Virtual Link Trunking in Dell EMC OS10 Enterprise Edition

Reference Architecture

Abstract

VLT configuration and best practices within the Dell EMC OS10 Enterprise Edition operating system

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Executive summary

Virtual link trunking, or VLT, enables networks with high availability and resiliency. VLT has been deployed at various locations and customers are satisfied with its seamless functionality for the traffic flow and their business needs.

This document explains VLT functionality within Dell EMC OS10 Enterprise Edition (OS10EE) 10.4.1 and the best practices for efficient operation. This document also provides the configuration, syslog details, and troubleshooting tools using show commands.

1 Virtual link trunking overview

In a simpler term, VLT aggregates two identical physical switches to form a single logical extended switch. This single logical entity ensures high availability and high resilience for all its connected access, core switches, and clients. Though the dual physical units form together as a single logical unit, the control and data plane of both switches remain isolated, which differs from the legacy stacking concept, where the control plane is unified. This results in VLT with added advantage during switch firmware upgrade without bringing down the network.

With the mandatory need of high availability in modern data centers and enterprise networks, VLT plays a vital role connecting to all its access nodes with rapid convergence, seamless traffic flow, efficient load balancing, and loop free mechanism.

2 VLT architecture

This section describes the VLT architecture that is implemented in OS10EE. The VLT-Fabric Manager (VLT-FM) module implements the core VLT protocol functionalities and VLT fabric orchestration. Other modules in the system uses the services of VLT-FM to implement the complete VLT solution.

The VLT fabric consists of two nodes providing a logical single switch view to the connected devices. However, each of the VLT peers has its own control and data planes and can be configured individually for port, protocol, and management behaviors.

The VLT design architecture is based on VLT fabric manager process, controlling the VLT neighbor and overall fabric orchestration. The protocol used to communicate between VLT peers is defined as VLT Control Protocol (VLT-CP). The topology discovery and management are handled by Node discovery service module, or NDS. On receiving the topology update message, VLT-FM builds raw topology and initiates loop prevention algorithm to construct the overlay topology.

The VLT application elects the primary node that is based on the lower MAC address, however with `primary-priority` command, the node with the least primary priority becomes the Primary node. This election is not preempted, which means whenever there is a change in priority, the primary role does not change until the nodes are rebooted, or the VLT process is restarted.

The VLT-related information between the nodes is exchanged through the specific reserved VLAN (*VLAN 4094*). The VLT database (VLT DB) is used to store the VLT control information, to be exchanged between the VLT nodes. The local database (Local DB) stores the MAC and ARP table entries.
The design and operation of internal communication details and failure handling are beyond the scope of this document.

3 VLT operation

Both the VLT nodes of a domain always continue to forward data plane traffic in Active-Active mode. With the instantaneous synchronization of MAC and ARP entries, both the nodes remain Active-Active and continue to forward the data traffic seamlessly.

The VLT implementation in OS10EE has been modified for optimal operation that is based on the internal architecture and the base operating system.

4 VLT functionality

The same VLT domain-id should be configured on both VLT nodes. The unit-id 1 and 2 for the nodes is configured automatically. For rapid convergence and optimal service, the same VLT MAC address (System-mac as in OS9) should be configured on both the nodes using `vlt-mac` command (optional). In the absence of `vlt-mac` configuration, if primary VLT node goes down, the VLT port channel on secondary node would flap causing slight traffic disruption. The priority of the primary node election is based on the lower system mac-address of the switch, however with the `primary-priority` command, the VLT node with the least configured priority takes over as primary. This election will not be preempted. For example, when the primary node is reloaded, it is assigned the secondary role. The role change avoids disruptions in traffic flow due to the election process.

Election happens only during the initial configuration or when VLT is first launched. The VLT role election has no significance for the data traffic flowing through the VLT domain. It is only for the control protocol exchange and handles potential split-control failure scenarios.

VLAN ID 4094 is assigned automatically and internally reserved as a control VLAN for the exchange of VLT-related information between the nodes. The IPv6 address that is automatically assigned within the reserved range, is mapped for VLAN 4094 for reachability between the VLT nodes.

For the VLT interconnect (VLTi) link, once the discovery interfaces are configured on both the nodes, Port-channel 1000 is automatically configured, mapping the physical discovery interfaces. The ports should be configured as **no switchport** from the default Layer-2 mode while configuring the discovery interfaces.

Every thirty seconds, heartbeat messages are sent between the VLT nodes to check the liveliness of the peers, and to handle the VLTi failure scenario. The heartbeat interval value is configurable and reaches the peer through the backup destination. Similarly, keep alive messages (non-configurable) are sent through the VLTi port channel.

For VLT port channels, the user should explicitly assign the `vlt-port-channel id` to the configured port channel on both the nodes. This port channel identifier should be same across both the nodes.

CAUTION: Customers should ensure they do not use VLAN 4094 for their services. This cannot be configured locally. Similarly, Port-channel interface 1000 cannot be configured locally.

4.1 Peer routing

The peer routing feature assists with achieving active-active forwarding on the VLANs with routing protocols such as OSPF and BGP. Typically, this would be the northbound upstream VLANs having dynamic routing protocols. When north to south traffic hashes to a different VLT node (the destination MAC address is of VLT Node 1, but packet hashes to Node 2), it is routed by that VLT node itself. The local destination MAC address is synchronized between the VLT peers. Without peer routing, the traffic is sent through the VLTi link to the right peer which does the routing, as shown in Figure 1. With peer-routing in VLT, sub-optimal routing is mitigated.

Peer routing is not restricted for a VLAN with routing protocols, rather, it is enabled domain wide. Peer routing ensures active-active routing for the traffic path. To route traffic on behalf of other VLT peers, enable `peer-routing` on both nodes. Peer routing synchronizes the router MAC address (local destination MAC address) within the VLT domain, and ensures seamless routing by the peer node.

4.2 Peer-routing-timeout

In the event of peer-node failure, the `peer-routing-timeout` command enables the availability of peer-routing feature and retains the corresponding local destination MAC address until the timer expires. For customers who would like to be aware of the node failure and its associated traffic, this command would cease routing on behalf of the peer after the expiration of the timer. This timer does not need to be configured for normal, high availability requirement deployments.

Figure 1 illustrates the peer-routing concept:

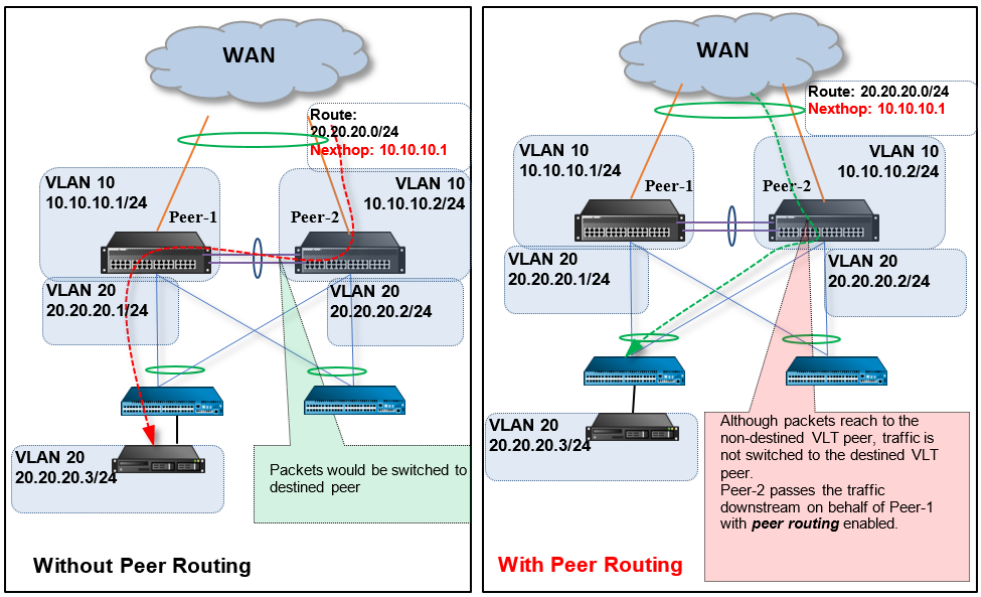

Figure 1 Peer routing

The **Delay-restore timer** works in the same way as in OS9 with default of 90 seconds. After a VLTi flap or node reboot, the VLT port channel is held in a **down** state in the secondary VLT node until the delay-restore time has passed. This function allows the MAC and ARP address table synchronization to complete between the nodes and the control protocols to converge before reinstating the VLT port channel for forwarding the traffic. When the VLT port channel is brought to a working state, the forwarding tables are populated in the hardware, which allows traffic to flow without disruption. In a highly scaled setup, it is recommended that the timer is increased to ensure that all of the tables are synchronized, and that the protocol converges before opening the VLT port channel, as to avoid a traffic black hole.

Note: The ARP proxy is not currently available in OS10EE. Dell EMC recommends you use VRRP for gateway redundancy in host-facing VLANs.

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5 VRRP in VLT

With VRRP configured in both the VLT nodes, active-active mode is internally enabled by default, which ensures seamless traffic flow. The active-active mode is activated when the VLT VLANs are configured with a VRRP group. For practical purposes, VRRP offers a single virtual IP as a default gateway for its access clients.

VRRP should be enabled on host facing VLANs. The gateway for the hosts should be the virtual IP of the respective VRRP group. Traffic from the hosts is routed by either of the VLT nodes since VRRP establishes active-active mode in VLT.

6 eVLT in OS10EE

Data Center Interconnect (DCI) between VLT domains is supported in OS10EE with VRRP feature across the VLT domains (eVLT). With OS10EE, VRRP can be configured for dual VLT domains to form an eVLT topology as shown in Figure 2. The same VRRP group-id enables a common virtual IP address across both the VLT domains. Therefore, any VM migration from DC-1 to DC-2 can be initiated without any dependency while retaining the VM IP address and gateway IP address.

The VRRP group for the configured VLANs should be the same VRRP group id in both VLT domains. With this implementation, only one of the nodes is selected as the VRRP Master, where the other three nodes act as a standby for that VRRP group. For example, the virtual IP address 192.168.1.254 is retained across both the DC. In case a VM with a default gateway of 192.168.1.254 is migrated from DC-1 to DC-2, the VM can still retain its IP address and continue to forward and receive the traffic, without any changes.

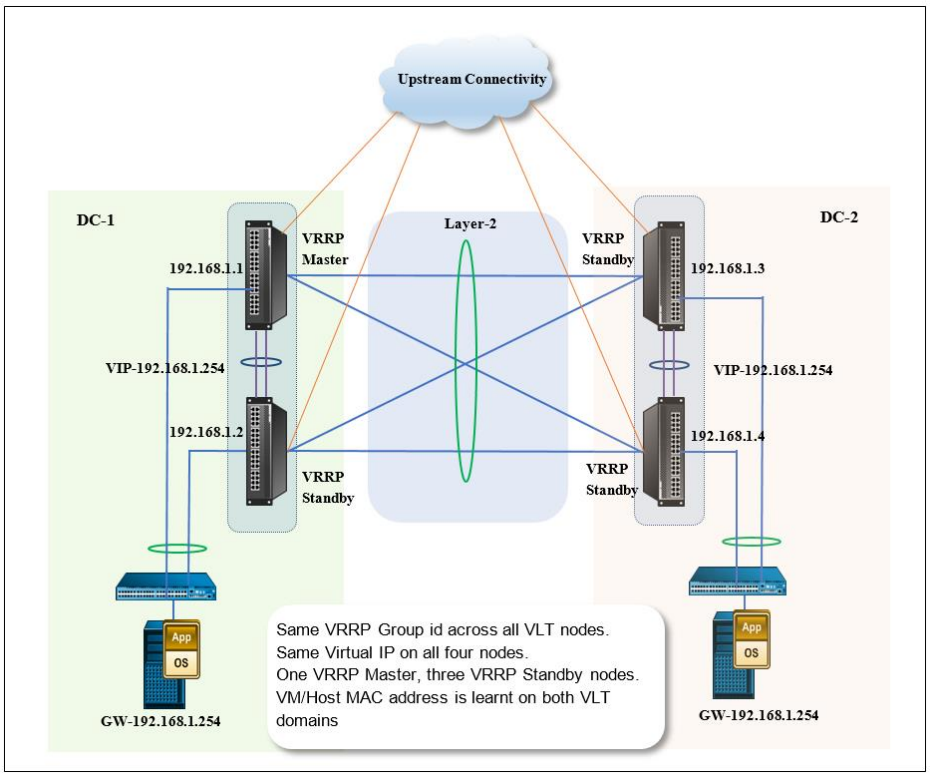

Figure 2 DCI using eVLT with VRRP

Upstream devices from the VLT domains can have static routing, or any other dynamic routing protocols, to support the N-S traffic. The host can still be reached if the traffic to the VM host lands at any upstream DC, which ensures high availability for the application and services.

7 Split-control scenario

If the VLTi links (Po-1000) go down with the backup link status in an **Up** state, the secondary VLT node automatically shuts down the VLT port channels. This ensures that the traffic only flows through the primary VLT node. In another scenario, where the backup link is also down and with the complete isolation between VLT nodes, the secondary node without receiving any keep alive and heartbeat messages from the peer, changes its role to Primary node.

MAC/ARP addresses that are learned in both switches are retained for the traffic flow. However, any new MAC/ARP addresses that are learned from the access nodes are not synchronized. In both the cases, the orphan ports, or non-VLT ports, continue to function without any change in the port state.

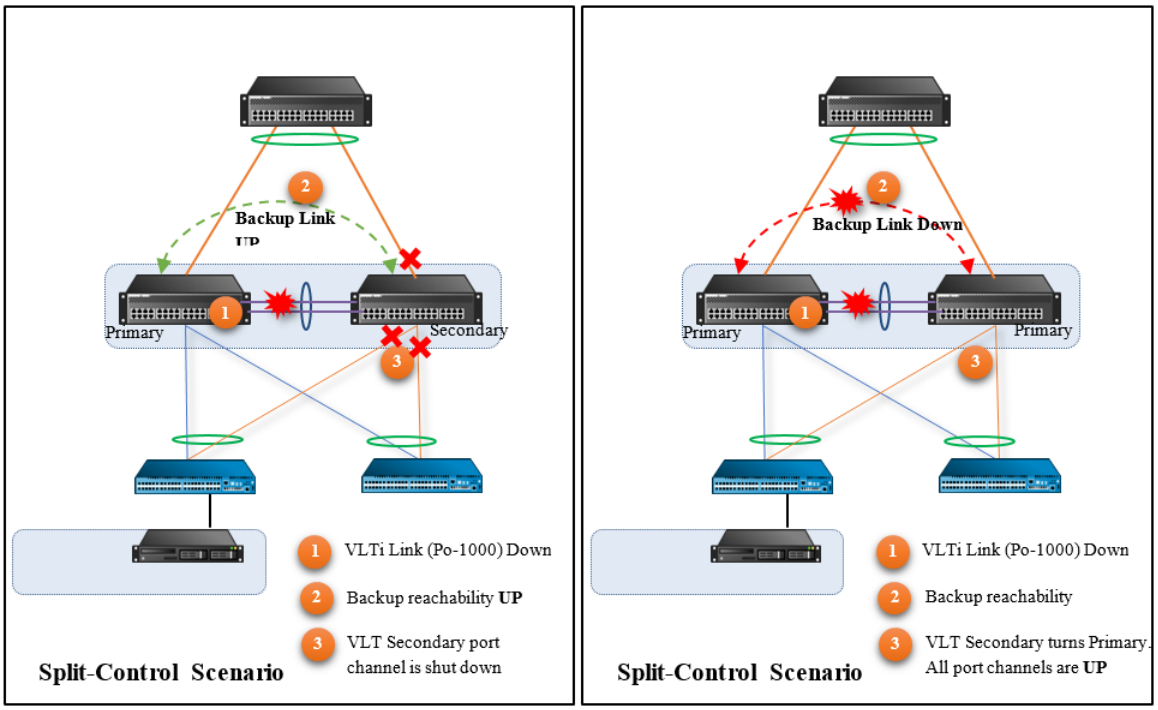

Figure 3 Split-control scenario

8 Spanning tree protocol with VLT

Rapid spanning tree protocol (RSTP) and rapid per-vlan spanning tree+ (RPVST+) modes of spanning tree protocol in VLT is supported. Currently, multiple spanning tree protocol (MSTP) is not supported. Depending on the network topology, the primary node of the VLT domain can be made as root bridge. BPDUs are processed only in the primary node.

NOTE: Dell EMC recommends you enable spanning tree (RSTP or RPVST+) before enabling VLT to avoid any possible loop.

The configurations and best practices for spanning tree protocol are as follows:

8.1 Spanning tree configuration

1. RPVST+ is enabled by default in OS10EE. No need to configure RPVST+ unless the default spanning-tree mode is changed.

```
OS10-VLT-Peer1(config)# spanning-tree mode rapid-pvst
OS10-VLT-Peer2(config)# spanning-tree mode rapid-pvst
```

2. RSTP is enabled by changing the mode to RSTP using the following commands:

```
OS10-VLT-Peer1(config)# spanning-tree mode rstp
OS10-VLT-Peer2(config)# spanning-tree mode rstp
```

3. Based on the customer design solution and existing STP mode, if you plan to deploy VLT nodes as the root bridge, assign the bridge priority value to both nodes so that both of the VLT nodes have lesser priority in the network. The assignment ensures that no other access switch becomes the root bridge when one VLT node goes down, and avoids unintended topology changes.

   a. Configuring RPVST+

```
OS10-VLT-Peer1(config)# spanning-tree vlan 2 priority 4096
OS10-VLT-Peer1(config)# spanning-tree vlan 3 priority 4096

OS10-VLT-Peer2(config)# spanning-tree vlan 2 priority 8192
OS10-VLT-Peer2(config)# spanning-tree vlan 3 priority 8192
```

   b. Configuring RSTP

```
OS10-VLT-Peer1(config)# spanning-tree rstp priority 4096
OS10-VLT-Peer2(config)# spanning-tree rstp priority 8192
```

4. The STP state of the VLTi link is always placed in forward (FWD) state. Run the show spanning-tree virtual-interface command to verify the spanning tree status of VLTi.

```
OS10-VLT-Peer1# show spanning-tree virtual-interface
VFP(VirtualFabricPort) of RSTP 1 is Designated Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-
Guard-violation: No
Root-Guard: Disable, Loop-Guard: Disable
```

```
Bpdus (MRecords) Sent: 1083, Received: 3
Interface
      Designated
Name                            PortID    Prio      Cost      Sts         C
ost      Bridge ID                 PortID
-------------------------------------------------------------------------
----------------------------------------
VFP(VirtualFabricPort)          0.1       0         1         FWD         0
         4096     3417.eb3a.ef80  0.1
OS10-VLT-Peer1#

OS10-VLT-Peer2# show spanning-tree virtual-interface
VFP(VirtualFabricPort) of vlan 1 is Root Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-
Guard-violation: No
Root-Guard: Disable, Loop-Guard: Disable
Bpdus (MRecords) Sent: 22, Received: 271
Interface
      Designated
Name                            PortID    Prio      Cost      Sts         C
ost      Bridge ID                 PortID
-------------------------------------------------------------------------
----------------------------------------
VFP(VirtualFabricPort)          0.1       0         1         FWD         0
         4097     3417.eb3a.ef80  0.1
OS10-VLT-Peer2#
```

5. Configure orphan ports (non-VLT ports) connected to end hosts (not connected to switches) as an edge-port to avoid any topology change, when link state changes.

```
OS10-VLT-Peer1(conf-if-eth1/1/45)# spanning-tree port type edge
OS10-VLT-Peer2(conf-if-eth1/1/45)# spanning-tree port type edge
```

6. Apply the edge-port config on the VLT port channel if the VLT port channel is connected directly to the end host.
7. Replicate spanning-tree configurations applied on the VLT port channel, such as cost, priority, and edge port, on both VLT peers.
8. The primary VLT node controls all the VLT port channel interfaces within the VLT domain. The primary VLT node synchronizes the calculated spanning-tree role and state with the secondary VLT node.

   a. When a BPDU is received on the VLT port channel:

      i. The BPDU is consumed for internal processing if the node is primary.
      ii. If the node is secondary, the BPDU is redirected to the primary node for processing.

Note: The processing of the BPDU is done only by the VLT primary node.

9. Use the same command for VLT and standalone nodes to check the spanning-tree states. For example:

```
OS10-VLT-Peer1# show spanning-tree active
Spanning tree enabled protocol rstp with force-version rstp
Executing IEEE compatible Spanning Tree Protocol
Root ID    Priority 4096, Address 3417.eb3a.ef80
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID    Priority 4096, Address 3417.eb3a.ef80
We are the root
Configured hello time 2, max age 20, forward delay 15
Flush Interval 200 centi-sec, Flush Invocations 69
Flush Indication threshold 0 (MAC flush optimization is disabled)
Interface                                                                  Desig
nated
Name              PortID    Prio      Cost      Sts         Cost      Brid
ge ID               PortID
-------------------------------------------------------------------------
-----------------------------
port-
channel1     128.2517  128       1000      FWD         0         4096
3417.eb3a.ef80  128.2517
port-
channel2     128.2518  128       1000      FWD         0         4096
3417.eb3a.ef80  128.2518
Interface
Name              Role    PortID    Prio      Cost      Sts         Cost
    Link-type   Edge
-------------------------------------------------------------------------
-----------------------------
port-
channel1     Desg    128.2517  128       1000      FWD         0         A
UTO        No
port-
channel2     Desg    128.2518  128       1000      FWD         0         A
UTO        No
OS10-VLT-Peer1#

OS10-VLT-Peer2# show spanning-tree active
Spanning tree enabled protocol rstp with force-version rstp
Executing IEEE compatible Spanning Tree Protocol
Root ID    Priority 4096, Address 3417.eb3a.ef80
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID    Priority 8192, Address 3417.eb3a.f480
Configured hello time 2, max age 20, forward delay 15
Flush Interval 200 centi-sec, Flush Invocations 67
Flush Indication threshold 0 (MAC flush optimization is disabled)
Interface                                                                  Desig
nated
Name              PortID    Prio      Cost      Sts         Cost      Brid
ge ID               PortID
-------------------------------------------------------------------------
-----------------------------
```

```
port-
channel1     128.2517  128       1000      FWD         1         8192
3417.eb3a.f480  128.2517
port-
channel2     128.2518  128       1000      FWD         1         8192
3417.eb3a.f480  128.2518
Interface
Name              Role    PortID    Prio      Cost      Sts         Cost
    Link-type   Edge
--------------------------------------------------------------------------
------------------------------
port-
channel1     Desg    128.2517  128       1000      FWD         1         A
UTO        No
port-
channel2     Desg    128.2518  128       1000      FWD         1         A
UTO        No
OS10-VLT-Peer2#
```

9 LACP fallback in VLT

- LACP fallback feature is applied to support PXE boot from servers with NIC teaming or bonding
- Use the `lacp fallback enable` command on the VLT port channels on both of the VLT nodes that are connected to servers
- A member port in the VLT port channel is made active if the LACP PDUs are not received from the server within the `lacp fallback timeout` period, which by default is set to 15 seconds.
- LACP fallback in VLT allows the PXE boot server to establish a connection over a single port, download the boot image, and continue the boot process
- After the server boots, it establishes the LACP port channel, which allows the VLT port channels to function like a regular VLT port channel after the LACP PDUs are received
- PXE boot uses untagged packets, therefore, configure the VLT port channel as an untagged member in the respective VLAN to reach PXE/DHCP server
- During the duration of LACP fallback, one VLT port channel member port is kept active while other ports are kept in an inactive state

The active port is selected based on the following order:

1. The port with the lowest LACP port priority is kept active.
2. The lowest port number is kept active if the port priority is same or if it is the default port.
3. The port on the VLT node with the lowest system MAC address are kept active if the port numbers are the same in both VLT nodes.

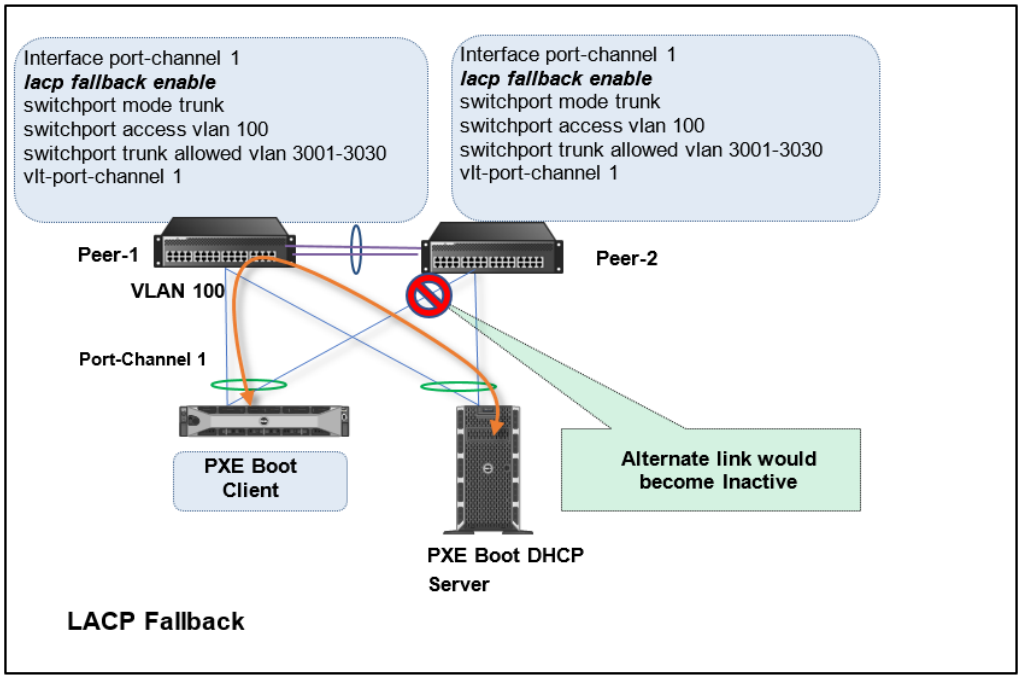

Figure 4 LACP Fallback

10 Best practices for VLT deployment

When deploying VLT, consider the following best practices:

- Both VLT peers require the same OS10EE version within the production environment, however, a mismatch in version is acceptable during upgrade procedure
- Backup destination, or heartbeat connectivity, is recommended through the management network
- Enable spanning tree to avoid unintentional loops in the network
- Configure identical `vlt-mac` on both VLT peers to avoid VLT port channel flap during failure scenarios such as VLTi flap and node reboot
- Increase the delay restore timer in a scaled VLAN configuration
- Always deploy more than one link for VLTi port channel
- Implement dynamic LACP for VLT port channels
- Implement VLT nodes as the root bridge and the backup root bridge
- Use default active-active VRRP mode in VLT-VLANs
- Configure symmetrical configurations on VLT port channels and VLT-VLANs on both VLT nodes
- Identify and correct any mismatches reported by the `show vlt mismatch` command
- For high-availability, connect VLT port channels to the access nodes. Orphan ports that are connected directly to servers or switches would fail if the connected node goes down

10.1 Scale-profile VLAN

For a deployment with a requirement of highly scaled Layer-2 VLANs, apply the `scale-profile vlan` command. The `scale-profile vlan` command enables OS10EE to scale the VLANs in optimal way with less memory footprint. This command makes all VLAN to work in Layer-2 mode and should be used only in scaled L2 deployments. However, if there is need to have Layer-3 VLANs on this profile, enable `mode L3` on the specific VLANs that require Layer-3 support.

11 VLT Configuration

Figure 5 provides an overview of the VLT configuration:

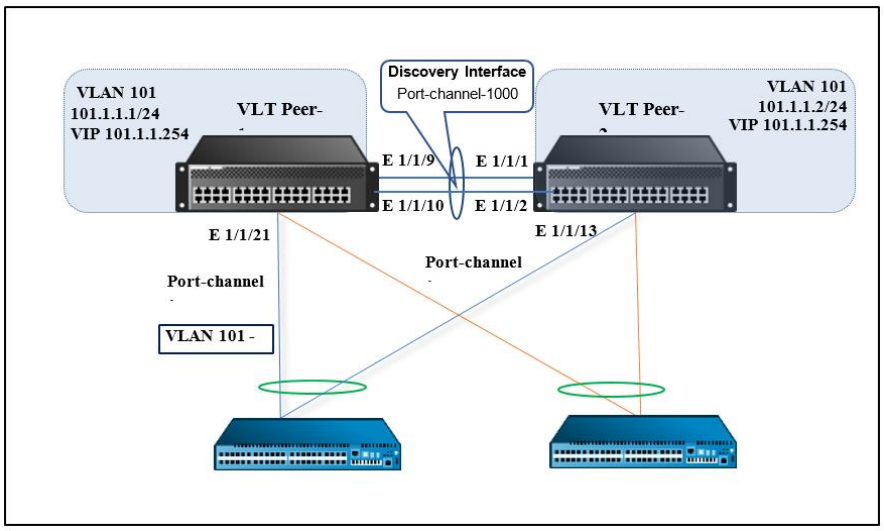

Figure 5 VLT topology

The 1/1/9 and 1/1/10 interfaces form the discovery interface/VLTi (Po-1000) on the VLT Peer1. Similarly, the 1/1/1 and 1/1/2 interfaces form the discovery interface on VLT Peer2. The VLT backup destination is mapped to the remote node management IP address. Port channel 1 is configured on both VLT nodes as interface 1/1/21 and 1/1/13. VLAN 101-110 is mapped to port channel 1, with the VRRP group 1 configured for VLAN 101 using the virtual IP 101.1.1.254. Peer-routing is enabled on both VLT nodes.

11.1 VLT configuration steps and verification

1. Use the `no switchport` command to configure the discovery-interfaces:

   VLT Peer1 configuration

```
OS10-VLT-Peer1# configure terminal
OS10-VLT-Peer1(config)# interface ethernet 1/1/9
OS10-VLT-Peer1(conf-if-eth1/1/9)# no shutdown
OS10-VLT-Peer1(conf-if-eth1/1/9)# no switchport
OS10-VLT-Peer1(conf-if-eth1/1/9)# exit
OS10-VLT-Peer1(config)# interface ethernet 1/1/10
OS10-VLT-Peer1(conf-if-eth1/1/10)# no shutdown
OS10-VLT-Peer1(conf-if-eth1/1/10)# no switchport
OS10-VLT-Peer1(conf-if-eth1/1/10)#
```

   VLT Peer2 configuration

```
OS10-VLT-Peer2# configure terminal
OS10-VLT-Peer2(config)# interface ethernet 1/1/1
OS10-VLT-Peer2(conf-if-eth1/1/1)# no shutdown
OS10-VLT-Peer2(conf-if-eth1/1/1)# no switchport
OS10-VLT-Peer2(conf-if-eth1/1/1)# exit
OS10-VLT-Peer2(config)# interface ethernet 1/1/2
```

```
OS10-VLT-Peer2(conf-if-eth1/1/2)# no shutdown
OS10-VLT-Peer2(conf-if-eth1/1/2)# no switchport
OS10-VLT-Peer2(conf-if-eth1/1/2)#
```

2. Configure the same VLT domain ID on both VLT peers:

   VLT Peer1 configuration

```
OS10-VLT-Peer1(config)# vlt-domain 1
OS10-VLT-Peer1(conf-vlt-1)#
```

   VLT Peer2 configuration

```
OS10-VLT-Peer2(config)# vlt-domain 1
OS10-VLT-Peer2(conf-vlt-1)#
```

3. Optionally, configure the primary priority to influence the primary election.

Note: The lower priority becomes the primary.

   VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# primary-priority 1
OS10-VLT-Peer1(conf-vlt-1)#
```

   VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# primary-priority 65535
OS10-VLT-Peer2(conf-vlt-1)#
```

4. Configure the same vlt-mac on both VLT peers:

   VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# vlt-mac de:11:de:11:de:11
OS10-VLT-Peer1(conf-vlt-1)#
```

   VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# vlt-mac de:11:de:11:de:11
OS10-VLT-Peer2(conf-vlt-1)#
```

5. Configure the VLTi links as discovery interfaces in both nodes:

   VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# discovery-interface ethernet 1/1/9
OS10-VLT-Peer1(conf-vlt-1)# discovery-interface ethernet 1/1/10
```

   VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# discovery-interface ethernet 1/1/1
OS10-VLT-Peer2(conf-vlt-1)# discovery-interface ethernet 1/1/2
```

6. Configure peer-routing to make both VLT peers route traffic on behalf of each other.

Note: The configuration of peer-routing on both VLT peers is recommended for L3 deployment.

VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# peer-routing
OS10-VLT-Peer1(conf-vlt-1)#
```

VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# peer-routing
OS10-VLT-Peer2(conf-vlt-1)#
```

7. Configure the backup destination on each VLT node as the IP address of the other peer.

Note: The configuration of the peer node management interface IP address is recommended.

VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# backup destination 10.16.208.184
OS10-VLT-Peer1(conf-vlt-1)#
```

VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# backup destination 10.16.208.181
OS10-VLT-Peer2(conf-vlt-1)#
```

8. Enter the following commands to check the status of both VLT nodes:

VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1
Domain ID                  : 1
Unit ID                    : 1
Role                       : primary
Version                    : 2.0
Local System MAC address   : 14:18:77:98:48:f4
Role priority              : 1
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::1
Delay-Restore timer        : 90 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up

VLT Peer Unit ID System MAC Address Status IP Address           Version
--------------------------------------------------------------------------
2               14:18:77:98:3d:f4  up     fda5:74c8:b79e:1::2  2.0
OS10-VLT-Peer1#
```

VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1
Domain ID                  : 1
Unit ID                    : 2
Role                       : secondary
Version                    : 2.0
Local System MAC address   : 14:18:77:98:3d:f4
Role priority              : 65535
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::2
Delay-Restore timer        : 90 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up

VLT Peer Unit ID System MAC Address   Status IP Address           Version
--------------------------------------------------------------------------
1               14:18:77:98:48:f4    up     fda5:74c8:b79e:1::1  2.0
OS10-VLT-Peer2#
```

9. Check the VLTi link detail and status:

VLT Peer1 output

```
OS10-VLT-Peer1# show topology-map

   TOPOLOGY MAP
------------------
Topology ID      : 1
Topology Pattern : chain
Topology User    : VLT
Local Unit ID    : 1
Master Unit ID   : 1
From-Interface|From-Interface|To-Interface|To-Interface|Link-Speed|Link-Status |
   Unit ID    |              |   Unit ID  |              | (Gb/s) |            |
-------------------------------------------------------------------------------
1             |ethernet1/1/9 |2           |ethernet1/1/1 |10      |up          |
1             |ethernet1/1/10|2           |ethernet1/1/2 |10      |up          |
2             |ethernet1/1/1 |1           |ethernet1/1/9 |-       |-           |
2             |ethernet1/1/2 |1           |ethernet1/1/10 |-      |-           |
```

VLT Peer2 output

```
OS10-VLT-Peer2# show topology-map
     TOPOLOGY MAP
-------------------------
Topology ID      : 1
Topology Pattern : chain
Topology User    : VLT
Local Unit ID    : 2
Master Unit ID   : 1
From-Interface|From-Interface|To-Interface|To-Interface|Link-Speed|Link-Status|
```

```
   Unit ID    |              |   Unit ID  |              | (Gb/s) |           |
--------------------------------------------------------------------------------
1             |ethernet1/1/9 |2           |ethernet1/1/1 |-       |-          |
1             |ethernet1/1/10|2           |ethernet1/1/2 |-       |-          |
2             |ethernet1/1/1 |1           |ethernet1/1/9 |10      |up         |
2             |ethernet1/1/2 |1           |ethernet1/1/10|10      |up         |
```

10. Check the backup link status:

    VLT Peer1 output

    ```
    OS10-VLT-Peer1# show vlt 1 backup-link
    VLT Backup Link
    ------------------------
    Destination                    : 10.16.208.184
    Peer Heartbeat status          : Up
    Heartbeat interval             : 30
    Heartbeat timeout              : 90
    OS10-VLT-Peer1#
    ```

    VLT Peer2 output

    ```
    OS10-VLT-Peer2# show vlt 1 backup-link
    VLT Backup Link
    ------------------------
    Destination                    : 10.16.208.181
    Peer Heartbeat status          : Up
    Heartbeat interval             : 30
    Heartbeat timeout              : 90
    OS10-VLT-Peer2#
    ```

11. Check the VLT role:

    VLT Peer1 output

    ```
    OS10-VLT-Peer1# show vlt 1 role
    VLT Unit ID    Role
    ------------------------
    * 1            primary
      2            secondary
    OS10-VLT-Peer1#
    ```

    VLT Peer2 output

    ```
    OS10-VLT-Peer2# show vlt 1 role
    VLT Unit ID    Role
    ------------------------
      1            primary
    * 2            secondary
    OS10-VLT-Peer2#
    ```

12. Configure the VLT port channel:

    ```
    VLT Peer1 configuration
    ```

```
OS10-VLT-Peer1(config)# interface port-channel 1
OS10-VLT-Peer1(conf-if-po-1)# vlt-port-channel 1
OS10-VLT-Peer1(conf-if-po-1)#

VLT Peer2 configuration

OS10-VLT-Peer2(config)# interface port-channel 1
OS10-VLT-Peer2(conf-if-po-1)# vlt-port-channel 1
OS10-VLT-Peer2(conf-if-po-1)#
```

13. Configure members to the VLT port channel:

```
VLT Peer1 configuration

OS10-VLT-Peer1(config)# interface ethernet 1/1/21
OS10-VLT-Peer1(conf-if-eth1/1/21)# channel-group 1 mode active
OS10-VLT-Peer1(conf-if-eth1/1/21)# no shutdown
OS10-VLT-Peer1(conf-if-eth1/1/21)#

VLT Peer2 configuration

OS10-VLT-Peer2(config)# interface ethernet 1/1/13
OS10-VLT-Peer2(conf-if-eth1/1/13)# channel-group 1 mode active
OS10-VLT-Peer2(conf-if-eth1/1/13)# no shutdown
OS10-VLT-Peer2(conf-if-eth1/1/13)#
```

14. Configure the VLT LAG status:

```
VLT Peer1 output

OS10-VLT-Peer1# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel1      up        1                   1
  2            port-channel1      up        1                   1
OS10-VLT-Peer1#

VLT Peer2 output

OS10-VLT-Peer2# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
  1            port-channel1      up        1                   1
* 2            port-channel1      up        1                   1
OS10-VLT-Peer2#
```

```
VLT Peer1 output

OS10-VLT-Peer1# show interface port-channel summary
LAG     Mode      Status    Uptime              Ports
1       L2-HYBRID up        00:10:36            Eth 1/1/21 (Up)
OS10-VLT-Peer1#

VLT Peer2 output

OS10-VLT-Peer2# show interface port-channel summary
LAG     Mode      Status    Uptime              Ports
1       L2-HYBRID up        00:10:00            Eth 1/1/13 (Up)
OS10-VLT-Peer2#
```

15. Use the running-configuration command to check the VLT configuration:

```
VLT Peer1 output

OS10-VLT-Peer1# show running-configuration vlt
!
vlt-domain 1
 backup destination 10.16.208.184
 discovery-interface ethernet1/1/9-1/1/10
 peer-routing
 primary-priority 1
 vlt-mac de:11:de:11:de:11
!
interface port-channel1
 vlt-port-channel 1
OS10-VLT-Peer1#

VLT Peer2 output

OS10-VLT-Peer2# show running-configuration vlt
!
vlt-domain 1
 backup destination 10.16.208.181
 discovery-interface ethernet1/1/1-1/1/2
 peer-routing
 primary-priority 65535
 vlt-mac de:11:de:11:de:11
!
interface port-channel1
 vlt-port-channel 1
OS10-VLT-Peer2#
```

Note: As an option, you can use the following commands to delay the restore timer or to set the peer-routing-timeout:
VLT Peer1 configuration

```
OS10-VLT-Peer1(conf-vlt-1)# delay-restore 120
OS10-VLT-Peer1(conf-vlt-1)# peer-routing-timeout 240
OS10-VLT-Peer1(conf-vlt-1)#
```

VLT Peer2 configuration

```
OS10-VLT-Peer2(conf-vlt-1)# delay-restore 120
OS10-VLT-Peer2(conf-vlt-1)# peer-routing-timeout 240
OS10-VLT-Peer2(conf-vlt-1)#
```

16. Enter the following commands to configure the VLAN on both VLT peers:

    VLT Peer1 configuration

    ```
    OS10-VLT-Peer1(config)# interface range vlan 101-110
    OS10-VLT-Peer1(conf-range-vl-101-110)#
    ```

    VLT Peer2 configuration

    ```
    OS10-VLT-Peer2(config)# interface range vlan 101-110
    OS10-VLT-Peer2(conf-range-vl-101-110)#
    ```

17. Use the following commands to add the VLT port-channel to each VLAN:

    VLT Peer1 configuration

    ```
    OS10-VLT-Peer1(config)# interface port-channel 1
    OS10-VLT-Peer1(conf-if-po-1)# switchport mode trunk
    OS10-VLT-Peer1(conf-if-po-1)# switchport trunk allowed vlan 101-110
    OS10-VLT-Peer1(conf-if-po-1)#
    ```

    VLT Peer2 configuration

    ```
    OS10-VLT-Peer2(config)# interface port-channel 1
    OS10-VLT-Peer2(conf-if-po-1)# switchport mode trunk
    OS10-VLT-Peer2(conf-if-po-1)# switchport trunk allowed vlan 101-110
    OS10-VLT-Peer2(conf-if-po-1)#
    ```

18. Check the VLAN membership:

    VLT Peer1 output

    ```
    OS10-VLT-Peer1# show vlan
    Codes: * - Default VLAN, M - Management VLAN, R - Remote Port Mirroring
    VLANs
    Q: A - Access (Untagged), T - Tagged
        NUM    Status    Description                    Q Ports
        1      Active                                   A Eth1/1/1-
    1/1/8,1/1/11-1/1/20,1/1/22-1/1/54
                                                        A Po1,1000
    ```

```
    101    Active                                        T Po1,1000
    102    Active                                        T Po1,1000
    103    Active                                        T Po1,1000
    104    Active                                        T Po1,1000
    105    Active                                        T Po1,1000
    106    Active                                        T Po1,1000
    107    Active                                        T Po1,1000
    108    Active                                        T Po1,1000
    109    Active                                        T Po1,1000
    110    Active                                        T Po1,1000
    4094   Active                                        T Po1000
OS10-VLT-Peer1#
```

VLT Peer2 output

```
OS10-VLT-Peer2# show vlan
Codes: * - Default VLAN, M - Management VLAN, R - Remote Port Mirroring
VLANs
Q: A - Access (Untagged), T - Tagged
    NUM    Status    Description                     Q Ports
    1      Active                                    A Eth1/1/3-
1/1/12,1/1/14-1/1/54
                                                     A Po1,1000
    101    Active                                    T Po1,1000
    102    Active                                    T Po1,1000
    103    Active                                    T Po1,1000
    104    Active                                    T Po1,1000
    105    Active                                    T Po1,1000
    106    Active                                    T Po1,1000
    107    Active                                    T Po1,1000
    108    Active                                    T Po1,1000
    109    Active                                    T Po1,1000
    110    Active                                    T Po1,1000
    4094   Active                                    T Po1000
OS10-VLT-Peer2#
```

19. Configure the IPv4 address for L3 VLAN with VRRP:

VLT Peer1 configuration

```
OS10-VLT-Peer1(config)# interface vlan 101
OS10-VLT-Peer1(conf-if-vl-101)# ip address 101.1.1.1/24
OS10-VLT-Peer1(conf-if-vl-101)# vrrp-group 1
OS10-VLT-Peer1(conf-vlan101-vrid-1)# virtual-address 101.1.1.254
OS10-VLT-Peer1(conf-vlan101-vrid-1)#
```

VLT Peer2 configuration

```
OS10-VLT-Peer2(config)# interface vlan 101
OS10-VLT-Peer2(conf-if-vl-101)# ip address 101.1.1.2/24
OS10-VLT-Peer2(conf-if-vl-101)# vrrp-group 1
```

```
OS10-VLT-Peer2(conf-vlan101-vrid-1)# virtual-address 101.1.1.254
OS10-VLT-Peer2(conf-vlan101-vrid-1)#
```

20. Configure the IPv6 address for L3 VLAN with VRRP:

    VLT Peer1 configuration

```
OS10-VLT-Peer1(config)# vrrp version 3
OS10-VLT-Peer1(config)# interface vlan 102
OS10-VLT-Peer1(conf-if-vl-102)# ipv6 address 2001:102:1:1::1/64
OS10-VLT-Peer1(config)# interface vlan 102
OS10-VLT-Peer1(conf-if-vl-102)# vrrp-ipv6-group 1
OS10-VLT-Peer1(conf-vlan102-vrid-v6-1)# virtual-address fe80::102
OS10-VLT-Peer1(conf-vlan102-vrid-v6-1)# virtual-address 2001:102:1:1::ffff
OS10-VLT-Peer1(conf-vlan102-vrid-v6-1)#
```

    VLT Peer2 configuration

```
OS10-VLT-Peer2(config)# vrrp version 3
OS10-VLT-Peer2(config)# interface vlan 102
OS10-VLT-Peer2(conf-if-vl-102)# ipv6 address 2001:102:1:1::2/64
OS10-VLT-Peer2(conf-if-vl-102)# vrrp-ipv6-group 1
OS10-VLT-Peer2(conf-vlan102-vrid-v6-1)# virtual-address fe80::102
OS10-VLT-Peer2(conf-vlan102-vrid-v6-1)# virtual-address 2001:102:1:1::ffff
OS10-VLT-Peer2(conf-vlan102-vrid-v6-1)#
```

21. Check for a VLT VLAN mismatch, which occurs when the VLT port-channel VLAN membership is different in both nodes:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1 mismatch vlt-vlan
VLT VLAN mismatch:
vlt-port-channel ID : 1
VLT Unit ID    Mismatch VLAN List
--------------------------------------------------------------------------------
* 1              101
  2              -
OS10-VLT-Peer1#
```

    VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1 mismatch vlt-vlan
VLT VLAN mismatch:
vlt-port-channel ID : 1
VLT Unit ID    Mismatch VLAN List
--------------------------------------------------------------------------------
  1              101
* 2              -
OS10-VLT-Peer2#
```

22. Check for a VLAN mismatch, which occurs in non-vlt or non-spanned VLANs when the VLAN does not exist in peer-node:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1 mismatch vlan
VLAN mismatch:
VLT Unit ID    Mismatch VLAN List
--------------------------------------------------------------------------------
--
* 1              -
  2              111
OS10-VLT-Peer1#
```

    VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1 mismatch vlan
VLAN mismatch:
VLT Unit ID    Mismatch VLAN List
--------------------------------------------------------------------------------
--
  1              -
* 2              111
OS10-VLT-Peer2#
```

23. Check for a VLT MAC mismatch, which occurs when vlt-mac is not identical or not configured in one node:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1 mismatch vlt-mac
VLT-MAC mismatch:
VLT Unit ID    vlt-mac
-------------------------------------
* 1            00:00:00:00:00:00
  2            de:11:de:11:de:11
OS10-VLT-Peer1#
```

    VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1 mismatch vlt-mac
VLT-MAC mismatch:
VLT Unit ID    vlt-mac
-------------------------------------
  1            00:00:00:00:00:00
* 2            de:11:de:11:de:11
OS10-VLT-Peer2#
```

24. Check the peer-routing configuration for a mismatch, which occurs when peer-routing is configured only in one node:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1 mismatch peer-routing
Peer-routing mismatch:
VLT Unit ID    Peer-routing
-------------------------------------
* 1            Disabled
  2            Enabled
OS10-VLT-Peer1#
```

VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1 mismatch peer-routing
Peer-routing mismatch:
VLT Unit ID    Peer-routing
-------------------------------------
  1            Disabled
* 2            Enabled
OS10-VLT-Peer2#
```

25. Check for MAC inconsistency, which occurs when the MAC address is missing in one node, or points to a different port in each VLT node:

VLT Peer1 output

```
OS10-VLT-Peer1# show vlt mac-inconsistency

Fetching MACs from unit 2
Fetching MACs from unit 1
Identifying inconsistencies ..

VLAN 110
----------
   MAC 14:18:77:98:48:f4 destination port mismatch
        At Node 1, MAC points to VLT Port 2
        At Node 2, MAC points to VLT Port 1
OS10-VLT-Peer1#
```

VLT Peer2 output

```
OS10-VLT-Peer2# show vlt mac-inconsistency

Fetching MACs from unit 2
Fetching MACs from unit 1
Identifying inconsistencies ..

VLAN 110
----------
   MAC 14:18:77:98:48:f4 destination port mismatch
        At Node 1, MAC points to VLT Port 2
        At Node 2, MAC points to VLT Port 1
OS10-VLT-Peer2#
```

26. Enter the following commands to resolve a No Mismatch output from a normal functional state:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt 1 mismatch
VLT-MAC mismatch:
No mismatch

Peer-routing mismatch:
No mismatch

VLAN mismatch:
No mismatch

VLT VLAN mismatch:
No mismatch
OS10-VLT-Peer1#
```

    VLT Peer2 output

```
OS10-VLT-Peer2# show vlt 1 mismatch
VLT-MAC mismatch:
No mismatch

Peer-routing mismatch:
No mismatch

VLAN mismatch:
No mismatch

VLT VLAN mismatch:
No mismatch
OS10-VLT-Peer2#
```

27. Enter the following commands to resolve a no MAC address inconsistency output from a normal functional state:

    VLT Peer1 output

```
OS10-VLT-Peer1# show vlt mac-inconsistency
Fetching MACs from unit 2
Fetching MACs from unit 1
Identifying inconsistencies ..

No inconsistencies found
OS10-VLT-Peer1#
```

    VLT Peer2 output

```
OS10-VLT-Peer2# show vlt mac-inconsistency
Fetching MACs from unit 2
Fetching MACs from unit 1
```

```
Identifying inconsistencies ..

No inconsistencies found
OS10-VLT-Peer2#
```

28. Verify that the VLTi link spanning tree status is set in a FWD state:

VLT Peer1 output

```
OS10-VLT-Peer1# show spanning-tree virtual-interface
VFP(VirtualFabricPort) of vlan 1 is Root Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-Guard-
violation: No
Root-Guard: Disable, Loop-Guard: Disable
Bpdus (MRecords) Sent: 16, Received: 60
Interface
Designated
Name                            PortID    Prio      Cost      Sts         Cost
Bridge ID               PortID
-------------------------------------------------------------------------------
-----------------------------------
VFP(VirtualFabricPort)          0.1       0         1         FWD         0
32769    1418.7798.3df4  0.1
VFP(VirtualFabricPort) of vlan 101 is Root Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-Guard-
violation: No
Root-Guard: Disable, Loop-Guard: Disable
Bpdus (MRecords) Sent: 6, Received: 30
Interface
Designated
Name                            PortID    Prio      Cost      Sts         Cost
Bridge ID               PortID
-------------------------------------------------------------------------------
-----------------------------------
VFP(VirtualFabricPort)          0.1       0         1         FWD         0
32869    1418.7798.3df4  0.1
VFP(VirtualFabricPort) of vlan 102 is Root Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-Guard-
violation: No
--more--
```

VLT Peer2 output

```
OS10-VLT-Peer2# show spanning-tree virtual-interface
VFP(VirtualFabricPort) of vlan 1 is Designated Forwarding
Edge port: No (default)
```

```
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-Guard-
violation: No
Root-Guard: Disable, Loop-Guard: Disable
Bpdus (MRecords) Sent: 116, Received: 8
Interface
Designated
Name                PortID    Prio      Cost      Sts         Cost      Bridge
ID               PortID
-------------------------------------------------------------------------------
-----------------------------------
VFP(VirtualFabricPort)         0.1       0         1         FWD         0
32769    1418.7798.3df4  0.1
VFP(VirtualFabricPort) of vlan 101 is Designated Forwarding
Edge port: No (default)
Link type: point-to-point (auto)
Boundary: No, Bpdu-filter: Disable, Bpdu-Guard: Disable, Shutdown-on-Bpdu-Guard-
violation: No
Root-Guard: Disable, Loop-Guard: Disable
Bpdus (MRecords) Sent: 58, Received: 2
Interface
Designated
Name                           PortID    Prio      Cost      Sts         Cost
Bridge ID               PortID
-------------------------------------------------------------------------------
-----------------------------------
VFP(VirtualFabricPort)         0.1       0         1         FWD         0
32869    1418.7798.3df4  0.1
VFP(VirtualFabricPort) of vlan 102 is Designated Forwarding  <<SNIP>>
```

12 VLT syslog messages

1. Configuring VLT domain - Both nodes create vlan4094 and initiate as primary (this state change happens before configuring discovery interface)

```
VLT peer1 syslog

Aug  2 10:58:15 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_UP: Interface admin
state up :vlan4094
Aug  2 10:58:15 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 1
is elected as primary

VLT peer2 syslog

Aug  2 10:58:20 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_UP: Interface admin
state up :vlan4094
Aug  2 10:58:20 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 1
is elected as primary
```

2. Configuring discovery interface - Both nodes bring up port-channel1000. VLT election starts

```
VLT peer1 (primary) syslog

Aug  2 11:02:09 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_UP: Interface admin
state up :port-channel1000
Aug  2 11:02:09 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface
operational state is down :port-channel1000
Aug  2 11:02:09 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :port-channel1000
Aug  2 11:02:09 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :vlan4094
Aug  2 11:02:09 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_UP: VLT unit 2 is up
Aug  2 11:02:09 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_UP: VLT
interconnect link between unit 1 and unit 2 is up
Aug  2 11:02:18 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 2
is elected as secondary
Aug  2 11:02:18 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :vlan1

VLT peer2 (secondary) syslog
```

```
Aug  2 11:02:05 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_UP: Interface admin
state up :port-channel1000
Aug  2 11:02:05 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface
operational state is down :port-channel1000
Aug  2 11:02:05 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :port-channel1000
Aug  2 11:02:05 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :vlan4094
Aug  2 11:02:05 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_UP: VLT unit 1 is up
Aug  2 11:02:05 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_UP: VLT
interconnect link between unit 2 and unit 1 is up
Aug  2 11:02:14 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 2
role transitioned from primary to secondary
Aug  2 11:02:14 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 1
is elected as primary
Aug  2 11:02:14 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_DELAY_RESTORE_START: VLT
delay restore timer start
Aug  2 11:02:14 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
operational state is up :vlan1
```

3. Configure the backup destination

```
VLT peer1 syslog

Aug  2 11:05:53 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_HB_UP: VLT peer heartbeat
link is up

VLT peer2 syslog

Aug  2 11:05:48 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_HB_UP: VLT peer heartbeat
link is up
```

4. Configure the VLT port-channel:

   VLT peer1 syslog

```
Aug  2 11:16:29 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PORT_CHANNEL_UP: vlt-port-
channel 1 is up
```

VLT peer2 syslog

```
Aug  2 11:16:25 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PORT_CHANNEL_UP: vlt-port-
channel 1 is up
```

5. Review the syslog to see that the heartbeat is down:

```
VLT peer1 syslog

Aug  2 11:29:53 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_HB_DOWN: VLT peer
heartbeat link is down

VLT peer2 syslog

Aug  2 11:29:37 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_HB_DOWN: VLT peer
heartbeat link is down
```

6. VLTi links that are down, where the secondary node has shut down the VLT port-channel, shows the following syslog information:

VLT peer1 (primary) syslog

```
Aug  2 11:30:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :ethernet1/1/9
Aug  2 11:30:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :ethernet1/1/10
Aug  2 11:30:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :port-channel1000
Aug  2 11:30:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan4094

Aug  2 11:31:00 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_DOWN: VLT interconnect
link between unit 1 and unit 2 is down
Aug  2 11:31:00 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_DOWN: VLT unit 2 is down
```

VLT peer2 (secondary) syslog

```
Aug  2 11:30:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :ethernet1/1/1
```

```
Aug  2 11:30:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :ethernet1/1/2
Aug  2 11:30:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :port-channel1000
Aug  2 11:30:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan4094

Aug  2 11:30:56 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_DOWN: VLT interconnect
link between unit 2 and unit 1 is down
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_DN: Interface admin state
down :port-channel1
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :port-channel1
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan1
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan108
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan107
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan110
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan106
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan109
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan105
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan102
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan103
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan101
```

```
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :vlan104
Aug  2 11:30:56 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_DN: Interface operational
state is down :ethernet1/1/13
Aug  2 11:30:56 OS10-VLT-Peer2 dn_lacp[698]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:LACP_PORT_UNGROUPED: Interface exited
port-channel port-channel1 : ethernet1/1/13
Aug  2 11:30:57 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_DOWN: VLT unit 1 is down
Aug  2 11:30:58 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PORT_CHANNEL_DOWN: vlt-port-
channel 1 is down
```

7. VLTi links that are up and restored after failure, displays the following syslog information:

VLT peer1 (primary) syslog

```
Aug  2 11:39:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :ethernet1/1/9
Aug  2 11:39:57 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :ethernet1/1/10
Aug  2 11:39:58 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :port-channel1000
Aug  2 11:39:58 OS10-VLT-Peer1 dn_ifm[745]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :vlan4094
Aug  2 11:39:58 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_UP: VLT unit 2 is up
Aug  2 11:39:58 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_UP: VLT interconnect
link between unit 1 and unit 2 is up
Aug  2 11:40:08 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 2 is
elected as secondary
```

VLT peer2 (secondary) syslog

```
Aug  2 11:39:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :ethernet1/1/1
Aug  2 11:39:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :ethernet1/1/2
Aug  2 11:39:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :port-channel1000
```

```
Aug  2 11:39:53 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
[os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface operational
state is up :vlan4094
Aug  2 11:39:54 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_PEER_UP: VLT unit 1 is up
Aug  2 11:39:54 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLTI_LINK_UP: VLT interconnect
link between unit 2 and unit 1 is up
Aug  2 11:40:03 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:VLT_ELECTION_ROLE: VLT unit 1 is
elected as primary
```

8. Review the delay restore timer start/stop in the syslog. After the VLTi reboots, the secondary node VLT port-channel:

   VLT peer2 (secondary) syslog

   ```
   Aug  2 11:40:03 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:VLT_DELAY_RESTORE_START: VLT
   delay restore timer start

   Aug  2 11:40:04 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:VLT_PORT_CHANNEL_UP: vlt-port-
   channel 1 is up
   Aug  2 11:41:33 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:VLT_DELAY_RESTORE_COMPLETE:
   VLT delay restore timer stop
   Aug  2 11:41:33 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:IFM_ASTATE_UP: Interface admin
   state up :port-channel1
   Aug  2 11:41:34 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
   [os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
   operational state is up :ethernet1/1/13
   Aug  2 11:41:36 OS10-VLT-Peer2 dn_ifm[662]: Node.1-Unit.1:PRI:notice
   [os10:trap], %Dell EMC (OS10) %log-notice:IFM_OSTATE_UP: Interface
   operational state is up :port-channel1
   Aug  2 11:41:36 OS10-VLT-Peer2 dn_lacp[698]: Node.1-Unit.1:PRI:notice
   [os10:trap], %Dell EMC (OS10) %log-notice:LACP_PORT_GROUPED: Interface
   joined port-channel  port-channel1 : ethernet1/1/13
   ```

9. Review the detected VLT MAC mismatch

   VLT peer1 syslog

   ```
   Aug  2 11:51:57 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLT_MAC_MISMATCH: VLT mac
   mismatch detected for unit 2
   ```

   VLT peer2 syslog

   ```
   Aug  2 11:51:53 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
   [os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLT_MAC_MISMATCH: VLT mac
   mismatch detected for unit 1
   ```

10. Review the VLT MAC mismatch syslog:

    VLT peer1 syslog

    ```
    Aug  2 11:53:12 OS10-VLT-Peer1 dn_app_vlt[1246]: Node.1-Unit.1:PRI:notice
    [os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLT_MAC_MISMATCH: VLT mac
    mismatch cleared for unit 2
    ```

    VLT peer2 syslog

    ```
    Aug  2 11:53:08 OS10-VLT-Peer2 dn_app_vlt[1267]: Node.1-Unit.1:PRI:notice
    [os10:notify], %Dell EMC (OS10) %log-notice:VLT_VLT_MAC_MISMATCH: VLT mac
    mismatch cleared for unit 1
    ```

13 VLT upgrade steps

To upgrade the VLT, enter the following commands:

1. Install the OS10EE firmware in both VLT nodes

   Installation in VLT-Peer1

```
OS10-VLT-Peer1# image download <[ftp/http/scp/sftp/tftp/usb]/PKGS_OS10-
Enterprise-10.4.1.0.483stretch-installer-x86_64.bin>
Download started.
Use 'show image status' for updates

OS10-VLT-Peer1# show image status
Image Upgrade State:     idle
================================================
File Transfer State:     idle
------------------------------------------------
  State Detail:          Completed: No error
  Task Start:            2018-08-16T19:38:37Z
  Task End:              2018-08-16T19:38:44Z
  Transfer Progress:     100 %
  Transfer Bytes:        417828173 bytes
  File Size:             417828173 bytes
  Transfer Rate:         58152 kbps

Installation State:      idle
------------------------------------------------
  State Detail:          No install information available
  Task Start:            0000-00-00T00:00:00Z
  Task End:              0000-00-00T00:00:00Z
OS10-VLT-Peer1#
OS10-VLT-Peer1# dir image

Directory contents for folder: image
Date (modified)        Size (bytes)  Name
---------------------  ------------  ------------------------------------
-----
2018-08-16T19:38:44Z   417828173     PKGS_OS10-Enterprise-
10.4.1.0.483stretch-installer-x86_64.bin
OS10-VLT-Peer1#
OS10-VLT-Peer1# image install image://PKGS_OS10-Enterprise-
10.4.1.0.483stretch-installer-x86_64.bin
Install started.
Use 'show image status' for updates
OS10-VLT-Peer1#
OS10-VLT-Peer1# show image status
Image Upgrade State:     idle
================================================
File Transfer State:     idle
------------------------------------------------
  State Detail:          Completed: No error
```

```
  Task Start:            2018-08-16T19:38:37Z
  Task End:              2018-08-16T19:38:44Z
  Transfer Progress:     100 %
  Transfer Bytes:        417828173 bytes
  File Size:             417828173 bytes
  Transfer Rate:         58152 kbps

Installation State:      idle
-------------------------------------------------
  State Detail:          Completed: Success
  Task Start:            2018-08-16T19:40:57Z
  Task End:              2018-08-16T19:45:16Z
OS10-VLT-Peer1#
```

2. Installation in VLT-node 2

```
OS10-VLT-Peer2# image download <[ftp/http/scp/sftp/tftp/usb]/PKGS_OS10-
Enterprise-10.4.1.0.483stretch-installer-x86_64.bin>
Download started.
Use 'show image status' for updates
OS10-VLT-Peer2#
OS10-VLT-Peer2# show image status
Image Upgrade State:     idle
================================================
File Transfer State:     idle
------------------------------------------------
  State Detail:          Completed: No error
  Task Start:            2018-08-16T19:41:49Z
  Task End:              2018-08-16T19:42:09Z
  Transfer Progress:     100 %
  Transfer Bytes:        417828173 bytes
  File Size:             417828173 bytes
  Transfer Rate:         21092 kbps

Installation State:      idle
------------------------------------------------
  State Detail:          No install information available
  Task Start:            0000-00-00T00:00:00Z
  Task End:              0000-00-00T00:00:00Z
OS10-VLT-Peer2#
OS10-VLT-Peer2# dir image

Directory contents for folder: image
Date (modified)        Size (bytes)  Name
---------------------  ------------  ----------------------------------
-----
2018-08-16T19:42:09Z   417828173     PKGS_OS10-Enterprise-
10.4.1.0.483stretch-installer-x86_64.bin
OS10-VLT-Peer2#
OS10-VLT-Peer2# image install image://PKGS_OS10-Enterprise-
10.4.1.0.483stretch-installer-x86_64.bin
```

```
Install started.
Use 'show image status' for updates
OS10-VLT-Peer2#
OS10-VLT-Peer2# show image status
Image Upgrade State:     idle
================================================
File Transfer State:     idle
------------------------------------------------
  State Detail:          Completed: No error
  Task Start:            2018-08-16T19:41:49Z
  Task End:              2018-08-16T19:42:09Z
  Transfer Progress:     100 %
  Transfer Bytes:        417828173 bytes
  File Size:             417828173 bytes
  Transfer Rate:         21092 kbps

Installation State:      idle
------------------------------------------------
  State Detail:          Completed: Success
  Task Start:            2018-08-16T19:42:59Z
  Task End:              2018-08-16T19:47:19Z
OS10-VLT-Peer2#
```

3. Change the boot partition to standby on both VLT peers

```
Change in VLT-node 1

OS10-VLT-Peer1# boot system standby
OS10-VLT-Peer1#
Change in VLT-Peer2

OS10-VLT-Peer2# boot system standby
OS10-VLT-Peer2#
```

4. Save the configuration on VLT peer1 and VLT peer2

```
Recommended to take backup of the saved config : config://startup.xml. You
may copy this file to an external location

Save configuration in VLT-Peer1

OS10-VLT-Peer1# write memory
OS10-VLT-Peer1# copy config://startup.xml config://backup_prev_release.xml
OS10-VLT-Peer1#
Save configuration in VLT-Peer2

OS10-VLT-Peer2# write memory
OS10-VLT-Peer2# copy config://startup.xml config://backup_prev_release.xml
OS10-VLT-Peer2#
```

5. Reload VLT node1

```
OS10-VLT-Peer1# reload

Proceed to reboot the system? [confirm yes/no]:yes
Aug 16 19:58:18 OS10-VLT-Peer1 dn_ndm[676]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:NDM_SYSTEM_RELOAD: User
request to reload system Cold reload system
```

6. Wait for VLT node1 to come up. It will join as secondary. Wait until it converges and forward traffic after delay restore timer.

```
OS10-VLT-Peer1# show vlt 1
Domain ID                  : 1
Unit ID                    : 2
Role                       : secondary
Version                    : 2.0
Local System MAC address   : 34:17:eb:3a:ef:80
Role priority              : 1
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::2
Delay-Restore timer        : 90 seconds
Remaining Restore time     : 53 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up

VLT Peer Unit ID    System MAC Address    Status    IP Address
Version
--------------------------------------------------------------------------
--------
  1                 34:17:eb:3a:f4:80      up       fda5:74c8:b79e:1::1
2.0
OS10-VLT-Peer1# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
  1            port-channel1      up        1                   1
* 2            port-channel1      down      1                   0
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
  1            port-channel2      up        1                   1
* 2            port-channel2      down      1                   0
OS10-VLT-Peer1#

OS10-VLT-Peer1# show vlt 1 vlt-port-detail
```

```
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
  1            port-channel1      up        1                   1
* 2            port-channel1      up        1                   1
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
  1            port-channel2      up        1                   1
* 2            port-channel2      up        1                   1
OS10-VLT-Peer1#
```

7. Reload VLT node 2

```
OS10-VLT-Peer2# reload

Proceed to reboot the system? [confirm yes/no]:yes
Aug 16 20:00:39 OS10-VLT-Peer2 dn_ndm[729]: Node.1-Unit.1:PRI:notice
[os10:notify], %Dell EMC (OS10) %log-notice:NDM_SYSTEM_RELOAD: User
request to reload system Cold reload system
```

8. Wait for VLT node 2 to come up. Now it will be secondary. Wait until it converges and forward traffic after delay restore timer.

```
OS10-VLT-Peer2# show vlt 1
Domain ID                  : 1
Unit ID                    : 1
Role                       : secondary
Version                    : 2.0
Local System MAC address   : 34:17:eb:3a:f4:80
Role priority              : 65535
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::1
Delay-Restore timer        : 90 seconds
Remaining Restore time     : 67 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up

VLT Peer Unit ID    System MAC Address    Status    IP Address
Version
--------------------------------------------------------------------------
--------
  2                 34:17:eb:3a:ef:80      up       fda5:74c8:b79e:1::2
2.0
OS10-VLT-Peer2# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
```

```
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel1      down      1                   0
  2            port-channel1      up        1                   1
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel2      down      1                   0
  2            port-channel2      up        1                   1
OS10-VLT-Peer2#

OS10-VLT-Peer2# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel1      up        1                   1
  2            port-channel1      up        1                   1
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel2      up        1                   1
  2            port-channel2      up        1                   1
OS10-VLT-Peer2#
```

9. Upgrade is now complete. Both nodes are actively forwarding traffic. VLT Node 1 will be primary and VLT node 2 will be secondary after upgrade.

```
OS10-VLT-Peer1# show vlt 1
Domain ID                  : 1
Unit ID                    : 2
Role                       : primary
Version                    : 2.0
Local System MAC address   : 34:17:eb:3a:ef:80
Role priority              : 1
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::2
Delay-Restore timer        : 90 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up
```

```
VLT Peer Unit ID    System MAC Address    Status    IP Address
Version
--------------------------------------------------------------------------------
--------
  1                 34:17:eb:3a:f4:80      up       fda5:74c8:b79e:1::1
2.0
OS10-VLT-Peer1#
OS10-VLT-Peer1# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------------
-----
  1            port-channel1      up        1                   1
* 2            port-channel1      up        1                   1
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------------
-----
  1            port-channel2      up        1                   1
* 2            port-channel2      up        1                   1
OS10-VLT-Peer1#

OS10-VLT-Peer2# show vlt 1
Domain ID                  : 1
Unit ID                    : 1
Role                       : secondary
Version                    : 2.0
Local System MAC address   : 34:17:eb:3a:f4:80
Role priority              : 65535
VLT MAC address            : de:11:de:11:de:11
IP address                 : fda5:74c8:b79e:1::1
Delay-Restore timer        : 90 seconds
Peer-Routing               : Enabled
Peer-Routing-Timeout timer : 0 seconds
VLTi Link Status
    port-channel1000       : up

VLT Peer Unit ID    System MAC Address    Status    IP Address
Version
--------------------------------------------------------------------------------
--------
  2                 34:17:eb:3a:ef:80      up       fda5:74c8:b79e:1::2
2.0
OS10-VLT-Peer2# show vlt 1 vlt-port-detail
vlt-port-channel ID : 1
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------------
-----
```

```
* 1            port-channel1      up        1                    1
  2            port-channel1      up        1                    1
vlt-port-channel ID : 2
VLT Unit ID    Port-Channel      Status    Configured ports    Active
ports
--------------------------------------------------------------------------
-----
* 1            port-channel2      up        1                    1
  2            port-channel2      up        1                    1
```

14 Summary

VLT configured in the OS10EE operating system offers efficient and seamless traffic flow, which ensures high availability and resiliency for various network deployments. Modern networks are widely implemented with VLT at multiple layers for mission critical applications while meeting the customer business needs. With current network systems offering more than just connectivity, IT businesses require the high availability of their network systems, and VLT allows businesses to achieve those needs.