Configuring Private VLANs

This chapter contains the following sections:

Information About Private VLANs

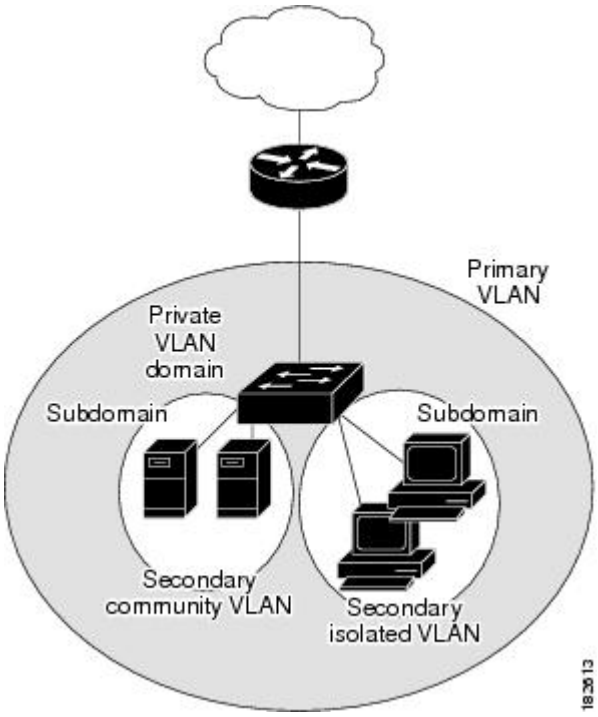
PVLANs achieve Layer 2 isolation through the use of three separate port designations, each having its own unique set of rules that regulate each connected endpoint's ability to communicate with other connected endpoints within the same private VLAN domain.

Private VLAN Domains

A PVLAN domain consists of one or more pairs of VLANs. The primary VLAN makes up the domain; and each VLAN pair makes up a subdomain. The VLANs in a pair are called the primary VLAN and the secondary

VLAN. All VLAN pairs within a private VLAN have the same primary VLAN. The secondary VLAN ID is what differentiates one subdomain from another. See the following figure.

Figure 1: Private VLAN Domain



Spanning Multiple Switches

PVLANs can span multiple switches, just like regular VLANs. Inter-switch link ports do not need to be aware of the special VLAN type and carry frames tagged with these VLANs just like they do any other frames. PVLANs ensure that traffic from an isolated port in one switch does not reach another isolated or community port in a different switch even after traversing an inter-switch link. By embedding the isolation information at the VLAN level and by transporting it with the packet, it is possible to maintain consistent behavior throughout the network. The mechanism that restricts Layer 2 communication between two isolated ports in the same switch also restricts Layer 2 communication between two isolated ports in two different switches.

Private VLAN Ports

Within a PVLAN domain, there are three separate port designations. Each port designation has its own unique set of rules that regulate the ability of one endpoint to communicate with other connected endpoints within the same private VLAN domain. The three port designations are as follows:

- promiscuous
- isolated
- community

Primary VLANs and Promiscuous Ports

The primary VLAN encompasses the entire PVLAN domain. It is a part of each subdomain and provides the Layer 3 gateway out of the VLAN. A PVLAN domain has only one primary VLAN. Every port in a PVLAN domain is a member of the primary VLAN.

A promiscuous port can talk to all other types of ports; it can talk to isolated ports as well as community ports and vice versa. Layer 3 gateways, DHCP servers, and other trusted devices that need to communicate with the customer endpoints are typically connected with a promiscuous port. A promiscuous port can be either an access port or a hybrid/trunk port according to the terminology presented in Annex D of the IEEE 802.1Q specification.

Secondary VLANs and Host Ports

Secondary VLANs provide Layer 2 isolation between ports in a PVLAN domain. A PVLAN domain can have one or more subdomains. A subdomain is made up of a VLAN pair that consists of the primary VLAN and a secondary VLAN. Because the primary VLAN is a part of every subdomain, secondary VLANs differentiate the VLAN subdomains.

To communicate to the Layer 3 interface, you must associate a secondary VLAN with at least one of the promiscuous ports in the primary VLAN. You can associate a secondary VLAN to more than one promiscuous port within the same PVLAN domain, for example, if needed for load balancing or redundancy. A secondary VLAN that is not associated with any promiscuous port cannot communicate with the Layer 3 interface.

A secondary VLAN can be one of the following types:

- Isolated VLANs—Isolated VLANs use isolated host ports. An isolated port cannot talk to any other port in that private VLAN domain except for promiscuous ports. If a device needs to have access only to a gateway router, it should be attached to an isolated port. An isolated port is typically an access port, but in certain applications, it can also be a hybrid or trunk port.

  An isolated VLAN allows all its ports to have the same degree of segregation that could be obtained from using one separate dedicated VLAN per port. Only two VLAN identifiers are used to provide this port isolation.

  Note While multiple community VLANs can be in a private VLAN domain, one isolated VLAN can serve multiple customers. All endpoints that are connected to its ports are isolated at Layer 2. Service providers can assign multiple customers to the same isolated VLAN and be assured that their Layer 2 traffic cannot be sniffed by other customers that share the same isolated VLAN.

- Community VLANs—Community VLANs use community host ports. A community port is part of a group of ports. The ports within a community can communicate at Layer 2 with one another and can also talk to any promiscuous port. For example, if an ISP customer has four devices and wants them isolated from those devices of other customers but still be able to communicate among themselves, community ports should be used.

  Note Because trunks can support a VLAN that carries traffic between its ports, VLAN traffic can enter or leave the device through a trunk interface.

Communication Between Private VLAN Ports

The following table shows how access is permitted or denied between PVLAN port types.

Table 1: Communication Between PVLAN Ports

	Isolated	Promiscuous	Community 1	Community 2	Interswitch Link Port[1]
Isolated	Deny	Permit	Deny	Deny	Permit
Promiscuous	Permit	Permit	Permit	Permit	Permit
Community 1	Deny	Permit	Permit	Deny	Permit
Community 2	Deny	Permit	Deny	Permit	Permit
Interswitch Link Port	Deny[2]	Permit	Permit	Permit	Permit

1 An interswitch link port is a regular port that connects two switches and that happens to carry two or more VLANs.

2 This behavior applies to traffic that traverses inter-switch link ports over an isolated VLAN only. Traffic from an inter-switch link port to an isolated port will be denied if it is in the isolated VLAN. Traffic from an inter-switch link port to an isolated port will be permitted if it is in the primary VLAN.

Guidelines and Limitations

PVLANs have the following configuration guidelines and limitations:

Control VLANs, packet VLANs, and management VLANs must be configured as regular VLANs and not as private VLANs.

The following are configuration limits:

- Private VLANs per DVS: 512 maximum
- Primary VLANs per promiscuous trunk port: 64 maximum
- Private VLAN associations: 511 maximum
- Private VLAN ports per DVS : 4096 maximum

Default Settings

Table 2: Default PVLAN Settings

Parameters	Default
PVLANs	Disabled

Configuring a Private VLAN

Refer to the *Cisco Nexus 1000V for Microsoft Hyper-V Network Segmentation Manager Configuration Guide* for more about the private VLAN configuration process.

Feature History for Private VLAN

Feature Name	Releases	Feature Information
Private VLAN	5.2(1)SM1(5.1)	This feature was introduced.