

# MDS to MDS 802.1Q Configuration with FCIP

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## Introduction

This document provides a sample configuration for Fibre Channel Over TCP/IP (FCIP) with 802.1Q Multilayer Director Switch (MDS) to MDS.

FCIP describes mechanisms that allow the interconnection of islands of Fibre Channel (FC) storage area networks (SANs) over IP-based networks to form a unified SAN in a single FC fabric. FCIP relies on IP-based network services to provide the connectivity between the SAN islands over local area networks, metropolitan area networks, or wide area networks.

### Fibre Channel SANs Connected by FCIP



FCIP uses Transmission Control Protocol (TCP) on port 3225 as a network layer transport.

## Prerequisites

### Requirements

The IP backbone must be operational and delivering the required bandwidth to support the applications running across the FCIP links this could be a Layer 2 (L2) or Layer 3 (L3) topology. If it is a L3 topology, the intermediate routers or multilayer switches must be set up and configured to appropriately forward IP traffic between source and destination IP addresses of the FCIP tunnels. If Quality of Service (QoS) or traffic shaping is enforced at any network device in the path between the FCIP peers, the network manager administrating the IP infrastructure should be consulted to get the necessary details before configuring any TCP-related parameters and features on the Multilayer Director Switch (MDS) FCIP profile(s). The Ethernet switches which are adjacent to the MDSes must support and be configured for 802.1Q trunking if subinterfaces are configured on the MDS IP Storage (IPS) services module.

## Components Used

The information in this document is based on these software and hardware versions:

- MDS 9509 with IPS service module (DS-X9308-SMIP) running version 1.2.(2a)
- MDS 9216 with IPS service module (DS-X9308-SMIP) running version 1.2.(2a)
- Catalyst 6509 running Catalyst OS (CatOS) 7.4(3)
- Win2003 Server (HPQ Pro-Liant-P4) with Emulex LP9K HBA
- IBM Storage Array (ESS-2105-F20)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

## Background Information

FCIP consists of these specifications:

### ANSI T11

1. FC-SW-2 describes the operation and interaction of FC switches including E\_Port and fabric operation.
2. FC-BB-2 is a mapping that pertains to the extension of FC switched networks across a TCP network backbone, and defines reference models that support E\_Port and B\_Port.

### IETF IPS Working Group

1. FC over TCP covers the TCP/IP requirements for transporting FC frames over an IP network.
2. FC frame encapsulation defines the common fibre encapsulation format.

### IEEE 802 Standards

IEEE 802 LANs of all types may be connected together with MAC Bridges, as specified in ISO/IEC 15802-3. This standard defines the operation of VLAN Bridges that permit the definition, operation, and administration of VLAN topologies within a Bridged LAN infrastructure.

An interconnection between two SAN switches or fabrics across FCIP is called an FCIP link and can contain one or more TCP connections. Each end of a FCIP link is associated with a Virtual E port (VE\_port) or a B\_port, depending on the implementation. FC-BB and FC-BB-2 are describing the differences between both approaches. The IP services module (DS-X9308-SMIP) is supporting both modes but defaults to VE\_Port, which is also the recommended mode to run if all relevant peers are DS-X9308-SMIP modules. The VE\_Port functionality on MDS platforms is also supporting TE port functionality, which makes it capable of trunking traffic from multiple virtual SANs (VSANs) across one FCIP instance. The Gigabit Ethernet (GE) interfaces residing aboard the Cisco X9308-SMIP modules support 802.1Q in order to leverage the bandwidth of 1 Gbps between two or more FCIP tunnels in situations where low bandwidth requirements per FCIP tunnel exist. One must understand that sharing bandwidth by using dot1q is not providing deterministic Bandwidth per FCIP tunnel when FCIP Profile TCP parameters are left in default state.

# Configure

On the MDSes, you need to familiarize yourself with the IPS configuration guides for both platforms. The most current version of the manuals can be found at [Configuring IP Storage on Cisco.com](#). On the Ethernet switch side, one needs to be familiar with the dot1q trunking configuration specifics. In this particular example, a Catalyst running Hybrid CatOS is deployed; different configuration may apply to other Cisco switches or to switches from other vendors.

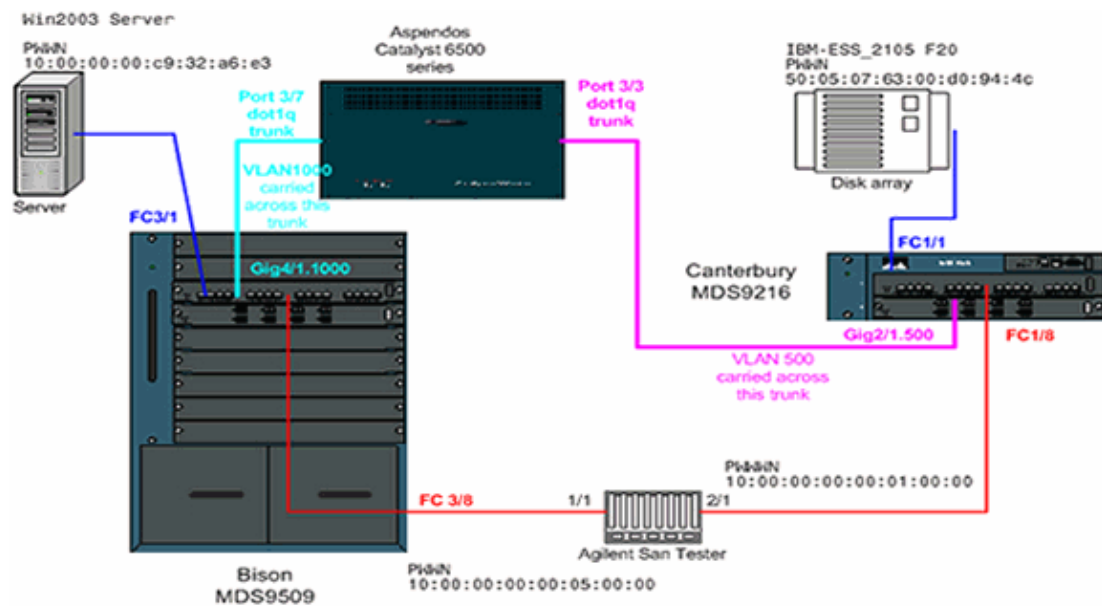
For Catalyst 6000 series running hybrid mode, refer to [Configuring Ethernet VLAN Trunks](#). For Native IOS, refer to [Configuring VLANs](#). For Catalyst XL type switches running Native IOS, refer to [Configuring VLANs](#).

**Note:** To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

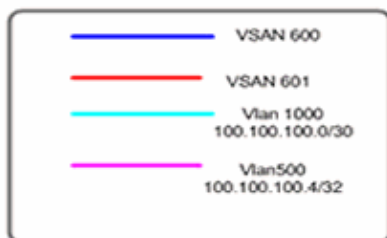
## Network Diagram

This document uses the network setup shown in the diagram below.

### Topology 2



### Topology 2 - FCIP tunnel across dot1q subinterface



Topology 2 depicts one FCIP tunnel running across a 802.1Q trunk on either side of the IP cloud. The IP cloud is collapsed into one multilayer switch (Catalyst 6500) which routes traffic from VLAN 1000 to VLAN 500 and from VLAN 500 to VLAN 1000. VLAN 1000 conceptually maps to IP subnet 100.100.100.0/30, and VLAN 500 maps to IP subnet 100.100.100.4/30. The way the MDS maps and retrieves dot1q frames will become clear in the configuration section below. For simplicity, only one FCIP tunnel across one physical

interface on both MDSes is defined; in reality, one would only use dot1q trunking to share the bandwidth of one Gigabit interface between multiple FCIP tunnels.

## Configurations

- MDS 9509 (Bison) with IPS-8 module
- MDS 9216 (Canterbury) with IPS-8 module
- Catalyst 6000 (Aspendos) with IPS-8 module

### MDS 9509 (Bison) with IPS-8 module

```
bison# sh ver

Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
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The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.

Software
BIOS: version 1.0.8
loader: version 1.2(2)
kickstart: version 1.2(2a)
system: version 1.2(2a)

BIOS compile time: 08/07/03
kickstart image file is: bootflash:/k122a
kickstart compile time: 9/23/2003 11:00:00
system image file is: bootflash:/s122a
system compile time: 10/8/2003 18:00:00

Hardware
RAM 1024584 kB

bootflash: 500736 blocks (block size 512b)
slot0: 0 blocks (block size 512b)

bison uptime is 1 days 15 hours 45 minute(s) 44 second(s)

Last reset
Reason: Unknown
System version: 1.2(2a)
Service:

bison# sh run

Building Configuration ...
fcip profile 1
ip address 100.100.100.1

!--- FCIP profile 1 is bound to the local relevant IPS interface.
!--- In this example, it is the IP address of interface Gig4/1.

vsan database
vsan 200 name test
vsan 600
vsan 601

fcdomain priority 1 vsan 1
fcdomain domain 1 preferred vsan 1
fcdomain domain 1 preferred vsan 600
fcdomain domain 1 preferred vsan 601
```

```
interface fcip1
no shutdown
switchport trunk allowed vsan 600-601
use-profile 1
peer-info ipaddr 100.100.100.6

<!-- peer IP address is the address on remote MDS Canterbury
<!-- configured on interface Gig4/1.500.

vsan database
vsan 600 interface fc3/1
vsan 601 interface fc3/8

boot system bootflash:/s122a sup-1
boot kickstart bootflash:/k122a sup-1
boot system bootflash:/s122a sup-2
boot kickstart bootflash:/k122a sup-2
boot asm-sfn bootflash:/ilc1.bin module 4

ip domain-name cisco.com
ip name-server 144.254.10.123
ip default-gateway 10.48.69.129
ip route 100.100.100.4 255.255.255.252 100.100.100.2 distance 2

!--- The next hop IP address is 100.100.100.2
!--- and is owned by the intermediate
!--- Ethernet multilayer switch Apendos.

zone name z-fcip2 vsan 600
member pwn 50:05:07:63:00:d0:94:4c
member pwn 10:00:00:00:c9:32:a6:e3

zone name Zone_a1 vsan 601
member pwn 10:00:00:00:00:01:00:00
member pwn 10:00:00:00:00:05:00:00

zone default-zone permit vsan 1
zone default-zone permit vsan 603

zoneset distribute full vsan 600

zoneset name zs-fcip2 vsan 600
member z-fcip2

zoneset name Agilent_1 vsan 601
member Zone_a1

zoneset activate name zs-fcip2 vsan 600

zoneset activate name Agilent_1 vsan 601

interface fc3/1
no shutdown

!--- Output suppressed.

interface fc3/8
no shutdown

interface mgmt0
ip address 10.48.69.151 255.255.255.192

interface GigabitEthernet4/1
no shutdown
```

```
interface GigabitEthernet4/1.1000
ip address 100.100.100.1 255.255.255.252

switchport mtu 3000
no shutdown

!--- Here the subinterface 1000 is configured,
!--- which ties into dot1q VLAN 1000 on the Ethernet switch.
!--- The MTU size is changed from the default 1500 bytes to 3000,
!--- because the intermediate switch supports jumbo frames
!--- on both L2 and L3.
```

### MDS 9216 (Canterbury) with IPS-8 module

```
canterbury# sh run

Building Configuration ...
fcip profile 1
ip address 100.100.100.6

vsan database
vsan 600
vsan 601

fcdomain domain 2 preferred vsan 600
fcdomain domain 2 preferred vsan 601

interface fcip1
use-profile 1
peer-info ipaddr 100.100.100.1

vsan database
vsan 600 interface fc1/1
vsan 601 interface fc1/8

boot system bootflash:/s122a
boot kickstart bootflash:/k122a
fcalias name test vsan 1

ip domain-name cisco.com
ip name-server 144.254.10.123
ip default-gateway 10.48.69.129
ip route 10.61.0.0 255.255.0.0
ip route 10.61.0.0 255.255.0.0 10.48.69.200
ip route 100.100.100.0 255.255.255.252 100.100.100.5 distance 2

!--- Static IPS route required to reach the FCIP peer address.

line vty
exec-timeout 0

switchname canterbury
system default switchport trunk mode auto

zone name z-fcip2 vsan 600
member pwn 50:05:07:63:00:d0:94:4c
member pwn 10:00:00:00:c9:32:a6:e3

zone default-zone permit vsan 777
zoneset distribute full vsan 600

zoneset name zs-fcip2 vsan 600
member z-fcip2
```

```

zoneset activate name zs-fcip2 vsan 600
zoneset activate name Agilent_1 vsan 601

interface GigabitEthernet2/1
no shutdown

interface GigabitEthernet2/1.500
ip address 100.100.100.6 255.255.255.252

switchport mtu 3000
no shutdown

interface fcl/1
no shutdown

interface fcl/8
no shutdown

interface mgmt0
ip address 10.48.69.156 255.255.255.128

```

### Catalyst 6000 (Aspendos) with IPS-8 module

Aspendos> (enable) **sh vlan 500**

VLAN Name	Status	IfIndex	Mod/Ports, Vlans
500 VLAN0500	active	191	1/1 3/3 15/1

VLAN	Type	SAID	MTU	Parent	RingNo	BrdgNo	Stp	Brdg	Mode	Trans1	Trans2
500	enet	100	500	1500	-	-	-	-	-	0	0

VLAN	MISTP-Inst	DynCreated	RSPAN
500	-	static	disabled

Aspendos> (enable) **sh vlan 1000**

VLAN Name	Status	IfIndex	Mod/Ports, Vlans
1000 fcip-extra-hop	active	131	3/7 15/1

VLAN	Type	SAID	MTU	Parent	RingNo	BrdgNo	Stp	Brdg	Mode	Trans1	Trans2
1000	enet	101	000	1500	-	-	-	-	-	0	0

VLAN	MISTP-Inst	DynCreated	RSPAN
1000	-	static	disabled

Aspendos> (enable) **sh trunk 3/3**

\* - indicates vtp domain mismatch

Port	Mode	Encapsulation	Status	Native vlan
3/3	on	dot1q	trunking	1

Port Vlans allowed on trunk

3/3	1,500
-----	-------

Port Vlans allowed and active in management domain

-----  
3/3 1,500

Port Vlans in spanning tree forwarding state and not pruned

-----  
3/3 1,500

Aspendos> (enable) **sh trunk 3/7**

\* - indicates vtp domain mismatch

Port	Mode	Encapsulation	Status	Native vlan
3/7	on	dot1q	trunking	1

Port Vlans allowed on trunk

-----  
3/7 1,1000

Port Vlans allowed and active in management domain

-----  
3/7 1,1000

Port Vlans in spanning tree forwarding state and not pruned

-----  
3/7 1,1000

*!--- Note that VLAN 500 is trunked on port 3/3, which is physically connected  
!--- to MDS Canterbury while port 3/7 trunks for VLAN 1000 and is connected  
!--- to MDS Bison. The port 15/1 is an internal port and directs to the  
!--- multilayer entity in the switch.*

Aspendos> (enable) **sh port jumbo**

**Jumbo frames MTU size is 9216 bytes.**

Jumbo frames enabled on port(s) 1/2,3/1-16.

*!--- L2 Jumbo support must be enabled for all relevant ports.*

Aspendos> (enable) **sh spantree 3/3**

Port	Vlan	Port-State	Cost	Prio	Portfast	Channel_id
3/3	1	forwarding	4	32	disabled	0
3/3	500	forwarding	4	32	disabled	0

Aspendos> (enable) **sh spantree 3/7**

Port	Vlan	Port-State	Cost	Prio	Portfast	Channel_id
3/7	1	forwarding	4	32	disabled	0
3/7	1000	forwarding	4	32	disabled	0

Aspendos> (enable) **sh spantree 15/1**

Port	Vlan	Port-State	Cost	Prio	Portfast	Channel_id
15/1	192	forwarding	4	32	enabled	0
15/1	500	forwarding	4	32	enabled	0
15/1	691	forwarding	4	32	enabled	0
15/1	1000	forwarding	4	32	enabled	0

*!--- All relevant ports on the Catalyst are forwarding*



```

!--- for their respective VLANs.

Aspendos> (enable) ses 15

Trying Router-15...
Connected to Router-15.
Escape character is '^]'.

User Access Verification

Password:
Aspendos_MSFC2> en
Password:
Aspendos_MSFC2#

!
interface Vlan500
mtu 3000
ip address 100.100.100.5 255.255.255.252
end

Aspendos_MSFC2# sh run int vlan 1000
Building configuration...

Current configuration : 113 bytes
!
interface Vlan1000
description "test-vlan-fcip-1000"
mtu 3000
ip address 100.100.100.2 255.255.255.252
end

!--- The VLANs 500 and 1000 are configured properly on the MSFC
!--- of the Catalyst 6000.
!--- Both subnets are directly connected to the same Ethernet
!--- switch, so no additional routes are needed here. Also note
!--- that the MTU size is changed accordingly on the MDS Gigabit
!--- interfaces to 3000 bytes. This change is required to support
!--- jumbo multilayer switching.

```

## Verify

This section provides information you can use to confirm that your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show interface gig x/y** Displays status of the relevant Gigabit interface bound to the FCIP profile.
- **show ips stats tcp int gig x/y** Displays TCP statistics and active connections for the relevant Gigabit interface.
- **show ips arp int gig x/y** Displays all Address Resolution Protocol (ARP) entries for the relevant Gigabit interface; the next hop or peer should be present in this list.
- **show ips ip route int gig x/y** Displays the specific routes going across the relevant Gigabit interface.
- **show interface fcip x** Displays the FCIP interface status and all details related to this FCIP tunnel.
- **show profile fcip x** Displays the IP address to which the profile is bound and all configured TCP parameters.
- **show int fcip x counters** Used to check if there are any frames going through the FCIP tunnel.
- **show fcdomain vsan x** Lists all domain-related details; used to verify that the fabric is formed across the FCIP tunnel(s).

- **show fcns da vsan x** Displays all pwwn, FC4–Types, and FCIDs of the relevant VSAN; used to verify that all expected entries are distributed across the FCIP tunnel(s).

**Note:** The dot1q interface acts as a normal physical interface for FCIP. There is no specific requirement to verify proper operation other than the **show interface gig x/y.z** command where z represents the subinterface. Depending upon the device connected to the local MDS Gigabit interfaces, you must consult the related documentation to verify that interfaces and ports are configured correctly.

## Troubleshoot

Be sure to issue the **show** commands multiple times to build a counter history. Counters that are not related to a point in time and just collected only once are mostly useless.

Use the configurations shown below for more troubleshooting.

- MDS 9509 (Bison)
- MDS 9216 (Canterbury)
- Note on Native VLAN Mismatch

MDS 9509 (Bison)
<pre> bison# sh int gig 4/1.1000  GigabitEthernet4/1.1000 is up   Hardware is GigabitEthernet, address is 0005.3000.a85a   Internet address is 100.100.100.1/30   MTU 3000 bytes  !--- Configured to 3000 bytes.    5 minutes input rate 488 bits/sec, 61 bytes/sec, 0 frames/sec   5 minutes output rate 488 bits/sec, 61 bytes/sec, 0 frames/sec   1785 packets input, 996030 bytes     0 multicast frames, 0 compressed     0 input errors, 0 frame, 0 overrun 0 fifo   1812 packets output, 354152 bytes, 0 underruns     0 output errors, 0 collisions, 0 fifo     0 carrier errors  !--- MTU is configured to 3000 bytes to avoid unnecessary !--- TCP segmentation and limit overhead.  bison# sh ips stats tcp int gig 4/1 de  TCP Statistics for port GigabitEthernet4/1 TCP send stats   337202017 segments, 222637392068 bytes   130562402 data, 205533417 ack only packets   503 control (SYN/FIN/RST), 0 probes, 1105737 window updates   7 segments retransmitted, 2208 bytes   4 retransmitted while on ethernet send queue, 40061909 packets split   250922624 delayed acks sent TCP receive stats   932985742 segments, 921498012 data packets in sequence,   936715052100 bytes in sequence   770241 predicted ack, 856752348 predicted data   0 bad checksum, 0 multi/broadcast, 0 bad offset   0 no memory drops, 0 short segments   0 duplicate bytes, 16 duplicate packets   0 partial duplicate bytes, 0 partial duplicate packets </pre>

```
53128 out-of-order bytes, 165 out-of-order packets
0 packet after window, 0 bytes after window
5 packets after close
76225562 acks, 192030009160 ack bytes, 0 ack toomuch,
  5851 duplicate acks
0 ack packets left of snd_una, 0 non-4 byte aligned packets
9124012 window updates, 0 window probe
1381 pcb hash miss, 984 no port, 103 bad SYN, 0 paws drops
TCP Connection Stats
272 attempts, 107 accepts, 163 established
511 closed, 3 drops, 206 conn drops
3 drop in retransmit timeout, 20 drop in keepalive timeout
0 drop in persist drops, 0 connections drained
TCP Miscellaneous Stats
61792500 segments timed, 76225541 rtt updated
124 retransmit timeout, 0 persist timeout
5760 keepalive timeout, 5740 keepalive probes
TCP SACK Stats
0 recovery episodes, 0 data packets, 0 data bytes
0 data packets retransmitted, 0 data bytes retransmitted
0 connections closed, 0 retransmit timeouts
TCP SYN Cache Stats
107 entries, 107 connections completed, 0 entries timed out
0 dropped due to overflow, 0 dropped due to RST
0 dropped due to ICMP unreachable, 0 dropped due to bucket overflow
0 abort due to no memory, 0 duplicate SYN, 0 no-route SYN drop
0 hash collisions, 0 retransmitted
```

```
100.100.100.1:64860 100.100.100.6:3225 ESTABLISH 0 0
100.100.100.1:64862 100.100.100.6:3225 ESTABLISH 0 0
100.100.100.1:3225 0.0.0.0:0 LISTEN 0 0
```

```
!-- No specific counters are maintained per subinterface.
!-- All stats for all subinterfaces on Gig 4/1 are seen here.
```

```
bison# sh ips arp interface gig 4/1
```

```
Protocol Address Age (min) Hardware Addr Type Interface
Internet 100.100.100.2 13 0008.e21e.c7bc ARPA GigabitEthernet4/1.1000
```

```
!-- No specific ARP table is maintained per subinterface.
!-- All entries for all subinterface on Gig4/1 are seen here.
```

```
bison# sh ips ip route int gig 4/1
```

```
Codes: C - connected, S - static
```

```
No default gateway
```

```
S 100.100.100.4/30 via 100.100.100.2, GigabitEthernet4/1.1000
C 100.100.100.0/30 is directly connected, GigabitEthernet4/1.1000
```

```
!-- IPS routes are derived from the main-interface,
!-- not specifically per subinterface. The next hop is verified here.
```

```
bison# sh cdp ne int gig 4/1
```

```
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
S - Switch, H - Host, I - IGMP, r - Repeater
```

```
Device ID Local Intrfce Hldtme Capability Platform Port ID
-----
TBM06033144 (Aspe Gig4/1 136 T S WS-C6506 3/7
```

*!--- Use this command if the neighbor supports it to verify  
!--- physical connectivity.*

bison# **sh fcip profile 1**

FCIP Profile 1  
Internet Address is 100.100.100.1 (interface GigabitEthernet4/1.1000)  
Listen Port is 3225  
TCP parameters  
SACK is enabled  
PMTU discovery is enabled, reset timeout is 3600 sec  
Keep alive is 60 sec  
Minimum retransmission timeout is 200 ms  
Maximum number of re-transmissions is 4  
Send buffer size is 0 KB  
Maximum allowed bandwidth is 1000000 kbps  
Minimum available bandwidth is 15000 kbps  
Estimated round trip time is 1000 usec  
Congestion window monitoring is enabled, burst size is 10 KB

*!--- The profile parameters are an easy way to directly verify  
!--- the configured TCP/IP parameters per FCIP instance.*

bison# **sh int fcip 1**

fcip1 is trunking  
Hardware is GigabitEthernet  
Port WWN is 20:c2:00:05:30:00:7a:de  
Peer port WWN is 20:42:00:0c:30:6c:24:40  
Admin port mode is auto, trunk mode is on  
**Port mode is TE**  
vsan is 1  
Trunk vsans (allowed active) (1,600-601)  
Trunk vsans (operational) (1,600-601)  
Trunk vsans (up) (1,600-601)  
Trunk vsans (isolated) ()  
Trunk vsans (initializing) ()  
Using Profile id 1 (**interface GigabitEthernet4/1.1000**)  
Peer Information  
**Peer Internet address is 100.100.100.6 and port is 3225**  
Special Frame is disabled  
Maximum number of TCP connections is 2  
Time Stamp is disabled  
QOS control code point is 0  
QOS data code point is 0  
B-port mode disabled  
TCP Connection Information  
2 Active TCP connections  
Control connection: Local 100.100.100.1:64860, Remote 100.100.100.6:3225  
Data connection: Local 100.100.100.1:64862, Remote 100.100.100.6:3225  
2 Attempts for active connections, 0 close of connections  
TCP Parameters  
**Path MTU 3000 bytes**  
Current retransmission timeout is 200 ms  
Round trip time: Smoothed 2 ms, Variance: 1  
Advertized window: Current: 118 KB, Maximum: 118 KB, Scale: 1  
Peer receive window: Current: 118 KB, Maximum: 118 KB, Scale: 1  
Congestion window: Current: 10 KB, Slow start threshold: 112 KB  
5 minutes input rate 200 bits/sec, 25 bytes/sec, 0 frames/sec  
5 minutes output rate 200 bits/sec, 25 bytes/sec, 0 frames/sec  
1306 frames input, 891212 bytes  
472 Class F frames input, 46972 bytes  
834 Class 2/3 frames input, 844240 bytes

```
0 Error frames timestamp error 0
867 frames output, 252424 bytes
470 Class F frames output, 48860 bytes
397 Class 2/3 frames output, 203564 bytes
0 Error frames 0 reass frames
```

```
!--- Here, the specific details per FCIP interface are shown
!--- by a running FCIP instance. You can also derive the
!--- TCP parameters of the peer with this output.
```

```
bison# sh fcdomain vsan 600
```

```
The local switch is the Principal Switch.
```

```
Local switch run time information:
State: Stable
Local switch WWN: 22:58:00:05:30:00:7a:df
Running fabric name: 22:58:00:05:30:00:7a:df
Running priority: 2
Current domain ID: 0x01(1)
```

```
Local switch configuration information:
State: Enabled
FCID persistence: Disabled
Auto-reconfiguration: Disabled
Contiguous-allocation: Disabled
Configured fabric name: 20:01:00:05:30:00:28:df
Configured priority: 128
Configured domain ID: 0x01(1) (preferred)
```

```
Principal switch run time information:
Running priority: 2
```

Interface	Role	RCF-reject
-----	-----	-----
<b>fcip1</b>	<b>Downstream</b>	<b>Disabled</b>
-----	-----	-----

```
bison# sh fcdomain vsan 601
```

```
The local switch is the Principal Switch.
```

```
Local switch run time information:
State: Stable
Local switch WWN: 22:59:00:05:30:00:7a:df
Running fabric name: 22:59:00:05:30:00:7a:df
Running priority: 2
Current domain ID: 0x01(1)
```

```
Local switch configuration information:
State: Enabled
FCID persistence: Disabled
Auto-reconfiguration: Disabled
Contiguous-allocation: Disabled
Configured fabric name: 20:01:00:05:30:00:28:df
Configured priority: 128
Configured domain ID: 0x01(1) (preferred)
```

```
Principal switch run time information:
Running priority: 2
```

Interface	Role	RCF-reject
-----	-----	-----
<b>fcip1</b>	<b>Downstream</b>	<b>Disabled</b>
-----	-----	-----

*!--- Similar to normal (E)ISL troubleshooting, verify  
!--- that the fabric is formed as expected.*

bison# **sh fcns da vsan 600-601**

VSAN 600:

FCID	TYPE	PWWN	(VENDOR)	FC4-TYPE:FEATURE
0x010001	N	10:00:00:00:c9:32:a6:e3	(Emulex)	scsi-fcp:init
0x020001	N	50:05:07:63:00:d0:94:4c	(IBM)	scsi-fcp:target fc..

Total number of entries = 2

VSAN 601:

FCID	TYPE	PWWN	(VENDOR)	FC4-TYPE:FEATURE
0x010001	N	10:00:00:00:c9:32:a6:e2	(Emulex)	scsi-fcp:init
0x010100	N	10:00:00:00:00:05:00:00		
0x020100	N	10:00:00:00:00:01:00:00		

Total number of entries = 3

### MDS 9216 (Canterbury)

canterbury# **sh int gig 2/1.500**

GigabitEthernet2/1.500 is up

Hardware is GigabitEthernet, address is 0005.3000.ade6

Internet address is 100.100.100.6/30

MTU 3000 bytes

5 minutes input rate 2248 bits/sec, 281 bytes/sec, 0 frames/sec

5 minutes output rate 696 bits/sec, 87 bytes/sec, 0 frames/sec

2263 packets input, 482038 bytes

0 multicast frames, 0 compressed

0 input errors, 0 frame, 0 overrun 0 fifo

2479 packets output, 1077822 bytes, 0 underruns

0 output errors, 0 collisions, 0 fifo

0 carrier errors

canterbury# **sh cdp ne int gig 2/1**

Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge  
S - Switch, H - Host, I - IGMP, r - Repeater

Device ID	Local Intrfce	Hldtme	Capability	Platform	Port ID
TBM06033144	(Aspe Gig2/1	165	T S	WS-C6506	3/3

*!--- If the neighbor supports CDP, use this command  
!--- to verify physical connectivity.*

canterbury# **sh fcip profile 1**

FCIP Profile 1

Internet Address is 100.100.100.6 (interface GigabitEthernet2/1.500)

Listen Port is 3225

TCP parameters

SACK is enabled

PMTU discovery is enabled, reset timeout is 3600 sec

Keep alive is 60 sec

Minimum retransmission timeout is 200 ms

```

Maximum number of re-transmissions is 4
Send buffer size is 0 KB
Maximum allowed bandwidth is 1000000 kbps
Minimum available bandwidth is 15000 kbps
Estimated round trip time is 1000 usec
Congestion window monitoring is enabled, burst size is 10 KB

canterbury# sh int fcip 1
fcip1 is trunking
Hardware is GigabitEthernet
Port WWN is 20:42:00:0c:30:6c:24:40
Peer port WWN is 20:c2:00:05:30:00:7a:de
Admin port mode is auto, trunk mode is auto
Port mode is TE
vsan is 1
Trunk vsans (allowed active) (1,600-601)
Trunk vsans (operational) (1,600-601)
Trunk vsans (up) (1,600-601)
Trunk vsans (isolated) ()
Trunk vsans (initializing) ()
Using Profile id 1 (interface GigabitEthernet2/1.500)
Peer Information
Peer Internet address is 100.100.100.1 and port is 3225
Special Frame is disabled
Maximum number of TCP connections is 2
Time Stamp is disabled
QOS control code point is 0
QOS data code point is 0
B-port mode disabled
TCP Connection Information
2 Active TCP connections
Control connection: Local 100.100.100.6:3225, Remote 100.100.100.1:64860
Data connection: Local 100.100.100.6:3225, Remote 100.100.100.1:64862
0 Attempts for active connections, 0 close of connections
TCP Parameters
Path MTU 3000 bytes
Current retransmission timeout is 200 ms
Round trip time: Smoothed 2 ms, Variance: 1
Advertized window: Current: 118 KB, Maximum: 118 KB, Scale: 1
Peer receive window: Current: 118 KB, Maximum: 118 KB, Scale: 1
Congestion window: Current: 10 KB, Slow start threshold: 112 KB
5 minutes input rate 184 bits/sec, 23 bytes/sec, 0 frames/sec
5 minutes output rate 184 bits/sec, 23 bytes/sec, 0 frames/sec
1163 frames input, 336700 bytes
722 Class F frames input, 72176 bytes
441 Class 2/3 frames input, 264524 bytes
0 Error frames timestamp error 0
1588 frames output, 917216 bytes
724 Class F frames output, 70288 bytes
864 Class 2/3 frames output, 846928 bytes
0 Error frames 0 reass frames




```

## Note on Native VLAN Mismatch

Under some conditions, customers may see the native vlan mismatch error message in the system log of the adjacent (Catalyst) Ethernet switch. This indicates an incorrect configuration on the trunkport of those switches. If a subinterface of **.1000** is configured on one of the main interfaces on the MDS IP Services module, the adjacent switchport on the Catalyst switch needs to be trunking for that same VLAN ID of **1000**. If, for some reason, the Catalyst is running VLAN **1000** as **Port VLAN** or **Native VLAN**, then error messages are generated and connectivity is broken, because the dot1q encapsulated frames from the MDS side are not understood by the switch and will be discarded. An example of native vlan mismatch errors is shown below.

2003 Nov 13 02:36:39 %CDP-4-NVLANMISMATCH:Native vlan mismatch detected on port 3/7  
2003 Nov 13 02:37:26 %CDP-4-NVLANMISMATCH:Native vlan mismatch detected on port 3/3

## Related Information

- [RFC 3821 – Fibre Channel Over TCP/IP \(FCIP\)](#) 
  - [T11 Home Page](#) 
  - [Get IEEE 802" Program](#) 
  - [Technical Support – Cisco Systems](#)
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