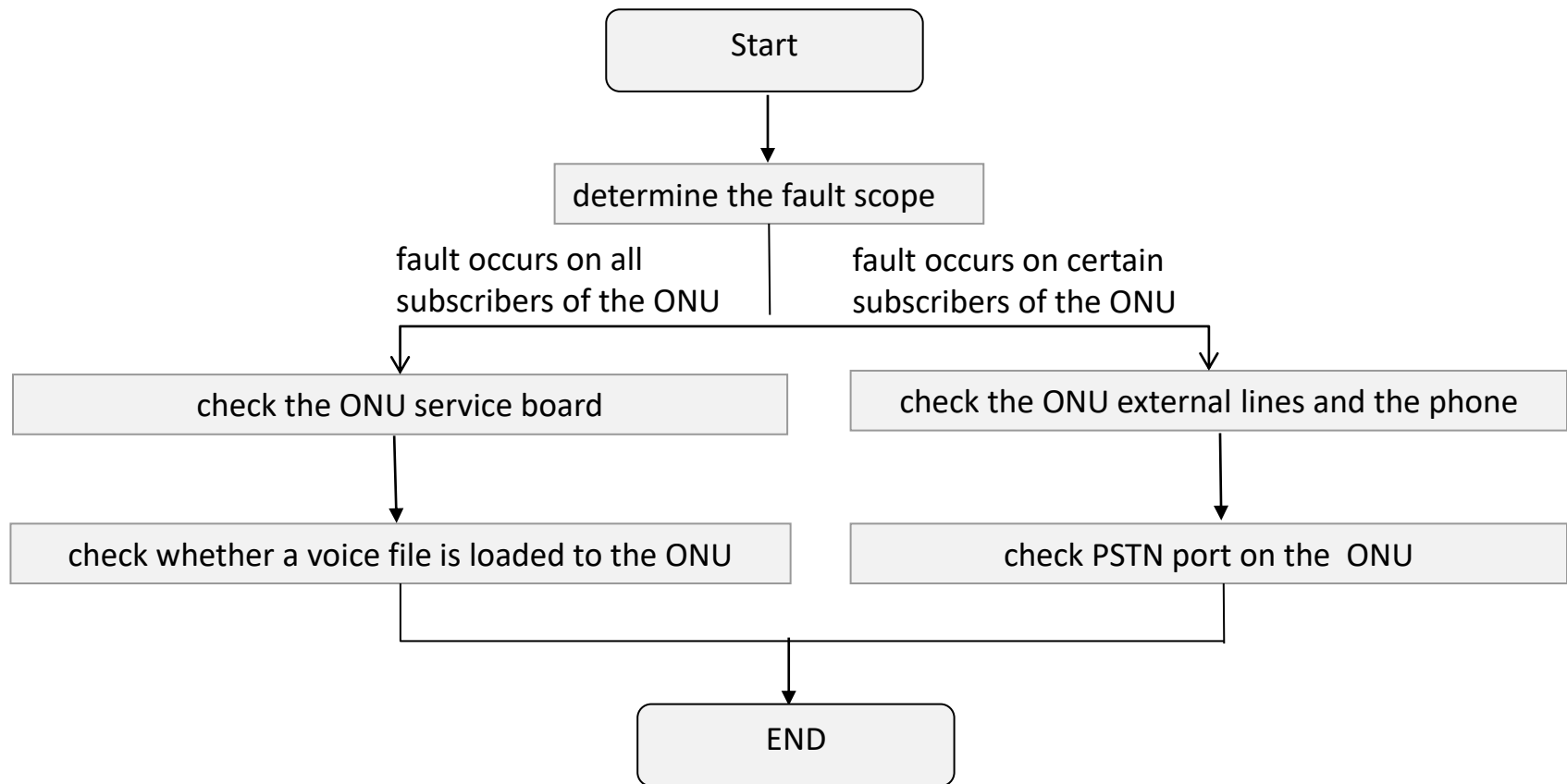
Category and Cause of Common Faults

S/N	Fault Category	Possible Causes
5	Failure to display the calling line identity	<ul style="list-style-type: none">•Customer's incorrect operation•MGC configuration error•Phone set fault•Data configuration error•Ringing configuration error
6	MG interface failure	<ul style="list-style-type: none">•Uplink port failure•Network connectivity failure•Parameter configuration error

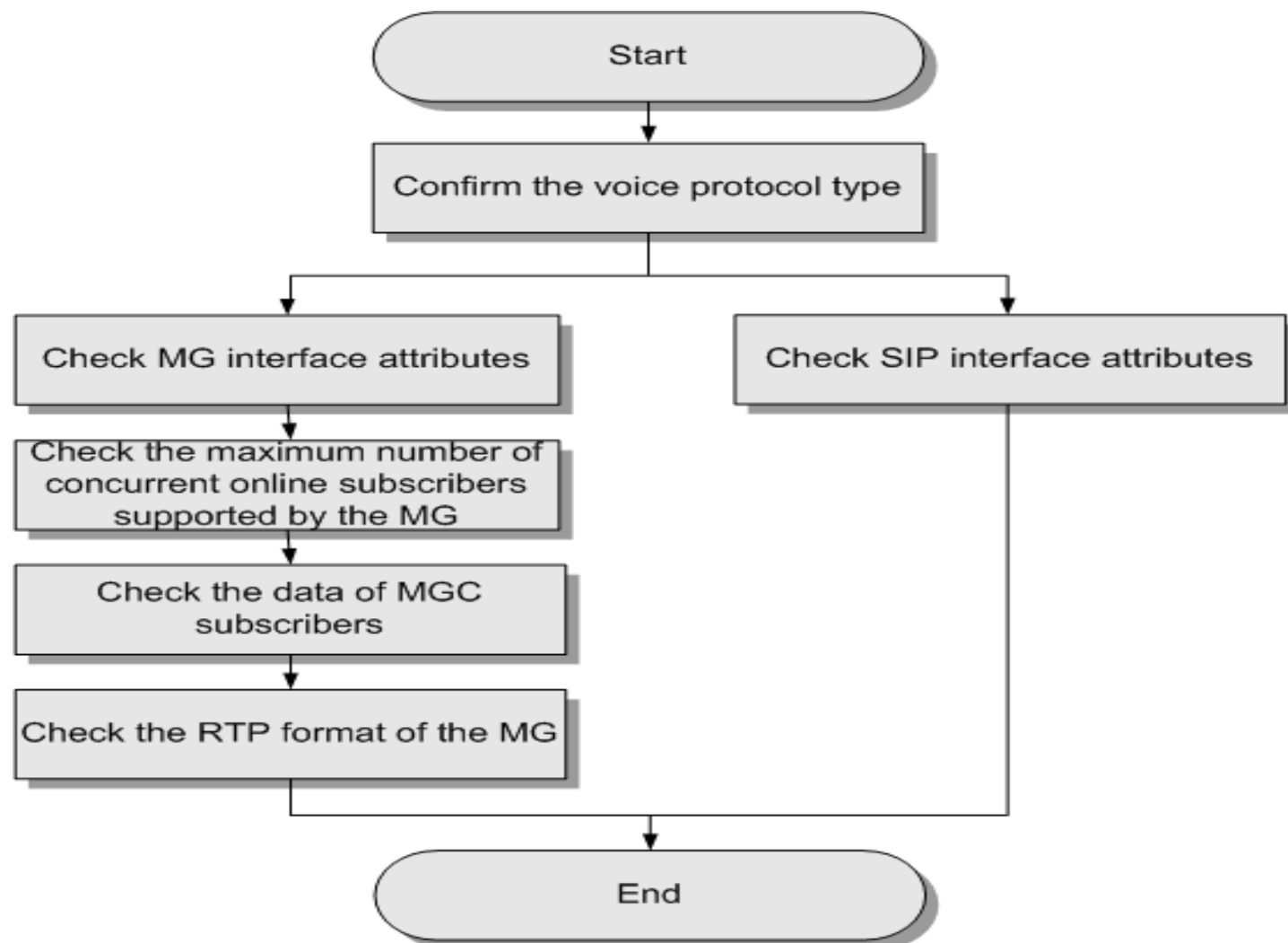
Loss of Feeding Current



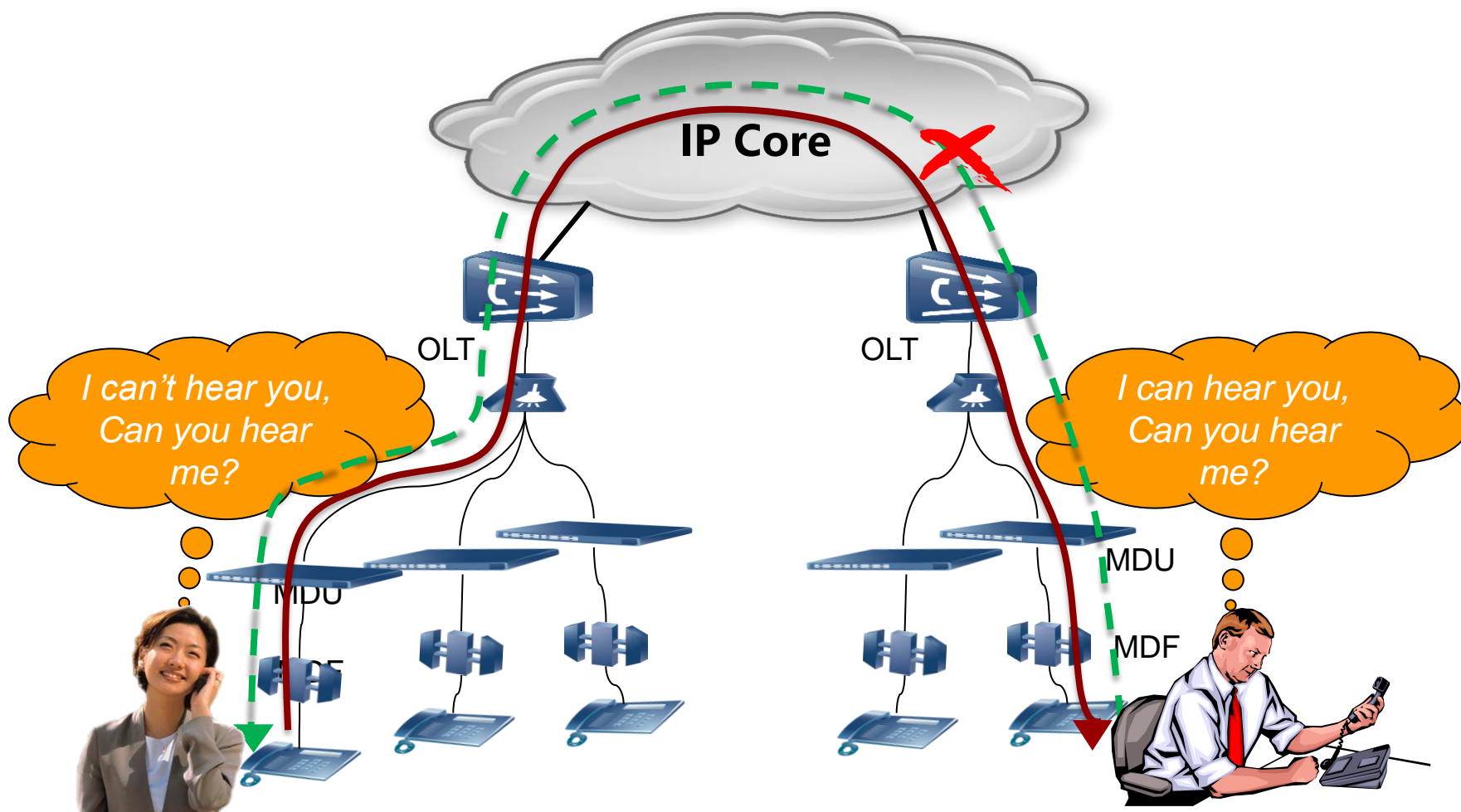
No Tone After Offhook



Busy Tone After Offhook



One-way Audio In Communication



One-way Audio In Communication

When the fault of one-way audio occurs in an FTTx network, locate the fault according to the following procedure:

1. Check configurations of the MG route.
2. Check configurations of ACL rules of the ONU, OLT, and bearer network.

Dialing a phone number and hearing the ringing tone are normal on the device, and it can be determined that the signaling streams are normal. In this case, one-way audio maybe because the route of the device is incorrect or the route of the bearer network is incorrect.

If a fault occurs on the bearer network, locate the fault by making phone calls within two parties of the same OLT. If two parties can call each other, it indicates that media streams are forwarded inside the device instead of the bearer network. In this case, you can determine that the fault occurs on the link between the device and the bearer network.

Noise In Communication

Noise in communication indicates that a subscriber hears a strong current noise and broadcast noise in communication, but the noise does not include the environment noise of two parties.

Fault Scope	Possible Cause
All subscribers of an ONU	<ul style="list-style-type: none">•The grounding of the digital distribution frame (DDF) and ONU is not standard.•The electrical attributes configured on the PSTN port do not comply with the local standard.•The input and output gains of the DSP chip do not comply with the local standard.
Subscribers of certain ports on an ONU	<ul style="list-style-type: none">•The subscriber line and phone are faulty.•The VoIP service board of the ONU is faulty.•The environment of the OLT, ONU, and external line has electromagnetic interference.
Subscribers using certain numbers	The configurations related to numbers of the softswitch and voice gateway are incorrect.

Poor Voice Service In Communication

Poor voice service in communication indicates that the voice heard by one party of the communication is poor and is interrupted at times.

Location Method

- Check whether the QoS priority of the voice service is very low.
On the ONU, run the **display qos ip** command and the **display qos vlan** command to check whether the QoS priority of the voice service is very low.
- Check whether the phone is faulty.

Failure To Dial Certain Phone Numbers

Location Method

- Check whether digitmaps associated with the phone numbers are configured on the MGC.
- Check the network between the ONU and the softswitch.

Step1:

Check whether digitmaps associated with the phone numbers are configured on the MGC.

Step2:

Call each other again to check whether the fault is rectified.

Step3:

On the ONU, run the **ping** command to ping the IP address of the software to check whether packet loss occurs.

Step4:

Call each other again to check whether the fault is rectified.

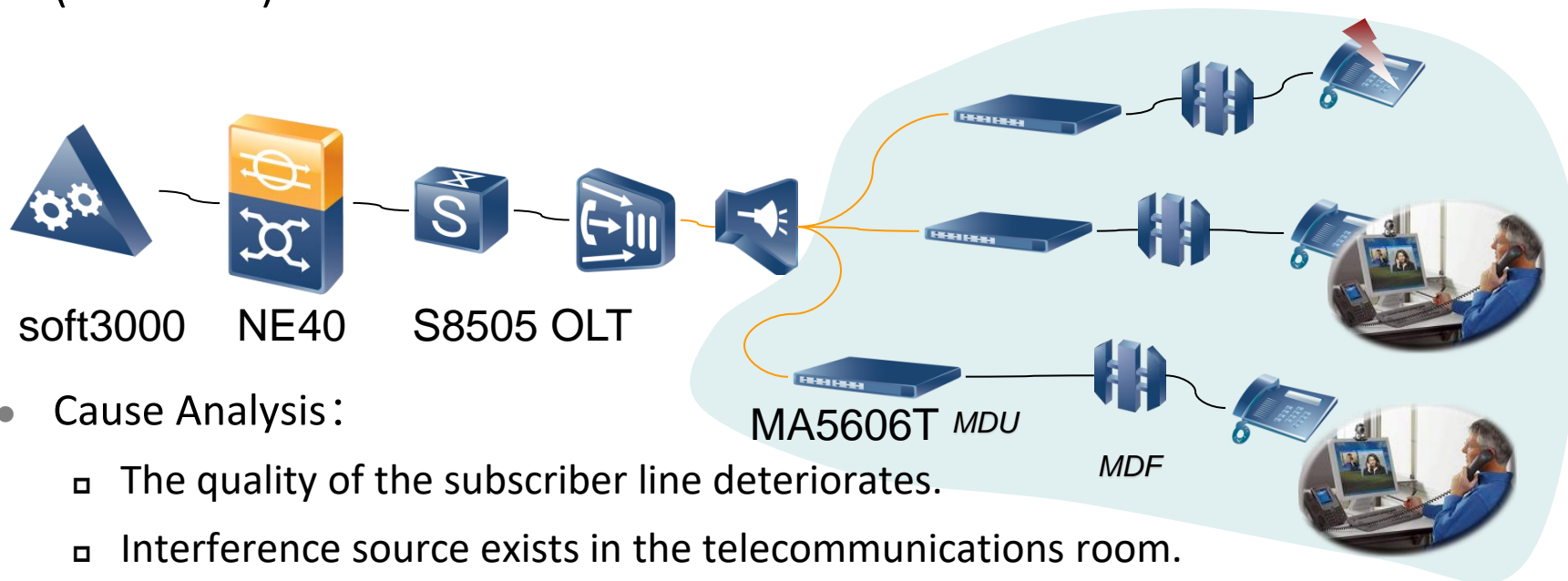


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Case1 Noise Occurs in the VoIP Service of the ONU

- Description: Noise often occurs in the VoIP service of the ONU (MA5606T).



- Cause Analysis:
 - The quality of the subscriber line deteriorates.
 - Interference source exists in the telecommunications room.
 - The DDF grounding is improper.
 - The service boards are faulty.
 - The upstream transmission is faulty.

Case1 Noise Occurs in the VoIP Service of the ONU

- Fault scope analysis:
 - Only one ONU has the problem, so we can locate the fault point between the ONU and the telephone set.
- Troubleshooting procedure
 1. Make calls for test on the DDF and the device separately. It is found that noise exists.
 2. Check the environment of the telecommunications room. It is found that both cabling and the power supply meet the specifications and there is no strong electromagnetic interference.
 3. Test the grounding resistance. It is found that the grounding resistance is 3.48 ohms, which is in the normal range.
 4. Test all the boards. It is found they are all faulty. This indicates that the noise is not caused by service boards.

Case1 Noise Occurs in the VoIP Service of the ONU

- Troubleshoot the fault:

After checking, it is found that the OLT suffers the ARP attack, which leads to high CPU usage. Configure the firewall for the OLT. It is found that the CPU usage recovers and the noise occurred in the VoIP service of the ONU disappears.

- huawei(config-if-giu-0/19)#traffic-suppress
 - { portid<U><0,7>|all<K> }:all
 - { broadcast<K>|multicast<K>|unicast<K> }:broadcast
 - { value<K> }:value
 - { value<L><1,13> }:4
 - Command:
 - traffic-suppress all broadcast value 4

Experience & Conclusion:

To rectify the noise fault, follow the method of checking from nearness to farness and from the hardware to data. After an uncomplicated hardware component is replaced, if the fault persists, compare data to find out certain differences. That is, do not replace a complicated hardware component such as the backplane. This minimizes the effect on the current service.

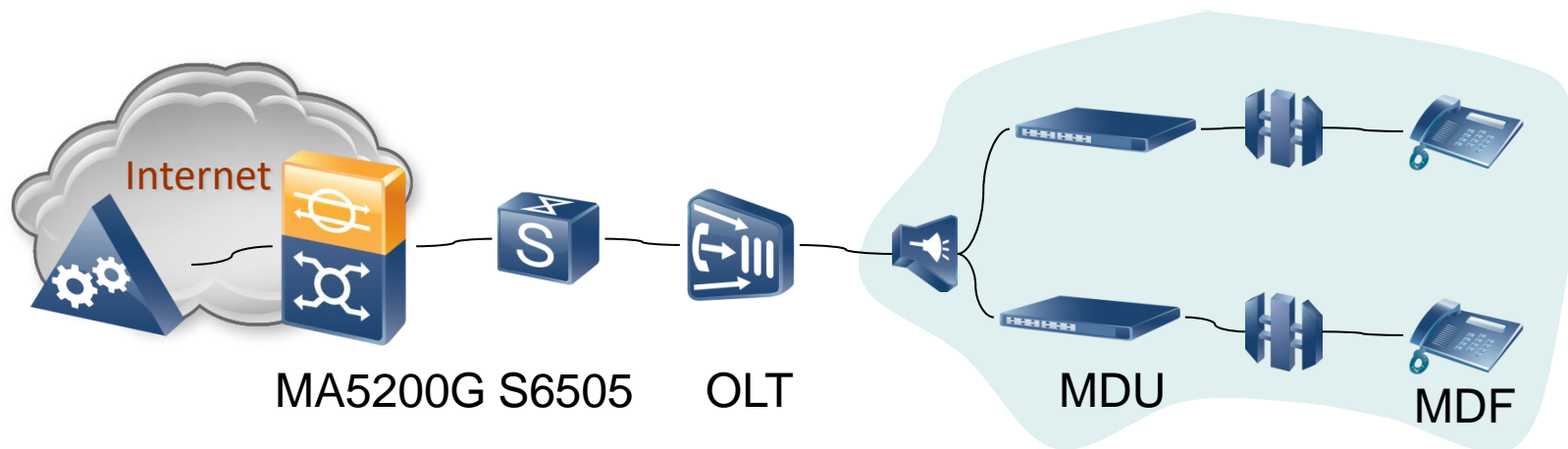
Case2 Users Of Two AGs Can't Make Call To Each Other

- Description:

Users of AG_1 and AG_2 can't make call to each other(two AGs belong to the same OLT), two sides can hear the ringing tone but no voice after offhook. Users can make call to other city normally.

- Networking

- Configuration: AG_1 and AG_2 share the ip address of the same network, belong to the same sub interface on MA5200G. AG_1 and AG_2 use the same QINQ vlan.



Case2 Users Of Two AGs Can't Make Call To Each Other

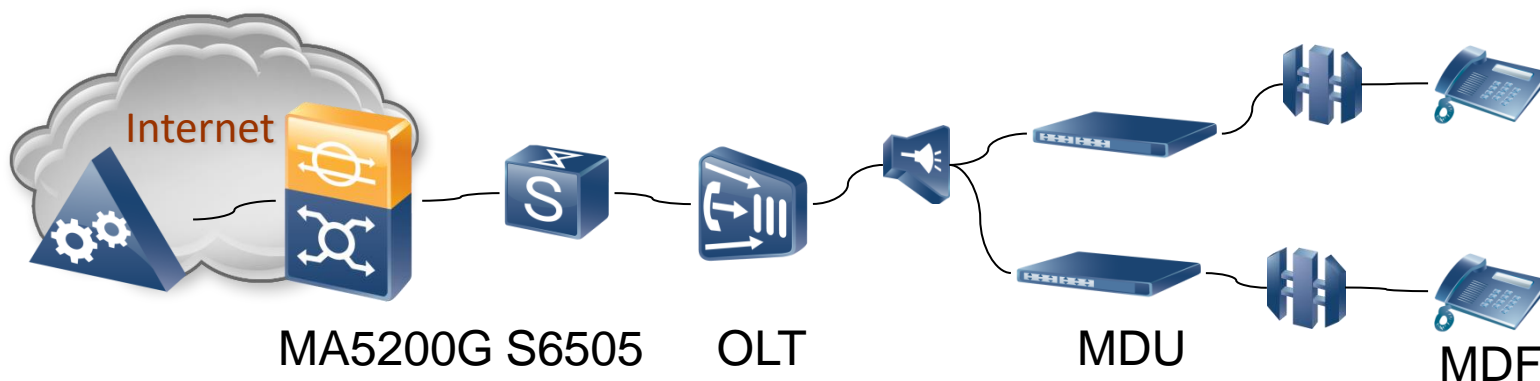
- Fault scope analysis:
 1. AG register to the Softswitch fails global config or interface mode
 2. The configuration of OLT and SS has some problem
 3. Other problems
- Troubleshooting Procedure
 1. Two AGs can ping and register to remote SS successfully. Exclude the problem of registration.
 2. Because the communication of AGs that belong to the same network need not to through the gateway, but OLT isolate the data in layer 2, we must enable the “arp proxy” or “vlan bridge” function in OLT.
 3. Because that OLT be configured QINQ VLAN for VoIP service, prohibit ARP Proxy. Check the MA5200G find that the sub interface disable arp proxy, after enable it fault disapper.

Experience & Conclusion:

1. OLT not support ARP-PROXY for QinQ VLAN.
2. The arp-proxy function in MA5200G is disabled by default.

Case3 No Dialing Tone After Offhook

- Description
 - On one site, MA5606T (used as ONU) connect to OLT. The state of H248 interface in MA5606T is normal, but all the subscribers that belong to this interface can't hear the dialing tone after offhook.
- Alarm
 - No



Case3 No Dialing Tone After Offhook

- Fault scope analysis
 - The cause may be the interface configuration, MDU device fault, OLT fault, SS fault. But the fault occurs only for MDUs belong to the same OLT. So we can locate the fault point between the gateway and OLT.
- Troubleshooting procedure
 1. Check the state and parameter of H248 interface, all normal.
 2. Check subscriber's data configuration, it is normal.
 3. Ping the ip address of SS in MDU, find 50% of the packets get lost.
 4. Ping the ip address of SS in OLT, find 50% of the packets get lost either.
 5. Check the data configuration, find that the upper layer LAN switch was configured link aggregation, but not in OLT.

Experience & Conclusion:

When the VoIP service is fault, after we confirm the H248 interface is normal, usually not care the link condition between AG and SS. This case tell us that the H248 interface is normal not indicate the link is normal.

Case4 One-Way Audio Because of the ACL Configuration

- Description
 - The ringing is normal after a POTS user connected to an ONU makes a phone call. One-way audio, however, occurs sometimes when a call is set up.
- Alarm
 - No
- Cause analysis
 - The data configuration is incorrect.
 - The softswitch is faulty.
 - The upstream bearer network is faulty.

Case4 One-Way Audio Because of the ACL Configuration

- Troubleshooting procedure
 - The user can make phone calls normally, which indicates that the data configurations of the OLT and ONU are correct, and the signaling interaction with the softswitch is normal. Therefore, it can be determined that the fault is not caused by the ONU, OLT or softswitch.
 - Capture packets and analyze the packets. It is found that the IP packet interaction of media streams is faulty when one-way audio occurs. Check the configurations of the router on the IP bearer network. It is found that the ACL of UDP ports 50000-60000 are limited. Nevertheless, media streams of the ONU ranges from 49500 to 65500. Therefore, when the media streams occupy UDP ports 50000-60000, one-way audio occurs due to the ACL limit.
 - Cancel the ACL settings on the IP bearer network, and test the service. As a result, the service becomes normal.

Experience & Conclusion:

When the VoIP service is provided, pay attention to the range of UDP port numbers in the ACL configured on the upstream bearer network.



Summary

- VoIP service common fault category
- Useful command for VoIP service troubleshooting
- Typical case study



Glossary

- SS: Softswitch
- ACL: Access Control List
- MG: Media Gateway
- AG: Access Gateway
- MGC: Media Gateway Controller
- ARP: Address Resolution Protocol

Thank you

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