Voice vlan

A voice VLAN is a VLAN that is specifically allocated for a user's voice stream. In the network, data, voice, video and other traffic are often transmitted simultaneously. Because packet loss and delay have a great impact on the quality of the call, the quality of the voice is more sensitive than the quality of the data or video. Therefore, in the case of limited bandwidth, the quality of the call needs to be prioritized. By configuring a voice VLAN, the switch can identify the voice stream, add the voice stream to the voice VLAN, and perform targeted QoS guarantee. When the network is congested, the voice stream can be preferentially guaranteed.

In general, IP phones fall into two broad categories:
Send an IP phone with a tagged voice packet (such as the Cisco 7960) and an IP phone that sends untagged voice packets (such as the Huawei MC850).
To increase the priority of the voice data stream, you must first identify the voice stream. After the voice data stream is identified, the voice data stream is prioritized and transmitted.
Voice VLAN can identify voice data streams in two ways:

1.By receiving the source MAC address of the packet, that is, based on the MAC address.
The device can determine whether the data stream is a voice data stream according to a source MAC address field in a data packet that enters the interface. The message of the Organizationally Unique Identifier (OUI) of the voice device set by the source MAC address matching system is considered to be a voice data stream. The user needs to set the OUI in advance, which is applicable to the scenario where the IP phone sends untagged voice packets.

2. The VLAN tag carried in the packet, that is, the VLAN-based method.

If there are a large number of IP phones accessing the switch, configuring the OUI of the IP phone can be very cumbersome. You can configure the VLAN based on the switch to improve the priority of voice packets. The device determines whether the data packet is a voice packet based on the VLAN ID of the packets entering the interface. When the VLAN ID matches the voice VLAN configured in the system, it is considered to be a voice data stream. The premise of this method is that the IP phone supports the function of obtaining the voice VLAN information configured on the switch. In the case of a large number of IP phones, the configuration can be simplified.

The above scheme is given from the perspective of convenient configuration. In fact, regardless of whether the voice packet sent by the IP phone has a VLAN tag, the MAC address and the VLAN-based voice VLAN can be implemented.
The main differences are:
If the IP phone is sent untagged voice packets, you must configure the OUI to distinguish the voice packets from the data packets. If the IP phone sends the tagged voice packets, you can configure the VLAN-based voice. VLAN, so in the case of a large number of IP phone access, there is no need to configure a cumbersome OUI to simplify configuration.

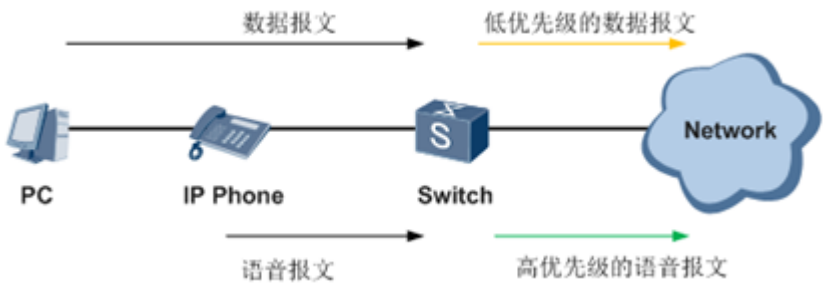
1. Voice VLAN based on MAC address
OUI
OUI refers to the first 24 bits (binary) of the MAC address, which can be used to represent a MAC address segment, which is a globally unique identifier assigned by the IEEE to different device vendors, and each device vendor allocates 24 from this address segment. Bit, thus forming a 48-bit MAC address.
Therefore, according to the OUI, the principle of identifying an IP telephone is to identify which messages are sent by the telephone according to the MAC address

segment applied by the IP telephone manufacturer, thereby determining which packets belong to the voice message.

The OUI in the Voice VLAN is different from the OUI in the usual sense. The OUI is configured by the user and can use a mask, that is, it does not need to be a 24-bit mask. The mask length can be specified by the user. The value of OUI is the result of the mac and mask parameters in the voice-vlan mac command.

Principle of implementation

As shown in the following figure, after receiving the untagged packet sent by the PC and the IP phone, the switch performs the following processing: If the source MAC address matches the OUI configured on the switch, the source MAC address is equal to the OUI mask and is equal to OUI. Matching, the tag of the voice VLAN is added to the packet, and the packet priority is increased. If the packet is not matched, the VLAN tag of the PVID is added to ensure the priority of voice packets.



In the MAC address mode, the mode of adding an interface to a voice VLAN can be classified into manual mode and automatic mode.

Automatic mode

In automatic mode, when the source MAC address of the packets sent by the voice device matches the configured OUI, the system automatically adds the interface connected to the voice device to the voice VLAN.

Manual mode

After the voice VLAN function is enabled in the manual mode, you must manually add the interface connected to the voice device to the voice VLAN. This ensures that the voice VLAN function takes effect.

You can divide the working mode of a voice VLAN into a security mode and a normal mode based on the filtering mechanism of the received packets.

Safe mode:

The inbound interface enabled with the voice VLAN function allows only the received voice packets whose source address matches the OUI. The non-voice packets in the voice VLAN are directly discarded. The packets in other VLANs are forwarded normally.

Normal mode:

The inbound interface enabled with the voice VLAN function allows voice packets and non-voice packets to be transmitted at the same time, which is vulnerable to malicious data traffic.

It is not recommended to plan voice and data services in the same VLAN. If this is necessary, please confirm that the voice VLAN works in normal mode.

VLAN-based voice VLAN

The principle of VLAN-based voice VLAN implementation is as follows:

After receiving the packet from the PC and the IP phone, the switch determines whether the VLAN ID of the packet is the same as the voice VLAN ID configured on the interface. If the switch is the same, the data stream is considered as the voice data stream and the priority is raised. Untagged packets are added with the VLAN tag of the PVID.

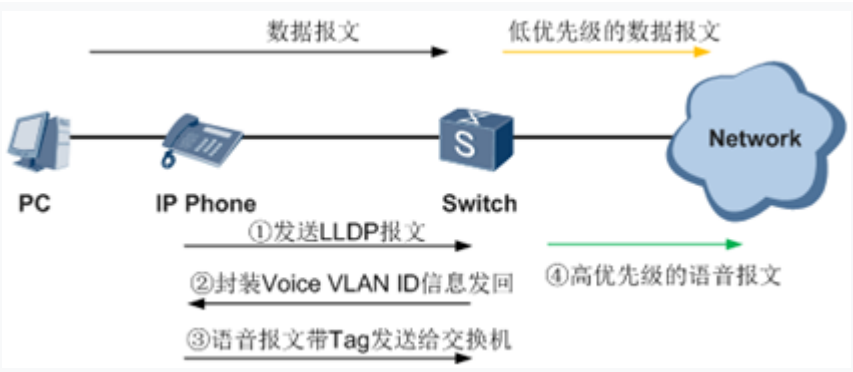
Therefore, an IP phone can obtain the voice VLAN information configured on the switch.

There are many ways to obtain the voice VLAN information on the switch. The following takes the IP phone to obtain the voice VLAN information of the switch through the LLDP protocol.

As shown in Figure 2, the IP phone is actively sent LLDP packets to obtain the voice VLAN information configured on the switch. The switch receives the LLDP packets from the IP phone and adds the voice VLAN information to the IP phone. After receiving the LLDP packet carrying the voice VLAN information, the IP phone sends the voice packet with the tag.

The switch receives the voice packets with the tag. If the tag matches the voice VLAN configured on the switch, the switch forwards the priority. The switch receives the untagged packet and adds it to the VLAN where the PVID resides.

In this way, the switch can ensure the priority transmission of voice packets when network congestion occurs.


数据报文
低优先级的数据报文
Network
PC
IP Phone
Switch
①发送LLDP报文
②封装Voice VLAN ID信息发回
③语音报文带Tag发送给交换机
④高优先级的语音报文

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