



Configuring VLAN Mapping

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Prerequisites for VLAN Mapping

- By default, no VLAN mapping is configured.
- Ensure that you run the **Network Advantage** license. VLAN Mapping is supported only with the **Network Advantage** license level.
- To process control traffic consistently, either enable Layer 2 protocol tunneling (recommended), as follows:

```
!  
Device(config)# interface TenGigabitEthernet1/0/1  
Device(config-if)# switchport mode access  
Device(config-if)# l2protocol-tunnel stp  
Device(config-if)# end
```

or insert a BPDU filter for spanning tree, as follows:

```
!  
Device(config)# interface TenGigabitEthernet1/0/1  
Device(config-if)# switchport mode trunk  
Device(config-if)# switchport vlan mapping 10 20  
Device(config-if)# spanning-tree bpdupfilter enable  
Device(config-if)# end
```

About VLAN Mapping

In a typical deployment of VLAN mapping, you want service provider to provide a transparent switching infrastructure that includes customers' switches at the remote location as a part of local site. This allows customers to use the same VLAN ID space and run Layer 2 control protocols seamlessly across the provider network. In such scenarios, we recommend that service providers do not impose their VLAN IDs on their customers.

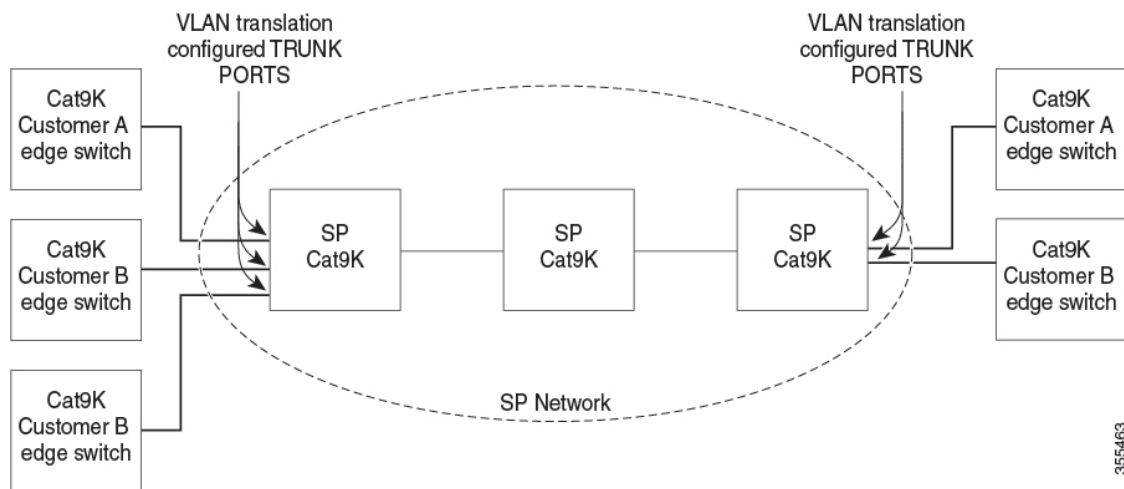
One way to establish translated VLAN IDs (S-VLANs) is to map customer VLANs to VLANs (called VLAN ID translation) on trunk ports that are connected to a customer network. Packets entering the port are mapped to service provider VLAN (S-VLAN) based on the port number and the packet's original customer VLAN-ID (C-VLAN).

Service providers' internal assignments might conflict with a customer's VLAN. To isolate customer traffic, a service provider decides to map a specific VLAN into another one while the traffic is in its cloud.

Deployment Example

In the [figure](#), the service provider provides Layer 2 VPN service to two different customers, A and B. The service provider separates the data and control traffic between the two customers and from the providers' own control traffic. The service provider network must also be transparent to the customer edge devices.

Figure 1: Example of a Service Provider with Layer 2 VPN Service



All forwarding operations on Catalyst 9000 series switch are performed using S-VLAN and not C-VLAN information because the VLAN ID is mapped to the S-VLAN on ingress.



Note When you configure features on a port for VLAN mapping, you always use the S-VLAN rather than C-VLAN.

On an interface configured for VLAN mapping, the specified C-VLAN packets are mapped to the specified S-VLAN when they enter the port. Symmetrical mapping to the customer C-VLAN occurs when packets exit the port.

The switch supports one-to-one VLAN mapping on trunk ports.

The switch supports these types of VLAN mapping on trunk ports:

- One-to-one VLAN mapping.
- Selective QinQ.

Figure 2: Mapping Customer VLANs to Service-Provider VLANs

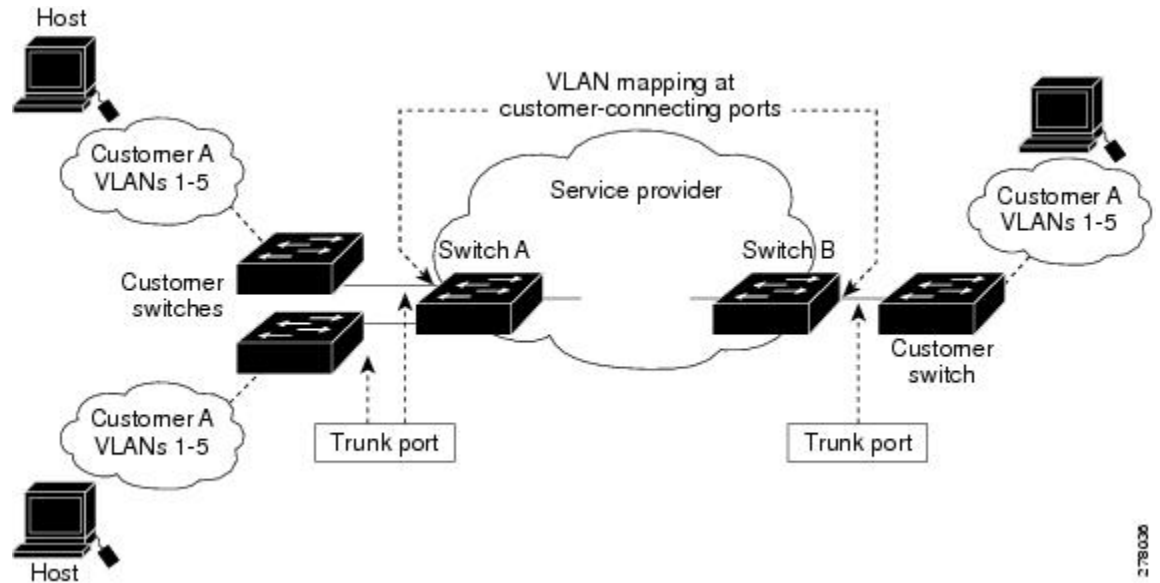


Figure shows a topology where a customer uses the same VLANs in multiple sites on different sides of a service-provider network. The C-VLAN IDs is mapped to service-provider VLAN IDs for packet travel across the service-provider backbone. The C-VLAN IDs are retrieved at the other side of the service-provider backbone for use in the other customer site. Configure the same set of VLAN mappings at a customer-connected port on each side of the service-provider network.

The maximum number of VLAN mapping configurations supported is 3000 system wide. The maximum number of VLAN mappings that can be configured on each ASIC is 1000.

One-to-One VLAN Mapping

One-to-one VLAN mapping occurs at the ingress and egress of the port and maps the customer C-VLAN ID in the 802.1Q tag to the service-provider S-VLAN ID. You can also specify that packets with all other Vlan IDs are forwarded.

Configuration Guidelines for VLAN Mapping



Note

- By default, no VLAN mapping is configured.
- Starting from Cisco IOS XE Amsterdam 17.2.1 the maximum number of VLAN mapping configurations supported is 3000 system wide. The maximum number of VLAN mappings that can be configured on each ASIC is 1000.

Guidelines include the following:

- If the VLAN mapping is enabled on an EtherChannel, the configuration does not apply to all member ports of the EtherChannel bundle and applies only to the EtherChannel interface.

- If the VLAN mapping is enabled on an EtherChannel and a conflicting mapping/translation is enabled on a member port, then the port is removed from the EtherChannel.
- If a port belonging to an EtherChannel is configured with a VLAN mapping and the EtherChannel is configured with a conflicting VLAN mapping, then the port is removed from the EtherChannel.
- The member port of an EtherChannel is removed from the EtherChannel bundle if the mode of the port is changed to anything other than ‘trunk’ mode.
- To process control traffic consistently, either enable Layer 2 protocol tunneling (recommended), as follows:

```

!
Device(config)# interface TenGigabitEthernet1/0/1
Device(config-if)# switchport mode trunk
Device(config-if)# switchport vlan mapping 20 300
Device(config-if)# l2protocol-tunnel stp
Device(config-if)# end

```

or insert a BPDU filter for spanning tree, as follows:

```

!
Device(config)# interface TenGigabitEthernet1/0/1
Device(config-if)# switchport mode trunk
Device(config-if)# switchport vlan mapping 10 20
Device(config-if)# spanning-tree bpdupfilter enable
Device(config-if)# end

```

- Default native VLANs, user-configured native VLANs, and reserved VLANs (range 1002-1005) cannot be used for VLAN mapping.
- The S-VLAN used for VLAN mapping cannot be a part of any other Layer 3 configurations like EVPN or LISP.
- PVLAN support is not available when VLAN mapping is configured.

Configuration Guidelines for One-to-One VLAN Mapping

- One-to-One VLAN mapping can be configured only on trunk ports and not on dynamic trunk.
- One-to-One VLAN mapping should be identical on both ports.
- S-VLAN should be created and present in the allowed VLAN list of the trunk port where One-to-One VLAN mapping is configured.
- When One-to-One VLAN mapping is configured, multiple C-VLANs cannot be mapped to the same S-VLAN.
- Merging of C-VLAN and S-VLAN spanning-tree topology is not supported in case of one-to-one VLAN mapping.

How to Configure VLAN Mapping

The following sections provide information about configuring VLAN mapping:

One-to-One VLAN Mapping



Note VLAN Mapping is supported only with the **network-advantage** license level.

To configure one-to-one VLAN mapping to map a customer VLAN ID to a service-provider VLAN ID, perform this task:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	interface <i>interface-id</i> Example: Device (config)# interface gigabitethernet1/0/1	Enters interface configuration mode for the interface that is connected to the service-provider network. You can enter a physical interface or an EtherChannel port channel.
Step 4	switchport mode trunk Example: Device (config-if)# switchport mode trunk	Configures the interface as a trunk port.
Step 5	switchport vlan mapping <i>vlan-id</i> <i>translated-id</i> Example: Device (config-if)# switchport vlan mapping 2 102	Enters the VLAN IDs to be mapped: <ul style="list-style-type: none"> • <i>vlan-id</i> —the customer VLAN ID (C-VLAN) entering the switch from the customer network. The range is from 1 to 4094. • <i>translated-id</i> —the assigned service-provider VLAN ID (S-VLAN). The range is from 1 to 4094.
Step 6	exit Example: Device (config-if)# exit	Returns to global configuration mode.
Step 7	spanning-tree bpdupfilter enable Example:	Inserts a BPDU filter for spanning tree.

	Command or Action	Purpose
	Device (config) # spanning-tree bpdufilter enable	Note To process control traffic consistently, either enable Layer 2 protocol tunneling (recommended) or insert a BPDU filter for spanning tree.
Step 8	end Example: Device (config) # end	Returns to privileged EXEC mode.
Step 9	show vlan mapping Example: Device # show vlan mapping	Verifies the configuration.
Step 10	copy running-config startup-config Example: Device # copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Example

Use **no switchport vlan mapping** command to remove the VLAN mapping information. Entering **no switchport vlan mapping all** command deletes all mapping configurations.

This example shows how to map VLAN IDs 2 to 6 in the customer network to VLANs 101 to 105 in the service-provider network (Figure 3-5). You configure the same VLAN mapping commands for a port in Switch A and Switch B; the traffic on all other VLAN IDs is forwarded as normal traffic.

```
Device> enable
Device# configure terminal
Device(config)# interface gigabiethernet0/1
Device(config-if)# switchport vlan mapping 2 101
Device(config-if)# switchport vlan mapping 3 102
Device(config-if)# switchport vlan mapping 4 103
Device(config-if)# switchport vlan mapping 5 104
Device(config-if)# switchport vlan mapping 6 105
Device(config-if)# exit
```

In the previous example, at the ingress of the service-provider network, VLAN IDs 2 to 6 in the customer network are mapped to VLANs 101 to 105, in the service provider network. At the egress of the service provider network, VLANs 101 to 105 in the service provider network are mapped to VLAN IDs 2 to 6, in the customer network.



Note Packets with VLAN IDs other than the ones with configured VLAN Mapping are forwarded as normal traffic.

Use **show vlan mapping** command to view information about configured vlans.

```

Device> enable
Device# configure terminal
Device(config)# show vlan mapping
Total no of vlan mappings configured: 1
Interface Po5:
VLANs on wire                Translated    VLAN Operation
-----
20                            30           1-to-1

```

Feature History for VLAN Mapping

This table provides release and related information for features explained in this module.

These features are available on all releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Gibraltar 16.11.1	One-to-One VLAN mapping	One-to-One VLAN mapping allows to map customer VLANs to service-provider VLANs on trunk ports that are connected to a customer network.
Cisco IOS XE Amsterdam 17.2.1	Increase in VLAN translation scale	The number of VLAN mappings one can configure on the device has increased.
Cisco IOS XE Bengaluru 17.5.1	Selective Q-in-Q	Support for selective Q-in-Q was introduced
Cisco IOS XE Cupertino 17.7.1	One-to-One VLAN mapping	This feature was implemented on supervisor modules C9400X-SUP-2 and C9400X-SUP-2XL, which were introduced in this release.

Use Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>.

