Private VLAN in OneView 4.20

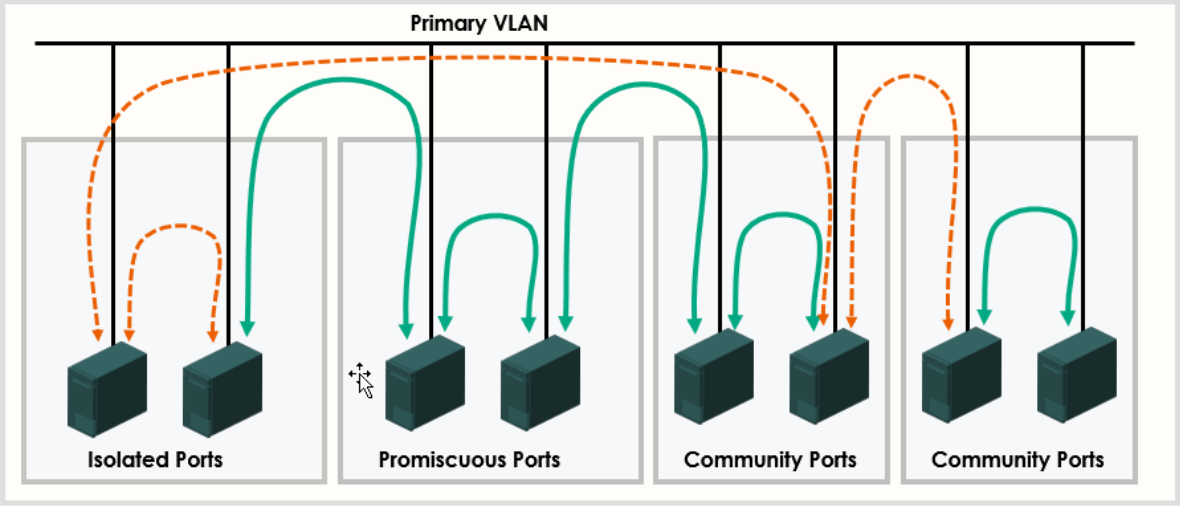
Thursday, April 4, 2019
5:43 PM

Private VLAN (PVLAN) provides Ethernet traffic isolation between all the members of the same VLAN. It diverts all the traffic between individual compute modules to flow through the upstream switch infrastructure unless explicitly permitted by a predefined policy.

- Private VLANs can help you restrict how hosts communicate with each other within the primary VLAN
- Private VLANs are helpful for isolating systems within the same subnet, without the lost addresses due to splitting the address range into multiple subnets
- This capability enables interoperability with HPE Synergy and Cisco ACI Intra-EPG (end-point groups) isolation and micro-segmentation features.

There are 3 types of Private VLAN ports in the Cisco world:

- **Promiscuous** ports: communicate with all other private VLAN ports, is the port that you typically use to communicate with external routers
- **Community** ports: communicate among themselves and with their promiscuous ports
- **Isolated** ports: can only communicate with promiscuous ports, have complete Layer 2 isolation from other ports within the same private VLAN (e.g. Ethernet ports in hotel rooms)



With OneView 4.20, we can support **Isolated** ports on the compute module network connections.

This means that all Compute modules connected to the same Private VLAN cannot communicate, they are isolated from each other's. They can only communicate with a Promiscuous port located upstream on a Nexus switch usually connected to a router.

OneView 4.20 supports three types of **Isolated** downlink ports:

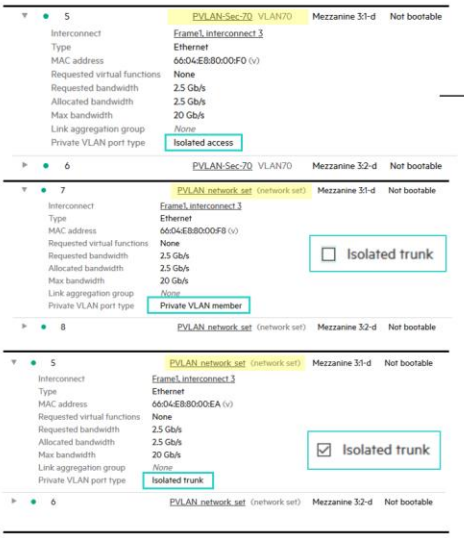
1. ISOLATED TRUNK: only recommended for PVLAN-unaware operating systems like bare metal server (Linux/Windows) - the traffic is tagged and requires a network set. A NIC teaming with VLAN 70 must be defined in the OS - The primary VLAN ID tags is translated to the isolated VLAN ID tags for traffic egressing to the downlink ports.

2. PRIVATE VLAN MEMBER: only recommended for PVLAN-aware operating systems like hypervisors: ESXi/Hyper-V. It requires a network set and a hypervisor virtual switch configured with Private VLAN. Upstream switch sends packets on the Primary VLAN but OS responds on the secondary (isolated) VLAN.

3. ISOLATED ACCESS: only recommended for PVLAN-unaware operating systems like bare metal server (Linux/Windows) and for untagged traffic only.

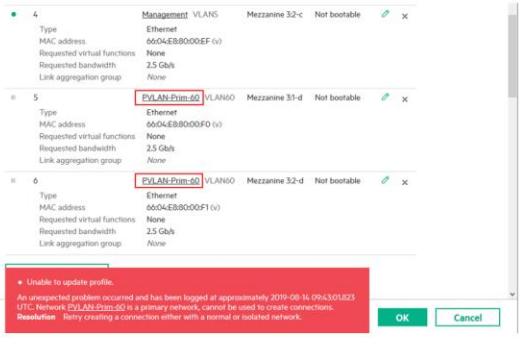
Private VLAN

Downlink Port types

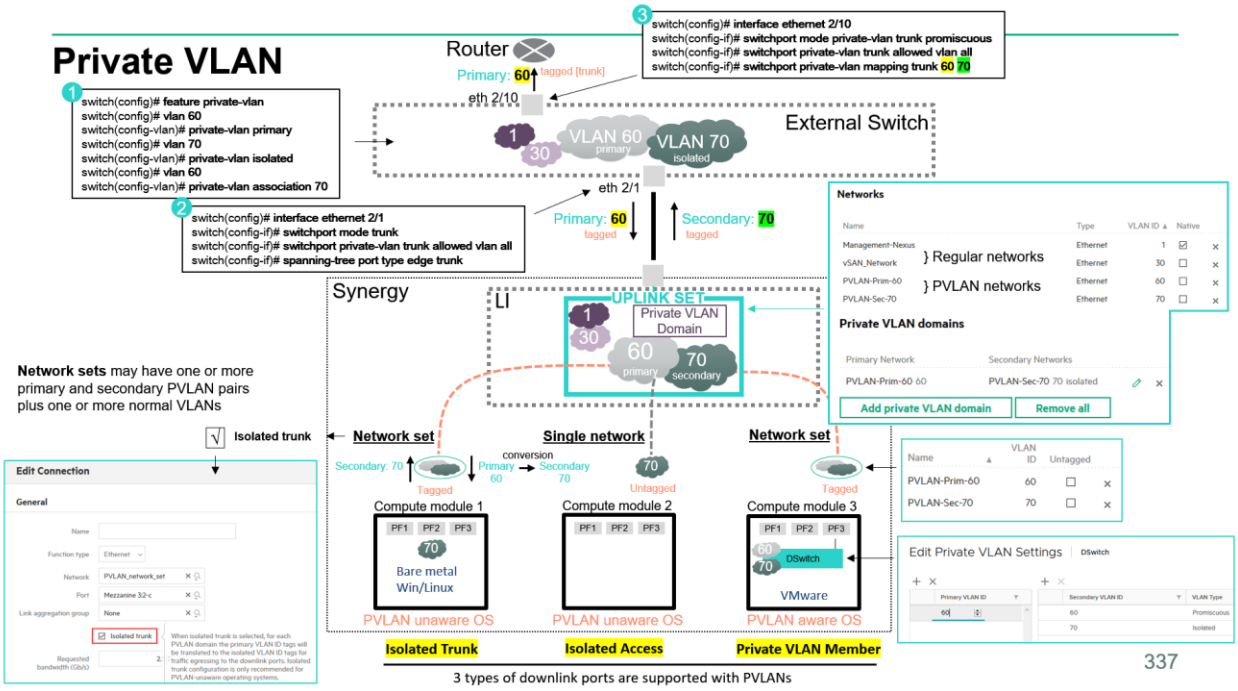


Can I create a **Promiscuous Access** ?

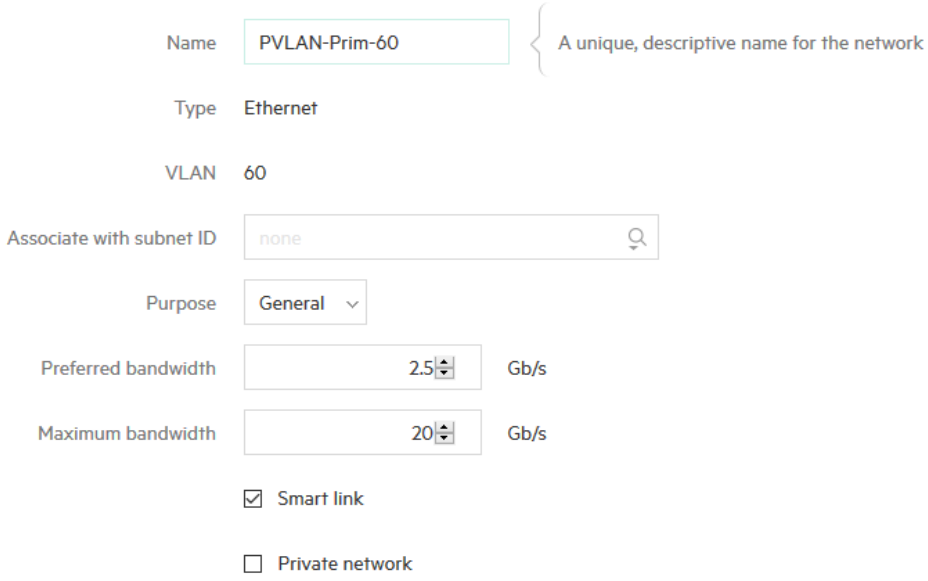
A primary network, cannot be used to create connections.



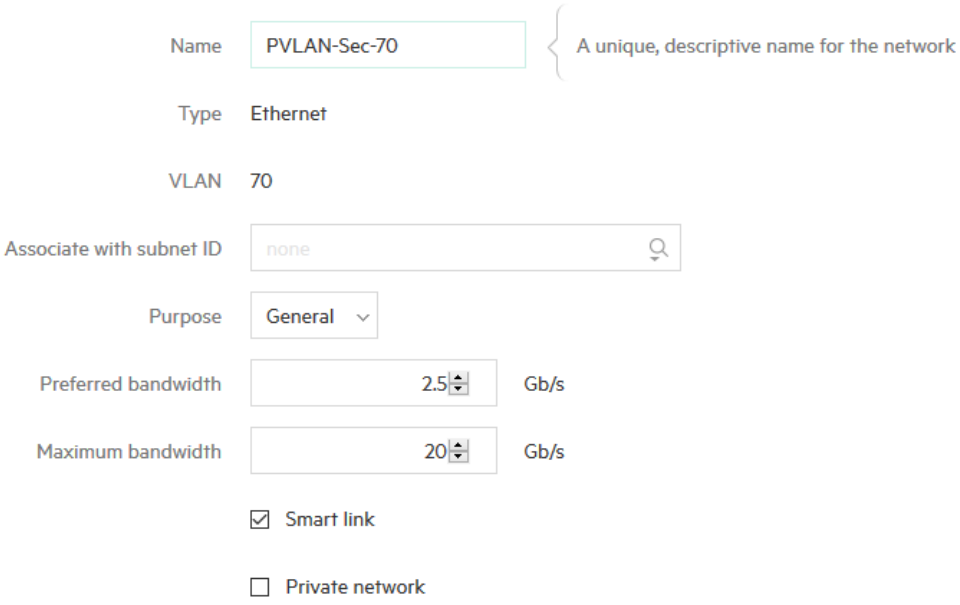
Setup:



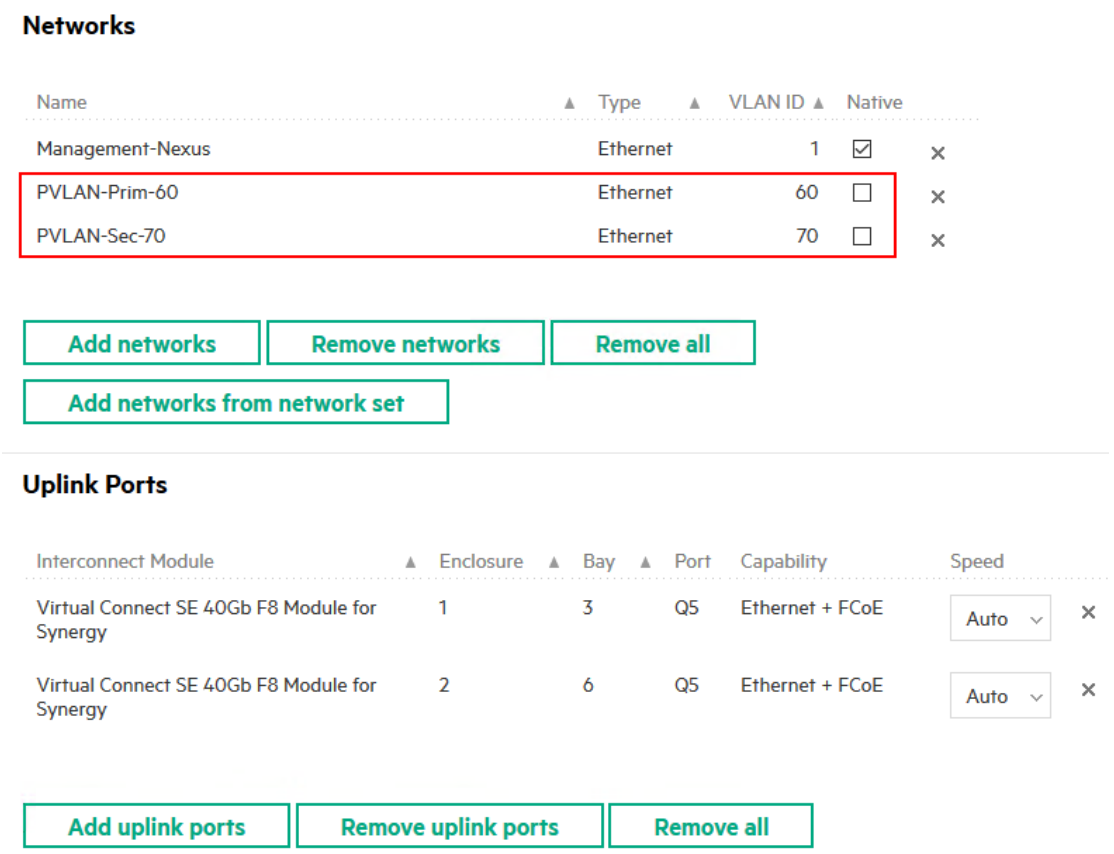
1. Create one network for the primary Private VLAN



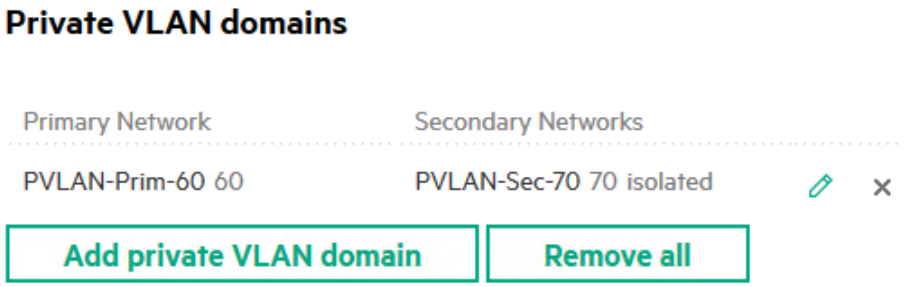
2. Create one network for the secondary isolated Private VLAN



3. Go to the **LIG** and add the two networks to the uplink set:



4. Scroll down to the **Private VLAN domains** section and create a PVLAN domain using the two networks:



Note: Private VLAN networks can be added or removed only in pairs. Both primary and secondary networks need to be added or removed together.

4. Go to the **LI** and **update from group** to set the PVLAN configuration to the VC modules

5. Enable the Nexus Private VLAN feature

   switch# **configure terminal**
   switch(config)# **feature private-vlan**

6. Configure VLAN 60 as a primary Private VLAN

   switch(config)# **vlan 60**
   switch(config-vlan)# **private-vlan primary**

7. Configure VLAN 70 as a secondary isolated Private VLAN

   switch(config)# **vlan 70**
   switch(config-vlan)# **private-vlan isolated**

8. Associate secondary VLAN 70 with Primary Private VLAN 60

   switch(config)# **vlan 60**
   switch(config-vlan)# **private-vlan association 70**

9. Configure the Nexus interface connected to the Synergy VC uplink set (with PVLAN domain) as a standard trunk port, allowing all networks in use (regular and Private VLANs):

   switch(config)# **interface port-channel20**
   switch(config-if)# **description vpc Synergy**
   switch(config-if)# **switchport mode trunk**
   switch(config-if)# **switchport private-vlan trunk allowed vlan all**
   switch(config-if)# **spanning-tree port type edge trunk**
   switch(config-if)# **vpc 20**

10. Configure Nexus interface connected to Layer3/Router as promiscuous port:

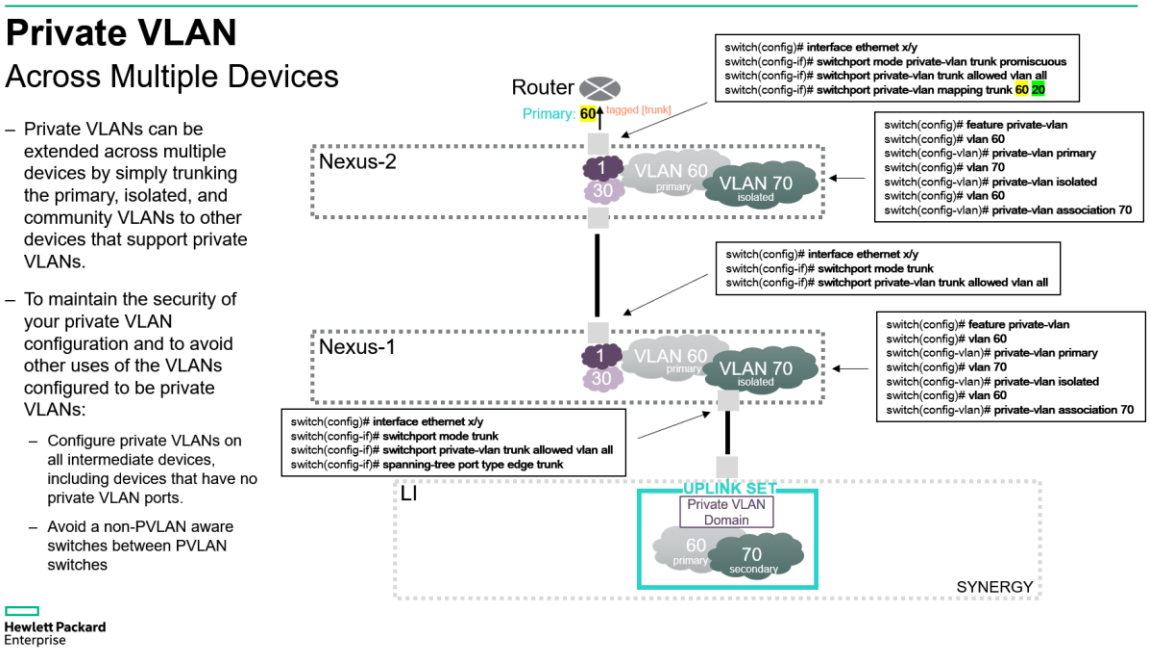
    Note: **Private-vlan Trunk** is required if regular VLANs or multiple primary/secondary PVLANs is also required

    switch(config)# **interface port-channel30**
    switch(config-if)# **description vpc router**
    switch(config-if)# **switchport mode private-vlan trunk promiscuous**
    switch(config-if)# **spanning-tree port type edge trunk**
    switch(config-if)# **switchport private-vlan trunk allowed vlan all**
    switch(config-if)# **switchport private-vlan mapping trunk 60 70**
    switch(config-if)# **vpc 30**

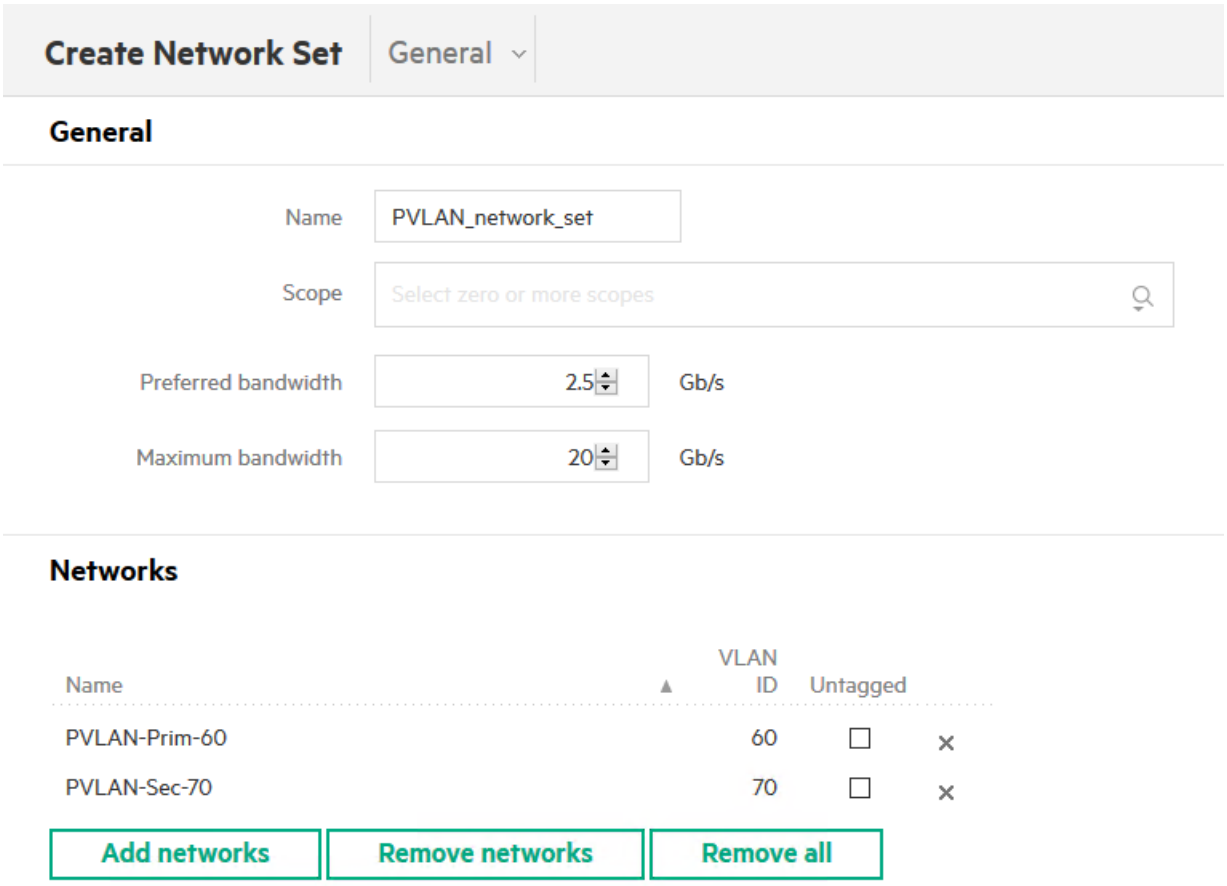
    Note: *switchport private-vlan mapping trunk {primary-vlan-id} {secondary-vlan-id}*

Note: According to Cisco documentation, if your Private VLAN networks need to cross over multiple devices to reach the Promiscuous port where you typically connect your external router, you can extend the private VLAN networks by simply trunking the primary, isolated, and community VLANs to other devices as long as those devices support private VLANs.

A typically device-to-device PVLAN configuration would be as follow:



11. For the **Isolated Trunk** and **Private VLAN Member** downlink configuration, you must create a **network set** with the pair of PVLAN networks:

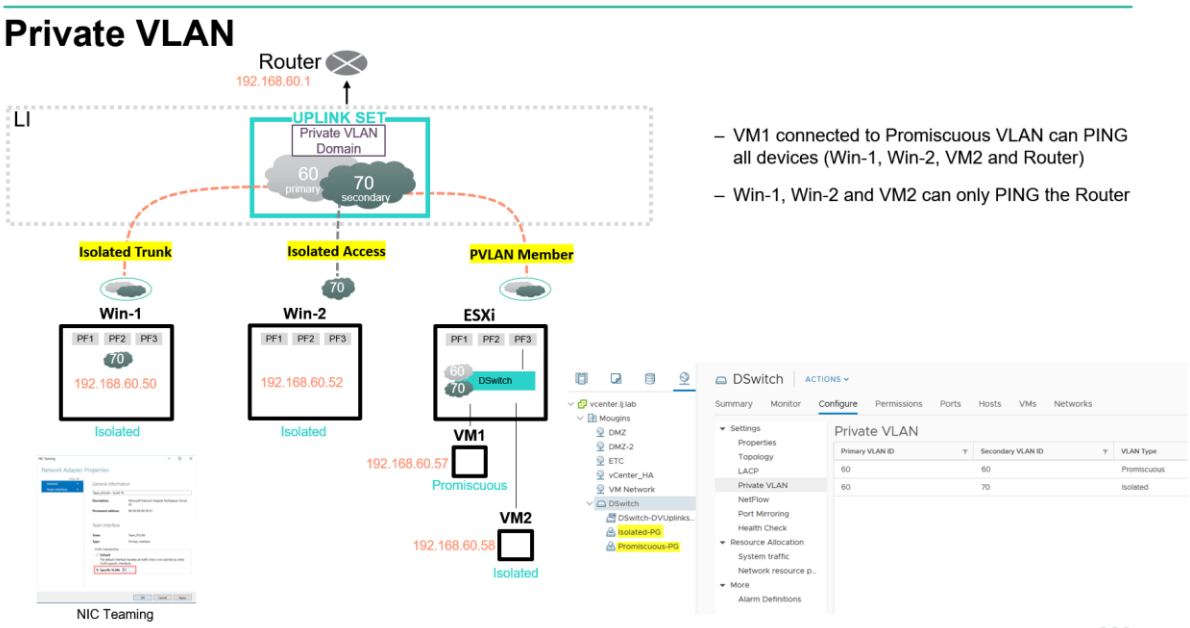


12. In **Server Profile**, define two connections with the desired downlink PVLAN option:

    A. ISOLATED TRUNK: only recommended for PVLAN-unaware operating systems like bare metal server (Linux/Windows) - the traffic is tagged and requires a network set. A NIC teaming with VLAN 70 must be defined in the OS - The primary VLAN ID tags is translated to the isolated VLAN ID tags for traffic egressing to the downlink ports.

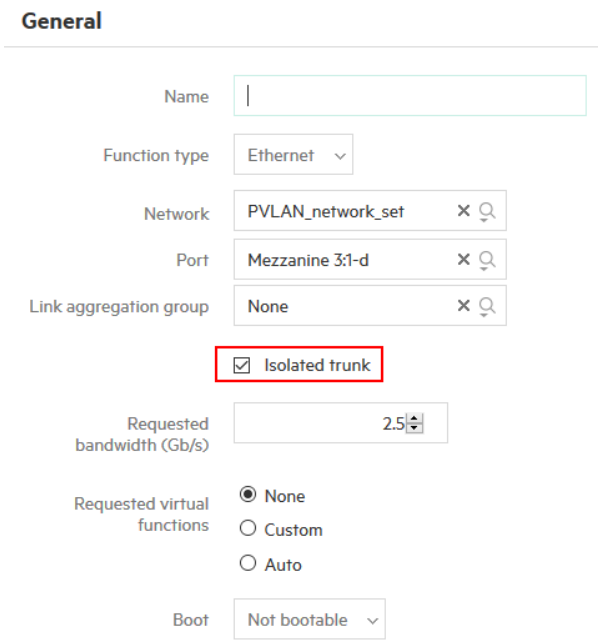
    B. PRIVATE VLAN MEMBER: only recommended for PVLAN-aware operating systems like hypervisors: ESXi/Hyper-V. It requires a network set and a hypervisor virtual switch configured with Private VLAN. Upstream switch sends packets on the Primary VLAN but OS responds on the secondary (isolated) VLAN.

    C. ISOLATED ACCESS: only recommended for PVLAN-unaware operating systems like bare metal server (Linux/Windows) and for untagged traffic only.

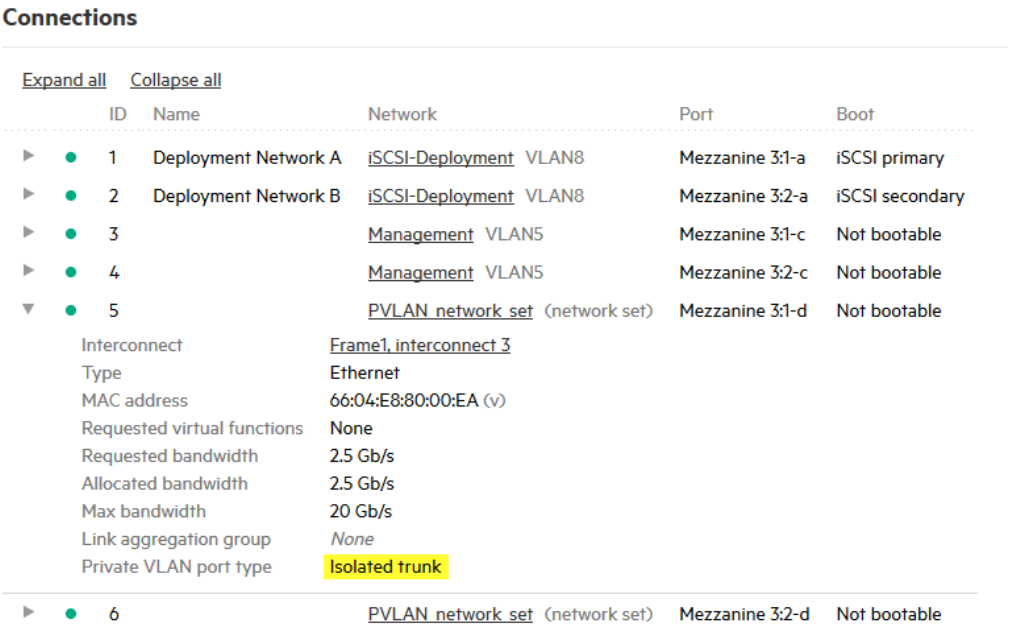


A. ISOLATED TRUNK:

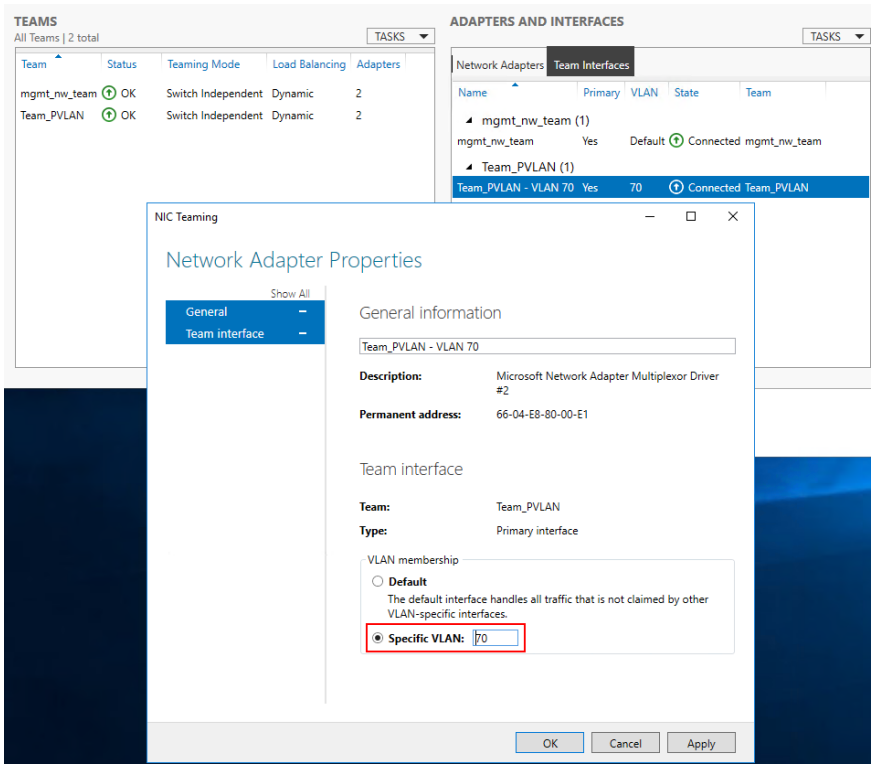
- Select the PVLAN Network set
- Check the **Isolated trunk** option



- The following is displayed in OneView for the Server Profile PVLAN network connection:

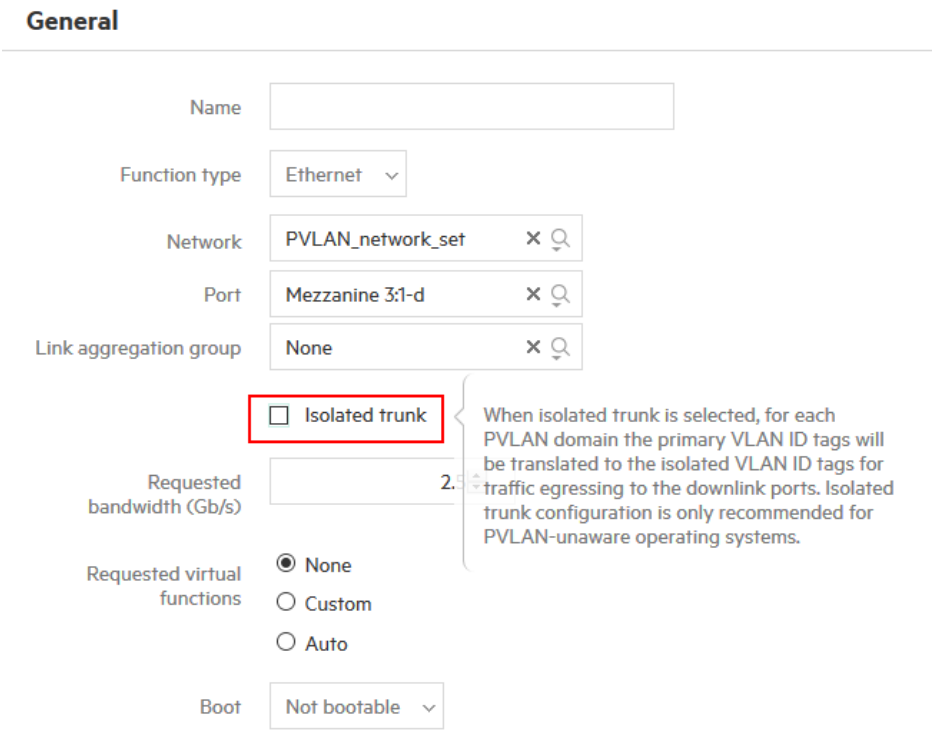


- A NIC teaming with VLAN 70 network adapter must be defined under the OS:

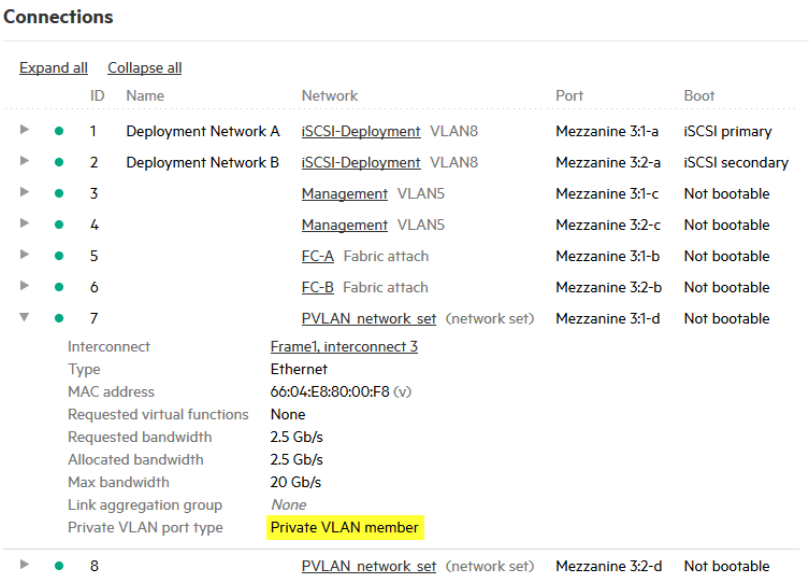


B. PRIVATE VLAN MEMBER: for hypervisor PVLAN aware OS's like ESXi/Hyper-v:

- Select the PVLAN Network set
- Unckeck the **Isolated trunk** option



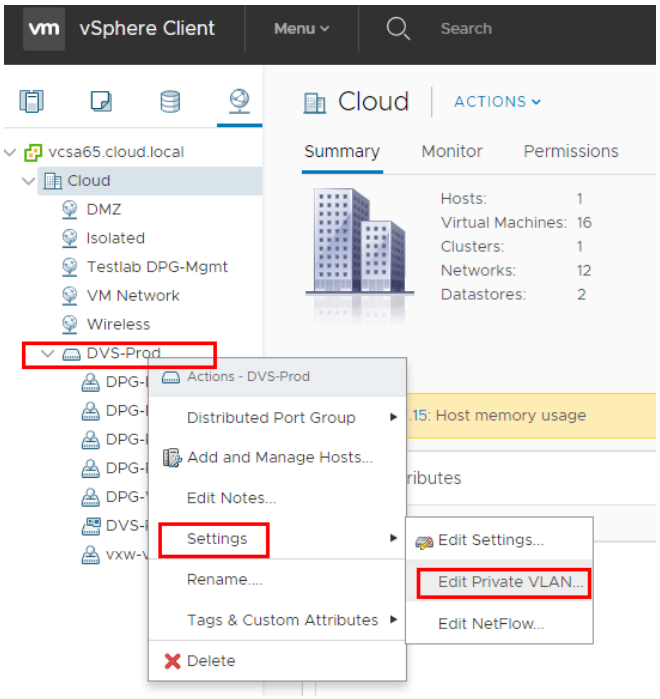
- The following is displayed in OneView for the Server Profile PVLAN network connection:



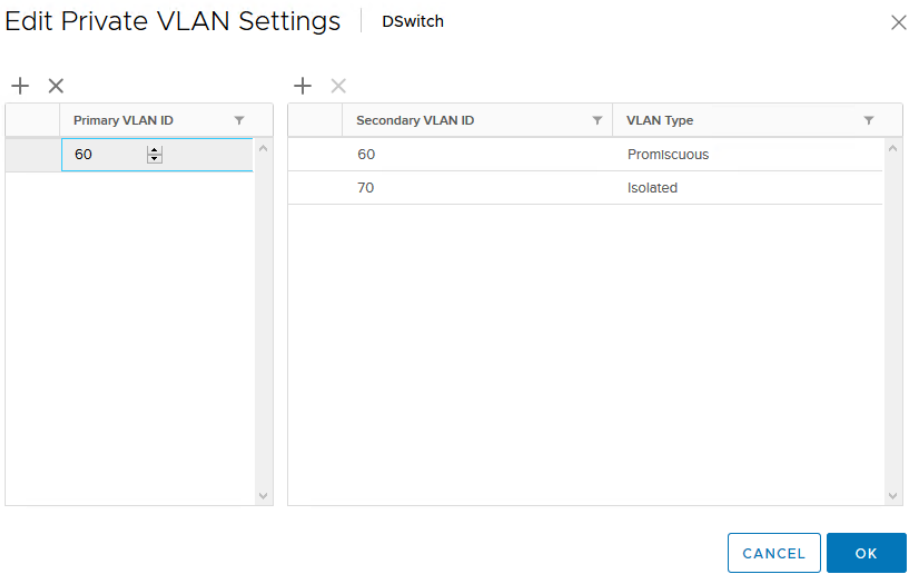
- **PVLAN with VMWare ESXi**:

  PVLANs in ESXi must be configured on virtual distributed switches.

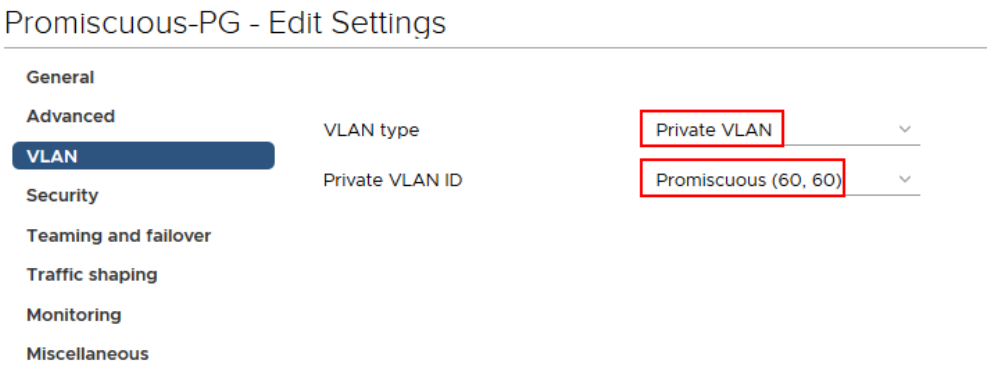
  To set PVLAN, right-click on the distributed switch and select **Settings** then **Edit Private VLAN**.



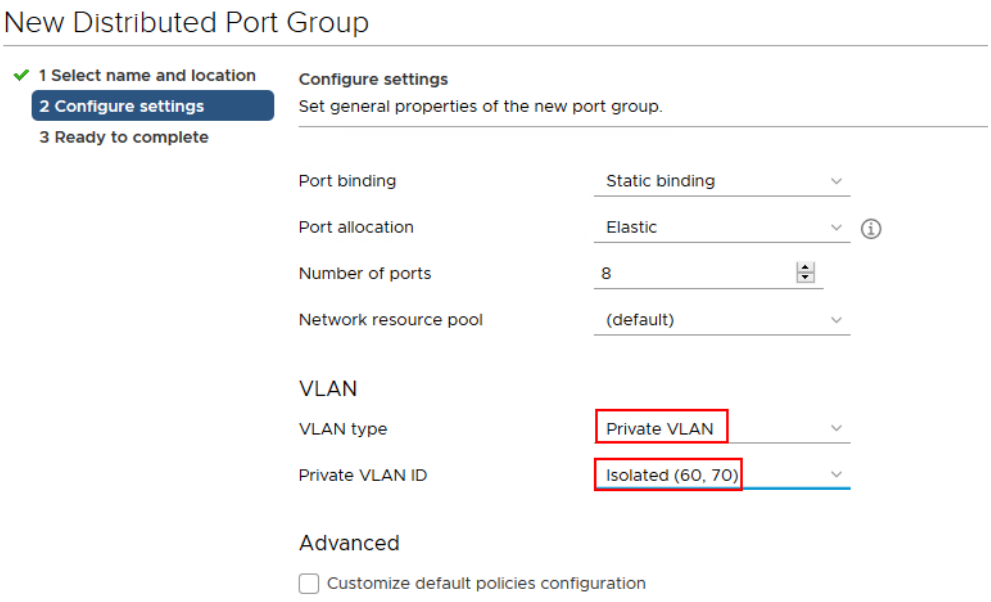
Click the "**+**" signs to add the Primary VLAN ID **60** with VLAN Type **Promiscuous**, then add the Secondary VLAN **70** as **Isolated**.

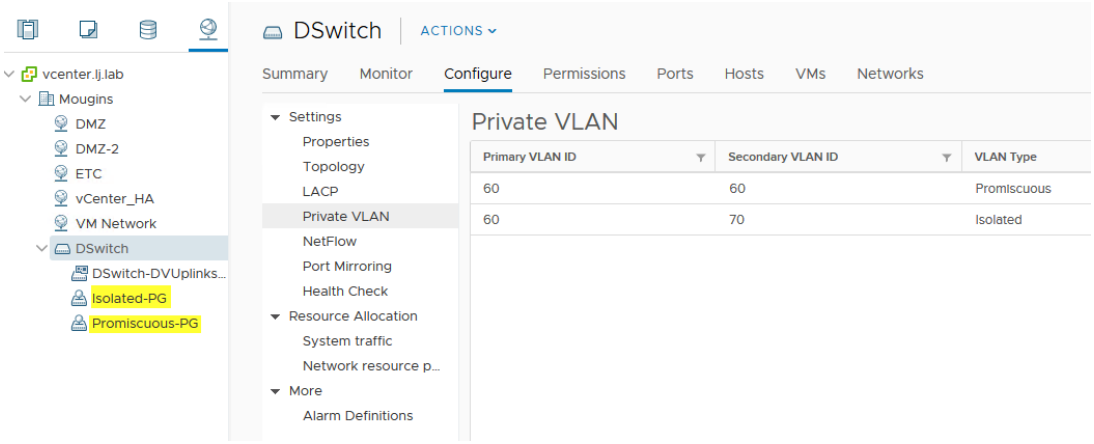


Next is to create a first distributed port group which will be connected to newly created primary PVLAN, select **Private VLAN** as VLAN Type and select **Promiscuous (60, 60)** as Private VLAN ID:



Next is to create a second distributed port group which will be connected to newly created isolated PVLAN, select **Private VLAN** as VLAN Type and select **Isolated (60, 70)** as Private VLAN ID:



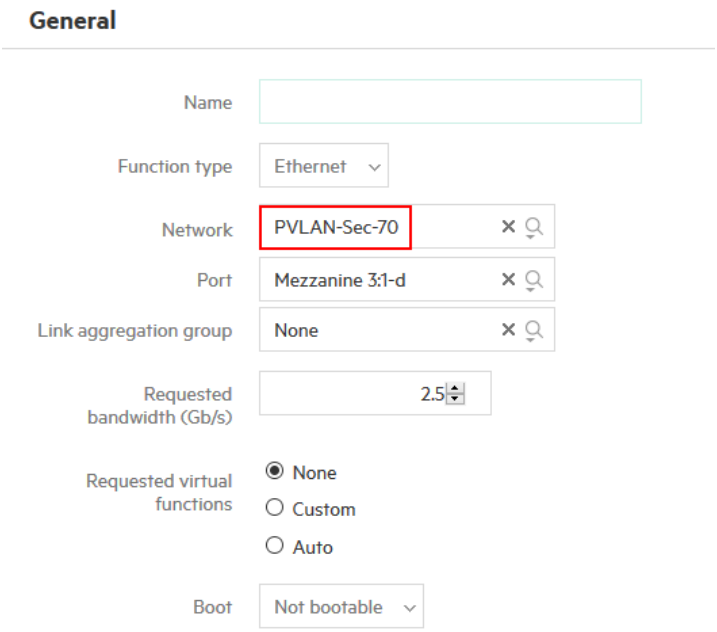


- Then VMs must be attached to the respective Port Groups for either isolation or promiscuous modes…

  Note: In Promiscuous mode, the VM can PING all VMs (in either isolated or promiscuous mode) and all Computes (in OneView isolated access or isolated trunk mode)

C. ISOLATED ACCESS: This option is for PVLAN unaware OS - traffic is **untagged** and does not need any specific OS requirements.

- For this single network option, do not select the network set but the Secondary Isolated VLAN 70: **PVLAN-Sec-70**.



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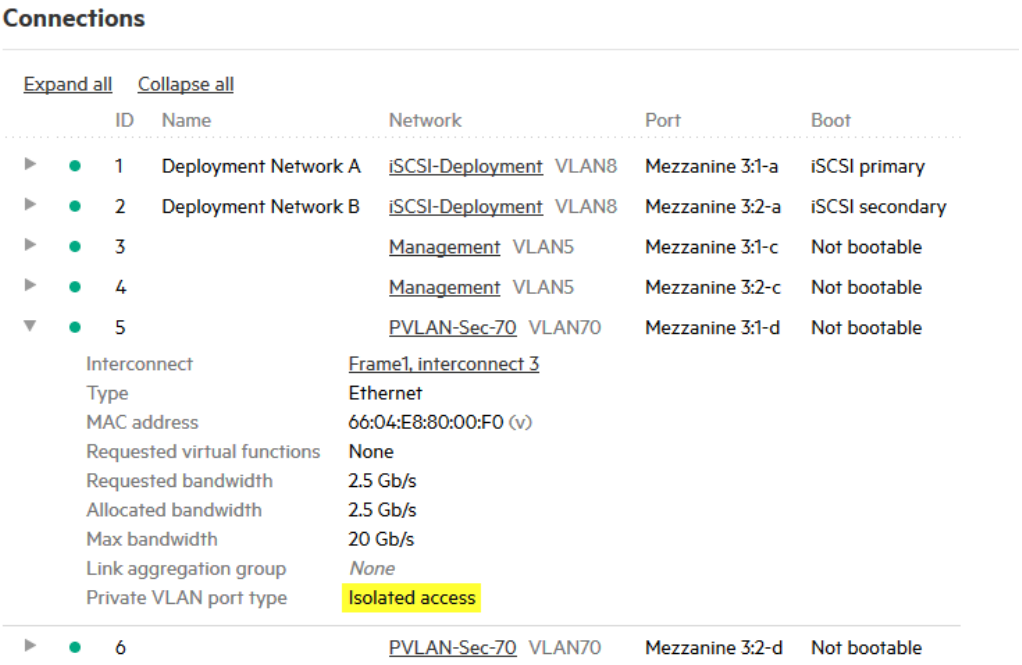

Troubleshooting

```
nexus5624-TOP# sh vlan private-vlan
Primary  Secondary  Type          Ports
-------  ---------  ---------------  ----------------------------------------
60       70         isolated      Po30

nexus5624-TOP# sh vlan private-vlan type
Vlan Type
---- -----------------
60   primary
70   isolated

# Interface of the Router
nexus5624-TOP# sh int po 30 switchport
Name: port-channel30
  Switchport: Enabled
  Switchport Monitor: Not enabled
  Operational Mode: Private-vlan trunk promiscuous
  Access Mode VLAN: 60 (VLAN0060)
  Trunking Native Mode VLAN: 1 (default)
  Trunking VLANs Allowed: 1-4094
  Voice VLAN: none
  Extended Trust State : not trusted [COS = 0]
  Administrative private-vlan primary host-association: none
  Administrative private-vlan secondary host-association: none
  Administrative private-vlan primary mapping: none
  Administrative private-vlan secondary mapping: none
  Administrative private-vlan trunk native VLAN: 1
  Administrative private-vlan trunk encapsulation: dot1q
  Administrative private-vlan trunk normal VLANs: 1-59,61-69,71-3967,4048-4093
  Administrative private-vlan trunk private VLANs: (60 70)
  Operational private-vlan: (60 70)
  Unknown unicast blocked: disabled
  Unknown multicast blocked: disabled

# Interface of the Synergy uplink set
nexus5624-TOP# sh int po 20 switchport
interface port-channel40
  description vpc SY-5900AF-BOTTOM
nexus5624-TOP# sh int po 20 switchport
Name: port-channel20
  Switchport: Enabled
  Switchport Monitor: Not enabled
  Operational Mode: trunk
  Access Mode VLAN: 1 (default)
  Trunking Native Mode VLAN: 1 (default)
```

Trunking VLANs Allowed: **1-4094**
Voice VLAN: none
Extended Trust State : not trusted [COS = 0]
Administrative private-vlan primary host-association: none
Administrative private-vlan secondary host-association: none
Administrative private-vlan primary mapping: none
Administrative private-vlan secondary mapping: none
Administrative private-vlan trunk native VLAN: 1
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Unknown unicast blocked: disabled
Unknown multicast blocked: disabled

Interface of the Router
nexus5624-TOP# **sh int po30 br**

Port-channel Interface	VLAN	Type	Mode	Status	Reason	Speed	Protocol
Po30	1	eth	**pvlan**	**up**	none	a-10G(D)	lacp

Interface of the Synergy uplink set
nexus5624-TOP# **sh int po20 br**

Port-channel Interface	VLAN	Type	Mode	Status	Reason	Speed	Protocol
Po20	1	eth	**trunk**	**up**	none	a-40G(D)	lacp

Interface of the Router
nexus5624-TOP# **sh vpc 30**
vPC status

id	Port	Status	Consistency	Reason	Active vlans
30	Po30	up	success	success	1,6,10,20,30,60

Interface of the Synergy uplink set
nexus5624-TOP# **sh vpc 20**
vPC status

id	Port	Status	Consistency	Reason	Active vlans

20 Po20 up success success 1,6,10,20,30,60,70

Interface of the Synergy uplink set
nexus5624-TOP# **sh int po 20 status err-vlans**

Port	Name	Err-Vlans	Status
Po20	vpc Synergy	none	none

Interface of the Router
nexus5624-TOP# **sh int po 30 status err-vlans**

Port	Name	Err-Vlans	Status
Po30	vpc Router	none	none