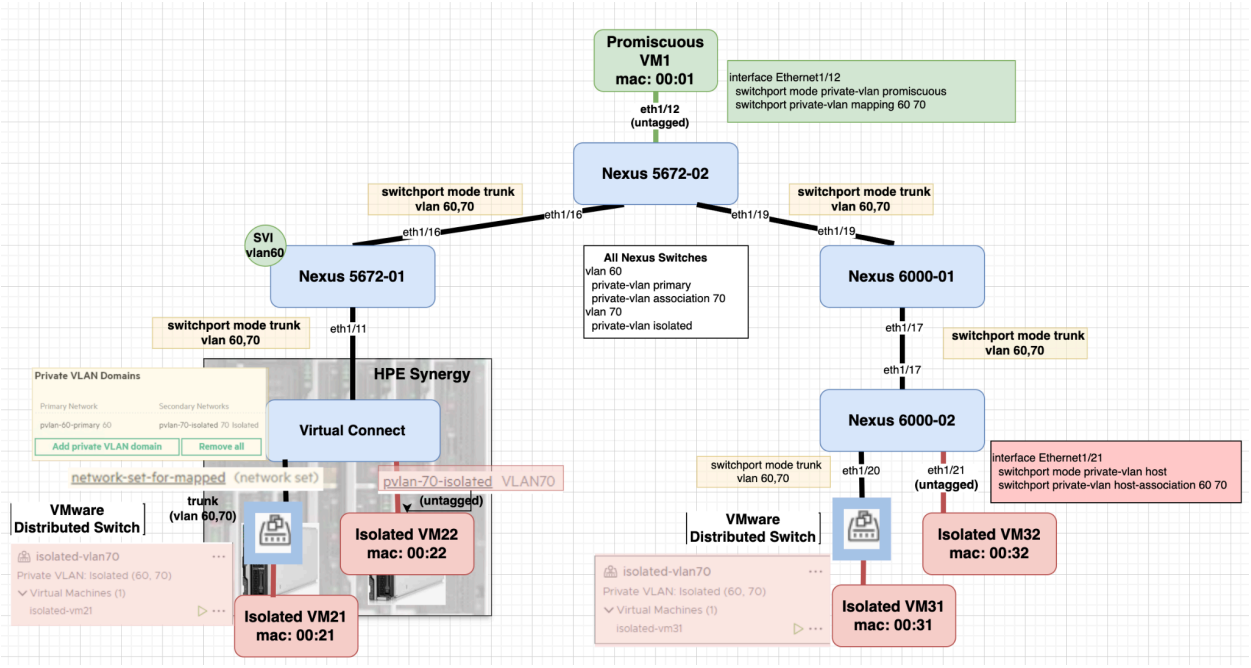
HPE Synergy and Cisco Nexus Private VLAN Technical Review

This technical document is designed to provide users with a clear understanding of how to configure Private VLANs (PVLAN) between Cisco Nexus switches and HPE Synergy. Additionally, it illustrates the traffic flow between Promiscuous and Isolated VMs.

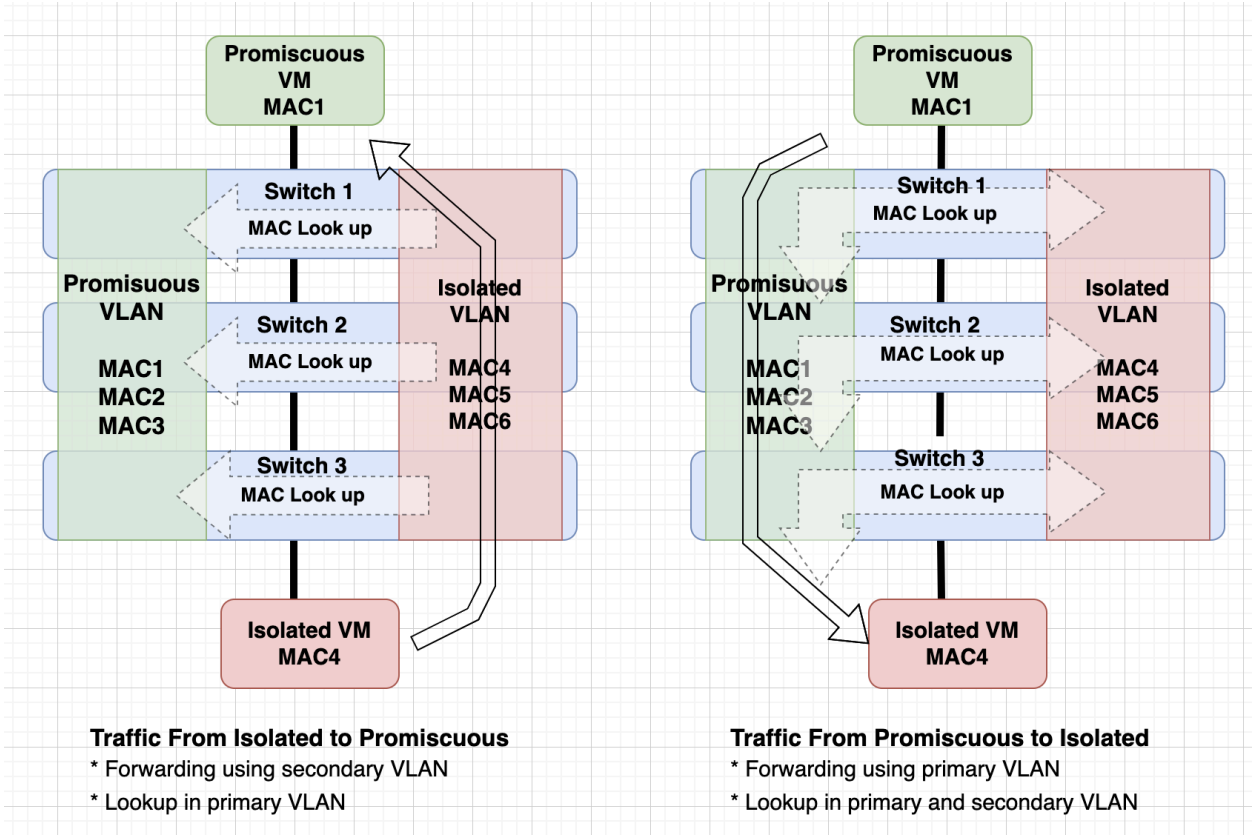
The key takeaway from this document is the following:
When configuring Cisco Nexus PVLAN, any switch ports connecting to HPE Synergy or rack servers running VMware DVS PVLAN must be configured as standard trunk ports, not as private-vlan promiscuous or isolated trunks.

This document serves as an addition to the original technical document, "Private VLAN in OneView 4.20," which remains accurate and valid. The latest tests were conducted in 2025 on HPE Synergy OneView 9.20 and 9.30. These features have been available for some time, and the fundamental concepts outlined in the previous white paper remain unchanged. On the Cisco side, although the lab tests utilized the classic Nexus 5500 and 6000 Series switches, the concepts are applicable to the latest Nexus 9000 series switches.

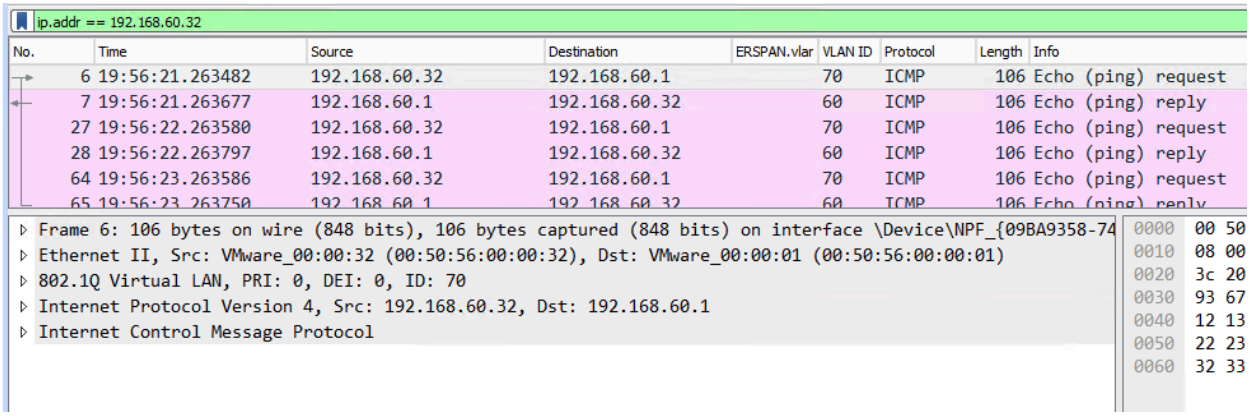
The diagram below illustrates the device connections. A Promiscuous VM is connected at the top to a Nexus switch. On the left side of the switch branch, Synergy VMs are connected, while on the right side, VMs on the rack server are connected. This setup helps users understand how PVLAN can be configured on Cisco switches without involving Synergy.



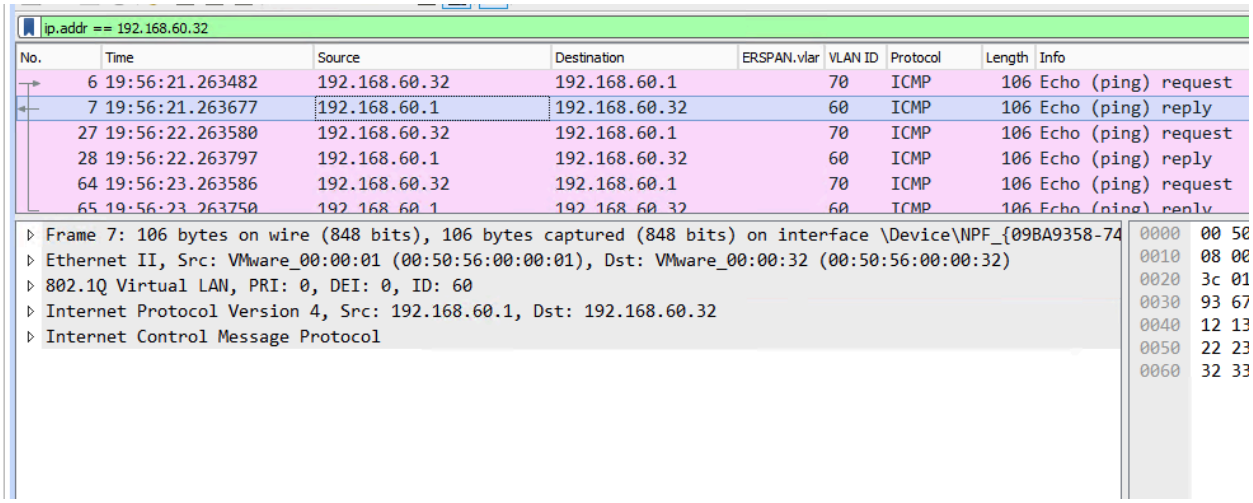
The reason that normal trunk configuration is required between PVLAN-aware switches is that switches use secondary VLAN to forward the traffic from Isolated VMs to Promiscuous VMs and primary VLAN to forward the traffic from Promiscuous VMs to Isolated VMs so both VLANs are required over the trunk.



Below is the Cisco SPAN session capturing traffic that shows isolated VM ping activity to promiscuous traffic within secondary VLAN 70.



Below is the Cisco SPAN session capturing traffic that shows promiscuous VM ping reply activity to isolated VM within primary VLAN 60.



Nexus also has two PVLAN trunk configuration options named Promiscuous trunk and Secondary trunk.

```
hst-5672-02(config-if)# switchport mode private-vlan trunk ?
  promiscuous  Port mode trunk promiscuous
  secondary    Port mode trunk isolated
```

Neither of these two modes supports the transmission of both primary and secondary VLANs over the port, which is necessary for PVLAN-aware devices to forward traffic between each other. As a result, these modes should not be used for connections between PVLAN-aware devices, such as Nexus to Synergy Virtual Connect or Nexus to VMware DVS.

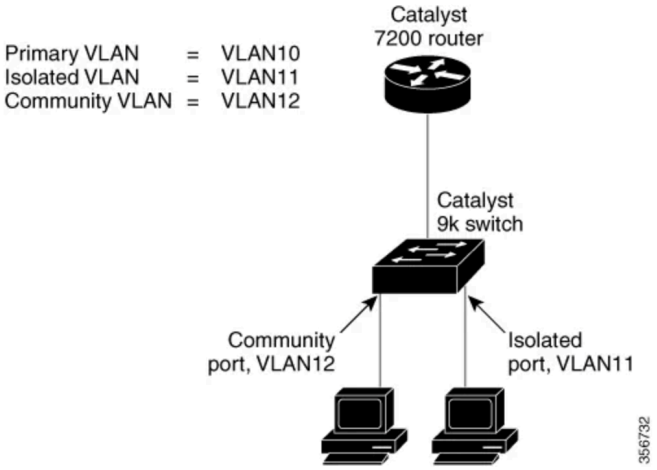
Some Cisco PVLAN documentation like the following
[VLAN Configuration Guide, Cisco IOS XE Amsterdam 17.3.x (Catalyst 9400 Switches) - Configuring Private VLANs [Support]]
has good diagrams explaining the use cases for promiscuous and secondary private-vlan trunk.

In a promiscuous private-vlan trunk, only primary VLANs and regular VLANs are allowed over the port.

Promiscuous Private VLAN Trunk Ports

Promiscuous private VLAN trunk ports are used in situations where a PVLAN promiscuous host port is normally used, but where it is necessary to carry multiple VLANs, either normal VLANs or multiple PVLAN domains. You can connect to an upstream router that does not support PVLANs, such as a Cisco 7200 router.

Figure 4. Promiscuous PVLAN Trunk Ports

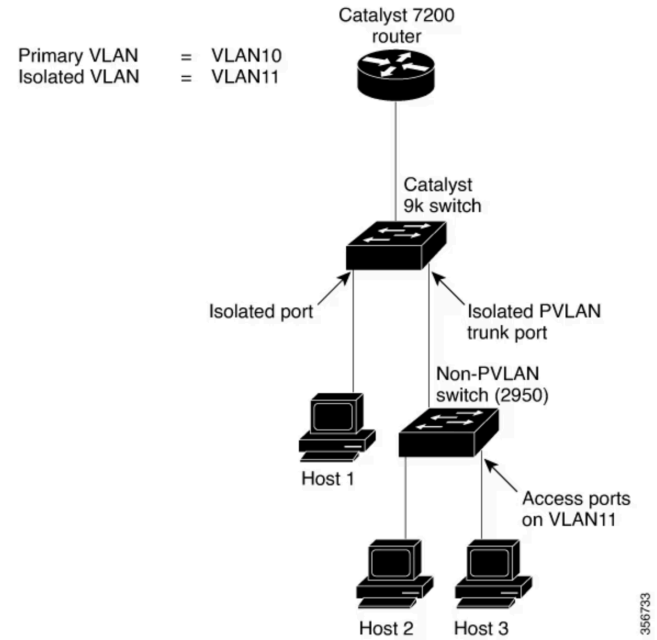


In an isolated private-vlan trunk, only isolated VLANs and regular VLANs are allowed over the port.

Isolated Private VLAN Trunk Ports

You use isolated PVLAN trunk ports if you anticipate using PVLAN isolated host ports to carry multiple VLANs, either normal VLANs or multiple PVLAN domains. You can connect a downstream switch that does not support PVLANs, such as a Catalyst 2950.

Figure 3. Isolated PVLAN Trunk Ports



The following captures illustrate when PVLAN works correctly, all switches store and display promiscuous and isolated VMs in their own perspective VLANs like regular VLANs. However, the PVLAN traffic forwarding has different MAC lookup mechanisms like explained earlier.

```
hst-n6k-01# show mac address-table vlan 60
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 60       002a.6ae0.a601    dynamic   60         F    F  Eth1/19
* 60       0050.5600.0001    dynamic   20         F    F  Eth1/19
hst-n6k-01# show mac address-table vlan 70
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 70       0050.5600.0021    dynamic   30         F    F  Eth1/19
* 70       0050.5600.0022    dynamic   60         F    F  Eth1/19
* 70       0050.5600.0031    dynamic   20         F    F  Eth1/17
* 70       0050.5600.0032    dynamic   20         F    F  Eth1/17
hst-n6k-01#
```

```
hst-n6k-02# show mac address-table vlan 60
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 60       002a.6ae0.a601    dynamic   10         F    F  Eth1/17
* 60       0050.5600.0001    dynamic   10         F    F  Eth1/17
hst-n6k-02# show mac address-table vlan 70
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
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   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+-----------------+--------+---------+------+----+------------------
* 70       0050.5600.0021    dynamic   10         F    F  Eth1/17
* 70       0050.5600.0022    dynamic   10         F    F  Eth1/17
* 70       0050.5600.0031    dynamic   10         F    F  Eth1/20
* 70       0050.5600.0032    dynamic   10         F    F  Eth1/21
hst-n6k-02#
```

```
hst-5672-02# show mac address-table vlan 60
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+----------------+--------+---------+------+----+------------------
* 60       002a.6ae0.a601    dynamic   110        F    F  Eth1/16
* 60       0050.5600.0001    dynamic   0          F    F  Eth1/12
hst-5672-02# show mac address-table vlan 70
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+----------------+--------+---------+------+----+------------------
* 70       0050.5600.0021    dynamic   0          F    F  Eth1/16
* 70       0050.5600.0022    dynamic   80         F    F  Eth1/16
* 70       0050.5600.0031    dynamic   0          F    F  Eth1/19
* 70       0050.5600.0032    dynamic   0          F    F  Eth1/19
hst-5672-02#
```

```
hst-5672-01# show mac address-table vlan 60
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+----------------+--------+---------+------+----+------------------
* 60       0050.5600.0001    dynamic   0          F    F  Eth1/16
hst-5672-01# show mac address-table vlan 70
Legend:
        * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
        age - seconds since last seen,+ - primary entry using vPC Peer-Link
   VLAN     MAC Address      Type      age     Secure NTFY   Ports/SWID.SSID.LID
---------+----------------+--------+---------+------+----+------------------
* 70       0050.5600.0021    dynamic   10         F    F  Eth1/11
* 70       0050.5600.0022    dynamic   10         F    F  Eth1/11
* 70       0050.5600.0031    dynamic   120        F    F  Eth1/16
* 70       0050.5600.0032    dynamic   300        F    F  Eth1/16
hst-5672-01#
```