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ACRONYMS AND ABBREVIATIONS

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<td>VSF</td>
<td>Virtual Switching Framework</td>
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<td>MAD</td>
<td>Multiple Active Detection</td>
</tr>
<tr>
<td>VID</td>
<td>VLAN ID</td>
</tr>
<tr>
<td>LACP</td>
<td>Link Aggregation Control Protocol</td>
</tr>
<tr>
<td>IGMP</td>
<td>Internet Group Management Protocol</td>
</tr>
<tr>
<td>PIM</td>
<td>Protocol-Independent Multicast protocol</td>
</tr>
<tr>
<td>OSPF</td>
<td>Open Shortest-Path First routing protocol</td>
</tr>
<tr>
<td>VLAN</td>
<td>Virtual LAN</td>
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</table>

OVERVIEW

HP Virtual Switching Framework (VSF) technology virtualizes multiple physical devices into one virtual fabric which provides high availability due to significant reduction in recovery time simplified network design and management.

Virtual Switching Framework (VSF) allows supported switches connected to each other through Ethernet connections (copper or fiber) to behave like a single chassis switch.

Configuration guidelines:

- Supported for 5400R only (5406R, 5412R)
- 5400R with v3 modules, operating in v3-only mode
- Currently limited to 2 members (SW version 16.x.x or greater)
- Only same model switches can join a VSF system
- VSF links supported on 10G and 40G Ethernet interfaces only (no 1G)
- Each switch supports only 1 logical VSF link
- Logical VSF links can support up to 8 physical ports
- Physical ports can reside on different modules
- VSF is disabled on the switch by default
Advantages of VSF:
- Simplified topology and ease of management
- Single logical redundant entity
- VSF link aggregation
- Eliminates the need for L2 redundancy protocols such as spanning tree (STP)
- Eliminates the need for L3 redundancy protocols such as Virtual Routing Redundancy protocol (VRRP)

VSF DEFINITIONS

VSF terminology:
- VSF member ID – unique ID assigned by VSF; configurable
- VSF Domain ID – uniquely identifies VSF system and prevents interfering with other VSF systems; must match with other member to form VSF; configurable;
- VSF Split – when a VSF link becomes disconnected, resulting in two independent VSF systems
- VSF Merge – when a member joins to form a VSF
- VSF link – logical port dedicated to the internal connection of the VSF device
- VSF port – physical port which is assigned to the logical VSF link; limited configuration options
- VSF member priority – default value is 128; configurable; Member priority determines the possibility of a member device to be elected the Commander. A member with higher priority is more likely to be elected the Commander.
- Multiple Active Detection (MAD) – mechanism to detect and mitigate VSF split conditions
- LAG connectivity – Link aggregation or port trunking

VSF Device Roles:
- Commander – controls VSF administration and control plane
- Standby – standby management and under control of the Commander; synchronizes control plan with Commander; extension of the virtual switch
Supported VSF Port-types and media

- 10Gig fiber
- 10Gig DAC
- 10Gig copper (SR)
- 40Gig DAC

VSF Port Restrictions

- VSF ports should be in default configuration
- VSF ports cannot be part of a trunk, mesh, Distributed Trunk, ISC link
- A VSF link can only comprise ports with the same speed; either all 10G or all 40G
- Different port media types are supported, but must be the same speed
- Maximum of 8 physical ports in on logical VSF link
- A VSF port can only be enabled or disabled. No other port configuration is supported

VSF member states

- Commander – The member-switch which is the commander of the VSF virtual chassis.
- Standby – The member-switch which is the standby of the VSF virtual chassis
- Not Joined – Standby provisioned by not yet connected
- Missing – A VSF chassis member-switch is marked as missing when it becomes non-responsive. A lack of response from the switch means that either the virtual chassis link or the virtual chassis member has crashed. Note that it is possible to remove a missing member from the virtual chassis. Once removed, the missing member’s configuration will be deleted from the virtual chassis configuration file.
- Standby Booting – standby switch booting up to join the VSF
- Shutdown - The member-switch is in the shutdown state
- Provisioned - A member switch that is not physically present but whose configuration is provisioned
- CommunicationFailure - The member-switch cannot be reached.
- IncompatibleOS - The member-switch is running with a different Operating System.
- UnknownState - The state of the member-switch cannot be determined.

VSF Deployment methods

There are several ways to implement a Virtual Switching Framework; including:

- **Auto-join/plug-and-play** – configure one switch with VSF and a second, factory default switch that is connected will join and form a VSF automatically
• **Manual configuration** – configure both VSF members manually
  
  o Assign VSF ports to VSF link
  o Enable VSF domain ID and reboot

• **VSF provisioning** – configure one switch with VSF, and manually provision a second switch with:
  
  o Chassis type; called loose provision
  o Chassis type and mac-address; called strict provisioning
  o Connect a second member matching the provisioning

---

**Figure 1.** Basic VSF topology

```
Figure 1. Basic VSF topology
```

---

**Caution:**

To avoid broadcast storms or loops in your network while configuring a VSF, it is recommended to first disconnect or disable all ports you want to add to or remove from the VSF. After you finish configuring the VSF, enable or re-connect the ports.

---

**Auto-join/plug-and-play**

Using auto-join/plug-and-play allows you to configure one switch with VSF and when connecting a second switch which is factory default will join and form a VSF automatically (assume V3 module is inserted to slot B on the chassis).

---

• **Configure Member 1** – configure one switch with VSF and reboot

  `HP-VSF-Switch(config)# vsf member 1 link 1 b1`
  
  All configuration on this port has been removed and port is placed in VSF mode.

  `HP-VSF-Switch(config)# vsf enable domain 2`
To enable VSF, the REST interface will be disabled.  
This will save the current configuration and reboot the switch.  
Continue (y/n)? y

- **Connect Member 2** – connect a factory default switch to the VSF port configured on Member 1.
  - After a few brief moments, the VSF will detect the new device, reboot the new switch and join the VSF.

- **Validate VSF status**
  - Show vsf
  - Show vsf detail
  - Show vsf link
  - Show vsf link detail
  - Show running-config

```
HP-VSF-Switch# show vsf
VSF Domain ID : 2
MAC Address : 3ca8a-3f913f
VSF Topology : Chain
VSF Status : Active
Uptime : 0d 0h 9m
VSF Oobm-MAD : Disabled
Software Version : KB.16.01.0000x

Mbr
ID  Mac Address   Model          Pri  Status
---  --------------- ----------------- ---  ------------
 1   3ca8a-3f8100  HP J9850A Switch 5406Rzl2  128 Commander
 2   3ca8a-3f4800  HP J9850A Switch 5406Rzl2  128 Standby
```

**Manual configuration**

- **Configure Member 1** – configure member 1 with VSF and reboot

```
HP-VSF-Switch(config)# vsf member 1 link 1 b1
All configuration on this port has been removed and port is placed in VSF mode.
HP-VSF-Switch(config)# vsf enable domain 2
To enable VSF, the REST interface will be disabled.
```
This will save the current configuration and reboot the switch.
Continue (y/n)? y

- **Configure Member 2** – configure member 2 with VSF and reboot

  HP-VSF-Switch(config)# vsf member 2 link 1 bl
  All configuration on this port has been removed and port is placed in VSF mode.
  HP-VSF-Switch(config)# vsf enable domain 2
  To enable VSF, the REST interface will be disabled.
  This will save the current configuration and reboot the switch.
  Continue (y/n)? y

- **Connect VSF switches** – connect member 1 and 2 configured VFS ports before member 2 finish its boot cycle and validate VSF status after reboot

- **Validate VSF status**
  - Show vsf
  - Show vsf detail
  - Show VSF link
  - Show vsf link detail
  - Show running-config

  HP-VSF-Switch# show vsf
  VSF Domain ID : 2
  MAC Address : 3ca82a-3f913f
  VSF Topology : Chain
  VSF Status : Active
  Uptime : 0d 0h 9m
  VSF Oobm-MAD : Disabled
  Software Version : KB.16.01.0000x

  Mbr
  ID  Mac Address  Model                  Pri  Status
  ---  -------------  ------------------  ---  ---------------
  1    3ca82a-3f8100  HP J9850A Switch 5406Rzl2  128  Commander
  2    3ca82a-3f4800  HP J9850A Switch 5406Rzl2  128  Standby
VSF provisioning

- **Configuring Member 1** – configure one switch with VSF and reboot
  
  **HP-VSF-Switch(config)# vsf member 1 link 1 b1**
  All configuration on this port has been removed and port is placed in VSF mode.

  **HP-VSF-Switch(config)# vsf enable domain 2**
  To enable VSF, the REST interface will be disabled.
  This will save the current configuration and reboot the switch.
  Continue (y/n)? y

- **On Member 1, provision Member 2** – after Member 1 reboots, provision Member 2 for either:
  - **Loose provision** – This scenario is will allow ANY device with matching J# to join the VSF domain for this you will need to get the device J# (you can find it when you execute show running-config)
    
    **HP-VSF-Switch(config)# vsf member 2 type j9850a**
  
  - **Strict provision** - This scenario is will only devices with matching J# + MAC to join the VSF domain for this you will need to get the device J# and MAC address (you can find them when you executing show running-config, and show system)
    
    **HP-VSF-Switch(config)# vsf member 2 type j9850a 3ca82a-3f583f**

- **Connect Member 2** – connect member 2 and validate VSF status after reboot
  - For Member 2 to join the stack it can either be default configuration or pre-provisioned as well

- **Validate VSF status**
  - **Show vsf**
  - **Show vsf detail**
  - **Show vsf link**
  - **Show vsf link detail**
  - **Show running-config**

**Maintaining VSF**

**Assign additional ports to a VSF link**
VSF allows multiple ports assigned to a logical VSF link:

- **Assign VSF ports on Member 1 to VSF link**
  
  **HP-VSF-Switch(config)# vsf member 1 link 1/b2**
  
  **HP-VSF-Switch(config)# vsf member 1 link 1/b3**
  
  **HP-VSF-Switch(config)# vsf member 1 link 1/b4**
• Assign VSF ports on Member 2 to VSF link

   HP-VSF-Switch(config)# vsf member 2 link 1 2/b2
   HP-VSF-Switch(config)# vsf member 2 link 1 2/b3
   HP-VSF-Switch(config)# vsf member 2 link 1 2/b4

• Validate status

   HP-VSF-Switch(config)# show vsf link detail
   VSF Member: 1     Link: 1

   Vsf-Port Port-State
   -------       -------
   1/B1     Up: Connected to port 2/B1
   1/B2     Up: Connected to port 2/B2
   1/B3     Up: Connected to port 2/B3
   1/B4     Up: Connected to port 2/B4

   VSF Member: 2     Link: 1

   Vsf-Port Port-State
   -------       -------
   2/B1     Up: Connected to port 1/B1
   2/B2     Up: Connected to port 1/B2
   2/B3     Up: Connected to port 1/B3
   2/B4     Up: Connected to port 1/B4

Changing VSF ports in a VSF link

• Remove VSF Standby switch via sw

• Physically disconnect all VSF ports

• If a different port speed, remove VSF ports from VSF link on commander

• Assign new port to VSF link

• Connect factory default or provisioned switch and reboot

• Show vsf link detail

Removing and shutting down a VSF member

• Vsf member <x> remove
HP-VSF-Switch(config)# vsf member 2 remove

The specified VSF virtual chassis standby member will be removed and its configuration will be erased. The resulting configuration will be saved. The VSF standby member will be shutdown. Continue (y/n)? y

HP-VSF-Switch(config)# show vsf

VSF Domain ID : 2
MAC Address   : 3ca82a-3f913f
VSF Topology  : No Stack Formed
VSF Status    : Active
Uptime        : 0d 4h 2m
VSF Oobm-MAD  : Disabled
Software Version : KB.16.01.0000x

Mbr
<table>
<thead>
<tr>
<th>ID</th>
<th>Mac Address</th>
<th>Model</th>
<th>Pri Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3ca82a-3f8100</td>
<td>HP J9850A Switch 5406Rz12</td>
<td>128 Commander</td>
</tr>
</tbody>
</table>

Shutting down a member
  • Vsf member <x> shutdown

  HP-VSF-Switch(config)# vsf member 2 shutdown

Firmware upgrade
  • Updating firmware in a VSF is the same as if upgrading a stand-alone switch. The commander will send the firmware to the VSF member switch and both devices will reboot (as requested).

Replacing a member
  • Physically disconnect all VSF links

    Example: VSF configured on 1/b5 and 2/b5

    • From the Commander, remove VSF related port/link configuration for the old member in the stack

      Example: no vsf member 2 link 1 2/b5

    • From the Commander, remove the module (via software) that the VSF link was configured for the old member

      Example: no module 2/b

    • From the Commander, loose (or strict, adding mac-address) provision the new member in the stack
Example: `vsf member 2 type J9850A <optional mac-address>`

- Connect the new, factory default member, to the port where previous old member was connected
  
  **Example:** connect any 10G port of the new member to port 1/b5 of the Commander

- New VSF member will reboot and join the VSF stack through plug-n-play
- Validate VSF formed with `show vsf` command

**Enabling SNMP traps**

HP-VSF-Switch(config)# snmp-server enable traps vsf

**Erase startup**

HP-VSF-Switch(config)# erase startup-config

**Redundancy Switchover**

There are a number of events that can cause the Commander management module to failover to the Standby management module:

- Commander management module crashes or heartbeats lost
- Redundancy switchover command is executed – useful command for changing Commander/Standby assignments in a VSF

**VSF status information**

**General**

`show running configuration` - view the running configuration on the switch

show system information -

show modules details vsf member <x>mem -

show CPU slot -

show CPU process slot -

**VSF**

`show VSF` - shows the list of VSF virtual chassis members that are provisioned

`show vsf detail` - shows detailed information related to the current state of the VSF virtual chassis.

`show vsf link` - shows the state of the VSF links for each VSF member.

`show vsf link detail` - shows detail for the VSF links for each VSF member.

`show vsf member <x>` - shows the specified VSF virtual chassis members provisioned.

`show vsf lldp-mad status` - displays the VSF LLDP MAD (Multi-Active Detection) information.
**show vsf lldp-mad parameters** - displays the VSF LLDP MAD (Multi-Active Detection) information.

**show vsf trunk-designated-forwarder** - shows the designated forwarders for each trunk.

**RELATED COMMANDS**

**show trunks** -

**show lacp** - lists data for only the LACP-configured ports

**show log** -

- **show OOBM**
- **show OOBM VSF member**
- **show OOBM ip**
- **show running-config OOBM**

**chassis locate HP-VSF-Switch(config)# chassislocate vsf member 1 on**

**VSF Troubleshooting tools**

Noted below are several troubleshooting tips and CLI commands that can provide valuable information for troubleshooting VSF.

**VSF specific**

- For VSF support case/issue resolution, capture the output of the “**show tech vsf**” CLI command. Note: the output of the command contains a lot of information and may take an extended amount of time to complete.

- VSF specific event log messages of a typical VSF formation of a member joining a VSF as a result of the “**show log vsf**” CLI command:

```
I 01/06/16 22:31:39 04900 vsf: ST1-CMDR: VSF link 1 port 1/B1 up: Peer validated
I 01/06/16 22:31:38 04907 vsf: ST1-CMDR: VSF link 1 up: Peer has mac 3c98ca-31f800
I 01/06/16 22:31:38 04900 vsf: ST1-CMDR: VSF link 1 port 1/B2 up: Peer validated
I 01/06/16 22:31:38 04908 vsf: ST1-CMDR: VSF link 1 port 1/B4 up: Peer validated
I 01/06/16 22:31:39 04900 vsf: ST1-CMDR: VSF link 1 port 1/B3 up: Peer validated
I 01/06/16 22:31:38 04902 vsf: ST1-CMDR: VSF link 1 is up
I 01/06/16 22:31:41 00255 ports: ST1-CMDR: Port 2/B1 is reserved for VSF use
I 01/06/16 22:31:41 00256 ports: ST1-CMDR: Port 2/B2 is reserved for VSF use
I 01/06/16 22:31:41 00257 ports: ST1-CMDR: Port 2/B3 is reserved for VSF use
I 01/06/16 22:31:41 00258 ports: ST1-CMDR: Port 2/B4 is reserved for VSF use
---- Bottom of log: Events listed - 12 ----
HP-VSF-Switch#
HP-VSF-Switch# show vsf
```

- Use the “**show vsf**” CLI command output to view the status of the VSF
Use the “show vsf detail” CLI command output to view status, priority and CPU Utilization information. Higher than normal CPU Utilization could indicate a misconfiguration or network loop.
SF-VSF-Switch(config)# show vsf detail

VSF Domain ID : 8
MAC Address : 1e002a-3f889f
VSF Topology : Chain
Active
Option : ESI 2th 5th
VSF OEM-ID : Disabled
Software Version : R8.16.01.0003

Name : SF-VSF-Switch
Contact
Location

Member ID : 1
MAC Address : 1e002a-2f2109
Type : J0850A
Model : M6 J0850A Switch 5406Rai2
Priority : 128
Status : Commander
SCH Version : EB34.01.0005
Serial Number : 8656454R70
Optime : 144 4h 58m
CPU Utilisation : 2%
Memory - Total : 72,953,750 bytes
Free : 539,363,298 bytes
VSF Links
#1 : Active, Peer member

Member ID : 2
MAC Address : 1e002a-3f6889
Type : J0850A
Model : M6 J0850A Switch 5406Rai6
Priority : 128
Status : SchedBy
SCH Version : EB34.01.0005
Serial Number : 8656454R70
Optime : 0d 0h 15m
CPU Utilisation : 0%
Memory - Total : 72,953,750 bytes
Free : 541,663,992 bytes
VSF Links
#1 : Active, Peer member
• Use the “show vsf link detail” CLI command output to verify VSF link peer connectivity.

HP-VSF-Switch(config)# show vsf link detail

VSF Member: 1     Link: 1

Vsfl-Port  Port-State
----------  ----------
1/E1       Up: Connected to port 2/B1
1/E2       Up: Connected to port 2/B2
1/E3       Up: Connected to port 2/B3
1/E4       Up: Connected to port 2/B4

VSF Member: 2     Link: 1

Vsfl-Port  Port-State
----------  ----------
2/E1       Up: Connected to port 1/B1
2/E2       Up: Connected to port 1/B2
2/E3       Up: Connected to port 1/B3
2/E4       Up: Connected to port 1/B4

HP-VSF-Switch(config)#

• Use the “show vsf lldp-mad status” CLI command output to view the status of a VSF split.

HP-VSF-Switch(config)# show vsf lldp-mad status

MAD device IP : 10.111.130.66
MAD-probe portset : 1/C1,2/C1,

VSF split : No
MAD probe originator : No
Number of probe requests sent : 0
Number of probe responses received : 0
MAD Active Fragment : Yes
• Use the “show vsf lldp-mad parameters” CLI command output to view MAD readiness status and LAG connectivity.

```
HP-VSF-Switch(config)# show vsf lldp-mad parameters

MAD device IF                   : 10.111.120.66
  MAD readiness status          : Success
    MAD device MAC             : 082e5f-253bfc
    Reachable via Vlan         : 1110
    Local LAG interface        : Trk29
    MAD-probe portset          : 1/C1,2/C1,

  LAG connectivity             : Full

HP-VSF-Switch(config)#
```

• Use the “show vsf trunk-designated-forwarder” CLI command output to view which VSF member is the designated traffic forwarder for a particular link.

```
HP-VSF-Switch(config)# show vsf trunk-designated-forwarder

Trunk Designated Forwarders

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trk3</td>
<td>LACP</td>
<td>1</td>
</tr>
<tr>
<td>Trk25</td>
<td>TRK</td>
<td>1</td>
</tr>
<tr>
<td>Trk29</td>
<td>LACP</td>
<td>1</td>
</tr>
</tbody>
</table>

HP-VSF-Switch(config)#
```
• Use the “show boot vsf member <x>” CLI command to view crash information for a particular VSF member.

```
HP-VSF-Switch(config)# show boot vsf member 1

Member 1
Master -- Saved Crash Information (most recent first):

-----------------------------------------------
ID: 1da6e739
Active system went down: 12/23/15 18:18:53 KB.16.01.0000x 508
Reboot of Member ID 1, Lost merge
ID: b98bdec8
Active system went down: 12/21/15 22:56:55 KB.16.01.0000x 508
Rebooting for VSF Admin State change
ID: 903392bb
Active system went down: 12/21/15 21:51:53 KB.16.01.0000x 508
Reboot of Member ID 1, User reboot
ID: 05096d09
Active system went down: 12/21/15 21:51:34 KB.16.01.0000x 508
Rebooting for VSF Admin State change
```

**General**

Copy core-dump – copy core-dump file from flash

- `copy core-dump VSF member VSF-MEMBER SLOT-ID | mm-active | mm-standby sftp | tftp | usb | xmodem HOST-NAME-STR | IP-ADDR | IPV6-ADDR FILENAME-STR`

Copy fdr-log - Copy FDR logs from the switch to an SFTP/TFTP server, USB or xmodem terminal

- `copy fdr-log VSF member VSF-MEMBER all | mm-active | mm-standby | slot current | previous | SLOT-ID-RANGE sftp | tftp | usb | xmodem HOST-NAME-STR | IP-ADDR | IPV6-ADDR FILENAME-STR`

Copy crash-log - Copy the switch log file

- `copy crash-log VSF member VSF-MEMBER | SLOT-ID-RANGE | mm | sftp | tftp | usb | xmodem sftp | tftp | usb | xmodem HOST-NAME-STR | IP-ADDR | IPV6-ADDR FILENAME-STR`

Copy crash data - Copy the crash data file of the switch
- copy crash-data VSF member VSF-MEMBER SLOT-ID-RANGE | mm | sftp | tftp | usb | xmodem sftp | tftp | usb | xmodem HOST-NAME-STR | IP-ADDR | IPV6-ADDR FILENAME-STR

Show boot-history - Show system’s boot log.
- show boot-history VSF member VSF-MEMBER-LIST

Core dump - Enable/disable core-dump on the management module or the interface module
- core-dump interfaces | management-module | VSF | tftp-server member MEMBER-ID interfaces | management-module

Configuration Example: VSF HA topology with LLDP-MAD

Caution
To avoid broadcast storms or loops in your network while configuring a trunk, first disable or disconnect all ports you want to add to or remove from the trunk. After you finish configuring the trunk, enable or re-connect the ports.

Enabling VSF
- **Configuring Member 1** – configure member 1 switch with VSF

  HP-VSF-Switch(config)# vsf member 1 link 1 1/b1

  All configuration on this port has been removed and port is placed in VSF mode.

  HP-VSF-Switch(config)# vsf enable domain 2

  Device will reboot
- **Configure Member 2** – configure member 2 switch with VSF

  * HP-VSF-Switch(config)# vsf member 2 link 1/1/b1

  **All configuration on this port has been removed and port is placed in VSF mode.**

  * HP-VSF-Switch(config)# vsf enable domain 2

  **Device will reboot**

- **Immediately connect switches together on port b1**

- **Validate VSF status**

  * HP-VSF-Switch# show vsf

  ```
  VSF Domain ID : 2
  MAC Address   : 3ca82a-3f583f
  VSF Topology  : Chain
  VSF Status    : Active
  Uptime        : 0d 0h 5m
  VSF Oobm-MAD  : Disabled
  Software Version : KB.16.01.0000x
  -------------------
  Mbr ID  Mac Address       Model   Pri Status
  -------------------
  1     3ca82a-3f8100      HP J9850A Switch 5406Rz12   128     Standby
  2     3ca82a-3f4800      HP J9850A Switch 5406Rz12   128     Commander
  ```

  * HP-VSF-Switch# show vsf link detail

    VSF Member: 1   Link: 1

    **Vsf-Port Port-State**

    ---------

    1/B1   Up: Connected to port 2/B1

    VSF Member: 2   Link: 1

    **Vsf-Port Port-State**

    ---------

    2/B1   Up: Connected to port 1/B1
Configure MAD device

- **Configuring MAD device for LACP trunk – configure Switch 2920**

  ```console
  HP-2920-48G-POEP(config)# vlan 1110
  HP-2920-48G-POEP(vlan-1110)# ip address 10.111.120.33/24
  HP-2920-48G-POEP(vlan-1110)# exit
  HP-2920-48G-POEP(config)# trunk 2,4 trk1 lacp
  HP-2920-48G-POEP(config)# vlan 1110
  HP-2920-48G-POEP(vlan-1110)# tag trk1
  HP-2920-48G-POEP(vlan-1110)# wr me
  ```

Configure VSF for LACP Trunk and MAD parameters

- **Configure LACP Trunk on the VSF**

  ```console
  HP-VSF-Switch(config)# vlan 1110
  HP-VSF-Switch(vlan-1110)# ip address 10.111.120.31/24
  HP-VSF-Switch(vlan-1110)# exit
  HP-VSF-Switch(config)# trunk 1/c1,2/c1 trk2 lacp
  HP-VSF-Switch(config)# vlan 1110
  HP-VSF-Switch(vlan-1110)# tag trk2
  HP-VSF-Switch(vlan-1110)# wr me
  HP-VSF-Switch(vlan-1110)# exit
  ```

- **Configure MAD on the VSF**

  ```console
  HP-VSF-Switch(config)# vsf lldp mad ipv4 10.111.120.33 v2c public
  ```

Validate MAD status

- **Validate MAD status on the VSF**

  ```console
  HP-VSF-Switch(config)# show vsf lldp-mad status
  MAD device IP : 10.111.120.33
  MAD-probe portset : 1/C1,2/C1,
  VSF split : No
  MAD probe originator : No
  Number of probe requests sent : 0
  Number of probe responses received : 0
  MAD Active Fragment : Yes
  ```
HP-VSF-Switch(config)# show vsf lldp-mad parameters
MAD device IP : 10.111.120.33
MAD readiness status : Success
MAD device MAC : d4c9ef-af5a80
Reachable via Vlan : 1110
Local LAG interface : Trk2
MAD-probe portset : 1/C1,2/C1,
LAG connectivity : Full

Validate MAD failure

- Disconnect VSF link and validate MAD outcome – MAD will disable the front ports on one of the VSF members to avoid network traffic/routing issues

HP-VSF-Switch# show vsf lldp-mad status
MAD device IP : 10.111.120.33
MAD-probe portset : 1/C1,2/C1,
VSF split : Yes
MAD probe originator : No
Number of probe requests sent : 0
Number of probe responses received : 0
MAD Active Fragment : Yes

HP-VSF-Switch# show vsf lldp-mad parameters
MAD device IP : 10.111.120.33
MAD readiness status : Failure
MAD device MAC : d4c9ef-af5a80
Reachable via Vlan : 1110
Local LAG interface : Trk2
MAD-probe portset : 1/C1,2/C1,
LAG connectivity : Partial
Best practices and configuration notes

- To avoid broadcast storms or loops in your network while configuring a VSF, it is recommended to first disconnect or disable all ports you want to add to or remove from the VSF. After you finish configuring the VSF, enable or reconnect the ports.
- For High Availability applications, it is recommended to trunk ports across VSF members on different modules.
- VSF will disable a second Management module in any 5400Rzl2 chassis that has 2 Management modules installed.
- Features mutually exclusive.
- It is HIGHLY recommended to use a MAD mechanism to detect and mitigate VSF split conditions.
- MAC Sec is not supported on VSF links.
- Port monitoring of VSF ports is not supported.
- VSF is not compatible with:
  - Distributed Trunking
  - Meshing

Appendix A:
VSF HA topology with LLDP-MAD configuration file

VSF configuration file

```
HP-VSF-Switch# show running-config
Running configuration:
; J9850A Configuration Editor; Created on release #KB.16.01.0000x
; Ver #0c:01.7c.59.f4.7b.ff.fc.ff.ff.3f.ef:
hostname "HP-VSF-Switch"
module 1/A type j9992a
module 1/B type j9995a
module 1/C type j9990a
module 2/A type j9992a
module 2/B type j9995a
module 2/C type j9990a
vsf
  enable domain 2
  member 1
    type "J9850A" mac-address 3ca82a-3f8100
    priority 128
    link 1 1/B1
```
link 1 name "I-Link1_1"
exit
member 2
type "J9850A" mac-address 3ca82a-3f4800
priority 128
link 1 2/B1
link 1 name "I-Link2_1"
exit
lldp-mad ipv4 10.111.120.33 v2c "public"
exit
no rest-interface
trunk 1/C1,2/C1 trk2 lacp
snmp-server community "public" unrestricted
oobm
  ip address dhcp-bootp
vsf member 1
  ip address dhcp-bootp
  exit
vsf member 2
  ip address dhcp-bootp
  exit
exit
vlan 1
  name "DEFAULT_VLAN"
  ip address dhcp-bootp
  exit
vlan 1110
  name "VLAN1110"
  tagged Trk2
  ip address 10.111.120.31 255.255.255.0
  exit
spanning-tree Trk2 priority 4
no allow-v2-modules

MAD Device configuration file

Running configuration:

; J9729A Configuration Editor; Created on release #WB.16.01.0000x
; Ver #0b:34.59.14.29.eb.fc.f3.ff.37.2d:d5

hostname "HP-2920-48G-POEP"
module 1 type j9729a
trunk 2,4 trk1 lacp
ip default-gateway 10.111.120.31
snmp-server community "public" unrestricted
snmp-server community "privatecomm" unrestricted
snmp-server community "publiccomm" operator
oobm
    ip address dhcp-bootp
    exit
vlan 1
    name "DEFAULT_VLAN"
    no untagged Trk1
    untagged 1,3,5-48
    ip address dhcp-bootp
    exit
vlan 1110
    name "VLAN1110"
    tagged Trk1
    ip address 10.111.120.33 255.255.255.0
    exit
spanning-tree Trk1 priority 4

HP-2920-48G-POEP(config)#