Cisco Catalyst 6500 Virtual Switching System (VSS)部署与实施

# 目录

概述

为了强化交换网络中的核心层设备，Cisco 推出 Cisco Catalyst 6500 Virtual Switching System，即 VSS 技术；VSS 被称为虚拟交换技术，VSS 的功能是将多台 Cisco Catalyst 6500 交换机虚拟成单台交换机，在配置 VSS 之后，不仅可以提高核心交换机的易操作性，同时还能实现核心层的故障恢复率，从而提供不间断通信能力。在配置 VSS 之后的多台交换机之间不再有冗余设备，而是所有交换机都同时工作，最终扩展整体核心交换能力。

截止到写此文档之时，VSS 允许将最多 2 台物理 Cisco Catalyst 6500 交换机虚拟成单台交换机。还需要说明的是，VSS 并不是硬件设备，而是软件技术，在符合 VSS 条件的 Cisco Catalyst 6500 交换机之间便可配置 VSS 技术，必须是 2 台带有 Supervisor 720-10GE 引擎的 Catalyst 6500 交换机之间才可配置 VSS，由于带有 Supervisor 720-10GE 引擎的 Catalyst 6500 交换机的核心交换能力为 720-Gbps，所以 2 台带有 Supervisor 720-10GE 引擎的 Catalyst 6500 交换机配置 VSS 之后的核心交换能力为 1440-Gbps，故 VSS 又称为 VSS1440。

2 台物理 Cisco Catalyst 6500 交换机通过 VSS 技术虚拟成单台交换机的示意图如下：
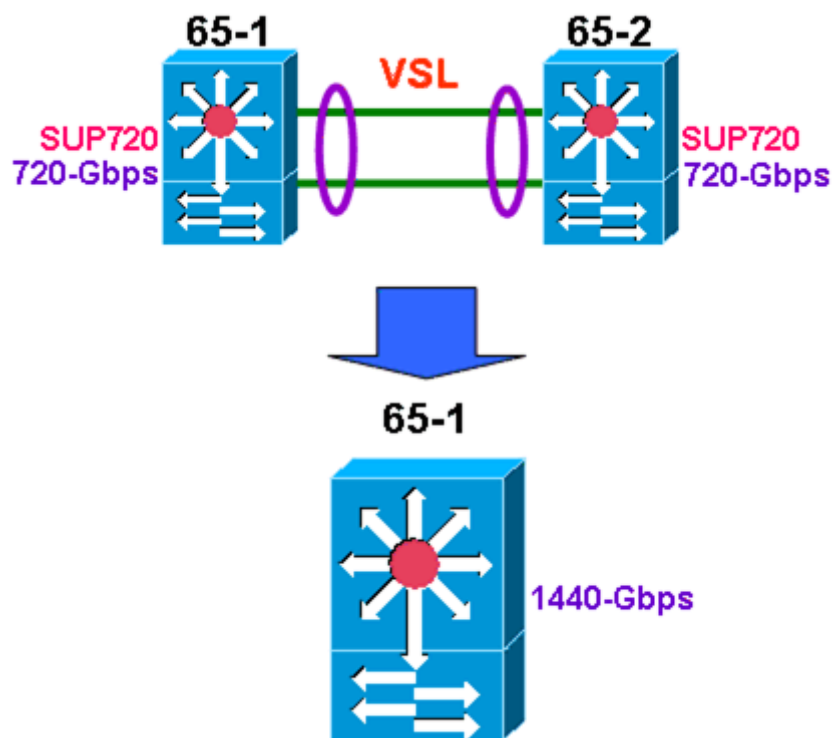
上图为 2 台物理 Cisco Catalyst 6500 交换机通过 VSS 技术虚拟成单台交换机，之前所有需要在两台交换机上完成的工作现在只需要在单台交换机上完成即可，但配置 VSS 的两台交换机之间必须使用 10 Gigabit 的光纤互连，互连的光纤无论是几条，都必须配置 EtherChannel，在 VSS 中，该 EtherChannel 称为 Virtual Switch Link(VSL)。

VSS 的优势

配置 VSS 之前

在多台交换机之间通过 HSRP 技术实现高可用性的网络中，有许多不足之处，如下图所示：
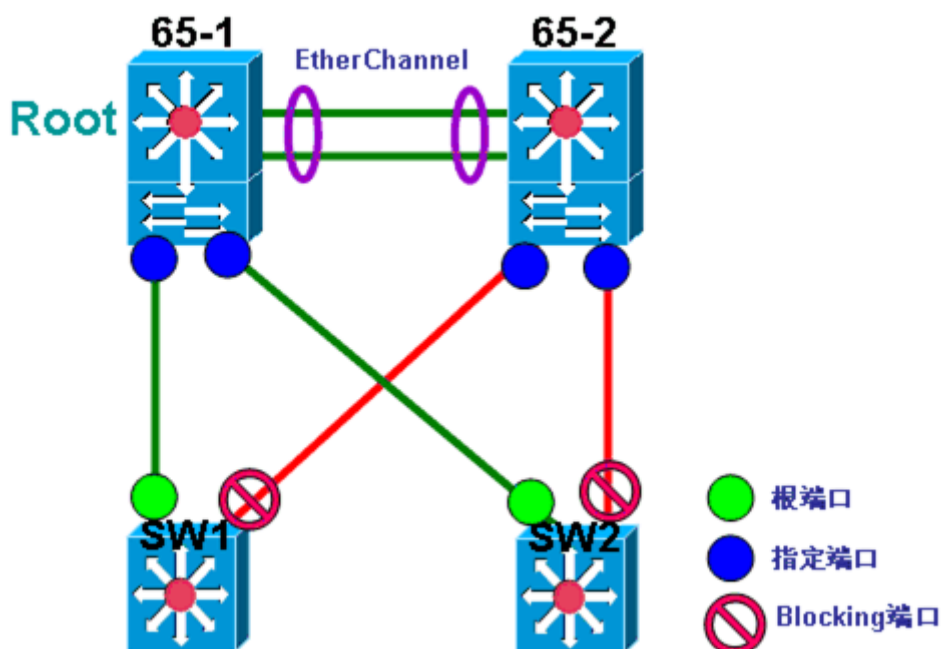
在上图中，核心层有两台 Catalyst 6500 交换机，接入层交换机同时连接两台

6500 交换机以实现网络冗余性，但是由于 STP 的原因，当将 6500 交换机 65-1 设置为 Root（根交换机）之后，接入交换机与核心交换机 65-2 的端口便被 STP 变成 Blocking 端口而不能转发数据，在上图中接入交换机连接 65-1 的绿色线路都处于数据转发状态，而连接 65-2 的红色线路都处于备份状态。从图中也可以看出，在部署了两台 6500 交换机的核心层，其中总有一台处于备份状态而不转发数据，这明显是一种资源浪费，所以应该尽力使网络资源得到充分利用。

如果通过 Per-VLAN Spanning-Tree(PVST)在网络中基于 VLAN 实施流量负载均衡，情况如下：
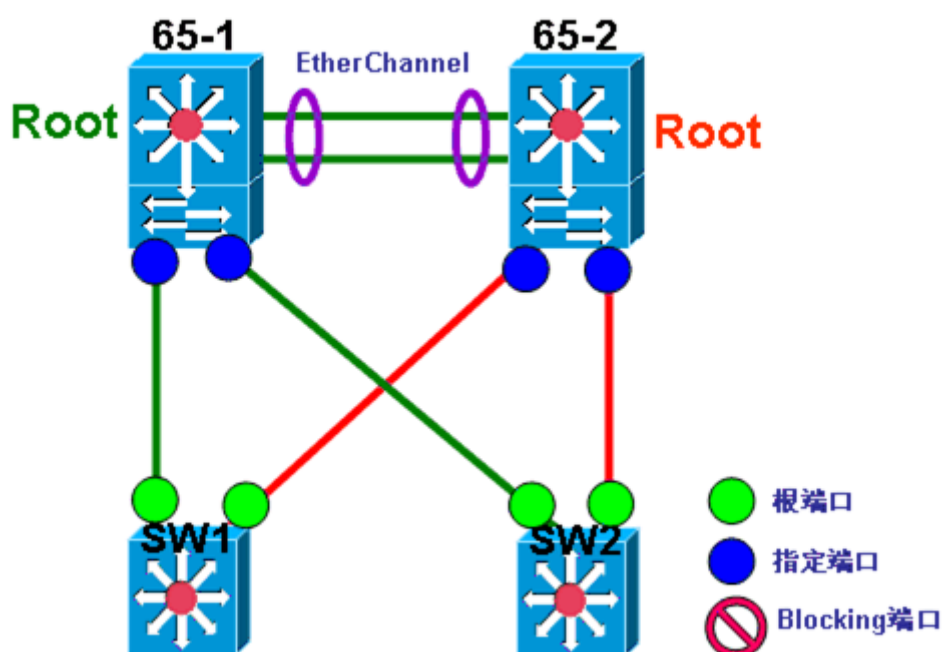
在网络中配置 Per-VLAN Spanning-Tree(PVST)之后，现在可以基于 VLAN 实施流量负载均衡，在上图中，核心交换机 65-1 为一部分 VLAN 的 Root，而核心交换机 65-2 为另一部分 VLAN 的 Root，网络中部分 VLAN 的流量从接入层通过绿色线路去往核心交换机 65-1，而其它 VLAN 的流量从接入层通过红色线路去往核心交换机 65-2，最终实现流量的负载。但在这样的拓扑中我们不难看出，虽然接入层交换机通过多条线路与核心交换机相连，但始终只有一条线路在提供数据转发，而这也不能通过配置 EtherChannel 来解决，因为接入交换机的对端是不同交换机。

配置 VSS 之后

当在核心交换机之间配置 VSS 之后，情况如下：
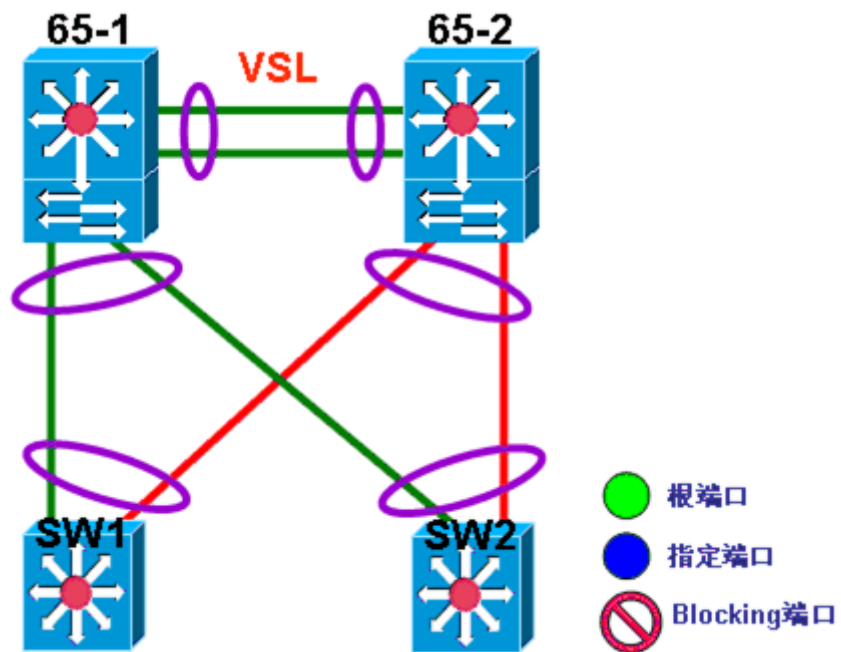
在上图中配置 VSS 之后，接入交换机与核心交换机相连的多条线路便可以通过配置 EtherChannel 来同时实现数据传输，网络中不会再有端口被 STP 变成 Blocking 端口，这是因为原本的两台核心交换机已经被 VSS 虚拟成单台交换机，网络将演变成如下拓扑结构：
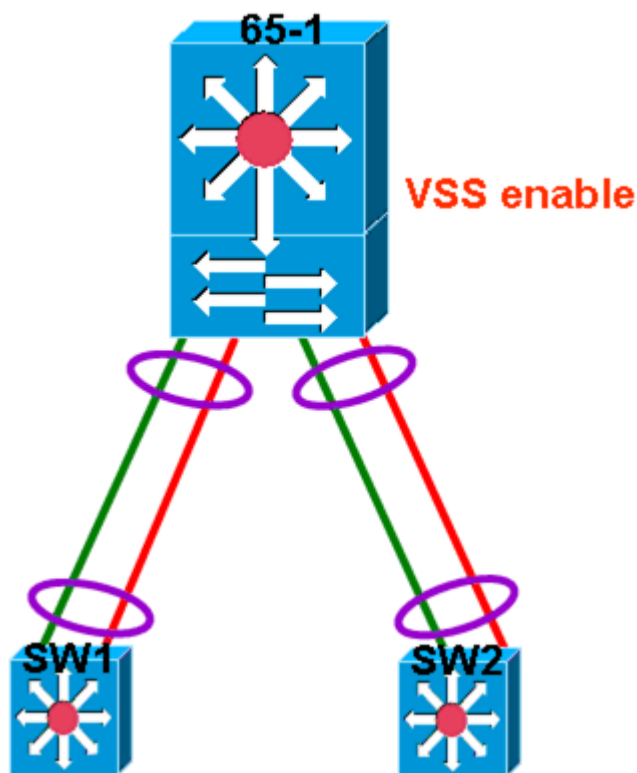
从图中可以看出，在核心交换机配置 VSS 之后，接入交换机原本连接两台核心交换机的两条线路已经捆绑成 EtherChannel，就犹如和单台核心交换机相连，此时连接核心交换机的多条线路也可以同时提供数据转发，充分利用了网络资源。

在传统网络中部署 HSRP 时，同样也不能充份利用 IP 地址，因为 HSRP 在提供网关 IP 地址时，必须同时使用 3 个 IP 地址，导致总有 2 个 IP 地址的浪费，而在 VSS 将两台核心交换机虚拟成单台交换机之后，也只需要直接配置单个网关 IP 地址，不再有 IP 地址浪费的情况。

在配置 VSS 之后，网络中不仅节省了 STP 的收敛时间，在路由协议故障切换时，同样也省去了路由计算时间，从而真正达到网络的高可用性。

在交换机之间完成 VSS 之后，由于两台设备虚拟成了单台，最终的配置文件也变成了单个配置文件，配置设备时，不再需要配置两台。

VSS 部署要求

因为 VSS 并不是硬件设备，而是软件技术，只要原有的硬件参数达到要求后，便可部署 VSS，VSS 具有如下部署要求：

机箱(Chassis)

VSS 支持所有 Catalyst 6500 系列的机箱，无论是 E 系列还是非 E 系列都支持，并且最少也是最多 2 台。

配置 VSS 的两台 Catalyst 6500 之间不必型号一致，例如在 WS-C6503-E 和 WS-C6513 之间也是可以配置 VSS 的，但是需要说明，虽然 VSS 支持不同型号机箱之间的协同工作，但请不要做这样的设计，务必保持两台机箱型号一致，否则后果将出乎您的意料。

注：

★Cisco Catalyst 6509-NEB 和 Cisco Catalyst 6503 Switch (non-E) 不支持。

引擎(Engine)

VSS 只支持 Supervisor 720-10GE 系列的引擎，其中包含 VS-S720-10GE-3C 和 VS-S720-10GE-3CXL 两款引擎。

Supervisor 720-10GE 系列引擎如下图：

VSL(Virtual Switch Link)

两台配置 VSS 的交换机之间的 VSL 线路必须使用 10 Gigabit 的光纤互连，10 Gigabit 的光模块为 X2 系列，VSS 并不限制两台交换机的物理距离，交换机之间的物理距离由光模块所支持的距离决定，交换机之间的光纤连接可以是一根，也可以是多根，但最多支持 8 根 无论 VSL 使用一根还是多根线路,都必须配置 EtherChannel ；VSL 所使用到的 X2 系列各光模块参数如下表：

模块型号	波长(nm)	光纤类型	芯细	传输距离
Cisco X2-10GB-CX4	—	CX4 (copper)	—	15m
Cisco X2-10GB-SR	850	MMF	62.5	26m
			62.5	33m
			50.0	66m
			50.0	82m
			50.0	300m
Cisco X2-10GB-LRM	1310	MMF	62.5	220m
			50.0	100m

			50.0	220m
		SMF	G.652	300m
Cisco X2-10GB-LX4	1310	MMF	62.5	300m
			50.0	240m
			50.0	300m
Cisco X2-10GB-LR	1310	SMF	G.652	10 km
Cisco X2-10GB-ER	1550	SMF	G.652	40 km
Cisco X2-10GB-ZR	1550	SMF	G.652	80 km

X2 系列光模块如下图：

SR,LR,LX4,ER,LRM,ZR 所使用的光纤连接线两头均为 SC 接口，而 CX4 则使用 InfiniBand 4x 接口。

注：VSL 可以使用引擎上自带的 10 Gigabit 光口，也可以使用业务板卡上的光口，

所支持的 10 Gigabit 光口业务板卡有：

WS-X6708-10GE-3C or WS-X6708-10GE-3CXL

WS-X6716-10GE-3C or WS-X6716-10GE-3CXL

WS-X6716-10T-3C or WS-X6716-10T-3CXL

IOS 软件

Cisco IOS Release 12.2(33)SXH1 以及更高版本。

业务板卡

VSS 支持所有 6500 系列以及 6700 系列业务板卡，其中 WS-X6716-10G 必须在 IOS 12.2(33)SXH2 以及更高版本中才能正常支持；目前 VSS 不支持任何广域网业务板卡（WAN Module）。

电源

6503-E 和 6504-E 支持所有电源；

6506，6506-E，6509，6509-E，6509-NEB-A，6509-V-E 以及 6513 只支持 2500W 以及更高电源。

VSS Dual Active

当互连的两台交换机之间的所有 VSL 链路都失效时，那么两台交换机都会变回配置 VSS 之前的原本单机 Active 的状态，这种状态称为 Dual Active 状态 ，在 Dual Active 下的任何交换机都可以独立工作并且独立配置。

Multichassis EtherChannel (MEC)

在传统在交换网络架构中，当接入交换机使用多条线路连接不同核心交换机时，在 STP 的影响下，通常只有单条线路提供数据转发，即使在配置 HSRP 之后，同样只有单条线路提供数据转发，无法充分利用网络资源，并且在这种情况下，接入交换机是无法与核心交换机之间通过配置 EtherChannel 来捆绑使用多条线路的，因为接入交换机的对端是不同交换机；在配置 VSS 之后，为了提供核心层的高可用性，所以都会在接入交换机使用多条线路连接两台核心 6500 交换机，在传统网络架构中，只有单条线路可用，但在 VSS 环境下，接入交换机和核心交换机之间可以将这些多条线路通过 EtherChannel 捆绑成单条线路，虽然接入交换机的 EtherChannel 对端是多台交换机，但 VSS 环境下允许这样的 EtherChannel 存在，这被称为 Multichassis EtherChannel (MEC)，如下图：
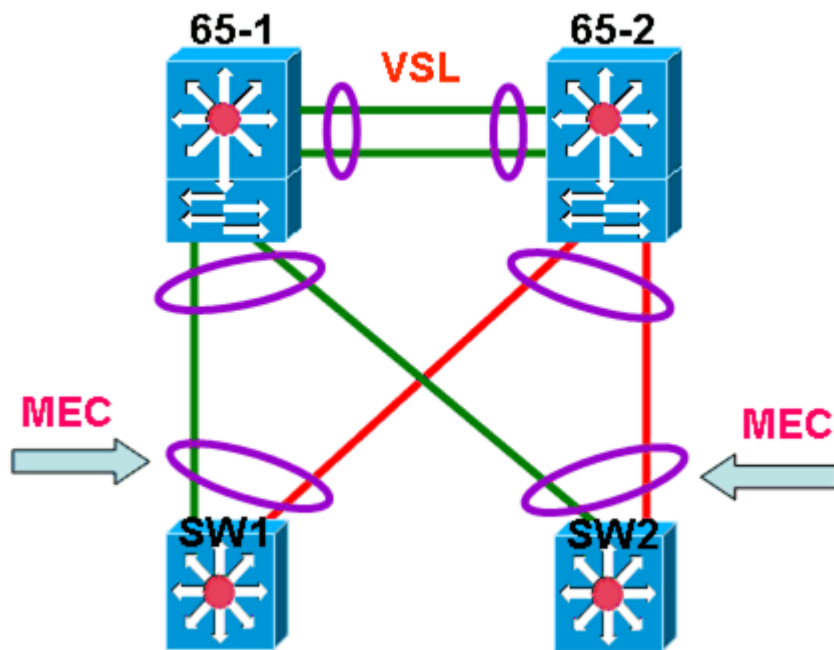
上图中接入交换机同时与两台配置 VSS 的核心交换机相连，虽然接入交换机的对端是不同交换机，但在 VSS 环境下却可以配置 Multichassis EtherChannel (MEC)来充分利用线路资源，在 VSS 环境下配置 Multichassis EtherChannel (MEC)后的效果如下图：
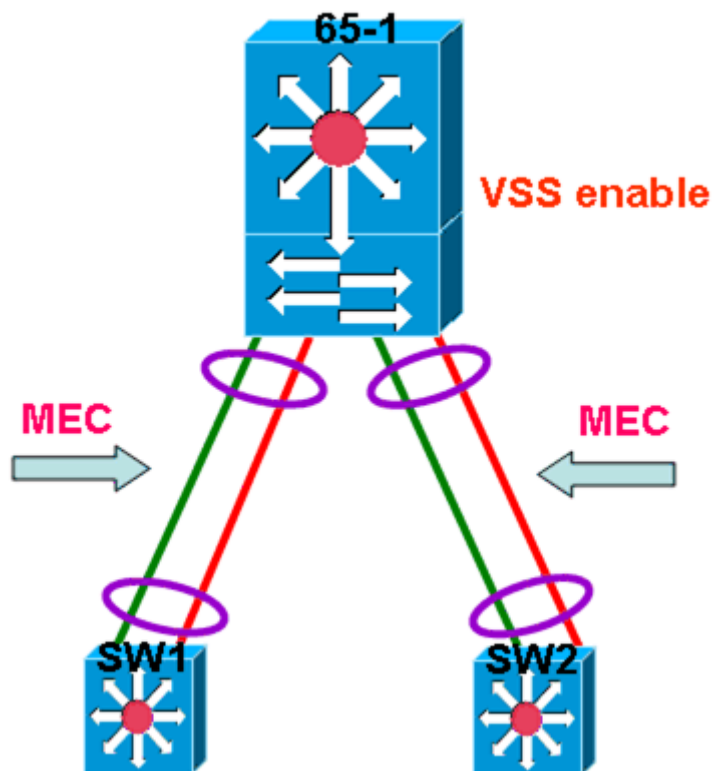
在 VSS 环境下配置 Multichassis EtherChannel (MEC)后，接入交换机与核心交换机之间的所有线路都能同时提供数据转发，并且接入交换机与核心交换机之间的流量会自动在 MEC 的每一根线路上进行负载均衡传输，不仅提高了传输带宽，同时也增强了高可用性

MEC 和普通 EtherChannel 一样最多支持 8 根线路同时传输。

注：

★VSS 最多支持 512 个 EtherChannel 接口，这是指普通 EtherChannel 和 MEC 的总和，由于 VSL 已经使用了两个 EtherChannel 接口（两个机箱各一个），所以用户可以配置的 EtherChannel 还剩 510 个；

★在 Cisco IOS Release 12.2(33)SXI，最多支持 128 个 EtherChannel 接口，所以用

户可以配置的 EtherChannel 还剩 126 个。

VSS 接口命名规则

当两台 Catalyst 6500 交换机通过 VSS 虚拟成单台交换机之后，只有一台能够进行配置和管理，而另一台则永远停留在用户模式（提示符为>），enble 模式是被阻塞而不能进入的，正因为如此，所以在单台设备上必须同时能够看见和配置两台设备上的所有接口信息，比如第一台交换机上的 G1/1 和 G2/1 与第二台交换机上的 G1/1 和 G2/1 必须都能同时配置，但是由于两台交换机上的接口可能在命名上出现重复，所以当两台交换机的接口在 VSS 中需要再次重新命名以区别不同接口，这样一来，原本第一台交换机上的 G1/1 就被 VSS 重新命名为 G1/1/1，原本第一台交换机上的 G2/1 就被 VSS 重新命名为 G1/2/1，同理，原本第二台交换机上的 G1/1 就被 VSS 重新命名为 G2/1/1，原本第二台交换机上的 G2/1 就被 VSS 重新命名为 G2/2/1，如下图所示：
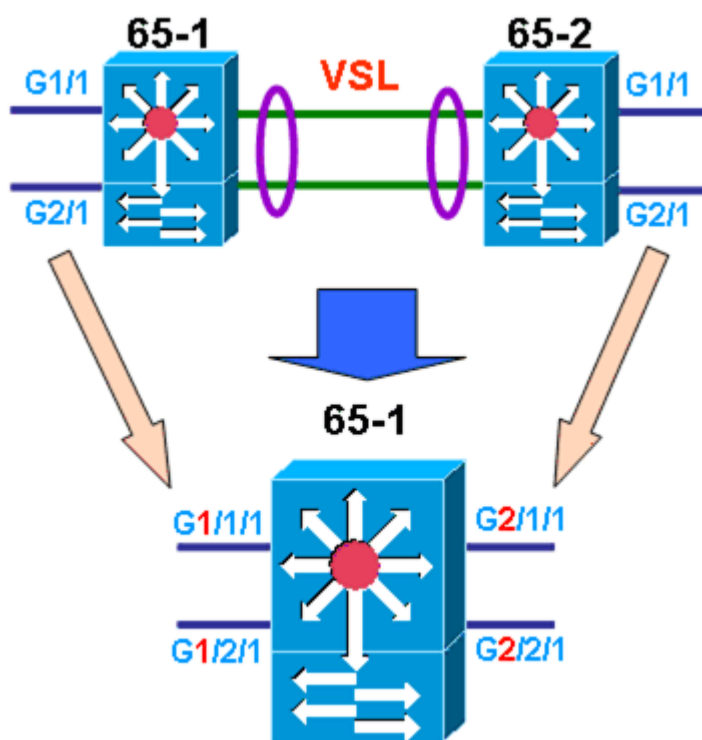
例如一个接口的名字为 G1/3/2 就表示第一台交换机的第三个业务插槽的第二个接口，接口的名字为 G2/5/6 就表示第二台交换机的第五个业务插槽的第六个接口。

注：从图中还可以看出，当两台交换机通过 VSS 虚拟成单台交换机后，这台虚拟交换机的主机名则沿用第一台交换机的名字。

注：

★在交换机之间配置 VSS 之后，两台设备被虚拟成了单台，而最终只有其中一台设备具有控制和配置能力，但设备的配置文件会在两台交换机之间自动同步，这种设备间的配置同步需要靠配置 Stateful Switchover (SSO)和 Nonstop Forwarding (NSF)来完成，但建议只配置 Stateful Switchover (SSO)即可。

★虽然 VSS 并没有要求两台交换机必须硬件型号相同，也没有要求两台交换机所运行的 IOS 版本必须相同，但建议保持配置 VSS 的两台交换机的硬件型号相同，以及保持双方所运行的 IOS 版本相同，否则将可能出现意外情况。

配置 VSS
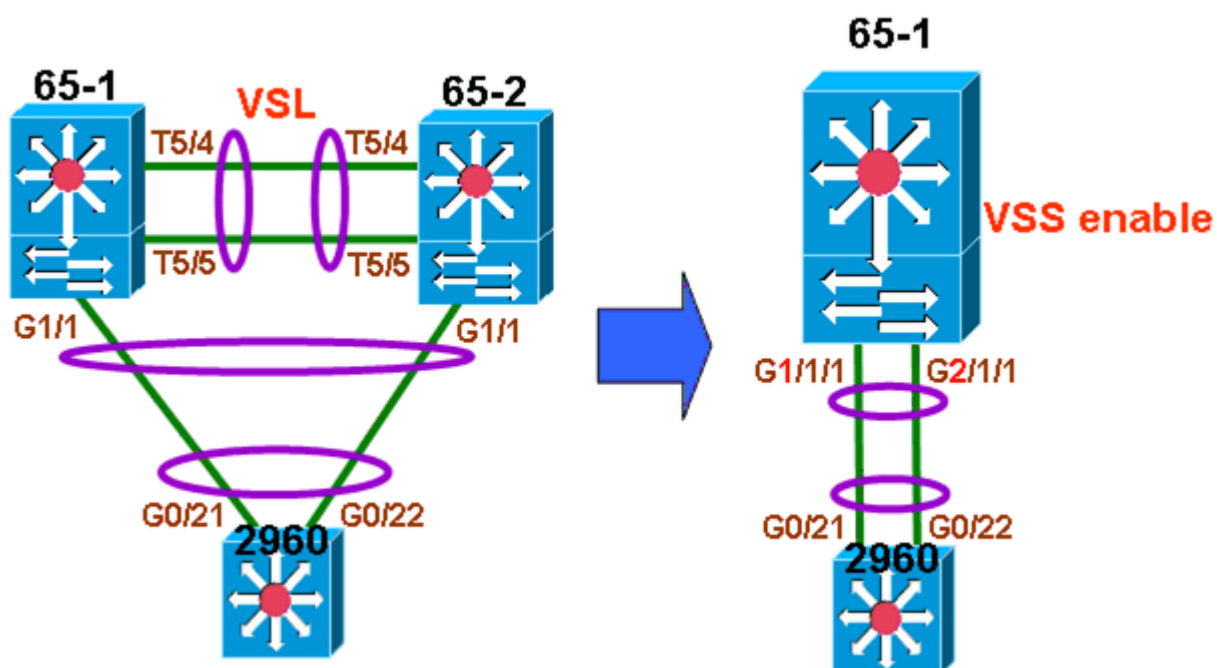
　　说明： 本实验中采用两台 WS-C6506-E 交换机，引擎都为 VS-S720-10GE-3C，分别安装于第 5 个插槽中；每台交换机还安装了两块业务板卡 WS-X6748-SFP 和 WS-X6748-GE-TX，分别安装于两台交换机的第 1 个插槽和第 2 个插槽；VSL 通过两台 交 换 机 引 擎 上 的 两 个 10 Gigabit 光 接 口 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5 使用 Cisco X2-10GB-SR 光模块互连；两台交换机运行的 IOS 版本都为 Cisco IOS Release 12.2(33)SXH7；接入层交换机为一台 WS-C2960G-24TC-L，接入交换机的 G0/21 和 G0/22 分别连接两台核心交换机的 G1/1。

VSS 基本配置

1. 查看核心交换机 65-1

（1）查看核心交换机 65-1 的 IOS 版本信息：

Switch-1show version

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

ROM: System Bootstrap, Version 12.2(17r)SX6, RELEASE SOFTWARE (fc1)

Router uptime is 5 minutes

Uptime for this control processor is 5 minutes

Time since Router switched to active is 5 minutes

System returned to ROM by reload at 03:09:52 UTC Thu Dec 9 2010 (SP by reload)

System image file is "sup-bootdisk:s72033-ipbase-vz.122-33.SXH7.bin"

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1412DQ6Y

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

99 Gigabit Ethernet interfaces

2 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

Configuration register is 0x2102

Patching is not available since the system is not running from an installed image. To install please use the "install file" command

Switch-1

说明：核心交换机 65-1 的 IOS 版本为 Cisco IOS Release 12.2(33)SXH7，符合 VSS 实施要求。

（2）查看核心交换机 65-1 的模块信息：

Switch-1show module

Mod Ports Card Type   Model   Serial No.

--- ----- ------------------------------------ ----------------- -----------

 1   48   CEF720 48 port 1000mb SFP   WS-X6748-SFP   XXXXXX

 2   48   CEF720 48 port 10/100/1000mb Ethernet   WS-X6748-GE-TX   XXXXXX

 5   5   Supervisor Engine 720 10GE (Active)   VS-S720-10G   XXXXXX

```
Mod MAC addresses                      Hw   Fw        Sw         Status

--- -------------------------------- ------ ----------- ----------- -------

  1  f866.f264.c2a0 to f866.f264.c2cf   2.4   12.2(18r)S1  12.2(33)SXH7 Ok

  2  1cdf.0f17.9680 to 1cdf.0f17.96af   3.4   12.2(18r)S1  12.2(33)SXH7 Ok

  5  0026.cb61.0278 to 0026.cb61.027f   3.2   8.5(3)       12.2(33)SXH7 Ok


Mod   Sub-Module              Model          Serial     Hw    Status

---- -------------------------- ------------------ ----------- ------- -------

  1  Centralized Forwarding Card WS-F6700-CFC       XXXXXX       4.1   Ok

  2  Centralized Forwarding Card WS-F6700-CFC       XXXXXX       4.1   Ok

  5  Policy Feature Card 3      VS-F6K-PFC3C      XXXXXX       1.1   Ok

  5  MSFC3 Daughterboard       VS-F6K-MSFC3      XXXXXX       2.1   Ok


Mod   Online Diag Status

---- -------------------

  1  Pass

  2  Pass

  5  Pass

Switch-1
```

说明：核心交换机 65-1 的引擎为 VS-S720-10G，安装于第 5 个插槽中，业务板卡 WS-X6748-SFP 和 WS-X6748-GE-TX 分别安装于第 1 个插槽和第 2 个插槽。

（3）查看核心交换机 65-1 的配置信息：

Switch-1show running-config

Building configuration...

Current configuration : 7241 bytes

!

upgrade fpd auto

version 12.2

service timestamps debug uptime

service timestamps log uptime

no service password-encryption

service counters max age 5

!

hostname Switch-1

!

boot-start-marker

boot-end-marker

!

!

no aaa new-model

ip subnet-zero

```
!
!
!
call-home
 alert-group configuration
 alert-group diagnostic
 alert-group environment
 alert-group inventory
 alert-group syslog
 profile "CiscoTAC-1"
  no active
  no destination transport-method http
  destination transport-method email
  destination address email callhome@cisco.com
                    destination         address         http
https://tools.cisco.com/its/service/oddce/services/DDCEService
   subscribe-to-alert-group diagnostic severity minor
   subscribe-to-alert-group environment severity minor
   subscribe-to-alert-group syslog severity major pattern ".*"
   subscribe-to-alert-group configuration periodic monthly 17 14:11
   subscribe-to-alert-group inventory periodic monthly 17 13:56
 mls netflow interface
```

```
no mls flow ip

no mls flow ipv6

mls cef error action reset

fabric timer 15

diagnostic cns publish cisco.cns.device.diag_results

diagnostic cns subscribe cisco.cns.device.diag_commands

!

redundancy

 keepalive-enable

 mode sso

 main-cpu

   auto-sync running-config

spanning-tree mode pvst

spanning-tree extend system-id

!

!

!

vlan internal allocation policy ascending

vlan access-log ratelimit 2000

!

!
```

```
interface GigabitEthernet1/1
 no ip address
 shutdown
!
interface GigabitEthernet1/2
 no ip address
 shutdown
!
interface GigabitEthernet1/3
 no ip address
 shutdown
!
interface GigabitEthernet1/4
 no ip address
 shutdown
!
interface GigabitEthernet1/5
 no ip address
 shutdown
!
interface GigabitEthernet1/6
```

no ip address

 shutdown

 !

interface GigabitEthernet1/7

 no ip address

 shutdown

 !

interface GigabitEthernet1/8

 no ip address

 shutdown

 !

interface GigabitEthernet1/9

 no ip address

 shutdown

 !

interface GigabitEthernet1/10

 no ip address

 shutdown

 !

interface GigabitEthernet1/11

 no ip address

shutdown

!

interface GigabitEthernet1/12

 no ip address

 shutdown

!

interface GigabitEthernet1/13

 no ip address

 shutdown

!

interface GigabitEthernet1/14

 no ip address

 shutdown

!

interface GigabitEthernet1/15

 no ip address

 shutdown

!

interface GigabitEthernet1/16

 no ip address

 shutdown

!

interface GigabitEthernet1/17

 no ip address

 shutdown

!

interface GigabitEthernet1/18

 no ip address

 shutdown

!

interface GigabitEthernet1/19

 no ip address

 shutdown

!

interface GigabitEthernet1/20

 no ip address

 shutdown

!

interface GigabitEthernet1/21

 no ip address

 shutdown

!

```
interface GigabitEthernet1/22

 no ip address

 shutdown

!

interface GigabitEthernet1/23

 no ip address

 shutdown

!

interface GigabitEthernet1/24

 no ip address

 shutdown

!

interface GigabitEthernet1/25

 no ip address

 shutdown

!

interface GigabitEthernet1/26

 no ip address

 shutdown

!

interface GigabitEthernet1/27
```

no ip address

 shutdown

!

interface GigabitEthernet1/28

 no ip address

 shutdown

!

interface GigabitEthernet1/29

 no ip address

 shutdown

!

interface GigabitEthernet1/30

 no ip address

 shutdown

!

interface GigabitEthernet1/31

 no ip address

 shutdown

!

interface GigabitEthernet1/32

 no ip address

```
 shutdown
!
interface GigabitEthernet1/33
 no ip address
 shutdown
!
interface GigabitEthernet1/34
 no ip address
 shutdown
!
interface GigabitEthernet1/35
 no ip address
 shutdown
!
interface GigabitEthernet1/36
 no ip address
 shutdown
!
interface GigabitEthernet1/37
 no ip address
 shutdown
```

!

interface GigabitEthernet1/38

 no ip address

 shutdown

!

interface GigabitEthernet1/39

 no ip address

 shutdown

!

interface GigabitEthernet1/40

 no ip address

 shutdown

!

interface GigabitEthernet1/41

 no ip address

 shutdown

!

interface GigabitEthernet1/42

 no ip address

 shutdown

!

```
interface GigabitEthernet1/43

 no ip address

 shutdown

!

interface GigabitEthernet1/44

 no ip address

 shutdown

!

interface GigabitEthernet1/45

 no ip address

 shutdown

!

interface GigabitEthernet1/46

 no ip address

 shutdown

!

interface GigabitEthernet1/47

 no ip address

 shutdown

!

interface GigabitEthernet1/48
```

no ip address

 shutdown

 !

interface GigabitEthernet2/1

 no ip address

 shutdown

 !

interface GigabitEthernet2/2

 no ip address

 shutdown

 !

interface GigabitEthernet2/3

 no ip address

 shutdown

 !

interface GigabitEthernet2/4

 no ip address

 shutdown

 !

interface GigabitEthernet2/5

 no ip address

shutdown

!

interface GigabitEthernet2/6

 no ip address

 shutdown

!

interface GigabitEthernet2/7

 no ip address

 shutdown

!

interface GigabitEthernet2/8

 no ip address

 shutdown

!

interface GigabitEthernet2/9

 no ip address

 shutdown

!

interface GigabitEthernet2/10

 no ip address

 shutdown

```
!

interface GigabitEthernet2/11

 no ip address

 shutdown

!

interface GigabitEthernet2/12

 no ip address

 shutdown

!

interface GigabitEthernet2/13

 no ip address

 shutdown

!

interface GigabitEthernet2/14

 no ip address

 shutdown

!

interface GigabitEthernet2/15

 no ip address

 shutdown

!
```

interface GigabitEthernet2/16

 no ip address

 shutdown

!

interface GigabitEthernet2/17

 no ip address

 shutdown

!

interface GigabitEthernet2/18

 no ip address

 shutdown

!

interface GigabitEthernet2/19

 no ip address

 shutdown

!

interface GigabitEthernet2/20

 no ip address

 shutdown

!

interface GigabitEthernet2/21

no ip address

 shutdown

 !

interface GigabitEthernet2/22

 no ip address

 shutdown

 !

interface GigabitEthernet2/23

 no ip address

 shutdown

 !

interface GigabitEthernet2/24

 no ip address

 shutdown

 !

interface GigabitEthernet2/25

 no ip address

 shutdown

 !

interface GigabitEthernet2/26

 no ip address

shutdown

!

interface GigabitEthernet2/27

 no ip address

 shutdown

!

interface GigabitEthernet2/28

 no ip address

 shutdown

!

interface GigabitEthernet2/29

 no ip address

 shutdown

!

interface GigabitEthernet2/30

 no ip address

 shutdown

!

interface GigabitEthernet2/31

 no ip address

 shutdown

!

interface GigabitEthernet2/32

 no ip address

 shutdown

!

interface GigabitEthernet2/33

 no ip address

 shutdown

!

interface GigabitEthernet2/34

 no ip address

 shutdown

!

interface GigabitEthernet2/35

 no ip address

 shutdown

!

interface GigabitEthernet2/36

 no ip address

 shutdown

!

```
interface GigabitEthernet2/37
 no ip address
 shutdown
!
interface GigabitEthernet2/38
 no ip address
 shutdown
!
interface GigabitEthernet2/39
 no ip address
 shutdown
!
interface GigabitEthernet2/40
 no ip address
 shutdown
!
interface GigabitEthernet2/41
 no ip address
 shutdown
!
interface GigabitEthernet2/42
```

no ip address

 shutdown

!

interface GigabitEthernet2/43

 no ip address

 shutdown

!

interface GigabitEthernet2/44

 no ip address

 shutdown

!

interface GigabitEthernet2/45

 no ip address

 shutdown

!

interface GigabitEthernet2/46

 no ip address

 shutdown

!

interface GigabitEthernet2/47

 no ip address

```
 shutdown
!
interface GigabitEthernet2/48
 no ip address
 shutdown
!
interface GigabitEthernet5/1
 no ip address
 shutdown
!
interface GigabitEthernet5/2
 no ip address
 shutdown
!
interface GigabitEthernet5/3
 no ip address
 shutdown
!
interface TenGigabitEthernet5/4
 no ip address
 shutdown
```

```
!
interface TenGigabitEthernet5/5
 no ip address
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
!
no ip http server
!
!
control-plane
!
!
line con 0
line vty 0 4
!
```

exception core-file

!

end

Switch-1

说明：从配置文件中可以看出核心交换机 65-1 上的接口均正常显示，GigabitEthernet1/2 为业务板卡 WS-X6748-SFP 上的接口，GigabitEthernet2/3 为业务板卡 WS-X6748-GE-TX 上的接口，TenGigabitEthernet5/4 为引擎 VS-S720-10G 上的 10 Gigabit 光模块接口。

2．查看核心交换机 65-2

（1）查看核心交换机 65-2 的 IOS 版本信息：

switch-2#show version

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

ROM: System Bootstrap, Version 12.2(17r)SX7, RELEASE SOFTWARE (fc1)

 switch-2 uptime is 15 minutes

Uptime for this control processor is 14 minutes

Time since switch-2 switched to active is 14 minutes

System returned to ROM by reload at 03:09:48 UTC Thu Dec 9 2010 (SP by reload)

System image file is "sup-bootdisk:s72033-ipbase-vz.122-33.SXH7.bin"

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1441W13F

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

99 Gigabit Ethernet interfaces

2 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

Configuration register is 0x2102

Patching is not available since the system is not running from an installed image. To install please use the "install file" command

switch-2#

说明：核心交换机 65-2 的 IOS 版本为 Cisco IOS Release 12.2(33)SXH7，符合 VSS 实施要求。

（2）查看核心交换机 65-2 的模块信息：

switch-2#show module

Mod Ports Card Type   Model   Serial No.

--- ----- -------------------------------------- ----------------- -----------

 1   48   CEF720 48 port 1000mb SFP   WS-X6748-SFP   XXXXXX

 2   48   CEF720 48 port 10/100/1000mb Ethernet   WS-X6748-GE-TX   XXXXXX

 5   5   Supervisor Engine 720 10GE (Active)   VS-S720-10G   XXXXXX

Mod MAC addresses   Hw   Fw   Sw   Status

--- ------------------------------- ------ ------------ ------------ -------

 1 588d.097c.a874 to 588d.097c.a8a3   2.4   12.2(18r)S1 12.2(33)SXH7 Ok

 2 f866.f2eb.19f0 to f866.f2eb.1a1f   3.4   12.2(18r)S1 12.2(33)SXH7 Ok

 5 c47d.4ffe.4090 to c47d.4ffe.4097   3.2   8.5(4)   12.2(33)SXH7 Ok

Mod   Sub-Module   Model   Serial   Hw   Status

---- --------------------------- ----------------- ----------- ------- -------

 1 Centralized Forwarding Card WS-F6700-CFC   XXXXXX   4.1   Ok

 2 Centralized Forwarding Card WS-F6700-CFC   XXXXXX   4.1   Ok

5   Policy Feature Card 3   VS-F6K-PFC3C   XXXXXX   1.1   Ok

5   MSFC3 Daughterboard   VS-F6K-MSFC3   XXXXXX   5.1   Ok

Mod   Online Diag Status

---- -------------------

  1   Pass

  2   Pass

  5   Pass

switch-2#

说明：核心交换机 65-2 的引擎为 VS-S720-10G，安装于第 5 个插糟中，业务板卡 WS-X6748-SFP 和 WS-X6748-GE-TX 分别安装于第 1 个插糟和第 2 个插糟。

（3）查看核心交换机 65-2 的配置信息：

switch-2#show running-config

Building configuration...

Current configuration : 7243 bytes

!

upgrade fpd auto

version 12.2

service timestamps debug uptime

service timestamps log uptime

```
no service password-encryption

service counters max age 5

!

hostname switch-2

!

boot-start-marker

boot-end-marker

!

!

no aaa new-model

ip subnet-zero

!

!

!

call-home

 alert-group configuration

 alert-group diagnostic

 alert-group environment

 alert-group inventory

 alert-group syslog

 profile "CiscoTAC-1"
```

no active

no destination transport-method http

destination transport-method email

destination address email callhome@cisco.com

destination address http https://tools.cisco.com/its/service/oddce/services/DDCEService

subscribe-to-alert-group diagnostic severity minor

subscribe-to-alert-group environment severity minor

subscribe-to-alert-group syslog severity major pattern ".*"

subscribe-to-alert-group configuration periodic monthly 12 12:38

subscribe-to-alert-group inventory periodic monthly 12 12:23

mls netflow interface

no mls flow ip

no mls flow ipv6

mls cef error action reset

fabric timer 15

diagnostic cns publish cisco.cns.device.diag_results

diagnostic cns subscribe cisco.cns.device.diag_commands

!

redundancy

keepalive-enable

mode sso

```
 main-cpu

   auto-sync running-config

spanning-tree mode pvst

spanning-tree extend system-id

!

!

!

vlan internal allocation policy ascending

vlan access-log ratelimit 2000

!

!

interface GigabitEthernet1/1

 no ip address

 shutdown

!

interface GigabitEthernet1/2

 no ip address

 shutdown

!

interface GigabitEthernet1/3

 no ip address
```

```
 shutdown

!

interface GigabitEthernet1/4

 no ip address

 shutdown

!

interface GigabitEthernet1/5

 no ip address

 shutdown

!

interface GigabitEthernet1/6

 no ip address

 shutdown

!

interface GigabitEthernet1/7

 no ip address

 shutdown

!

interface GigabitEthernet1/8

 no ip address

 shutdown
```

!

interface GigabitEthernet1/9

 no ip address

 shutdown

!

interface GigabitEthernet1/10

 no ip address

 shutdown

!

interface GigabitEthernet1/11

 no ip address

 shutdown

!

interface GigabitEthernet1/12

 no ip address

 shutdown

!

interface GigabitEthernet1/13

 no ip address

 shutdown

!

```
interface GigabitEthernet1/14

 no ip address

 shutdown

!

interface GigabitEthernet1/15

 no ip address

 shutdown

!

interface GigabitEthernet1/16

 no ip address

 shutdown

!

interface GigabitEthernet1/17

 no ip address

 shutdown

!

interface GigabitEthernet1/18

 no ip address

 shutdown

!

interface GigabitEthernet1/19
```

```
 no ip address

 shutdown

!

interface GigabitEthernet1/20

 no ip address

 shutdown

!

interface GigabitEthernet1/21

 no ip address

 shutdown

!

interface GigabitEthernet1/22

 no ip address

 shutdown

!

interface GigabitEthernet1/23

 no ip address

 shutdown

!

interface GigabitEthernet1/24

 no ip address
```

```
 shutdown

!

interface GigabitEthernet1/25

 no ip address

 shutdown

!

interface GigabitEthernet1/26

 no ip address

 shutdown

!

interface GigabitEthernet1/27

 no ip address

 shutdown

!

interface GigabitEthernet1/28

 no ip address

 shutdown

!

interface GigabitEthernet1/29

 no ip address

 shutdown
```

```
!
interface GigabitEthernet1/30
 no ip address
 shutdown
!
interface GigabitEthernet1/31
 no ip address
 shutdown
!
interface GigabitEthernet1/32
 no ip address
 shutdown
!
interface GigabitEthernet1/33
 no ip address
 shutdown
!
interface GigabitEthernet1/34
 no ip address
 shutdown
!
```

```
interface GigabitEthernet1/35

 no ip address

 shutdown

!

interface GigabitEthernet1/36

 no ip address

 shutdown

!

interface GigabitEthernet1/37

 no ip address

 shutdown

!

interface GigabitEthernet1/38

 no ip address

 shutdown

!

interface GigabitEthernet1/39

 no ip address

 shutdown

!

interface GigabitEthernet1/40
```

```
 no ip address

 shutdown

!

interface GigabitEthernet1/41

 no ip address

 shutdown

!

interface GigabitEthernet1/42

 no ip address

 shutdown

!

interface GigabitEthernet1/43

 no ip address

 shutdown

!

interface GigabitEthernet1/44

 no ip address

 shutdown

!

interface GigabitEthernet1/45

 no ip address
```

```
 shutdown
!
interface GigabitEthernet1/46
 no ip address
 shutdown
!
interface GigabitEthernet1/47
 no ip address
 shutdown
!
interface GigabitEthernet1/48
 no ip address
 shutdown
!
interface GigabitEthernet2/1
 no ip address
 shutdown
!
interface GigabitEthernet2/2
 no ip address
 shutdown
```

!

interface GigabitEthernet2/3

 no ip address

 shutdown

!

interface GigabitEthernet2/4

 no ip address

 shutdown

!

interface GigabitEthernet2/5

 no ip address

 shutdown

!

interface GigabitEthernet2/6

 no ip address

 shutdown

!

interface GigabitEthernet2/7

 no ip address

 shutdown

!

```
interface GigabitEthernet2/8

 no ip address

 shutdown

!

interface GigabitEthernet2/9

 no ip address

 shutdown

!

interface GigabitEthernet2/10

 no ip address

 shutdown

!

interface GigabitEthernet2/11

 no ip address

 shutdown

!

interface GigabitEthernet2/12

 no ip address

 shutdown

!

interface GigabitEthernet2/13
```

```
 no ip address

 shutdown

!

interface GigabitEthernet2/14

 no ip address

 shutdown

!

interface GigabitEthernet2/15

 no ip address

 shutdown

!

interface GigabitEthernet2/16

 no ip address

 shutdown

!

interface GigabitEthernet2/17

 no ip address

 shutdown

!

interface GigabitEthernet2/18

 no ip address
```

shutdown

!

interface GigabitEthernet2/19

 no ip address

 shutdown

!

interface GigabitEthernet2/20

 no ip address

 shutdown

!

interface GigabitEthernet2/21

 no ip address

 shutdown

!

interface GigabitEthernet2/22

 no ip address

 shutdown

!

interface GigabitEthernet2/23

 no ip address

 shutdown

```
!
interface GigabitEthernet2/24
 no ip address
 shutdown
!
interface GigabitEthernet2/25
 no ip address
 shutdown
!
interface GigabitEthernet2/26
 no ip address
 shutdown
!
interface GigabitEthernet2/27
 no ip address
 shutdown
!
interface GigabitEthernet2/28
 no ip address
 shutdown
!
```

```
interface GigabitEthernet2/29
 no ip address
 shutdown
!
interface GigabitEthernet2/30
 no ip address
 shutdown
!
interface GigabitEthernet2/31
 no ip address
 shutdown
!
interface GigabitEthernet2/32
 no ip address
 shutdown
!
interface GigabitEthernet2/33
 no ip address
 shutdown
!
interface GigabitEthernet2/34
```

no ip address

 shutdown

 !

interface GigabitEthernet2/35

 no ip address

 shutdown

 !

interface GigabitEthernet2/36

 no ip address

 shutdown

 !

interface GigabitEthernet2/37

 no ip address

 shutdown

 !

interface GigabitEthernet2/38

 no ip address

 shutdown

 !

interface GigabitEthernet2/39

 no ip address

shutdown

!

interface GigabitEthernet2/40

 no ip address

 shutdown

!

interface GigabitEthernet2/41

 no ip address

 shutdown

!

interface GigabitEthernet2/42

 no ip address

 shutdown

!

interface GigabitEthernet2/43

 no ip address

 shutdown

!

interface GigabitEthernet2/44

 no ip address

 shutdown

!

interface GigabitEthernet2/45

 no ip address

 shutdown

!

interface GigabitEthernet2/46

 no ip address

 shutdown

!

interface GigabitEthernet2/47

 no ip address

 shutdown

!

interface GigabitEthernet2/48

 no ip address

 shutdown

!

interface GigabitEthernet5/1

 no ip address

 shutdown

!

```
interface GigabitEthernet5/2

 no ip address

 shutdown

!

interface GigabitEthernet5/3

 no ip address

 shutdown

!

interface TenGigabitEthernet5/4

 no ip address

 shutdown

!

interface TenGigabitEthernet5/5

 no ip address

 shutdown

!

interface Vlan1

 no ip address

 shutdown

!

ip classless
```

!

!

no ip http server

!

!

control-plane

!

!

line con 0

line vty 0 4

!

exception core-file

!

end

switch-2#

说明： 从配置文件中可以看出核心交换机 65-2 上的接口均正常显示，GigabitEthernet1/2 为业务板卡 WS-X6748-SFP 上的接口，GigabitEthernet2/3 为业务板卡 WS-X6748-GE-TX 上的接口，TenGigabitEthernet5/4 为引擎 VS-S720-10G 上的 10 Gigabit 光模块接口。

还需要注意的是，此 IOS 版本中已经默认配置了 SSO，所以在配置 VSS 时，不再需要配置 SSO。

3．在核心交换机 65-1 上配置 VSS

说明：由于目前的 IOS 版本中已经默认配置了 SSO，所以在配置 VSS 时，不再需要配置 SSO。

（1）查看核心交换机 65-1 当前的工作模式：

switch-1#show switch virtual

Switch Mode : Standalone

switch-1#

说明：核心交换机 65-1 当前的工作模式为 Standalone，即为单机模式，而非 VSS 模式。

（2）将核心交换机 65-1 上与 65-2 相连的接口 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5 配置为 EtherChannel：

switch-1(config)#interface range tenGigabitEthernet 5/4 - 5

switch-1(config-if-range)#channel-group 10 mode on

switch-1(config-if-range)#no shutdown

% Range command terminated because it failed on TenGigabitEthernet5/4

switch-1(config-if-range)#exit

说明：将核心交换机 65-1 上与 65-2 相连的接口 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5 配置为 EtherChannel，为配置 VSL 作准备。

（3）配置 VSS 域名与 VSS 主机号：

switch-1(config)#switch virtual domain 100

Domain ID 100 config will take effect only

after the exec command 'switch convert mode virtual' is issued

switch-1(config-vs-domain)#switch 1

switch-1(config-vs-domain)#switch 1 priority 200

switch-1(config-vs-domain)#switch 1 preempt

Please note that Preempt configuration will make the ACTIVE switch with lower priority to reload forcefully when preempt timer expires

switch-1(config-vs-domain)#exit

说明：配置 VSS 的域名为 100，范围为 1-255，两台交换机必须相同；配置 VSS 的主机号码为 1，必须一台为 1，另一台为 2；并配置 VSS 优先级为 200，默认为 100，数字越大，优先级越高，便能成为主 VSS 交换机。

（4）配置 VSL 链路：

switch-1(config)#interface port-channel 10

switch-1(config-if)#switch virtual link 1

switch-1(config-if)#no shutdown

switch-1(config-if)#exit

switch-1(config)#exit

说明：将两台交换机互连的 EtherChannel 配置为 VSL。

（5）将交换机的工作模式改为 VSS 模式（确定之后，交换机将自动重启）：

switch-1#write

Building configuration...

[OK]

switch-1#

switch-1#switch convert mode virtual

This command will convert all interface names

to naming convention "interface-type switch-number/slot/port",

save the running config to startup-config and

reload the switch.

Do you want to proceed? [yes/no]: y

Converting interface names

Building configuration...

[OK]

Saving converted configuration to bootflash: ...

Destination filename [startup-config.converted_vs-20101209-032047]?

?

00:09:39: %SYS-SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:09:39: %OIR-SP-6-CONSOLE: Changing console ownership to switch processor

00:09:39: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:09:41: %SYS-SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

***

*** --- SHUTDOWN NOW ---

***

00:09:41: %SYS-SP-5-RELOAD: Reload requested

00:09:41: %OIR-SP-6-CONSOLE: Changing console ownership to switch processor

00:09:41: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure

console debugging output.

System Bootstrap, Version 8.5(3)

Copyright (c) 1994-2008 by cisco Systems, Inc.

Cat6k-Sup720/SP processor with 1048576 Kbytes of main memory

Autoboot: failed, BOOT string is empty

Autoboot executing command: "boot "

Initializing ATA monitor library...

string is bootdisk:s72033-ipbase-vz.122-33.SXH7.bin

Loading image, please wait ...

Initializing ATA monitor library...

Self extracting the image... [OK]

Self decompressing the image :
##
#######
##
#######
##
#######

[OK]

running startup....

Restricted Rights Legend

Use, duplication, or disclosure by the Government is

subject to restrictions as set forth in subparagraph

(c) of the Commercial Computer Software - Restricted

Rights clause at FAR sec. 52.227-19 and subparagraph

(c) (1) (ii) of the Rights in Technical Data and Computer

Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.

170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_sp Software (s72033_sp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

System detected Virtual Switch configuration...

 Interface TenGigabitEthernet 1/5/4 is member of PortChannel 10

 Interface TenGigabitEthernet 1/5/5 is member of PortChannel 10

00:00:21: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

Earl Card Index= 259

00:00:21: %PFREDUN-6-ACTIVE: Initializing as ACTIVE processor for this switch

Initializing as Virtual Switch ACTIVE processor

00:01:58: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging

output.

00:00:21: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:00:26: %VSL_BRINGUP-6-MODULE_UP: VSL module in slot 5 switch 1 brought up

00:01:58: %VSLP-5-RRP_PEER_TIMEOUT: VSLP peer timer expired without detecting peer. Resolving role as Active

00:01:58: %VSLP-2-VSL_DOWN: VSL links down and not ready for any traffic

00:01:58: %OIR-6-CONSOLE: Changing console ownership to route processor

System Bootstrap, Version 12.2(17r)SX6, RELEASE SOFTWARE (fc1)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 2009 by cisco Systems, Inc.

Cat6k-Sup720/RP platform with 1048576 Kbytes of main memory

Download Start

!! !!!!!!!!!!!!!!!!!
!!!

!!!!!!!!!!!

!!!

!!!!!!!!!!!

!!

!!!!!!!!!!!

!!

!!!!!!!!!!!

!!

!!!!!!!!!!!

!!

!!!!!!!!!!!

!!

!!!!!!!!!!!

Download Completed! Booting the image.

Self   decompressing   the   image   :
###

#######

###

#######

###

#######

###

#######

###

#######

################################# [OK]

running startup....

Restricted Rights Legend

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1412DQ6Y

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

99 Gigabit Ethernet interfaces

2 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

fabric timer 15

        ^

% Invalid input detected at '^' marker.

Press RETURN to get started!

00:00:49: curr is 0x0

00:00:49: RP: Currently running ROMMON from S (Gold) region

00:00:50: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:00:55: %SYS-5-CONFIG_I: Configured from memory by console

00:00:58: %SYS-5-RESTART: System restarted --

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

00:01:58: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:03:30: %SPANTREE-SW1_SP-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

switch-1> SW1_SP: SP: Currently running ROMMON from S (Gold) region

switch-1>

switch-1>

00:03:44: %SYS-SW1_SP-5-RESTART: System restarted --

Cisco IOS Software, s72033_sp Software (s72033_sp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

00:03:45: %SYS-SW1_SP-6-BOOTTIME: Time taken to reboot after reload = 309 seconds

00:03:45: %OIR-SW1_SP-6-INSPS: Power supply inserted in slot 1

00:03:45: %C6KPWR-SW1_SP-4-PSOK: power supply 1 turned on.

00:03:45: %OIR-SW1_SP-6-INSPS: Power supply inserted in slot 2

00:01:00:   c6k_pwr_is_fantray_ok returns ok for fan_index 1

00:01:00:   c6k_pwr_is_fantray_ok returns ok for fan_index 3

00:03:47: SW1_SP: Remote   Switch   1   Physical   Slot   5   -   Module   Type LINE_CARD   inserted

00:03:47: %FABRIC-SW1_SP-5-CLEAR_BLOCK: Clear block option is off for the fabric in slot 5.

00:03:47: %FABRIC-SW1_SP-5-FABRIC_MODULE_ACTIVE: The Switch Fabric Module in slot 5 became active.

00:03:48: %DI

switch-1>

switch-1>

switch-1>AG-SW1_SP-6-RUN_MINIMUM: Switch 1 Module 5: Running Minimal Diagnostics...

00:03:49: SW1_SP: Remote   Switch   1   Physical   Slot   1   -   Module   Type LINE_CARD   inserted

00:03:49: SW1_SP: Remote   Switch   1   Physical   Slot   2   -   Module   Type LINE_CARD   inserted

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>enable

switch-1#

说明：当将交换机的工作模式从单机改为 VSS 模式之后，交换机会自动重启。

（6）再次查看当前交换机的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

switch-1#

说明：交换机当前已经工作在 VSS 模式，并显示域名为 100，本地交换机号码为 1，本地交换机的角色为 Active，即具有控制权限的主交换机。

（7）查看当前交换机的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status   Preempt   Priority   Role   Session ID

     Number   Oper(Conf) Oper(Conf)   Local   Remote

LOCAL   1   UP   TRUE (Y*)   200(200)   ACTIVE   0   0

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：本地交换机的角色为 Active，即具有控制权限的主交换机。

（8）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : DOWN

VSL Uptime : -

VSL SCP Ping : -

VSL ICC Ping : -

VSL Control Link : -

switch-1#

说明：因为还没有配置第二台交换机，所以本地交换机当前的 VSL 链路状态为 DOWN。

（9）查看当前交换机 VSS 的更多信息：

switch-1#show switch virtual redundancy

My Switch Id = 1

Peer Switch Id = 2

Last switchover reason = none

Configured Redundancy Mode = sso

Operating Redundancy Mode = sso

Switch 1 Slot 5 Processor Information :

Current Software state = ACTIVE

Uptime in current state = 0 minutes

Image Version = Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

BOOT =

Configuration register = 0x2102

Fabric State = ACTIVE

Control Plane State = ACTIVE

Peer information is not available because

it is in 'DISABLED' state

switch-1#

说明：显示了 VSS 的更多信息。

（10）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

my state = 13 -ACTIVE

peer state = 1   -DISABLED

Mode = Simplex

Unit = Primary

Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = Non Redundant

Maintenance Mode = Disabled

Communications = Down   Reason: Simplex mode

client count = 72

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 0

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

switch-1#

说明：本地交换机的 SSO 状态为 Active，由于对端交换机并未配置，所以不能看到对端 peer 状态。

4．在核心交换机 65-2 上配置 VSS

说明：由于目前的 IOS 版本中已经默认配置了 SSO，所以在配置 VSS 时，不再需要配置 SSO。

（1）查看核心交换机 65-2 当前的工作模式：

switch-2#show switch virtual

Switch Mode : Standalone

switch-2#

说明：核心交换机 65-2 当前的工作模式为 Standalone，即为单机模式，而非 VSS 模式。

（2）将核心交换机 65-2 上与 65-1 相连的接口 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5 配置为 EtherChannel：

switch-2(config)#int range tenGigabitEthernet 5/4 - 5

switch-2(config-if-range)#channel-group 20 mode on

switch-2(config-if-range)#no shutdown

% Range command terminated because it failed on TenGigabitEthernet5/4

switch-2(config-if-range)#exit

00:15:51: %EC-5-STAYDOWN: Te5/4 will remain down as its port-channel Po20 is admin-down

switch-2(config)#

说明：将核心交换机 65-2 上与 65-1 相连的接口 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5 配置为 EtherChannel，为配置 VSL 作准备，请注意双方的 EtherChannel 号码不要配置相同。

（3）配置 VSS 域名与 VSS 主机号：

switch-2(config)#switch virtual domain 100

Domain ID 100 config will take effect only

after the exec command 'switch convert mode virtual' is issued

switch-2(config-vs-domain)#switch 2

switch-2(config-vs-domain)#switch 2 preempt

Please note that Preempt configuration will make the ACTIVE switch with lower priority to reload forcefully when preempt timer expires

switch-2(config-vs-domain)#exit

说明：配置 VSS 的域名为 100，范围为 1-255，两台交换机必须相同；配置 VSS 的主机号码为 2，必须一台为 1，另一台为 2。

（4）配置 VSL 链路：

switch-2(config)#int port-channel 20

switch-2(config-if)#switch virtual link 2

switch-2(config-if)#no shutdown

switch-2(config-if)#exi

switch-2(config)#exi

说明：将两台交换机互连的 EtherChannel 配置为 VSL。

（5）将交换机的工作模式改为 VSS 模式（确定之后，交换机将自动重启：

switch-2#wr

Building configuration...

[OK]

switch-2#

switch-2#switch convert mode virtual

This command will convert all interface names

to naming convention "interface-type switch-number/slot/port",

save the running config to startup-config and

reload the switch.

Do you want to proceed? [yes/no]: y

Converting interface names

Building configuration...

[OK]

Saving converted configuration to bootflash: ...

Destination filename [startup-config.converted_vs-20101209-033325]?

C!僋婷覀娉*歖 M 礄 P-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:18:01: %OIR-SP-6-CONSOLE: Changing console ownership to switch processor

00:18:01: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:18:03: %SYS-SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

***

*** --- SHUTDOWN NOW ---

***

00:18:03: %SYS-SP-5-RELOAD: Reload requested

00:18:03: %OIR-SP-6-CONSOLE: Changing console ownership to switch processor

00:18:03: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

System Bootstrap, Version 8.5(4)

Copyright (c) 1994-2009 by cisco Systems, Inc.

Cat6k-Sup720/SP processor with 1048576 Kbytes of main memory

Autoboot: failed, BOOT string is empty

Autoboot executing command: "boot "

Initializing ATA monitor library...

string is bootdisk:s72033-ipbase-vz.122-33.SXH7.bin

Loading image, please wait ...

Initializing ATA monitor library...

Self extracting the image... [OK]

Self decompressing the image :
##
#######
##
#######
##
#######
[OK]

running startup....

Restricted Rights Legend

Use, duplication, or disclosure by the Government is

subject to restrictions as set forth in subparagraph

(c) of the Commercial Computer Software - Restricted

Rights clause at FAR sec. 52.227-19 and subparagraph

(c) (1) (ii) of the Rights in Technical Data and Computer

Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.

170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_sp Software (s72033_sp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

System detected Virtual Switch configuration...

Interface TenGigabitEthernet 2/5/4 is member of PortChannel 20

Interface TenGigabitEthernet 2/5/5 is member of PortChannel 20

00:00:22: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

Earl Card Index= 259

00:00:22: %PFREDUN-6-ACTIVE: Initializing as ACTIVE processor for this switch

Initializing as Virtual Switch STANDBY processor

00:00:59: %SYS-SW2_SPSTBY-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:00:22: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:00:27: %VSL_BRINGUP-6-MODULE_UP: VSL module in slot 5 switch 2 brought up

00:00:54: %VSLP-5-VSL_UP: Ready for Role Resolution with Switch=1, MAC=8843.e1ce.4940 over 5/4

00:00:57: %VSLP-5-RRP_ROLE_RESOLVED: Role resolved as STANDBY by VSLP

00:00:57: %VSL-5-VSL_CNTRL_LINK: New VSL Control Link   5/4

00:00:57: %VSLP-5-VSL_UP: Ready for control traffic

00:00:59: %OIR-SW2_SPSTBY-6-CONSOLE: Changing console ownership to route processor

System Bootstrap, Version 12.2(17r)SX7, RELEASE SOFTWARE (fc1)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 2009 by cisco Systems, Inc.

Cat6k-Sup720/RP platform with 1048576 Kbytes of main memory

Download Start

!!
!!!!!!!!!!!!!!!!!!
!!
!!!!!!!!!!!!
!!

!!!!!!!!!!!!

!!!

!!!!!!!!!!!!

!!!

!!!!!!!!!!!!

!!!

!!!!!!!!!!!!

!!!

!!!!!!!!!!!!

!!!

!!!!!!!!!!!!

Download Completed! Booting the image.

Self   decompressing   the   image   :
##
#######
##
#######
##
#######
##
#######
##
#######
############################### [OK]

running startup....

Restricted Rights Legend

Use, duplication, or disclosure by the Government is

cisco Systems, Inc.

170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1441W13F

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

198 Gigabit Ethernet interfaces

4 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

Press RETURN to get started!

00:00:51: curr is 0x0

00:00:51: RP: Currently running ROMMON from S (Gold) region

00:00:52: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:01:33: c6k_pwr_is_fantray_ok returns ok for fan_index 5

00:01:39: %SYS-5-RESTART: System restarted --

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version

12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

说明：由于对端交换机 65-1 的 VSS 优先级高于本交换机，所以对方交换机已经工作在了 VSS 的 Active 状态，而本地交换机 65-2 只能工作在 Standby 状态；只有工作在 Active 模式的交换机才具有配置和管理双方交换机的权限，而工作在 Standby 状态的交换机则永远停留在用户模式（提示符为>），enable 模式是被阻塞而不能进入的。

并且需要注意，当两台交换机通过 VSS 合并成单台交换机之后，主机名则沿用 Active 交换机的主机名。

5．查看核心交换机 65-1 的 VSS 信息

（1）查看核心交换机 65-1 的 EtherChannel 状态：

switch-1#sh etherchannel summary

Flags: D - down   P - bundled in port-channel

I - stand-alone s - suspended

H - Hot-standby (LACP only)

R - Layer3   S - Layer2

U - in use   N - not in use, no aggregation

f - failed to allocate aggregator

M - not in use, no aggregation due to minimum links not met

m - not in use, port not aggregated due to minimum links not met

u - unsuitable for bundling

d - default port

w - waiting to be aggregated

Number of channel-groups in use: 1

Number of aggregators: 1

Group   Port-channel   Protocol   Ports

------+-------------+-----------+---

10   Po10(RD)   -   Te1/5/4(w)   Te1/5/5(D)

switch-1#

说明：核心交换机 65-1 当前的 EtherChannel 并未工作在正常状态，所以下面需要解决此问题。

（2）查看核心交换机 65-1 的配置信息：

switch-1#sh running-config

Building configuration...

Current configuration : 17253 bytes

!

upgrade fpd auto

version 12.2

service timestamps debug uptime

service timestamps log uptime

no service password-encryption

service counters max age 5

```
!
hostname switch-1
!
boot-start-marker
boot-end-marker
!
logging buffered 8192 debugging
!
no aaa new-model
ip subnet-zero
!
!
!
!
switch virtual domain 100
 switch mode virtual
 switch 1 priority 200
 switch 1 preempt
!
call-home
 alert-group configuration
```

alert-group diagnostic

alert-group environment

alert-group inventory

alert-group syslog

profile "CiscoTAC-1"

no active

no destination transport-method http

destination transport-method email

destination address email callhome@cisco.com

destination address http https://tools.cisco.com/its/service/oddce/services/DDCEService

subscribe-to-alert-group diagnostic severity minor

subscribe-to-alert-group environment severity minor

subscribe-to-alert-group syslog severity major pattern ".*"

subscribe-to-alert-group configuration periodic monthly 17 14:11

subscribe-to-alert-group inventory periodic monthly 17 13:56

mls netflow interface

no mls flow ip

no mls flow ipv6

mls cef error action reset

diagnostic cns publish cisco.cns.device.diag_results

diagnostic cns subscribe cisco.cns.device.diag_commands

```
!
redundancy
 keepalive-enable
 mode sso
 main-cpu
  auto-sync running-config
spanning-tree mode pvst
spanning-tree extend system-id
!
!
!
vlan internal allocation policy ascending
vlan access-log ratelimit 2000
!
!
interface Port-channel10
 no switchport
 no ip address
 switch virtual link 1
 mls qos trust cos
 no mls qos channel-consistency
```

```
!
interface GigabitEthernet1/1/1
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/1/2
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/1/3
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/1/4
 no switchport
 no ip address
 shutdown
!
```

interface GigabitEthernet1/1/5

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/6

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/7

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/8

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/9

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/10

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/11

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/12

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/13

 no switchport
```

no ip address

 shutdown

!

interface GigabitEthernet1/1/14

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/15

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/16

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/17

 no switchport

 no ip address

shutdown

!

interface GigabitEthernet1/1/18

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/19

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/20

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/21

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/22

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/23

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/24

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/25

 no switchport

 no ip address

 shutdown

!

```
interface GigabitEthernet1/1/26

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/27

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/28

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/29

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/30
```

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/31

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/32

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/33

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/34

 no switchport
```

```
 no ip address

 shutdown

!

interface GigabitEthernet1/1/35

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/36

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/37

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/38

 no switchport

 no ip address
```

shutdown

!

interface GigabitEthernet1/1/39

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/40

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/41

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/42

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/43

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/44

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/45

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/1/46

 no switchport

 no ip address

 shutdown

!

```
interface GigabitEthernet1/1/47
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/1/48
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/1
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/2
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/3
```

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/4

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/5

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/6

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/7

 no switchport
```

no ip address

 shutdown

 !

 interface GigabitEthernet1/2/8

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet1/2/9

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet1/2/10

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet1/2/11

 no switchport

 no ip address

shutdown

!

interface GigabitEthernet1/2/12

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/13

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/14

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/15

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/16

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/17

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/18

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/19

 no switchport

 no ip address

 shutdown

!

```
interface GigabitEthernet1/2/20

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/21

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/22

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/23

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/24
```

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/25

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/26

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/27

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/28

 no switchport
```

```
 no ip address

 shutdown

!

interface GigabitEthernet1/2/29

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/30

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/31

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/32

 no switchport

 no ip address
```

```
 shutdown
!
interface GigabitEthernet1/2/33
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/34
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/35
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet1/2/36
 no switchport
 no ip address
 shutdown
```

!

interface GigabitEthernet1/2/37

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/38

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/39

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/40

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/41

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/42

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/43

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/44

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/45

no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/46

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/47

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/2/48

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/5/1

 no switchport

```
 no ip address

 shutdown

!

interface GigabitEthernet1/5/2

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet1/5/3

 no switchport

 no ip address

 shutdown

!

interface TenGigabitEthernet1/5/4

 no switchport

 no ip address

 mls qos trust cos

 channel-group 10 mode on

!

interface TenGigabitEthernet1/5/5

 no switchport
```

```
 no ip address

 mls qos trust cos

 channel-group 10 mode on

!

interface GigabitEthernet2/1/1

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/2

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/3

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/4

 no switchport
```

no ip address

shutdown

!

interface GigabitEthernet2/1/5

no switchport

no ip address

shutdown

!

interface GigabitEthernet2/1/6

no switchport

no ip address

shutdown

!

interface GigabitEthernet2/1/7

no switchport

no ip address

shutdown

!

interface GigabitEthernet2/1/8

no switchport

no ip address

```
 shutdown
!
interface GigabitEthernet2/1/9
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/10
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/11
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/12
 no switchport
 no ip address
 shutdown
```

!

interface GigabitEthernet2/1/13

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/14

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/15

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/16

 no switchport

 no ip address

 shutdown

!

```
interface GigabitEthernet2/1/17

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/18

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/19

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/20

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/21
```

no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/22

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/23

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/24

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/25

 no switchport

no ip address

 shutdown

!

interface GigabitEthernet2/1/26

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/27

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/28

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/29

 no switchport

 no ip address

```
 shutdown

!

interface GigabitEthernet2/1/30

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/31

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/32

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/33

 no switchport

 no ip address

 shutdown
```

```
!

interface GigabitEthernet2/1/34

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/35

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/36

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/37

 no switchport

 no ip address

 shutdown

!
```

```
interface GigabitEthernet2/1/38
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/39
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/40
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/41
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/1/42
```

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/43

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/44

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/45

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/46

 no switchport
```

no ip address

 shutdown

!

interface GigabitEthernet2/1/47

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/1/48

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/1

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/2

 no switchport

 no ip address

shutdown

!

interface GigabitEthernet2/2/3

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/4

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/5

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/6

 no switchport

 no ip address

 shutdown

```
!
interface GigabitEthernet2/2/7
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/2/8
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/2/9
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/2/10
 no switchport
 no ip address
 shutdown
!
```

interface GigabitEthernet2/2/11

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/12

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/13

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/14

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/15

no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet2/2/16

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet2/2/17

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet2/2/18

 no switchport

 no ip address

 shutdown

 !

 interface GigabitEthernet2/2/19

 no switchport

no ip address

 shutdown

!

interface GigabitEthernet2/2/20

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/21

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/22

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/23

 no switchport

 no ip address

shutdown

!

interface GigabitEthernet2/2/24

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/25

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/26

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/27

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/28

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/29

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/30

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/31

 no switchport

 no ip address

 shutdown

!

```
interface GigabitEthernet2/2/32

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/33

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/34

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/35

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/36
```

```
 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/37

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/38

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/39

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/40

 no switchport
```

no ip address

 shutdown

!

interface GigabitEthernet2/2/41

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/42

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/43

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/44

 no switchport

 no ip address

```
 shutdown

!

interface GigabitEthernet2/2/45

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/46

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/47

 no switchport

 no ip address

 shutdown

!

interface GigabitEthernet2/2/48

 no switchport

 no ip address

 shutdown
```

```
!
interface GigabitEthernet2/5/1
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/5/2
 no switchport
 no ip address
 shutdown
!
interface GigabitEthernet2/5/3
 no switchport
 no ip address
 shutdown
!
interface TenGigabitEthernet2/5/4
 no switchport
 no ip address
 shutdown
!
```

```
interface TenGigabitEthernet2/5/5

 no switchport

 no ip address

 shutdown

!

interface Vlan1

 no ip address

 shutdown

!

ip classless

!

!

no ip http server

!

!

control-plane

!

!

line con 0

line vty 0 4

 login
```

!

exception core-file

!

!

module provision switch 1

slot 1 slot-type 152 port-type 31 number 48   virtual-slot 17

slot 2 slot-type 147 port-type 61 number 48   virtual-slot 18

slot 5 slot-type 254 port-type 31 number 2 port-type 61 number 1 port-type 60 number 2   virtual-slot 21

!

module provision switch 2

slot 1 slot-type 152 port-type 31 number 48   virtual-slot 33

slot 2 slot-type 147 port-type 61 number 48   virtual-slot 34

slot 5 slot-type 254 port-type 31 number 2 port-type 61 number 1 port-type 60 number 2   virtual-slot 37

!

end

switch-1#

说明：由于两台核心交换机之间配置了 VSS，所以两台交换机的配置信息将合并

为一台，65-1 之前的接口 GigabitEthernet1/2 现在变为 GigabitEthernet1/1/2，之前的接口 GigabitEthernet2/3 现在变为 GigabitEthernet1/2/3 ，之前的接口 TenGigabitEthernet5/4 现在变为 TenGigabitEthernet1/5/4 ，而 65-2 之前的接口 GigabitEthernet1/2 现在变为 GigabitEthernet2/1/2，之前的接口 GigabitEthernet2/3 现在变为 GigabitEthernet2/2/3 ，之前的接口 TenGigabitEthernet5/4 现在变为 TenGigabitEthernet2/5/4；除此之外，最重要的就是之前双方都配置好的 EtherChannel，现在只剩 Active 交换机 65-1 的 TenGigabitEthernet1/5/4 和 TenGigabitEthernet1/5/5 还正常存在，而 Standby 交换机 65-2 的 EtherChannel 配置在经过 VSS 合并之后被清空，所以必须手工添加交换机 65-2 上应有的 EtherChannel 配置和 VSL 配置，否则双方的 VSL 将不能正常工作，那么 VSS 也就不能正常工作。

（3）手工添加交换机 65-2 上应有的 EtherChannel 配置和 VSL 配置：

switch-1(config)#int range tenGigabitEthernet 2/5/4 - 5

switch-1(config-if-range)#channel-group 20 mode on

switch-1(config-if-range)#no shutdown

% Range command terminated because it failed on TenGigabitEthernet2/5/4

switch-1(config-if-range)#exit

00:10:36: %EC-5-STAYDOWN: Te2/5/4 will remain down as its port-channel Po20 is admin-down

switch-1(config)#

switch-1(config)#int port-channel 20

switch-1(config-if)#switch virtual link 2

switch-1(config-if)#no shutdown

switch-1(config-if)#exit

switch-1(config)#exit

switch-1#

00:11:03: %SYS-5-CONFIG_I: Configured from console by consolewr

switch-1#write

Building configuration...

00:14:16: %PFINIT-SW1_SP-5-CONFIG_SYNC: Sync'ing the startup configuration to the standby Router. [OK]

switch-1#

说明：虽然是配置 65-2 的 EtherChannel 和 VSL，但还是在 VSS 的 Active 交换机上配置的，因为 65-2 工作在 Standby 状态，是不能进入 enable 进行配置和管理的。

（4）再次查看交换机 65-1 的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

Peer switch number   : 2

Peer switch operational role : Virtual Switch Standby

Conversion completed   : No

Perform exec command 'switch accept mode virtual' to complete the VSS conversion

switch-1#

说明：交换机 65-1 当前工作在 VSS 模式，并显示域名为 100，本地交换机号码为 1，本地交换机的角色为 Active，即具有控制权限的主交换机，而对端交换机号码为 2，并且对端交换机角色为 Standby。

（5）查看当前交换机的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status Preempt   Priority Role   Session ID

     Number   Oper(Conf) Oper(Conf)   Local   Remote

LOCAL   1   UP   TRUE (Y*)   200(200) ACTIVE   0   0

REMOTE   2   UP   TRUE (Y*)   100(100) STANDBY 6887   6831

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：本地交换机 65-1 的角色为 Active，即具有控制权限的主交换机，而对端交换机角色为 Standby。

（6）查看当前交换机的 **VSL** 链路状态：

switch-1#show switch virtual link

VSL Status : UP

VSL Uptime : 5 minutes

VSL SCP Ping : Pass

VSL ICC Ping : Fail

VSL Control Link : Te1/5/4

switch-1#

说明：当前交换机双方的 VSL 链路已经工作正常。

（7）再次查看核心交换机 **65-1** 的 **EtherChannel** 状态：

switch-1#sh etherchannel summary

Flags: D - down   P - bundled in port-channel

    I - stand-alone s - suspended

    H - Hot-standby (LACP only)

    R - Layer3   S - Layer2

    U - in use   N - not in use, no aggregation

    f - failed to allocate aggregator

M - not in use, no aggregation due to minimum links not met

m - not in use, port not aggregated due to minimum links not met

u - unsuitable for bundling

d - default port

w - waiting to be aggregated

Number of channel-groups in use: 2

Number of aggregators: 2

Group Port-channel Protocol   Ports

------+-------------+----------+---

10   Po10(RU)   -   Te1/5/4(P)   Te1/5/5(D)

20   Po20(RU)   -   Te2/5/4(P)   Te2/5/5(D)

switch-1#

说明：目前 EtherChannel 状态已经工作正常，虽然双方 VSL 互连的链路为 TenGigabitEthernet5/4 和 TenGigabitEthernet5/5，但本实验中只在 TenGigabitEthernet5/4 之间连接了单条光纤，所以 TenGigabitEthernet5/5 的状态为 D。

（8）再次查看交换机当前的 SSO 状态：

switch-1#

switch-1#show redundancy states

my state = 13 -ACTIVE

peer state = 8   -STANDBY HOT

Mode = Duplex

Unit = Primary

Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

Maintenance Mode = Disabled

Communications = Up

client count = 72

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 1

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

switch-1#

说明： 本地交换机当前的 SSO 状态为 ACTIVE，而对端为 STANDBY HOT，表明工作正常，如果对端不是工作在 STANDBY HOT，则必须解决该问题，除 STANDBY HOT 之外的任何状态都为不正常。

VSS 故障测试

1. 手工命令故障切换

（1）在 Active 交换机 65-1 上输入命令手工执行故障切换（命令输入之后，本地交换机将自动重启）：

　　switch-1#redundancy force-switchover

　　This will reload the active unit and force switchover to standby[confirm]

　　Preparing for switchover..

　　00:15:17: %SYS-SW1_SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

　　00:15:17: %OIR-SW1_SP-6-CONSOLE: Changing console ownership to switch processor

switch-1-sp>

switch-1-sp>

00:15:17: %SYS-SW1_SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:15:19: %SYS-SW1_SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

***

*** --- SHUTDOWN NOW ---

***

00:15:19: %SYS-SW1_SP-5-RELOAD: Reload requested

00:15:19: %OIR-SW1_SP-6-CONSOLE: Changing console ownership to switch processor

00:15:19: %SYS-SW1_SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

System Bootstrap, Version 8.5(3)

Copyright (c) 1994-2008 by cisco Systems, Inc.

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

说明：在 Active 交换机 65-1 上输入命令 redundancy force-switchover 执行故障切换之后，本地交换机将自动重启，而工作在 Standby 状态的对端交换机 65-2 将在 Active 交换机 65-1 出现故障时接替 Active 的角色。

（2）查看交换机 65-2 的状态：

再看 65-2

switch-1>

switch-1>en

switch-1#

switch-1#

说明：原本工作在 Standby 状态的交换机 65-2 在 Active 交换机 65-1 出现故障时接替了 Active 的角色，所以现在 65-2 已经可以进入 enable 模式进行配置和管理了。

（3）查看交换机 65-2 当前的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 2

Local switch operational role: Virtual Switch Active

Peer switch number   : 1

Peer switch operational role : Virtual Switch Standby

switch-1#

说明：结果显示当前交换机的号码为 2，即为交换机 65-2，并且目前交换机 65-2 的角色为 Active，即具有控制权限的主交换机，而交换机 65-1 目前角色为 Standby。

（4）查看当前交换机的 VSS 角色：

switch-1#show switch virtual role

Switch Switch Status Preempt   Priority Role   Session ID

Number　　Oper(Conf) Oper(Conf)　　Local　Remote

LOCAL　2　UP　FALSE(N)　100(100)　ACTIVE　0　　0

REMOTE　1　UP　TRUE (Y*)　200(200)　STANDBY　8415　6961

Standby configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

　　说明：结果显示当前交换机的号码为 2，即为交换机 65-2，并且目前交换机 65-2 的角色为 Active，即具有控制权限的主交换机，而交换机 65-1 目前角色为 Standby。

　　（5）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : UP

VSL Uptime : 3 minutes

VSL SCP Ping : Pass

VSL ICC Ping : Pass

VSL Control Link : Te2/5/4

switch-1#

　　说明：当前交换机双方的 VSL 链路已经工作正常。

（6）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

my state = 13 -ACTIVE

peer state = 8   -STANDBY HOT

Mode = Duplex

Unit = Primary

Unit ID = 37

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

Maintenance Mode = Disabled

Communications = Up

client count = 74

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 0

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

switch-1#

说明：本地交换机当前的 SSO 状态为 ACTIVE，而对端为 STANDBY HOT，表明工作正常。

2. 关闭电源故障切换

说明：目前核心交换机 65-2 为 VSS 的 Active 交换机，而 65-1 工作在 Standby 状态，所以应该关闭核心交换机 65-2 的电源来做故障切换测试。

（1)连接目前工作在 Standby 状态的交换机 65-1，并观察关闭 Active 交换机 65-2 的电源之后，65-1 的状态变化：

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

00:07:43: %VSLP-SW1_SPSTBY-3-VSLP_LMP_FAIL_REASON: Te1/5/4: Link down

00:07:43: %VSLP-SW1_SPSTBY-2-VSL_DOWN: Last VSL interface Te1/5/4 went down

00:07:43: %VSLP-SW1_SPSTBY-5-RRP_PREEMPT: Role change due to the following preemptive configuration

      Switch 1: Priority 200: Preempt enabled

      Switch 2: Priority 100: Preempt not enabled

00:07:43: %VSLP-SW1_SPSTBY-2-VSL_DOWN: All VSL links went down while switch is in Standby role

00:07:43: %DUAL_ACTIVE-SW1_SPSTBY-1-VSL_DOWN: VSL is down - switchover, or possible dual-active situation has occurred

00:07:43: %DUAL_ACTIVE-SW1_SPSTBY-1-VSL_DOWN: VSL is down - switchover, or possible dual-active situation has occurred

00:07:43: %VSL-SW1_SPSTBY-3-VSL_SCP_FAIL: SCP operation failed

00:07:43: %PFREDUN-SW1_SPSTBY-6-ACTIVE: Initializing as Virtual Switch ACTIVE processor

00:05:59:   c6k_pwr_is_fantray_ok returns ok for fan_index 1

00:07:46: %C6KPWR-SP-4-PSOK: power supply 1 turned on.

00:07:46: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 1, interfaces are now online

00:07:46: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 2, interfaces are now

online

00:07:46: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 5, interfaces are now online

00:07:47: SW1_SP: remote_bay_ps_remove: couldn't sync the event

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>

switch-1>en

switch-1>enable

switch-1#

说明：当关闭工作在 Active 状态的交换机 65-2 的电源之后，原本工作在 Standby 状态的交换机 65-1 已经接替了 Active 的角色，并且已经可以进入 enable 模式进行配置了管理了。

（2）查看交换机 65-1 当前的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

switch-1#

说明：由于交换机 65-2 的电源已经关闭，所以本地交换机号码为 1 的 65-1 目前工作在 Active 状态。

（3）查看当前交换机 65-1 的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status   Preempt   Priority   Role   Session ID

    Number   Oper(Conf) Oper(Conf)   Local   Remote

LOCAL   1   UP   TRUE (Y*)   200(200) ACTIVE   0   0

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：由于交换机 65-2 的电源已经关闭，所以本地交换机号码为 1 的 65-1 目前

工作在 Active 状态。

（4）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : DOWN

VSL Uptime : -

VSL SCP Ping : -

VSL ICC Ping : -

VSL Control Link : -

switch-1#

说明：因为对端交换机的电源已经关闭，所以目前 VSL 的链路状态为 DOWN。

（5）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

      my state = 13 -ACTIVE

    peer state = 1   -DISABLED

        Mode = Simplex

        Unit = Primary

      Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = Non Redundant

   Maintenance Mode = Disabled

 Communications = Down   Reason: Simplex mode

   client count = 74

 client_notification_TMR = 30000 milliseconds

     keep_alive TMR = 9000 milliseconds

    keep_alive count = 0

   keep_alive threshold = 18

     RF debug mask = 0x0

   switch-1#

   switch-1#

   说明：本地交换机当前的 SSO 状态为 ACTIVE，由于对端电源已经关闭，所以本地看见对端为 DISABLED，一切正常。

（6）打开交换机 65-2 的电源，然后观察 65-1 的状态：

switch-1#

00:13:59: %VSLP-SW1_SP-5-VSL_UP: Ready for Role Resolution with Switch=2, MAC=d0d0.fda5.d640 over Te1/5/4

00:14:04: %VSLP-SW1_SP-5-RRP_ROLE_RESOLVED: Role resolved as ACTIVE   by VSLP

00:14:04: %VSL-SW1_SP-5-VSL_CNTRL_LINK: New VSL Control Link Te1/5/4

00:14:04: %VSLP-SW1_SP-5-VSL_UP: Ready for control traffic

switch-1#

switch-1#

00:15:26: %PFREDUN-SW1_SP-6-ACTIVE: Standby initializing for SSO mode

00:15:33: %PFINIT-SW1_SP-5-CONFIG_SYNC: Sync'ing the startup configuration to the standby Router.

switch-1#

说明：交换机 65-2 的电源已经打开，65-1 上出现接口开启的日志信息。

（7）查看开启交换机 65-2 的电源后，交换机 65-1 的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

Peer switch number   : 2

Peer switch operational role : Virtual Switch Standby

switch-1#

说明：目前交换机 65-1 的角色为 Active，即具有控制权限的主交换机，而交换

机 65-2 的角色为 Standby，在交换机 65-2 的电源重新开启之后，并未造成任何影响。

（8）查看当前交换机的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status Preempt   Priority Role   Session ID

    Number   Oper(Conf) Oper(Conf)   Local   Remote

LOCAL   1   UP   TRUE (Y*) 200(200) ACTIVE   0   0

REMOTE   2   UP   FALSE(N) 100(100) STANDBY 8832   646

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

switch-1#

说明：目前交换机 65-1 的角色为 Active，即具有控制权限的主交换机，而交换机 65-2 的角色为 Standby，在交换机 65-2 的电源重新开启之后，并未造成任何影响。

（9）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : UP

VSL Uptime : 2 minutes

VSL SCP Ping : Pass

VSL ICC Ping : Pass

VSL Control Link : Te1/5/4

switch-1#

switch-1#

说明：现在交换机双方的 VSL 链路已经恢复正常。

（10）查看 SSO 的状态变化：

switch-1#show redundancy states

　　　my state = 13 -ACTIVE

　　peer state = 4   -STANDBY COLD

　　　　Mode = Duplex

　　　　Unit = Primary

　　　Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

   Maintenance Mode = Disabled

 Communications = Up

   client count = 74

 client_notification_TMR = 30000 milliseconds

      keep_alive TMR = 9000 milliseconds

      keep_alive count = 0

    keep_alive threshold = 18

        RF debug mask = 0x0

switch-1#

switch-1#

switch-1#

switch-1#show redundancy states

    my state = 13 -ACTIVE

   peer state = 5   -STANDBY COLD-CONFIG

      Mode = Duplex

      Unit = Primary

     Unit ID = 21

```
Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State               = sso

    Maintenance Mode = Disabled

 Communications = Up


    client count = 74

client_notification_TMR = 30000 milliseconds

      keep_alive TMR = 9000 milliseconds

    keep_alive count = 0

  keep_alive threshold = 18

      RF debug mask = 0x0


switch-1#

switch-1#

switch-1#

switch-1#show redundancy states

    my state = 13 -ACTIVE

  peer state = 6   -STANDBY COLD-FILESYS

      Mode = Duplex

      Unit = Primary
```

```
          Unit ID = 21


     Redundancy Mode (Operational) = sso

     Redundancy Mode (Configured)   = sso

     Redundancy State           = sso

        Maintenance Mode = Disabled

      Communications = Up


        client count = 74

      client_notification_TMR = 30000 milliseconds

          keep_alive TMR = 9000 milliseconds

          keep_alive count = 0

        keep_alive threshold = 18

            RF debug mask = 0x0


     switch-1#

     switch-1#

     switch-1#show redundancy states

          my state = 13 -ACTIVE

         peer state = 7   -STANDBY COLD-BULK

             Mode = Duplex
```

Unit = Primary

Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

    Maintenance Mode = Disabled

 Communications = Up

   client count = 74

 client_notification_TMR = 30000 milliseconds

      keep_alive TMR = 9000 milliseconds

     keep_alive count = 0

   keep_alive threshold = 18

      RF debug mask = 0x0

switch-1#

switch-1#

switch-1#

switch-1#show redundancy states

     my state = 13 -ACTIVE

peer state = 8   -STANDBY HOT

Mode = Duplex

Unit = Primary

Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

Maintenance Mode = Disabled

Communications = Up

client count = 74

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 1

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

说明：本地交换机 65-1 当前的 SSO 状态为 ACTIVE，虽然对端交换机的 SSO 状态经过了 STANDBY COLD、STANDBY COLD-CONFIG、STANDBY COLD-FILESYS、STANDBY COLD-BULK 等多个状态，但最后还是工作在了 STANDBY HOT 状态，如果最终对端不

能工作在 STANDBY HOT 状态，则表示工作不正常，必须解决。

（11）查看交换机 65-2 的工作状态：

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

说明：在交换机 65-2 重新开启电源后，始终保持工作在 Standby 状态。

3．VSL 链路中断故障切换

说明： 如果 VSS 两台交换机之间的 VSL 链路中断，则两台交换机都会变回配置 VSS 之前的原本单机 Active 的状态（Standalone），这时双方的状态称为 Dual Active 状态，在 Dual Active 下的任何交换机都可以独立工作并且独立配置。

（1）查看 VSL 链路中断后 65-1 的状态：

switch-1#

00:16:23: %VSLP-SW1_SP-3-VSLP_LMP_FAIL_REASON: Te1/5/4: Link down

00:16:23: %VSLP-SW1_SP-2-VSL_DOWN:　Last VSL interface Te1/5/4 went down

00:16:23: %VSLP-SW1_SP-2-VSL_DOWN:　All VSL links went down while switch is in ACTIVE role

00:16:23: %VSL-SW1_SP-3-VSL_SCP_FAIL: SCP operation failed

00:16:24:　SW1_SP:　Remote　Switch　2　Physical　Slot　5　-　Module　Type LINE_CARD　removed

00:16:24:　SW1_SP:　Remote　Switch　2　Physical　Slot　1　-　Module　Type LINE_CARD　removed

00:16:24:　SW1_SP:　Remote　Switch　2　Physical　Slot　2　-　Module　Type LINE_CARD　removed

00:16:24: SW1_SP: remote_bay_ps_remove: couldn't sync the event

00:16:24: SW1_SP: remote_bay_ps_remove: couldn't sync the event

00:16:24: %PFREDUN-SW1_SP-6-ACTIVE: Standby supervisor removed or reloaded, changing to Simplex mode

switch-1#

说明：VSL 链路中断后，65-1 出现了一些日志提示。

（2）查看交换机 65-1 的 **EtherChannel** 状态：

switch-1#show etherchannel summary

Flags: D - down   P - bundled in port-channel

        I - stand-alone s - suspended

        H - Hot-standby (LACP only)

        R - Layer3   S - Layer2

        U - in use   N - not in use, no aggregation

        f - failed to allocate aggregator

        M - not in use, no aggregation due to minimum links not met

        m - not in use, port not aggregated due to minimum links not met

        u - unsuitable for bundling

        d - default port

w - waiting to be aggregated

Number of channel-groups in use: 2

Number of aggregators: 2

Group   Port-channel   Protocol   Ports

------+-------------+-----------+--

10   Po10(RD)   -   Te1/5/4(D)   Te1/5/5(D)

20   Po20(RD)   -

switch-1#

说明：因为交换机之间的链路已经中断，所以当前 EtherChannel 已经断开。

（3）查看交换机 65-1 的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以 65-1 现在的角色为 Active，即具有控制权限的主交换机。

（4）查看当前 65-1 的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status   Preempt   Priority   Role   Session ID

　　Number　　　　Oper(Conf) Oper(Conf)　　　Local   Remote

LOCAL　　1　　UP　　TRUE (Y*)　200(200)　ACTIVE　0　　0

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以 65-1 现在的角色为 Active，即具有控制权限的主交换机。

（5）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : DOWN

VSL Uptime : -

VSL SCP Ping : -

VSL ICC Ping : -

VSL Control Link : -

switch-1#

switch-1#

说明：目前交换机的 VSL 链路状态为 DOWN。

（6）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

　　my state = 13 -ACTIVE

　peer state = 1   -DISABLED

　　　Mode = Simplex

　　　Unit = Primary

　　Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = Non Redundant

　　Maintenance Mode = Disabled

 Communications = Down   Reason: Simplex mode

client count = 72

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 0

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以本地交换机的 SSO 状态为 Active，对端的状态为 DISABLED。

（7）查看 VSL 链路中断后 65-2 的状态：

00:16:23: %VSLP-SW1_SP-3-VSLP_LMP_FAIL_REASON: Te1/5/4: Link down

00:16:23: %VSLP-SW1_SP-2-VSL_DOWN: Last VSL interface Te1/5/4 went down

00:16:23: %VSLP-SW1_SP-2-VSL_DOWN: All VSL links went down while switch is in ACTIVE role

00:16:23: %VSL-SW1_SP-3-VSL_SCP_FAIL: SCP operation failed

00:16:24: SW1_SP: Remote Switch 2 Physical Slot 5 - Module Type LINE_CARD removed

switch-1>

switch-1>

switch-1>

switch-1>enble

switch-1#

说明：VSL 链路中断后，原本工作在 Standby 状态的 65-2 已经变为 Active 状态，并且可以进入 enable 模式进行配置和管理。

（8）查看交换机 65-2 的 EtherChannel 状态：

switch-1#show etherchannel summary

Flags:　D - down　　　P - bundled in port-channel

　　　I - stand-alone s - suspended

　　　H - Hot-standby (LACP only)

　　　R - Layer3　　　S - Layer2

　　　U - in use　　N - not in use, no aggregation

　　　f - failed to allocate aggregator

　　　M - not in use, no aggregation due to minimum links not met

　　　m - not in use, port not aggregated due to minimum links not met

　　　u - unsuitable for bundling

　　　d - default port

w - waiting to be aggregated

Number of channel-groups in use: 2

Number of aggregators: 2

Group   Port-channel   Protocol   Ports

------+-------------+-----------+---

10   Po10(RD)   -

20   Po20(RD)   -   Te2/5/4(D)   Te2/5/5(D)

switch-1#

switch-1#

说明：因为交换机之间的链路已经中断，所以当前 EtherChannel 已经断开。

（9）查看当前 65-2 的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 2

Local switch operational role: Virtual Switch Active

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以 65-2 现在的角色已经变为 Active。

（10）查看当前 65-2 的 VSS 角色：

switch-1#show switch virtual role

Switch Switch Status Preempt   Priority Role   Session ID

      Number   Oper(Conf) Oper(Conf)   Local Remote

LOCAL   2   UP   FALSE(N) 100(100) ACTIVE 0   0

In dual-active recovery mode: No

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以 65-2 现在的角色已经变为 Active。

（11）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : DOWN

VSL Uptime : -

VSL SCP Ping : -

VSL ICC Ping : -

VSL Control Link : -

switch-1#

说明：目前交换机的 VSL 链路状态为 DOWN。

（12）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

　　my state = 13 -ACTIVE

　　peer state = 1   -DISABLED

　　　　Mode = Simplex

　　　　Unit = Primary

　　　　Unit ID = 37

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = Non Redundant

　　Maintenance Mode = Disabled

 Communications = Down   Reason: Simplex mode

　client count = 74

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 0

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

switch-1#

说明：因为交换机之间的 VSL 链路已经中断，所以本地交换机的 SSO 状态为 Active，对端的状态为 DISABLED。

（13）恢复交换机之间的 VSL 链路，并观察交换机 65-2 的状态变化：

switch-1#

00:00:09: DaughterBoard (Centralized Forwarding Card)

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

00:00:12: %SYS-CFC1-5-RESTART: System restarted --

Cisco IOS Software, c6lc2 Software (c6lc2-SP-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:35 by prod_rel_team

00:00:09: DaughterBoard (Centralized Forwarding Card)

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

00:00:12: %SYS-CFC2-5-RESTART: System restarted --

Cisco IOS Software, c6lc2 Software (c6lc2-SP-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:35 by prod_rel_team

Dec   9 07:42:28.164: CFC1: Currently running ROMMON from S (Gold) region

Dec   9 07:42:29.156: CFC2: Currently running ROMMON from S (Gold) region

00:05:55: %DIAG-SW2_SP-6-RUN_MINIMUM: Switch 2 Module 2: Running Minimal Diagnostics...

00:05:56: %DIAG-SW2_SP-6-RUN_MINIMUM: Switch 2 Module 1: Running Minimal Diagnostics...

00:06:06: %VSLP-SW2_SP-5-VSL_UP: Ready for Role Resolution with Switch=1, MAC=8843.e1ce.4940 over Te2/5/4

00:06:10: %SYS-SW2_SP-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:06:09: %VSLP-SW2_SP-5-RRP_MSG: Role change from Active to Standby and hence need to reload

00:06:09: %VSLP-SW2_SP-5-RRP_MSG: Reloading the system...

00:06:10: %SYS-SW2_SP-5-RELOAD: Reload requested Reload Reason: VSLP HA role change from active to standby.

00:06:10: %OIR-SW2_SP-6-CONSOLE: Changing console ownership to switch processor

00:06:10: %SYS-SW2_SP-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

System Bootstrap, Version 8.5(4)

Copyright (c) 1994-2009 by cisco Systems, Inc.

Cat6k-Sup720/SP processor with 1048576 Kbytes of main memory

Autoboot: failed, BOOT string is empty

Autoboot executing command: "boot "

Initializing ATA monitor library...

string is bootdisk:s72033-ipbase-vz.122-33.SXH7.bin

Loading image, please wait ...

Initializing ATA monitor library...

Self extracting the image... [OK]

Self decompressing the image :
##
#######
##
#######
##
#######
[OK]

running startup....

Restricted Rights Legend

Use, duplication, or disclosure by the Government is

subject to restrictions as set forth in subparagraph

(c) of the Commercial Computer Software - Restricted

Rights clause at FAR sec. 52.227-19 and subparagraph

(c) (1) (ii) of the Rights in Technical Data and Computer

Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.

170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_sp Software (s72033_sp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

System detected Virtual Switch configuration...

 Interface TenGigabitEthernet 2/5/4 is member of PortChannel 20

 Interface TenGigabitEthernet 2/5/5 is member of PortChannel 20

00:00:22: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

Earl Card Index= 259

00:00:22: %PFREDUN-6-ACTIVE: Initializing as ACTIVE processor for this switch

Initializing as Virtual Switch STANDBY processor

00:00:59: %SYS-SW2_SPSTBY-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:00:22: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:00:27: %VSL_BRINGUP-6-MODULE_UP: VSL module in slot 5 switch 2 brought up

00:00:54: %VSLP-5-VSL_UP: Ready for Role Resolution with Switch=1, MAC=8843.e1ce.4940 over 5/4

00:00:57: %VSLP-5-RRP_ROLE_RESOLVED: Role resolved as STANDBY by VSLP

00:00:57: %VSL-5-VSL_CNTRL_LINK: New VSL Control Link 5/4

00:00:57: %VSLP-5-VSL_UP: Ready for control traffic

00:00:59: %OIR-SW2_SPSTBY-6-CONSOLE: Changing console ownership to route processor

System Bootstrap, Version 12.2(17r)SX7, RELEASE SOFTWARE (fc1)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 2009 by cisco Systems, Inc.

Cat6k-Sup720/RP platform with 1048576 Kbytes of main memory

Download Start

!!
!!!!!!!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!
!!
!!!!!!!!!!!

!!!

Download Completed! Booting the image.

Self   decompressing   the   image   :
###
#######
###
#######
###
#######
###
#######
###
#######
################################# [OK]

running startup....

                    Restricted Rights Legend

Use, duplication, or disclosure by the Government is

subject to restrictions as set forth in subparagraph

(c) of the Commercial Computer Software - Restricted

Rights clause at FAR sec. 52.227-19 and subparagraph

(c) (1) (ii) of the Rights in Technical Data and Computer

Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.

170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1441W13F

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

198 Gigabit Ethernet interfaces

4 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

Press RETURN to get started!

00:00:50: curr is 0x0

00:00:50: RP: Currently running ROMMON from S (Gold) region

00:00:51: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:01:32:   c6k_pwr_is_fantray_ok returns ok for fan_index 5

00:01:39: %SYS-5-RESTART: System restarted --

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

说明：交换机之间的 VSL 链路恢复之后，优先级低的交换机 65-2 将自动重启，启动之后将保持工作在 Standby 状态。

（14）查看 VSL 链路恢复之后，交换机 65-1 的工作模式：

switch-1#show switch virtual

Switch mode   : Virtual Switch

Virtual switch domain number : 100

Local switch number   : 1

Local switch operational role: Virtual Switch Active

Peer switch number   : 2

Peer switch operational role : Virtual Switch Standby

switch-1#

说明：当 VSL 链路恢复之后，交换机 65-1 的角色仍然保持在 Active 状态，而对端交换机 65-2 的角色则为 Standby。

（15）查看 VSL 链路恢复之后，交换机 65-1 的 VSS 角色：

switch-1#show switch virtual role

Switch   Switch Status Preempt   Priority Role   Session ID

    Number   Oper(Conf) Oper(Conf)   Local   Remote

LOCAL   1   UP   TRUE (Y*) 200(200) ACTIVE   0   0

REMOTE   2   UP   FALSE(N)   100(100) STANDBY 6288   6831

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：当 VSL 链路恢复之后，交换机 65-1 的角色仍然保持在 Active 状态，而对端交换机 65-2 的角色则为 Standby。

（16）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : UP

VSL Uptime : 3 minutes

VSL SCP Ping : Pass

VSL ICC Ping : Pass

VSL Control Link : Te1/5/4

switch-1#

switch-1#

说明：目前双方的 VSL 链路已经恢复。

（17）查看 VSL 链路恢复之后，交换机 65-1 的 SSO 状态：

switch-1#show redundancy states

　　my state = 13 -ACTIVE

　　peer state = 8　-STANDBY HOT

　　　Mode = Duplex

Unit = Primary

Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

Maintenance Mode = Disabled

Communications = Up

client count = 72

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 1

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

说明：双方交换机的 VSL 链路恢复之后，本地交换机 65-1 当前的 SSO 状态为 ACTIVE，而对端为 STANDBY HOT，表明工作正常。

（18）查看 VSL 链路恢复之后，交换机之间的 EtherChannel 状态：

switch-1#sh etherchannel summary

Flags: D - down   P - bundled in port-channel

   I - stand-alone s - suspended

   H - Hot-standby (LACP only)

   R - Layer3   S - Layer2

   U - in use   N - not in use, no aggregation

   f - failed to allocate aggregator

   M - not in use, no aggregation due to minimum links not met

   m - not in use, port not aggregated due to minimum links not met

   u - unsuitable for bundling

   d - default port

   w - waiting to be aggregated

Number of channel-groups in use: 2

Number of aggregators: 2

Group   Port-channel Protocol   Ports

------+-------------+-----------+---

10   Po10(RU)   -   Te1/5/4(P)   Te1/5/5(D)

20   Po20(RU)   -   Te2/5/4(P)   Te2/5/5(D)

switch-1#

switch-1#

说明：交换机之间的 VSL 链路恢复之后，EtherChannel 的状态也恢复了正常：

4. 测试双方同时开机的 VSS 状态

（1）两台交换机同时开机，查看 65-1 的状态：

Initializing as Virtual Switch ACTIVE processor

00:01:58: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging output.

00:00:21: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:00:26: %VSL_BRINGUP-6-MODULE_UP: VSL module in slot 5 switch 1 brought up

00:01:58: %VSLP-5-RRP_PEER_TIMEOUT: VSLP peer timer expired without detecting peer. Resolving role as Active

00:01:58: %VSLP-2-VSL_DOWN: VSL links down and not ready for any traffic

00:01:58: %OIR-6-CONSOLE: Changing console ownership to route processor

System Bootstrap, Version 12.2(17r)SX6, RELEASE SOFTWARE (fc1)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 2009 by cisco Systems, Inc.

Cat6k-Sup720/RP platform with 1048576 Kbytes of main memory

Download Start

!!!
!!!!!!!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!
!!!
!!!!!!!!!!!!

Download Completed! Booting the image.

Self decompressing the image :
###
#######
###
#######
###
#######
###
#######
###
#######
################################ [OK]

running startup....

                   Restricted Rights Legend

Use, duplication, or disclosure by the Government is

subject to restrictions as set forth in subparagraph

(c) of the Commercial Computer Software - Restricted

Rights clause at FAR sec. 52.227-19 and subparagraph

(c) (1) (ii) of the Rights in Technical Data and Computer

Software clause at DFARS sec. 252.227-7013.

          cisco Systems, Inc.

          170 West Tasman Drive

San Jose, California 95134-1706

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

Image text-base: 0x01020150, data-base: 0x01021000

cisco WS-C6506-E (R7000) processor (revision 1.2) with 1040384K/8192K bytes of memory.

Processor board ID SAL1412DQ6Y

SR71000 CPU at 600Mhz, Implementation 1284, Rev 1.2, 512KB L2 Cache

Last reset from s/w reset

1 Virtual Ethernet interface

198 Gigabit Ethernet interfaces

4 Ten Gigabit Ethernet interfaces

1917K bytes of non-volatile configuration memory.

65536K bytes of Flash internal SIMM (Sector size 512K).

Press RETURN to get started!

00:00:52: curr is 0x0

00:00:52: RP: Currently running ROMMON from S (Gold) region

00:00:53: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:00:59: %SYS-5-CONFIG_I: Configured from memory by console

00:01:03: %SYS-5-RESTART: System restarted --

Cisco IOS Software, s72033_rp Software (s72033_rp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:13 by prod_rel_team

00:01:58: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00 to ensure console debugging output.

00:02:05: %VSLP-SW1_SP-5-VSL_UP: Ready for Role Resolution with Switch=2, MAC=d0d0.fda5.d640 over   5/4

00:02:08: %VSLP-SW1_SP-5-RRP_ROLE_RESOLVED: Role resolved as ACTIVE   by VSLP

00:02:08: %VSL-SW1_SP-5-VSL_CNTRL_LINK: New VSL Control Link   5⁄4

00:02:08: %VSLP-SW1_SP-5-VSL_UP: Ready for control traffic

00:03:33: %SPANTREE-SW1_SP-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:03:33: SW1_SP: SP: Currently running ROMMON from S (Gold) region

00:03:49: %SYS-SW1_SP-5-RESTART: System restarted --

Cisco   IOS   Software,   s72033_sp   Software   (s72033_sp-IPBASE-VM),   Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

00:03:49: %OIR-SW1_SP-6-INSPS: Power supply inserted in slot 1

00:03:49: %OIR-SW1_SP-6-INSPS: Power supply inserted in slot 2

00:03:49: %C6KPWR-SW1_SP-4-PSOK: power supply 2 turned on.

00:01:05:   c6k_pwr_is_fantray_ok returns ok for fan_index 1

00:01:05:   c6k_pwr_is_fantray_ok returns ok for fan_index 3

00:03:52:   SW1_SP: Remote   Switch   1   Physical   Slot   5   -   Module   Type LINE_CARD   inserted

00:03:52: %FABRIC-SW1_SP-5-CLEAR_BLOCK: Clear block option is off for the fabric

in slot 5.

00:03:52: %FABRIC-SW1_SP-5-FABRIC_MODULE_ACTIVE: The Switch Fabric Module in slot 5 became active.

00:03:53: %DIAG-SW1_SP-6-RUN_MINIMUM: Switch 1 Module 5: Running Minimal Diagnostics...

00:03:53: %CONST_DIAG-SW1_SP-6-DIAG_PORT_SKIPPED: Module 5 port 4 is skipped in TestLoopback due to: the port is used as a VSL link.

00:03:54: SW1_SP: Remote Switch 1 Physical Slot 1 - Module Type LINE_CARD inserted

00:03:54: SW1_SP: Remote Switch 1 Physical Slot 2 - Module Type LINE_CARD inserted

00:03:56: %CONST_DIAG-SW1_SP-6-DIAG_PORT_SKIPPED: Module 5 port 4 is skipped in TestChannel due to: the port is used as a VSL link.

00:04:00: %DIAG-SW1_SP-6-DIAG_OK: Switch 1 Module 5: Passed Online Diagnostics

00:04:01: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 5, interfaces are now online

00:04:03: SW1_SP: Failed to inform standby of VSL port 1/5/4 addition

00:04:03: SW1_SP: Card inserted in Switch_number = 1 ,

physical slot 5, interfaces are now online

00:04:03: SW1_SP: Failed to inform standby of VSL port 1/5/5 addition

00:04:59: %PFREDUN-SW1_SP-6-ACTIVE: Standby initializing for SSO mode

00:05:06: %PFINIT-SW1_SP-5-CONFIG_SYNC: Sync'ing the startup configuration to the standby Router.

00:00:09: DaughterBoard (Centralized Forwarding Card)

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

00:00:12: %SYS-CFC2-5-RESTART: System restarted --

Cisco IOS Software, c6lc2 Software (c6lc2-SP-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:35 by prod_rel_team

00:00:09: DaughterBoard (Centralized Forwarding Card)

Firmware compiled 12-Jan-10 13:19 by integ Build [100]

00:00:12: %SYS-CFC1-5-RESTART: System restarted --

Cisco IOS Software, c6lc2 Software (c6lc2-SP-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:35 by prod_rel_team

Dec   9 07:29:47.336: CFC2: Currently running ROMMON from S (Gold) region

Dec   9 07:29:47.176: CFC1: Currently running ROMMON from S (Gold) region

00:05:12: %DIAG-SW1_SP-6-RUN_MINIMUM: Switch 1 Module 2: Running Minimal Diagnostics...

00:05:13: %DIAG-SW1_SP-6-RUN_MINIMUM: Switch 1 Module 1: Running Minimal Diagnostics...

00:05:30: %DIAG-SW1_SP-6-DIAG_OK: Switch 1 Module 2: Passed Online Diagnostics

00:05:30: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 2, interfaces are now online

00:05:34: SW1_SP: Card inserted in Switch_number = 1 ,

         physical slot 2, interfaces are now online

00:05:38: SW1_SP: Remote Switch 2 Physical Slot 5 - Module Type LINE_CARD   inserted

00:05:49: %DIAG-SW1_SP-6-DIAG_OK: Switch 1 Module 1: Passed Online Diagnostics

00:05:49: %OIR-SW1_SP-6-INSCARD: Card inserted in slot 1, interfaces are now online

00:05:51: %VSLP-SW1_SP-5-VSL_UP: Ready for data traffic

00:05:52: SW1_SP: Card inserted in Switch_number = 2 ,

         physical slot 5, interfaces are now online

00:05:52: SW1_SP: Card inserted in Switch_number = 1 ,

         physical slot 1, interfaces are now online

00:04:21: %SPANTREE-SW2_SPSTBY-5-EXTENDED_SYSID: Extended SysId enabled for type vlan. The Bridge IDs of all active STP instances have been updated, which might change the spanning tree topology

00:04:21: SW2_SPSTBY: SP: Currently running ROMMON from S (Gold) region

00:04:26: %C6KPWR-SW2_SPSTBY-4-PSOK: power supply 1 turned on.

00:04:28: %FABRIC-SW2_SPSTBY-5-CLEAR_BLOCK: Clear block option is off for the fabric in slot 5.

00:04:28: %FABRIC-SW2_SPSTBY-5-FABRIC_MODULE_ACTIVE: The Switch Fabric Module in slot 5 became active.

00:04:28: %DIAG-SW2_SPSTBY-6-RUN_MINIMUM: Switch 2 Module 5: Running Minimal Diagnostics...

00:04:29: %CONST_DIAG-SW2_SPSTBY-6-DIAG_PORT_SKIPPED: Module 5 port 4 is skipped in TestLoopback due to: the port is used as a VSL link.

00:04:31: %CONST_DIAG-SW2_SPSTBY-6-DIAG_PORT_SKIPPED: Module 5 port 4 is skipped in TestChannel due to: the port is used as a VSL link.

00:04:36: %DIAG-SW2_SPSTBY-6-DIAG_OK: Switch 2 Module 5: Passed Online Diagnostics

00:04:59: %SYS-SW2_SPSTBY-5-RESTART: System restarted --

Cisco IOS Software, s72033_sp Software (s72033_sp-IPBASE-VM), Version 12.2(33)SXH7, RELEASE SOFTWARE (fc3)

Technical Support: http://www.cisco.com/techsupport

Copyright (c) 1986-2010 by Cisco Systems, Inc.

Compiled Thu 11-Mar-10 15:46 by prod_rel_team

00:04:59: %PFREDUN-SW2_SPSTBY-6-STANDBY: Ready for SSO mode

00:06:10: SW1_SP: Remote Switch 2 Physical Slot 1 - Module Type LINE_CARD inserted

00:06:10: SW1_SP: Remote Switch 2 Physical Slot 2 - Module Type LINE_CARD inserted

switch-1>

switch-1>

switch-1>

switch-1>en

switch-1#

说明：两台交换机同时开机后，65-1 能够正常进入 enable 模式，说明 VSS 优先级高的将成为 Active 角色。

（2）查看交换机 65-1 当前的工作模式：

switch-1#show switch virtual

Switch mode　　　　　 : Virtual Switch

Virtual switch domain number : 100

Local switch number　　 : 1

Local switch operational role: Virtual Switch Active

Peer switch number　　　 : 2

Peer switch operational role : Virtual Switch Standby

switch-1#

switch-1#

说明：当前交换机的号码为 1，即交换机 65-1 目前的角色为 Active，而对方交换机 65-2 角色为 Standby。

（3）查看当前交换机的 VSS 角色：

switch-1#show switch virtual role

Switch Switch Status Preempt   Priority Role   Session ID

　　　　Number　　　　Oper(Conf) Oper(Conf)　　　Local　Remote

LOCAL   1   UP   TRUE (Y*) 200(200) ACTIVE   0   0

REMOTE   2   UP   FALSE(N) 100(100) STANDBY 3731   6831

Active configured preempt timer(switch 1): 5 minutes

In dual-active recovery mode: No

switch-1#

说明：当前交换机 65-1 目前的角色为 Active，而对方交换机 65-2 角色为 Standby。

（4）查看当前交换机的 VSL 链路状态：

switch-1#show switch virtual link

VSL Status : UP

VSL Uptime : 1 minute

VSL SCP Ping : Pass

VSL ICC Ping : Pass

VSL Control Link : Te1/5/4

switch-1#

switch-1#

说明： 当前交换机双方的 VSL 链路已经工作正常。

（5）查看交换机当前的 SSO 状态：

switch-1#show redundancy states

   my state = 13 -ACTIVE

  peer state = 8   -STANDBY HOT

    Mode = Duplex

    Unit = Primary

    Unit ID = 21

Redundancy Mode (Operational) = sso

Redundancy Mode (Configured)   = sso

Redundancy State   = sso

   Maintenance Mode = Disabled

 Communications = Up

client count = 72

client_notification_TMR = 30000 milliseconds

keep_alive TMR = 9000 milliseconds

keep_alive count = 1

keep_alive threshold = 18

RF debug mask = 0x0

switch-1#

switch-1#

说明：本地交换机当前的 SSO 状态为 ACTIVE，而对端为 STANDBY HOT，表明工作正常。

（6）查看交换机 65-2 的状态：

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>

Standby console disabled

switch-1-sdby>en

Standby console disabled

switch-1-sdby>

Standby console disabled

说明：当双方交换机同时开机，VSS 优先级高的交换机 65-1 将成为 Active，而优先级低的交换机 65-2 则工作在 Standby。

配置 Multichassis EtherChannel (MEC)

说明：继续以上图为例，配置 VSS 核心交换机与接入交换机 2960 之间的 Multichassis EtherChannel (MEC)。

1．配置 Multichassis EtherChannel (MEC)

（1）在 VSS 核心交换机上配置 Multichassis EtherChannel (MEC)：

switch-1(config)#interface gigabitEthernet 1/1/1 , g2/1/1

switch-1(config-if-range)#switchport

switch-1(config-if-range)#no shutdown

% Range command terminated because it failed on TenGigabitEthernet5/4

switch-1(config-if-range)#channel-group 100 mode desirable

switch-1(config-if-range)#exit

switch-1(config)#interface port-channel 100

switch-1(config-if)#switchport mode access

switch-1(config-if)#switchport access vlan 100

switch-1(config-if)#no shutdown

switch-1(config-if)#exit

说明：在 VSS 核心交换机上将连接接入交换机 2960 的两个光接口 gigabitEthernet 1/1/1 和 gigabitEthernet 2/1/1 配置为 Multichassis EtherChannel (MEC)，并且配置为 2 层 access 接口，然后划入 VLAN 100 中。

（2）在接入交换机 2960 上配置普通 EtherChannel：

2960(config)#interface gigabitEthernet 0/21 - 22

2960(config-if-range)#no shutdown

2960(config-if-range)#channel-group 1 mode desirable

2960(config-if-range)#exit

2960(config)#interface port-channel 1

2960(config-if)#switchport mode access

2960(config-if)#switchport access vlan 100

2960(config-if)#exit

说明：在接入交换机 2960 上将连接 VSS 核心交换机两个光接口 gigabitEthernet

0/21 和 gigabitEthernet 0/22 配置为普通 EtherChannel 即可，并且划入 VLAN 100 中。

（3）查看 VSS 核心交换机上的 EtherChannel 状态：

switch-1#show etherchannel summary

Flags: D - down   P - bundled in port-channel

I - stand-alone s - suspended

H - Hot-standby (LACP only)

R - Layer3   S - Layer2

U - in use   N - not in use, no aggregation

f - failed to allocate aggregator

M - not in use, no aggregation due to minimum links not met

m - not in use, port not aggregated due to minimum links not met

u - unsuitable for bundling

d - default port

w - waiting to be aggregated

Number of channel-groups in use: 3

Number of aggregators: 3

Group   Port-channel   Protocol   Ports

```
------+-------------+----------+-------------------------------------------
```

10   Po10(RU)   -   Te1/5/4(P)   Te1/5/5(D)

20   Po20(RU)   -   Te2/5/4(P)   Te2/5/5(D)

100   Po100(SD)   PAgP   Gi1/1/1(P)   Gi2/1/1(P)

switch-1#

说明：VSS 核心交换机上显示与接入交换机之间的 EtherChannel 工作正常。

（4）查看接入交换机 2960 上的 EtherChannel 状态：

2960#show etherchannel summary

Flags: D - down   P - bundled in port-channel

I - stand-alone s - suspended

H - Hot-standby (LACP only)

R - Layer3   S - Layer2

U - in use   f - failed to allocate aggregator

M - not in use, minimum links not met

u - unsuitable for bundling

w - waiting to be aggregated

d - default port

Number of channel-groups in use: 1

Number of aggregators: 1

Group   Port-channel   Protocol   Ports

------+-------------+-----------+--

1   Po1(SU)   PAgP   Gi0/21(P)   Gi0/22(P)

2960#

说明：接入交换机 2960 上与 VSS 核心交换机之间的 EtherChannel 工作正常。

2．测试交换机之间的 EtherChannel 连通性

（1）在 VSS 核心交换机上创建 SVI 接口，并配置 IP 地址：

switch-1(config)#int vlan 100

switch-1(config-if)#ip add 100.1.1.1 255.255.255.0

switch-1(config-if)#no shutdown

说明：在 VSS 核心交换机上创建与 2960 之间的 SVI 接口，以作测试。

（2）在接入交换机 2960 上创建 SVI 接口，并配置 IP 地址：

2960(config)#int vlan 100

2960(config-if)#ip add 100.1.1.2 255.255.255.0

2960(config-if)#no shutdown

说明：在接入交换机 2960 上创建与 VSS 核心交换机之间的 SVI 接口，以作测试。

（3）测试 VSS 核心交换机与 2960 之间的连通性：

switch-1#ping 100.1.1.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 100.1.1.2, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

switch-1#

说明：VSS 核心交换机与 2960 之间的通信正常。

（4）测试 2960 与 VSS 核心交换机之间的连通性：

2960#ping 100.1.1.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 100.1.1.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

2960#

说明：2960 与 VSS 核心交换机之间的通信正常。

注：当 VSS 中 Active 交换机出现故障之后，Standby 交换机在接替 Active 工作时，接入交换机与核心交换机之间的通信可能出现毫秒级的中断，如果使用 ICMP 作 ping 测试，会出现 1 个丢包，也有时会不丢包，因为中断是毫秒级的。