Chapter 9: QinQ

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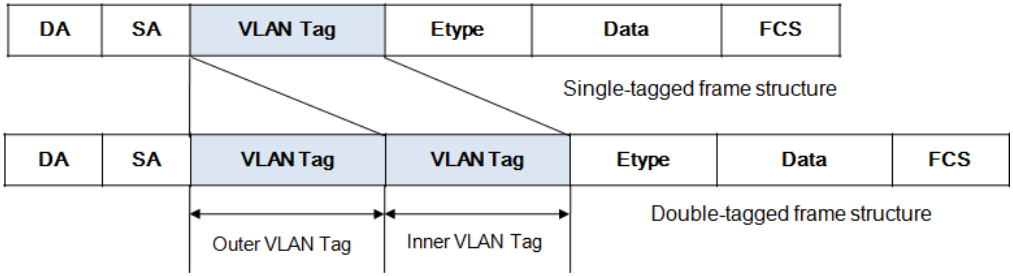
Chapter 9 QinQ

9.1 QinQ Overview

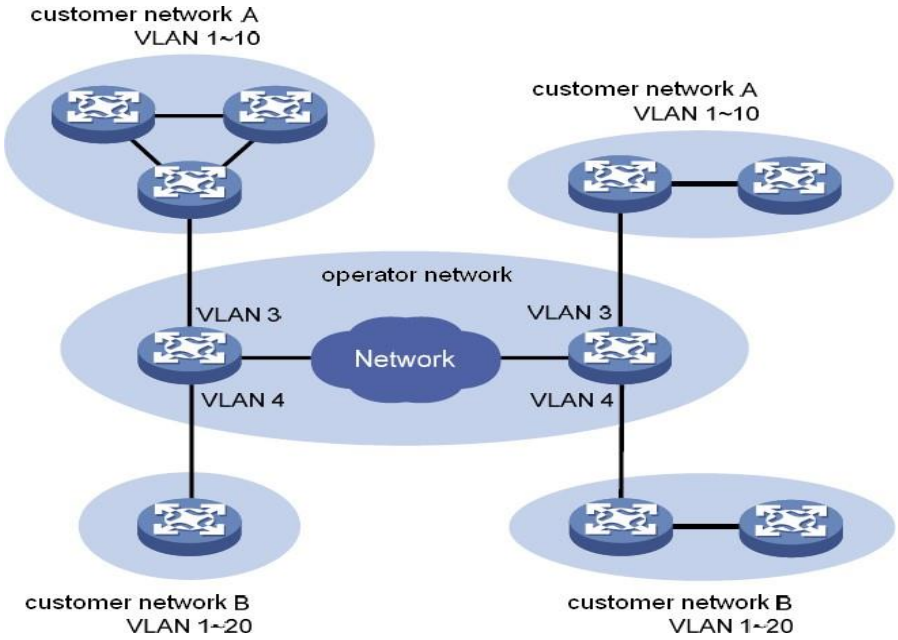
9.1.1 Understanding QinQ

In the VLAN tag field defined in IEEE 802.1Q, only 12 bits are used for VLAN IDs, so a Switchcan support a maximum of 4,094 VLANs. In actual applications, however, a large number of VLANs are required to isolate users, especially in metropolitan area networks (MANs), and 4,094 VLANs are far from satisfying such requirements. shows the structure of 802.1Q-taggedand double-tagged Ethernet frames. The QinQ feature enables a device to support up to 4,094x 4,094 VLANs to satisfy the requirement for the amount of VLANs in the MAN.



The port QinQ feature is a flexible, easy-to-implement Layer 2 VPN technique, which enables the access point to encapsulate an outer VLAN tag in Ethernet frames from customer networks(private networks), so that the Ethernet frames will travel across the service provider's backbone network (public network) with double VLAN tags. The inner VLAN tag is thecustomer network VLAN tag while the outer one is the VLAN tag assigned by the service

provider to the customer. In the public network, frames are forwarded based on the outer VLAN tag only, with the source MAC address learned as a MAC address table entry for the VLAN indicated by the outer tag, while the customer network VLAN tag is transmitted as part ofthe data in the frames.



9.1.2 Implementations of QinQ

There are two types of QinQ implementations: basic QinQ and Flexible QinQ.

1) Basic QinQ

Basic QinQ is implemented through VLAN VPN.

With the VLAN VPN feature enabled on a port, when a frame arrives at the port, the Switch willtag it with the port's default VLAN tag, regardless of whether the frame is tagged or untagged.

If the received frame is already tagged, this frame becomes a double-tagged frame; if it is an untagged frame, it is tagged with the port's default VLAN tag.

2) Flexible QinQ

Flexible QinQ is a more flexible, VLAN-based implementation of QinQ. If Flexible QinQ on portis enabled, Flexible QinQ can:

- For ingress packet, different outer vlan tag can be added according to different inner VLAN ID
- For ingress packet, new VLAN tag can take the place of some specific VLAN Tag
- For ingress packet, some VLAN can be transparent transmit.

For QinQ-enabled port, there are different handlings for different port type:

Uplink port: The Tag judgment on uplink port is based on the consistency between packet VIDand configured global outer-tpid.

Custom port: The Tag judgment on customer port is based on the consistency between packet VID and inner-tpid. The default inner-tpid is 0x8100

9.1.3 Modification of TPID Value of QinQ Frames

A VLAN tag uses the tag protocol identifier (TPID) field to identify the protocol type of the tag. The value of this field, as defined in IEEE 802.1Q, is 0x8100. The device can identify whether there is corresponded VLAN Tag according to TPID. If configured TPID is the same as the corresponded field, packet is regarded as with VLAN Tag.

The systems of different vendors may set the TPID of the outer VLAN tag of QinQ frames to different values. For compatibility with these systems, the S5710-48 series Switches allow youto modify the TPID value so that the QinQ frames, when sent to the public network, carry the

TPID value identical to the value of a particular vendor to allow interoperability with the devicesof that vendor.

The TPID in an Ethernet frame has the same position with the protocol type field in a frame without a VLAN tag. To avoid problems in packet forwarding and handling in the network, you cannot set the TPID value to any of the values in the table below.

Protocol type	**Value**
ARP	0x0806
PUP	0x0200
RARP	0x8035
IP	0x0800
IPv6	0x86DD
PPPoE	0x8863/0x8864
MPLS	0x8847/0x8848
IPX/SPX	0x8137
IS-IS	0x8000
LACP	0x8809
802.1x	0x888E
GnLink	0x0765
GSTP	0X5524

9.2 Configure QinQ

9.2.1 QinQ Configuration Task List

Configuration Task	Description	Detailed Configuration
Configure BASIC QinQ	Required	9.2.2
Configure Flexible QinQ	Required	9.2.3
Display QinQ configuration	Optional	9.2.4

9.2.2 Configure BASIC QinQ

Perform following commands in privilege mode.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter interface configuration mode	**interface ethernet** *interface-num*	
Enable basic QinQ	**qinq**	
Disable basic QinQ	**undo qinq**	

9.2.3 Configure Flexible QinQ

Perform following commands in privilege mode.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter interface configuration mode	**interface ethernet** *interface-num*	
Modify outer TPID	**qinq** { inner-tpid | outer-tpid } *tpid-value*	
Add different outer VLAN Tag for different inner VID	**flexible-vlan insert** *start-vlan-id end-vlan-id service-vlan-idpriority*	

Configure vlan-swap	**flexible-vlan swap** *start-vlan-id end-vlan-id target-vlan-idpriority*	
Configure packet belonged to specified vlan range need not to add double VLAN Tag	**flexible-vlan pass-through** *start-vlan-id end-vlan-id*	

9.2.4 Display QinQ configuration

Operation	Command	Remarks
Display qinq configuration	**display flexible-vlan interface** [ethernet *interface-list*]	