



**NETWORKERS 2004**

## **TROUBLESHOOTING MDS9000 FIBRE CHANNEL STORAGE AREA NETWORK**

**SESSION OPT-3051**

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## **Troubleshooting MDS9000 Fibre Channel Storage Area Networks: Session Objectives**

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- **Introduce the network engineer to the base skills in understanding the interworkings of a Fibre Channel storage network**
- **Learn how to use the Cisco storage switches as a diagnostic tool to troubleshoot the Fibre Channel network and attached devices**
- **Learn to shorten the time to resolution of most any problem where a Cisco FC switch is installed**

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## OPT-3051 Agenda

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- Introduction to Essential MDS Tools
- MDS Line Card Troubleshooting
- Device Connection and Fabric Services
- Switch-to-Switch Network Troubleshooting
- Zoning Troubles
- General Switch Maintenance

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## OPT-3051 Reference Network

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- All outputs and references for this session will be taken from the same working network built for this networks session; complete network configurations are part of your handouts, make sure you also have them
- Network is as true to a production SAN as possible
- Complete network configurations and topology maps are included in the handouts
- Use session materials as a workbook for troubleshooting your network

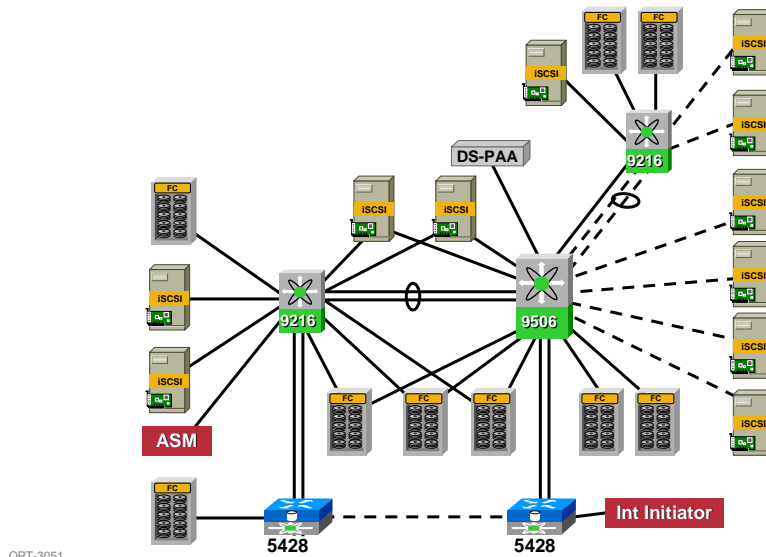
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# Topology

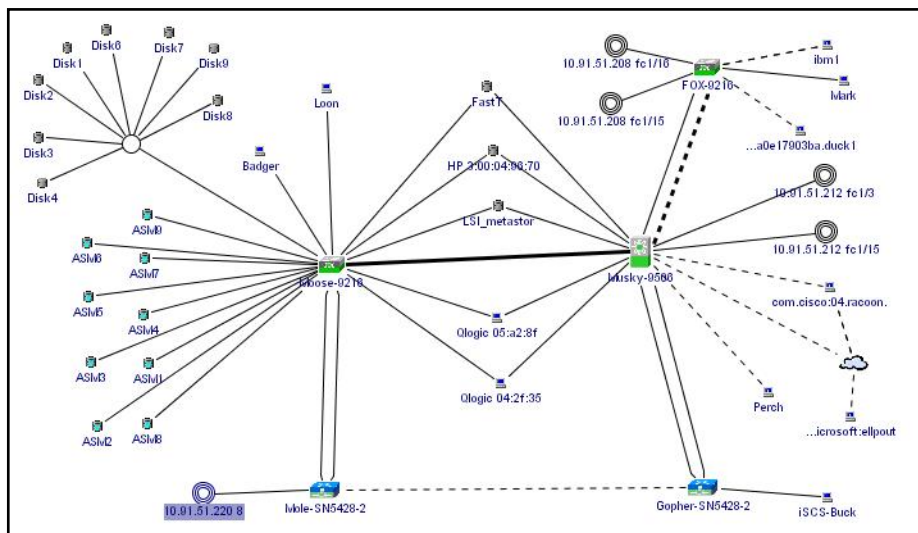
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# Topology as Seen by Fabric Manager

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## CISCO FIBRE CHANNEL SWITCH TOOLS



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## MDS Switch Troubleshooting Levels

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- **Command line debugs**  
Used by network Level 2–3 engineers
- **Analyzers and SPAN**  
Used by Level-3 engineers
- **Fabric manager and device manager**  
Used by network operators and Level 1 engineers
- **General statistics gathering from show commands and GUI managers**  
Network admins and operators Level 1 engineering

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# Debug 101: Capture Methods

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- **Direct to screen**  
Using Windows hyper term or any console/telnet/ssh utility
- **To a log file**  
Direct output to file within MDS
- **From command line or from within configuration**  
From CLI you can be from admin prompt or dropped into configuration mode to run debugs

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# Debugs to Direct Telnet Window

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## Example of Fibre Channel Name Server Registrations for VSAN 1

- Use a telnet or console application that will capture the expected output to buffer or file
- **Undebug all or no debug** of specific debug command is required to turn trace off
- The debugs are not persistent across reboots
- Most debugs are very readable and sensible to understand, some not

```
Musky-9506# debug fcnv events register vsan 1
fncv: vsan 1: Deleted entry for port-id 0x650000
fncv: vsan 1: Created entry for port-id 0x650000
fncv: vsan 1: Got Entry for port-id 0x650000
fncv: vsan 1: Registered port-name 20:04:00:a0:b8:0c:64:51 for port-id 0x650000
fncv: vsan 1: Registered node-name 20:04:00:a0:b8:0c:64:50 for port-id 0x650000
fncv: vsan 1: Got Entry for port-id 0x650000
fncv: vsan 1: Registered port-name 20:04:00:a0:b8:0c:64:51 for port-id 0x650000
fncv: vsan 1: Registered node-name 20:04:00:a0:b8:0c:64:50 for port-id 0x650000
fncv: vsan 1: Registered cos 8 for port-id 0x650000
fncv: vsan 1: Registered node-ipaddr for node-name 20:04:00:a0:b8:0c:64:50, port-id 0x650000
fncv: vsan 1: Registered ipa for node-name 20:04:00:a0:b8:0c:64:50, port-id 0x650000
fncv: vsan 1: Registered fc4-types for port-id 0x650000
fncv: vsan 1: Null symbolic node name, symbolic node name for port-id 0x650000 already deregistered
fncv: vsan 1: Registered port-type 1 for port-id 0x650000
fncv: vsan 1: Registered port-ipaddr for port-id 0x650000
fncv: vsan 1: Registered hard-addr 0x0 for port-id 0x650000
fncv: vsan 1: Registered fc4-features for fc4_type 8 for port-id 0x650000
fncv: vsan 1: Sending RSCN, affected port-id 0x650000
fncv: vsan 1: Received register fc4 attr request, port-id 0x650000, objects registered 4040
fncv: vsan 1: Registered fc4-types for port-id 0x650000
fncv: vsan 1: Registered fc4-features for fc4_type 8 for port-id 0x650000
fncv: vsan 1: Got Entry for port-id 0x650000
fncv: vsan 1: Registered port-name 20:04:00:a0:b8:0c:64:51 for port-id 0x650000
fncv: vsan 1: Registered node-name 20:04:00:a0:b8:0c:64:50 for port-id 0x650000
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fncv: vsan 1: Registered fc4-types for port-id 0x650000
fncv: vsan 1: Null symbolic node name, symbolic node name for port-id 0x650000 already deregistered
fncv: vsan 1: Registered port-type 1 for port-id 0x650000
fncv: vsan 1: Registered port-ipaddr for port-id 0x650000
fncv: vsan 1: Registered hard-addr 0x0 for port-id 0x650000
fncv: vsan 1: Registered fc4-features for fc4_type 8 for port-id 0x650000
fncv: vsan 1: Sending RSCN, affected port-id 0x650000
undebug all
Musky-9506#
```

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## Running Debugs from within Config

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Place the Word **<do>** in Front of Each Command  
that Is a Nonconfiguration Command

```
Musky-9506# config terminal
Enter configuration commands, one per line. End with CNTL/Z.

Musky-9506(config)# do debug fcns events register vsan 1
Musky-9506(config)# do show debug
Show Debug all

Name Server:
Register Events debugging is on for vsan: 1
Musky-9506(config)#
```

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## Debug Captures to a File

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```
Musky-9506# debug fcns events register vsan 1
Musky-9506 # debug logfile mike ?
size Set logfile size
<cr> Carriage Return

Musky-9506 # debug logfile mike
Musky-9506 # sh debug
Show Debug all (Output forwarded to file mike size - 4194304)

Name Server:
Register Events debugging is on for vsan: 1
Musky-9506 #
Musky-9506 # undebug all
```

Debug Is Enabled at CLI; It Can Be Started Before or After Logfile Is Started

Enter debug logfile Command and Set File Size if Required 4-Meg Default and Will Wrap

At This Point Debug Output Is Directed to the File and Can Be Verified Via SH Debug

File Is Created in a Hidden Directory Called log

To Display Captured Output to Screen:  
show debug logfile mike

Use Undebug Command to Turn Debugging Off

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## Saving Debug Captured off MDS

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```
Musky-9506 # copy log:mike ?  
bootflash:  Select destination filesystem  
ftp:        Select destination filesystem  
nvram:      Select destination filesystem  
running-config Copy from source to running  
scp:        Select destination filesystem  
sftp:       Select destination filesystem  
slot0:      Select destination filesystem  
startup-config Copy from source to startup  
system:     Select destination filesystem  
tftp:       Select destination filesystem  
volatile:   Select destination filesystem
```

**Lots of Choices for Copy**

**Example Uses TFTP**

**Capture File Remains on MDS  
Until Cleared or Another  
Logfile Is Created**

```
Musky-9506# copy log:mike tftp:  
Enter hostname for the tftp server: 10.91.51.200  
Enter destination filename: mike  
Trying to connect to tftp server.....  
-  
TFTP put operation was successful  
  
Musky-9506 # clear debug-logfile mike
```

**One Logfile per MDS**

**To Return Debug Output  
Back to Screen Type  
<Terminal monitor> at CLI**

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## Gathering Traces for Analysis

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- All non-disruptive to switch operations and traffic on the SAN
- Using built-in FC Analyzer
- Using Ethereal on PC
- Using the MDS port analyzer adapter
- Using SPAN
- Using an external FC Analyzer

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## Ethereal: Protocol Analyzer

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- iSCSI, FCIP, SCSI, and Fibre Channel Protocols supported in Ethereal version 0.9.9 and higher; **use latest Ethereal, currently 0.10.5**
- Analyzer can be run in two modes depending on what traffic you are troubleshooting
  - FC Analyzer is operating in SAN/OS on the supervisor card with output sent direct to telnet/console screen in **local mode**, or to Ethereal running on a PC on the management IP Network in **remote mode**
- These two modes are used to capture data going to and from the fabric services

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## MDS FCAnalyzer (SAN/OS Imbedded)

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- Output is displayed to the console in readable sniffer-like format
- Is only used to monitor Fibre Channel traffic to and from supervisor on the MDS9000
  - Traffic-like fabric logins, FSPF routing, switch-to-switch control traffic
- Output can go direct to your console screen or to a workstation running a color Ethereal program
- Note: SPAN is used for FC port to FC port monitoring

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## FC Analyzer Detail Trace

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- Command entered at the MDS CLI (while in config mode) to start the FC Analyzer trace; here we show how to filter for VSAN 1 traffic only

```
MDS-9509(config)# FCanalyzer local display-filter (mdshdr.vsan==0x01)
```

- Other MDS built-in filters for the imbedded Ethereal program are found in the MDS9000 configuration guide
- FC Analyzer is turned off with “control C” after output has been displayed to your screen

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## FC Analyzer Local: Detailed Output

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Action: Enable Interface FC 2/1 on Switch Moose (See Topology)  
Moose-9216(config)# fcanalyzer local display-filter mdshdr.vsan==01

Date/ Timestamp, Packet Number	{	Frame 12 (176 bytes on wire, 176 bytes captured) Arrival Time: Apr 29, 2004 15:15:15.7168800 Time delta from previous packet: 0.819080000 seconds Time since reference or first frame: 4.211122000 seconds Frame Number: 12 Packet Length: 176 bytes Capture Length: 176 bytes Ethernet II, Src: 00:00:00:00:00:00, Dst: 00:00:00:00:00:00 Destination: 00:00:00:00:00:00 (00:00:00:00:00:00) Source: 00:00:00:00:00:00 (00:00:00:00:00:00) Type: Unknown (0x0000)	{	OF_CTL: 0x00 SEQ_CNT: 0 OX_ID: 0x009b RX_ID: 0xffff Parameter: 0x00000000 FC ELS Cmd Code: FLOGI (0x04) Common Svc Parameters B2B Credit: 2 Common Svc Parameters: 0x0 (Normal B2B Credit Mgmt, Payload Len=116 bytes) 0000 ... = BB_SC Number: 0 ...1000 0000 0000 = Receive Size: 2048 Max Concurrent Seq: 0 Relative Offset By Info Cat: 0 E_D_TOV: 0 N_Port Port Name: 10:00:00:e6:63:f0:41:56 (00:e6:63:f0:41:56) Fabric Mode Name: 10:00:00:e6:63:f0:41:56 (00:e6:63:f0:41:56) Class 1 Svc Parameters Service Options: 0x0 (Class Not Supported) Class 2 Svc Parameters Service Options: 0x0 (Class Not Supported) Class 3 Svc Parameters Service Options: 0x0 (Seq Delivery Requested) Initiator Control: 0x0 (Seq Delivery Requested) Recipient Control: 0x0 (Seq Delivery Requested) Class Rev Size: 0 Total Concurrent Seq: 0 End2End Credit: 0 Open Seq Per Exchg: 0 Class 4 Svc Parameters Service Options: 0x0 (Class Not Supported) Vendor Version: 00000000000000000000000000000000
Ethernet Header		MDS Header (SOF1:EOH) MDS Header ...0 0000 1001 0010 = Packet Len: 146 ... 0011 1111 11... = Dat Index: 0x00ff ... 00 0010 0000 = Src Index: 0x0020 ... 0000 0000 0001 = VSAN: 1 MDS Trailer EOH: EOH (1) CRC: 0xc1703da1		
MDS Special Header		Fibre Channel Exchange Last In: 0 R_CTL: 0x22 (Extended Link Services Request) Dest Addr: 1177.6 CS_CTL: 0x00 Src Addr: 00.00.00 Type: Ext Link Svc (0x01) F_CTL: 0x200000 Exchange Originator, Seq Initiator, Exchg First, Seq Last, [CS_CTL, Transfer Seq Initiative, Last Data Frame - No Info, ABTS - AbortMS, B... .. = ExgRpt: Exchange Originator B... .. = SeqRpt: Seq Initiator ... .. = ExgFst: Exchg First ... .. = ExgLst: NOT exchg last ... .. = SeqLst: Seq Last ... .. = Pts: CS_CTL ... .. = TSE: Transfer Seq Initiative ... .. = LDF: Last Data Frame - No Info (0x000000) ... .. = ABT: no ack required (0x000000) ... .. = RetSeq: NOT retransmitted sequence ... .. = AA: ABTS - Cont (0x000000) ... .. = RelOff: rel offset NOT set SEQ_ID: 0x00		
The Remaining Info Is Fiber Channel				

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## FC Analyzer Local: Brief Output

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Action: Enable Interface FC 2/1 on Switch Moose

Moose-9216(config)# fcanalyzer local **brief** display-filter mdshdr.vsan==01

Previous Slide  
Had Breakdown  
of This Frame

- Line-by-line trace
- Cannot be expanded, use non brief to capture details

```

7.601720 00.00.00 -> ff.ff.fe 0x9b 0xffff FC ELS FLOGI
7.620451 ff.ff.fe -> 65.05.00 0x9b 0x7080 FC ELS ACC (FLOGI)
7.621043 ff.fc.65 -> 65.05.00 0x7082 0xffff FC ELS PLOGI
7.621471 ff.fc.65 -> ff.fc.68 0x7083 0xffff SW_ILS SW_RSCN
7.621517 ff.fc.65 -> ff.fc.75 0x7084 0xffff SW_ILS SW_RSCN
7.621760 ff.fc.68 -> ff.fc.65 0x7083 0xa06b FC Link Ctl, ACK1
7.621904 ff.fc.68 -> ff.fc.65 0x7083 0xa06b SW_ILS SW_ACC (SW_RSCN)
7.621939 ff.fc.65 -> ff.fc.68 0x7083 0xa06b FC Link Ctl, ACK1
7.622051 ff.fc.75 -> ff.fc.65 0x7084 0x4bdc FC Link Ctl, ACK1
7.622199 ff.fc.75 -> ff.fc.65 0x7084 0x4bdc SW_ILS SW_ACC (SW_RSCN)
7.622226 ff.fc.65 -> ff.fc.75 0x7084 0x4bdc FC Link Ctl, ACK1
7.622494 ff.fc.68 -> ff.fc.65 0xa06c 0xffff dNS GE_ID
7.622549 ff.fc.65 -> ff.fc.68 0xa06c 0x7085 FC Link Ctl, ACK1
7.622649 ff.fc.65 -> ff.fc.68 0xa06c 0x7085 dNS ACC (GE_ID)
7.622788 ff.fc.75 -> ff.fc.65 0x4bdd 0xffff dNS GE_ID
7.622821 ff.fc.65 -> ff.fc.75 0x4bdd 0x7086 FC Link Ctl, ACK1
7.622875 ff.fc.65 -> ff.fc.75 0x4bdd 0x7086 dNS ACC (GE_ID)
7.622935 ff.fc.68 -> ff.fc.65 0xa06c 0x7085 FC Link Ctl, ACK1
7.623230 ff.fc.75 -> ff.fc.65 0x4bdd 0x7086 FC Link Ctl, ACK1
7.635670 65.05.00 -> ff.ff.fc 0x9c 0xffff FC ELS PLOGI
7.635851 ff.ff.fc -> 65.05.00 0x9c 0x7087 FC ELS ACC (PLOGI)
7.635809 65.05.00 -> ff.fc.65 0x7082 0x9d FC ELS LS_RJT (PLOGI)
7.636104 65.05.00 -> ff.ff.fc 0xa0 0xffff dNS GID_FT
7.636745 ff.ff.fc -> 65.05.00 0xa0 0x7088 dNS ACC (GID_FT)
7.636985 65.05.00 -> ff.ff.fc 0xa1 0xffff FC ELS LOGO
7.638067 ff.ff.fc -> 65.05.00 0xa1 0x7089 FC ELS ACC (LOGO)
7.638303 65.05.00 -> ff.ff.fd 0xa2 0xffff FC ELS SCR
7.638551 ff.ff.fd -> 65.05.00 0xa2 0x708a FC ELS ACC (SCR)
7.642987 65.05.00 -> 65.00.00 0xa7 0xffff FCP SCSI: Report LUNs
7.643197 65.05.00 -> 65.00.00 0xa7 0xffff FCP SCSI: Report LUNs
7.643718 65.05.00 -> 68.01.00 0xa8 0xffff FCP SCSI: Report LUNs
7.643858 65.05.00 -> 68.01.00 0xa8 0xffff FCP SCSI: Report LUNs
    
```

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## MDS FC Analyzer Remote with Ethereal

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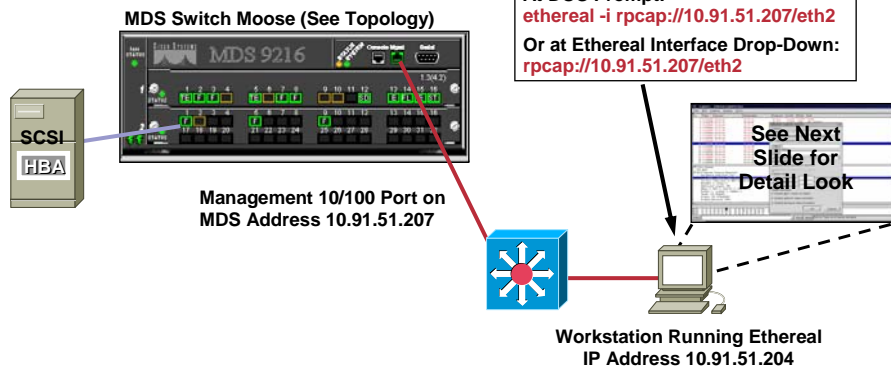
- For capture of internal MDS9000 switch traffic, FC traffic to and from supervisor not FC port-to-FC port traffic
- Make sure MDS can ping workstation

### MDS Configuration

```

IPS-TEST(config)# fcanalyzer remote
10.91.51.204
IPS-TEST# sh fcanalyzer
ActiveClient = 10.91.51.204, DEFAULT
IPS-TEST#clear fcanalyzer turns off analyzer
    
```

At DOS Prompt:  
**ethereal -i rpcap://10.91.51.207/eth2**  
Or at Ethereal Interface Drop-Down:  
**rpcap://10.91.51.207/eth2**



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**RPCAP Builds Tunnel Between This PC and Port Eth2 on MDS**

**Filters Can Be Applied Before or After Capture (Only Looking at FCID 65.05.00)**

Filter: `fcid == 65.05.00`

## Use of SPAN Feature

Cisco.com

- Used for FC port to FC port analyzing
- Same type of tool as used on Cisco Catalyst® products
- Ingress and egress ports are sent to an FC-port setup as a SPAN Destination (SD-port type)
- No limits to where the ports are located on the MDS switch
- Used to output to third-party test equipment or to Cisco Port Analyzer Adapter

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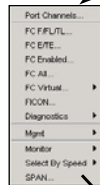
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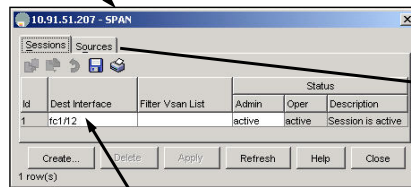
## Setting Up SPAN 1-2-3

Cisco.com

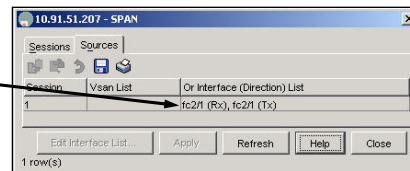
SPAN Drop Down Selected



One FC Interface Configured as SPAN Destination (SD)  
This Example Uses FC 1/12



Destination SD Port Selected



Source of Data Selected;  
Save and Close, SPAN Has Started

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## SPAN Configuration with Single FC Port Analyzer Tool

Cisco.com

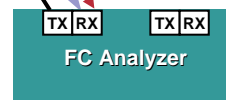


Moose-9216# sh span session 1  
Session 1 (active)  
Destination is fc1/12  
No session filters configured  
Ingress (rx) sources are  
fc2/1,  
Egress (tx) sources are  
fc2/1,

```
Moose-9216# sh int fc 1/12
fc1/12 is up
Port description is Span for Moose
Hardware is Fibre Channel, FCOT is short wave laser
Port HWN is 20:0c:00:0d:65:b4:2a:00
Admin port mode is SD
Port mode is SD
Port vsan is 1
Speed is 1 Gbps
Beacon is turned off
5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
815265233 frames input, 1549572798672 bytes
0 discards, 0 errors
0 CRC, 0 unknown class
0 too long, 0 too short
1619345592 frames output, 3170703091272 bytes
0 discards, 0 errors
93 input ULS, 32 LRR, 45 NDS, 34 loop inits
206 output ULS, 1673 LRR, 49 NDS, 31 loop inits
16 receive B2B credit remaining
0 transmit B2B credit remaining
```

Dropped

SPAN Destination  
Port (SD) FC 1/12



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## MDS 9000 Port Analyzer Adapter

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- **MDS Port Analyzer Adapter is a protocol converter**
  - Converts FC frames into Ethernet frames
  - FC-specific information is carried in encapsulation header
  - Enables use of Ethernet protocol analyzers to decode FC protocols
- **Cisco has released decodes for all FC protocols, the encapsulation header and SCSI decoder to public domain**
  - Part of the popular Ethereal protocol analyzer



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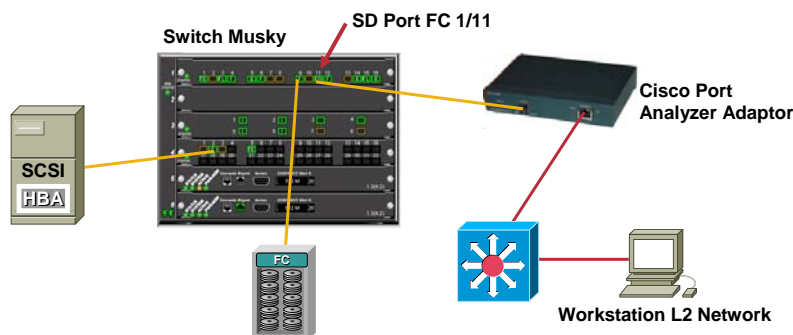
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## Port Analyzer Connection Using Port Analyzer with Ethereal

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- **For capture of device port-to-device port Fibre Channel traffic to an IP-attached workstation running Ethereal**
  - Configure Port Analyzer Adapter (dip-switch settings, mostly plug and play)
  - Configure SPAN port on MDS9000
  - Set Ethereal to capture on local Ethernet interface



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## Fibre Channel Capture without Port Analyzer with Third-Party Analyzer

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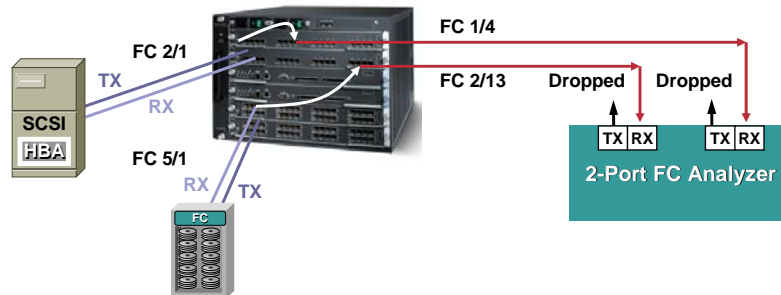
- For capture of device port-to-device port Fibre Channel traffic, to a Fibre Channel-attached tester

```
MDS9000#config t
```

```
span session 10  
destination interface fc1/4  
source interface fc 2/1 tx
```

```
MDS9000#config t
```

```
span session 11  
destination interface fc2/13  
source interface fc5/1 rx
```



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## Remote SPAN (RSPAN) (Added in Release 1.2)

Cisco.com

- Nondisruptively monitor FC ports at a remotely located switch using a SD (SPAN Destination) port
- RSPAN traffic is tunneled through network using FC tunnels
- RSPAN traffic is compatible with off-the-shelf FC Analyzers and MDS9000 port adapters
- RSPAN and local SPAN sessions can share the same SD port at the destination switch

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## RSPAN Requirements

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- All switches must be running MDS code 1.2 or later
- No cable should be attached to the SFP in the ST (SPAN Tunnel) port
- Make sure FC tunnel is UP before starting frame collection
- FC Analyzer can be a PAA and PC running Ethereal, or a Finisar-like analyzer

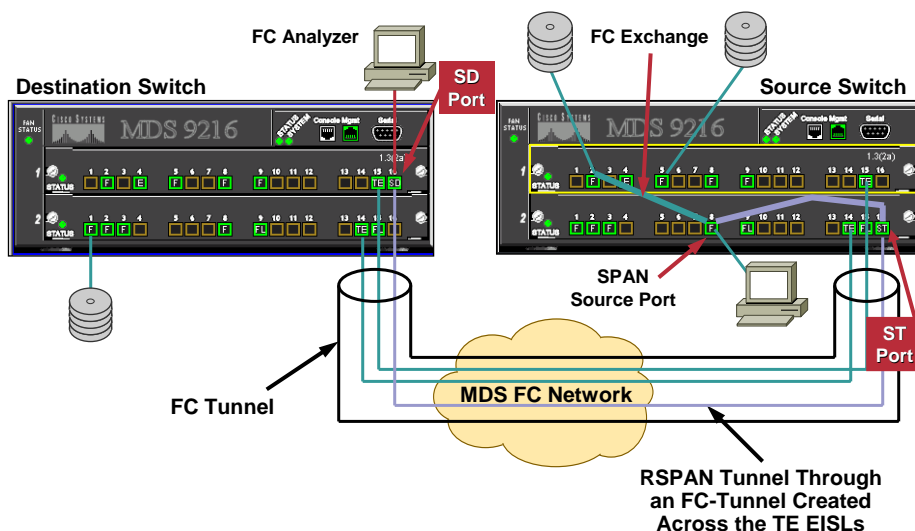
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## Understanding the RSPAN Setup

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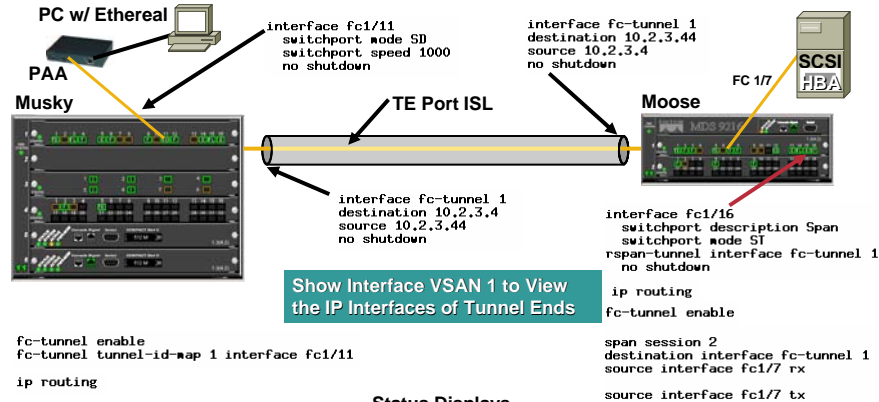
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## RSPAN Setup in Lab

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fc-tunnel enable  
fc-tunnel tunnel-id-map 1 interface fc1/11  
ip routing

### Status Displays

```
Moose-9216# show span session 1
Session 1 (active)
Destination is fc1/12
No session filters configured
Ingress (rx) sources are
fc2/1,
Egress (tx) sources are
fc2/1,
```

```
Moose-9216# show int fc-tunnel 1
fc-tunnel 1 is up
Dest IP Addr: 10.2.3.44 Tunnel ID: 1
Source IP Addr: 10.2.3.4 LSP ID: 1
Explicit Path Name:
Outgoing interface: port-channel 2
Outgoing Label(s) to Insert: 10001:0:1:ff'h
Record Routes:
10.2.3.44
```

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## MDS9000 Fabric Manager and Device Manager

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- That's right, were talking GUI stuff here
- Fabric manager and device manager are full of great serviceability tools for supporting the SAN network
- Best of both worlds, using JAVA-based manager along with CLI to troubleshoot
- Ability to run the graphic manager on any laptop from remote office location anywhere on IP network or from with the data center

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# Device Manager Tools Port Health Monitoring

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**Monitor for Errors and Live Performance**

Or Click on Log and View the Output in Text Format

From Device Manager Select Summary Tab

Message Log

Message Log

Device Manager 1.3(4.2) - Message Log

Interface	Rx	Tx	Errors	Discards	Time
Fc1/14	45	21	0	0	2004/04/30-10:26:06
Speed=0 s1speedDisc=10					
RxBytes=10452479908 pcev=10452479908 RxPackets=141844737 pcev=141844737					
TxBytes=4714149120552 pcev=4714149120552 RxPackets=2409238794 pcev=2409238794					
Fc1/14 46 22 0 0 2004/04/30-10:26:16					
Fallback reason: null					
Fc1/14	44	21	0	0	2004/04/30-10:26:36
Speed=0 s1speedDisc=10					
RxBytes=10452479908 pcev=10452479908 RxPackets=141844737 pcev=141844737					
TxBytes=4714149120552 pcev=4714149120552 RxPackets=2409238802 pcev=2409238802					
Fc1/14	45	21	0	0	2004/04/30-10:26:46

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# Device Manager Tools Port Health Monitoring

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Right Click on FC Port You Are Troubleshooting: In This Example Interface FC 1/14

Or, Highlight Any Fields and Graph the Output Real-Time

Device Summary

MDS 9216

1.3(4.2)

STATUS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

Timeout at 2004/04/30-10:18:48

Up Down Fail Minor Unreachable



fc2/3

Configure...

Monitor...

Enable

Disable

Beacon

Loopback

Monitor for Frame Errors, Discards, Link Errors, and Protocol Errors

10.91.51.207 - fc1/14

Traffic Protocol Discards Link Errors Frame Errors Class 2 Traffic Class 2 Errors PCON

Interval 10s Last Value/sec Speed: 00:00:53

Interface	Rx Bytes	Rx Frames	Tx Bytes	Tx Frames	Rx Bytes	Rx Frames	Tx Bytes	Tx Frames
fc1/14	45.81M	23.39K	22.34M	11.75K	0	0	0	0

Refresh Help Close

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## Section Notes

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- Learn the navigation of the Cisco SAN/OS CLI for use in troubleshooting, gathering debugs, and shows
- Using built in FC Analyzer or external FC equipment like a Finisar
- Learn to use SPAN, local and remote; engineer for the configuration of a SD port as part of the overall SAN design
- Learn to use GUI configuration tools and use FM/DM along with CLI to make job easier and faster

URL to User Guide for Filter Examples for Ethereal: [http://www.cisco.com/en/US/products/hw/ps4159/ps4358/products\\_configuration\\_guide\\_chapter09186a00801dd8e1.html](http://www.cisco.com/en/US/products/hw/ps4159/ps4358/products_configuration_guide_chapter09186a00801dd8e1.html)

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## MDS LINE CARD TROUBLESHOOTING



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## Section Agenda

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- Fibre Channel Layer Review
- Determining Low-Level Interface Physical Issues
- Switch FC Line Card Troubleshooting
- Using Loopbacks

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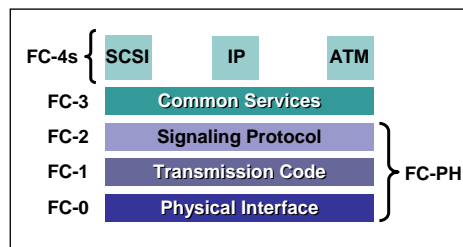
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## Fibre Channel Layers Review

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### Structure Is Divided into Five Levels of Functionality

- **FC-0**—defines the physical interface characteristics  
Signaling rates, cables, connectors, distance capabilities, etc.
- **FC-1**—defines how characters are encoded/  
decoded for transmission  
Transmission characters are  
given desirable characters
- **FC-2**—defines how  
information is transported  
Frames, sequences, exchanges,  
login sessions
- **FC-3**—place holder for  
future functions
- **FC-4**—defines how different  
protocols are mapped to use  
Fibre Channel  
SCSI, IP, Virtual Interface  
Architecture, others



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## Fibre Channel Transmission Words: FC-1

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- Ordered sets are transmitted continuously to indicate that specific conditions within the link are encountered
- Transmitted while the condition exist
- Four primitive sequences which can determine where problem exist

Not Operational Sequence (NOS)

Offline Sequence (OLS)

Link Reset Sequence (LR)

Link Reset Response Sequence (LRR)

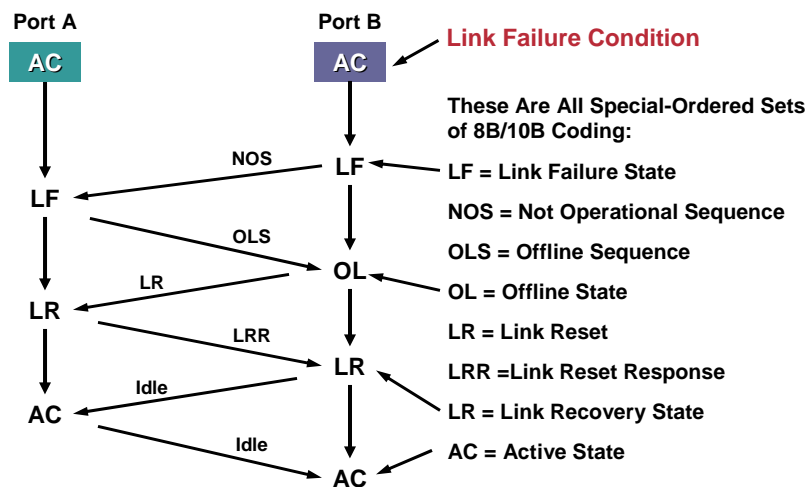
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## Link Initialization Flow Fibre Channel Layer 1 Protocol (FC-1)

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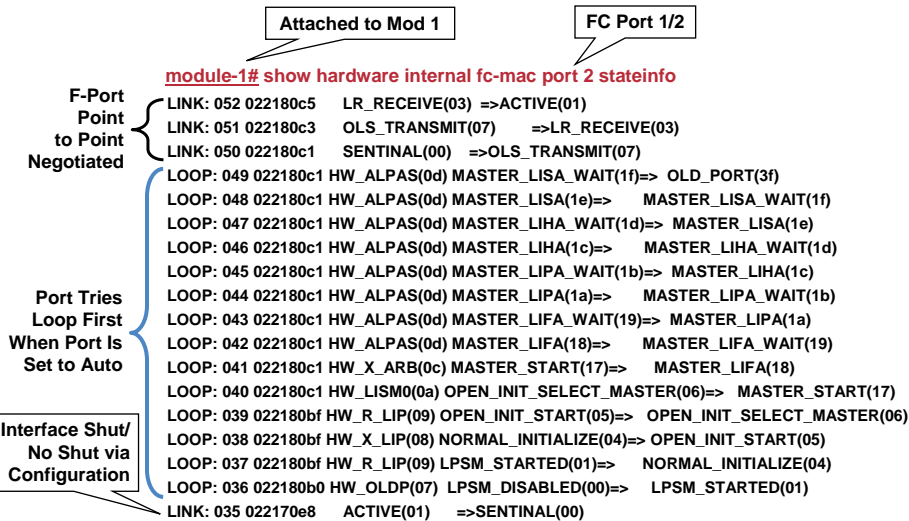
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## Monitor Link Init State (Flow from Bottom to Top)

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## Fibre Channel Port Issues

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- In order for a F\_Port to come up on a MDS switch

- 1) The switch port must first acquire bit and word synchronization with the N\_Port
- 2) N\_Port must issue a FLOGI to the MDS

Primitive Sequences  
Counters Can Determine  
Layer 1–2 Problems

**Tip:**  
Clear Counters and Monitor to Verify Active Issues, Use Device Manager Monitor Tool to Monitor Live; Set and Activate Threshold Manager to Alert You; Moose-9216# Clear Count Int FC2/1

```

moose-9216# sh int fc 2/1
c2/1 is up
Hardware is Fibre Channel, FCOT is short wave laser
Port WWN is 20:41:00:0d:65:b4:2a:00
Admin port mode is F
Port mode is F, FCID is 0x650500
Port vsan is 1
Speed is 1 Gbps
Transmit B2B Credit is 2
Receive B2B Credit is 12
Receive data field Size is 2112
Beacon is turned off
5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
257 frames input, 17284 bytes
0 discards, 0 errors
0 CRC, 0 unknown class
0 too long, 0 too short
280 frames output, 23704 bytes
0 discards, 0 errors
26 input OLS, 26 LRR, 35981 NOS, 0 loop inits
36016 output OLS, 35993 LRR, 15 NOS, 0 loop inits
12 receive B2B credit remaining
2 transmit B2B credit remaining
  
```

FCOT = Fibre Channel Optical Transport

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## Line Card Basics

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- Show module will display slot locations and type of card
- General information in interface and statistics can be gathered from switch main-level prompt
- More detailed gathering of ASIC counters may be required to troubleshoot difficult issues

Attach to Module with "Attach" Command, All Modules Can Be Attached to Including Standby Supervisor and IPS Blade  
Exit to Detach

```
Musky-9506# sh module
```

Mod	Ports	Module-Type	Model	Status
1	16	1/2 Gbps FC Module	DS-X9016	ok
3	8	1P Storage Services Module	DS-X9300-SMIP	ok
4	32	1/2 Gbps FC Module	DS-X9032	ok
5	0	Supervisor/Fabric-1	DS-X9530-SF1-K9	ha-standby
6	0	Supervisor/Fabric-1	DS-X9530-SF1-K9	active *

Mod	Sw	Hw	World-Wide-Name(s) (WWN)
1	1.3(4,2)	1.0	20:01:00:0d:ec:00:ea:40 to 20:10:00:0d:ec:00:ea:40
3	1.3(4,2)	0.206	20:81:00:0d:ec:00:ea:40 to 20:88:00:0d:ec:00:ea:40
4	1.3(4,2)	1.1	20:81:00:0d:ec:00:ea:40 to 20:e0:00:0d:ec:00:ea:40
5	1.3(4,2)	4.0	---
6	1.3(4,2)	4.0	---

Mod	MAC-Address(es)	Serial-Num
1	00-0c-30-0c-b4-9c to 00-0c-30-0c-b4-a0	JAB072405LR
3	00-05-30-00-a4-02 to 00-05-30-00-a4-0e	JAB070205AS
4	00-0c-30-d9-e4-78 to 00-0c-30-d9-e4-7c	JAB074606MM
5	00-0c-30-0d-2e-f4 to 00-0c-30-0d-2e-f8	JAB074104MK
6	00-0c-30-0d-31-3c to 00-0c-30-0d-31-40	JAB07410450

```
* this terminal session
Musky-9506# attach module 1
Attaching to module 1 ...
To exit type 'exit', to abort type '^.'
module 1# ?
Exec Commands:
clear          Reset functions
debug          Debugging functions
delete         Remove files
dir            Directory listing for files
exit           Exit from the EXEC
find           Find a file below the current directory
install        Enter target device server filename
mkdir          Create new directory
move           Move files
no             Disable debugging functions
rmdir          Remove existing directory
show           Show running system information
sleep          Sleep for the specified number of seconds
tail           Display the last part of a file
telnet         Telnet to another system
terminal       Set terminal line parameters
uninstall      Uninstall software:uninstall isan filesystem
```

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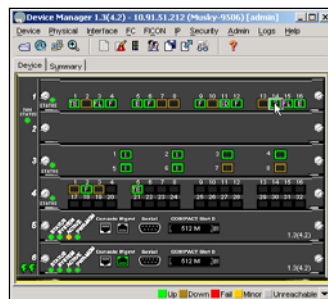
## Line Card Hardware Troubleshooting

Cisco.com

### Gathering Detail Information from a Line Card

- Attach to line card: **mds9216# attach module 1**  
show process exceptionlog  
show hardware internal debug-info interface fc <module>/<port>
- Show information from command line  
show interface transceiver details  
show tech-support interface fc 1/1 vsan 1

**Tip:**  
To Allow Capture of Long Outputs Without Pausing the Scroll Type at Command Line  
<term length 0>



Module 1—16-Port FC Line Card

Module 3—IPS-8 Card

Module 4—32-Port FC Line Card

Supervisor Modules Slots 5–6

Other Useful Commands from within the Configuration Prompt:  
poweroff module X  
no poweroff module x

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## Section Notes

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- Understand the physical layer operation
- Use basic interface statistics to determine direction of errors and type
- Use CLI from the administration prompt, attach to module if required to drill down to suspected hardware issues
- Use device manager tools to have help-desk people gather general health of the physical layer

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## DEVICE CONNECTION AND FABRIC SERVICES TROUBLESHOOTING



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## Section Agenda

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- Fabric Login (FLOGI)
- Address Assignment
- MDS Login to Attaching Devices
- FCPING and FCTRACE
- Debug
- FCANALYZER Examples

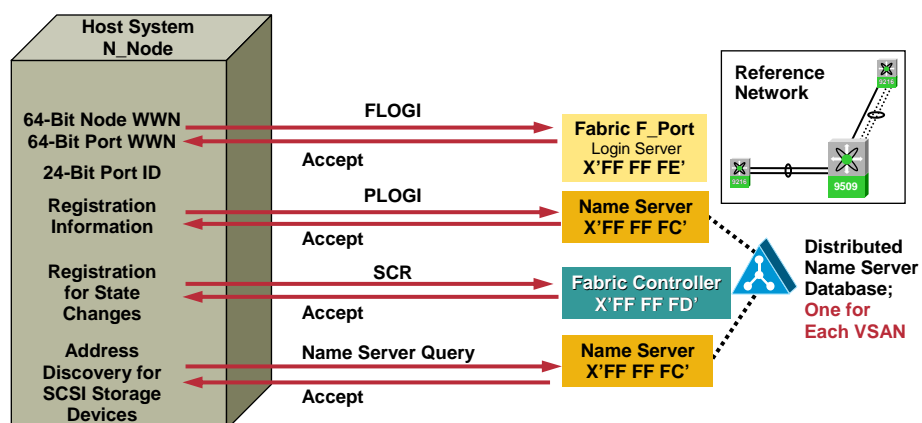
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## Host Port Fabric Login

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By Registering for State-Change Notifications the Port or Domain Controller Can Then Notify the Connected Ports with RSCNs when a Port Changes; **State-Change Notifications Will Stay Within the Zone**

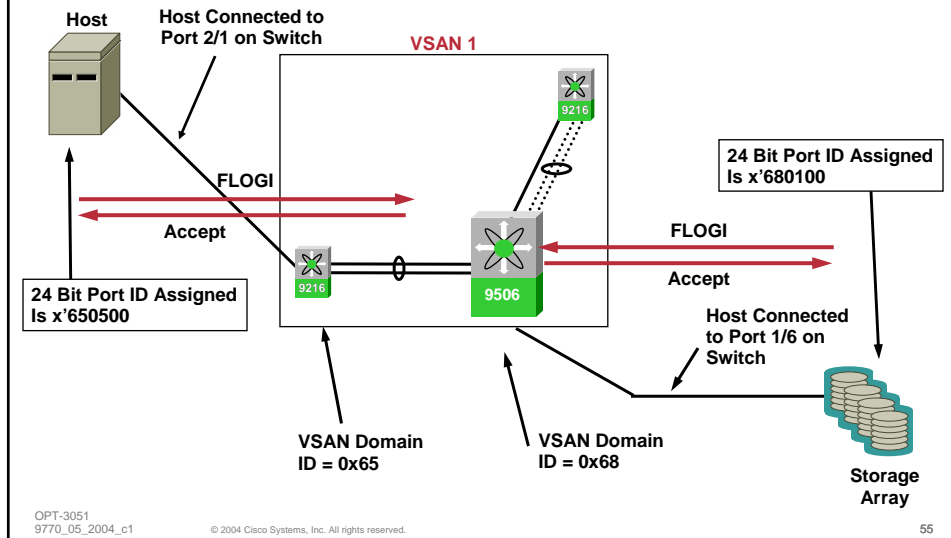
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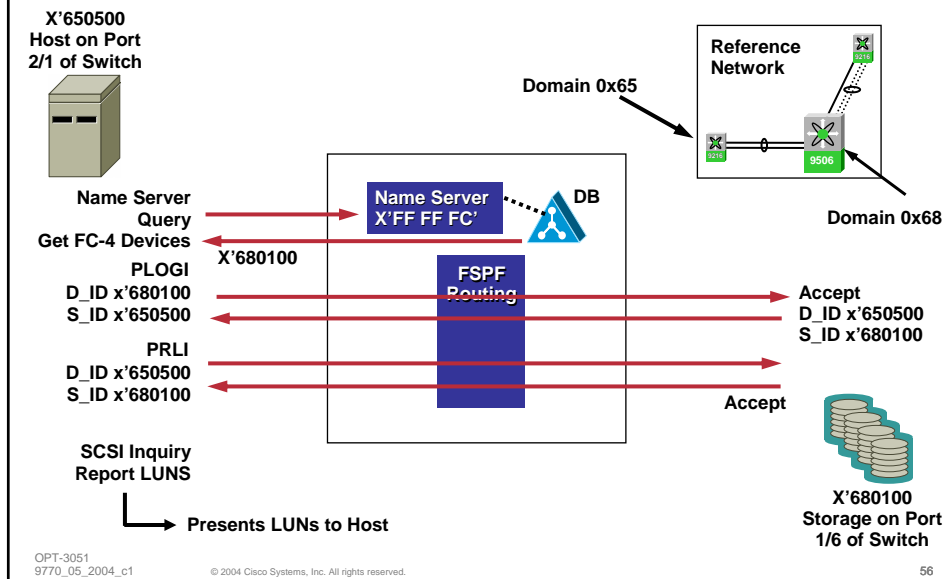
## 24-Bit Address Assignment

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## Host HBA to Storage Port

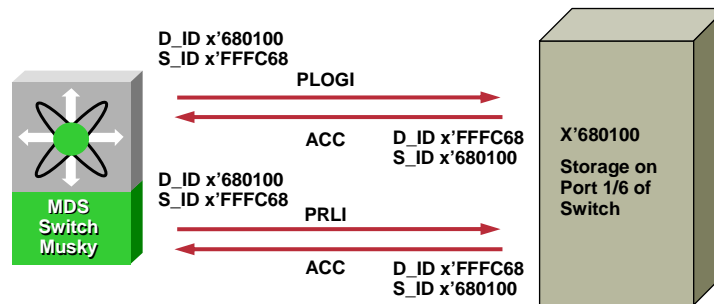
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## MDS Login to Devices

Cisco.com

- Not all devices support the PLOGI from the MDS
- Some may respond with a reject (LS\_RJT)



- MDS uses the FCID of the local name server to PLOGI and then PRLI into the attaching device; it uses the ACC to determine if the device is a TARGET or an INITIATOR, or in some cases BOTH

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## Using FCPing and FCtrace

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- Need FCID or pwwn of remote device
- Ping uses PRLI (Extended Link Service)
- Checks connectivity and latency on devices attached to MDS switches directly or across TE ports
- FCtrace command is two path descriptors that identify the path taken on a hop-by-hop basis

```
Moose-9216# show zoneset active vsan 1
```

```
zoneset name ZoneSet1 vsan 1
zone name LOON_HBA vsan 1
* fcid 0x680100 [pwwn 20:05:00:a0:b8:0c:64:51]
* fcid 0x650500 [pwwn 10:00:00:e0:69:f0:41:56]
```

```
Moose-9216# fcping fcid 0x680100 vsan 1
```

```
28 bytes from 0x680100 time = 3944 usec
28 bytes from 0x680100 time = 403 usec
28 bytes from 0x680100 time = 555 usec
28 bytes from 0x680100 time = 322 usec
28 bytes from 0x680100 time = 358 usec
5 frames sent, 5 frames received, 0 timeouts
Round-trip min/avg/max = 322/1116/3944 usec
Moose-9216#
```

```
Moose-9216# fctrace fcid 0x680100 vsan 1
```

```
Route present for : 0x680100
20:00:00:0d:65:b4:2a:00(0xffc65)
20:00:00:0d:ec:00:ea:40(0xffc68)
20:00:00:0d:ec:00:ea:40(0xffc68)
```

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## FCping Usage: Verifying Ping

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```
Musky-9506# sh int fc 1/6
fc1/6 is up
Port description is IDM FastT
Hardware is Fibre Channel, FCOT is short wave laser
Port WWN is 20:06:00:0d:ec:00:ea:40
Admin port mode is auto, trunk mode is on
Port mode is F, FCID is 0x680100
Port vsan is 1
Speed is 1 Gbps
Transmit B2B Credit is 4
Receive B2B Credit is 16
Receive data field Size is 2112
Beacon is turned off
5 minutes input rate 311889960 bits/sec, 0 bytes/sec, 0 frames/sec
5 minutes output rate 555024 bits/sec, 0 bytes/sec, 0 frames/sec
5 frames input, 140 bytes
0 discards, 0 errors
0 CRC, 0 unknown class
0 too long, 0 too short
5 frames output, 140 bytes
0 discards, 0 errors
0 input OLS, 0 LRR, 0 NOS, 0 loop inits
0 output OLS, 0 LRR, 0 NOS, 0 loop inits
16 receive B2B credit remaining
4 transmit B2B credit remaining
```

```
Musky-9506# sh flogi data vsan 1
```

INTERFACE	VSAN	FCID	PORT NAME	NODE NAME
fc1/6	1	0x680100	20:05:00:a0:b8:0c:64:51	20:04:00:a0:b8:0c:64:50
sup-fc0	1	0x680001	10:00:00:0d:ec:00:ea:45	20:00:00:0d:ec:00:ea:40
iscsi3/5	1	0x680009	21:09:00:0d:ec:00:ea:42	21:0a:00:0d:ec:00:ea:42

```
Moose-9216# fcping fcid 0x680100 vsan 1
```

```
28 bytes from 0x680100 time = 371 usec
28 bytes from 0x680100 time = 356 usec
28 bytes from 0x680100 time = 380 usec
28 bytes from 0x680100 time = 591 usec
28 bytes from 0x680100 time = 486 usec
5 frames sent, 5 frames received, 0 timeouts
Round-trip min/avg/max = 356/436/591 usec
Moose-9216#
```

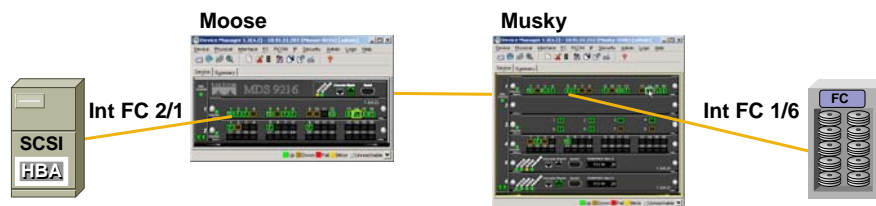
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## Debugging Host Login Issues

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### Commands to Run on MDS Moose

1. Show interface FC 2/1
2. Show port internal info int FC 2/1
3. debug port event int FC 2/1
4. Show FLOGI database VSAN 1

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## show interface fc 2/1

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```
Moose-9216# show interface fc 2/1
fc2/1 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:41:00:0d:65:b4:2a:00
  Admin port mode is F
  Port mode is F, FCID is 0x650500
  Port vsan is 1
  Speed is 1 Gbps
  Transmit B2B Credit is 2
  Receive B2B Credit is 12
  Receive data field Size is 2112
  Beacon is turned off
  5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
  5 minutes output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
  30 frames input, 2128 bytes
    0 discards, 0 errors
    0 CRC, 0 unknown class
    0 too long, 0 too short
  34 frames output, 3272 bytes
    0 discards, 0 errors
  4 input OLS, 4 LRR, 6001 NOS, 0 loop inits
  6007 output OLS, 6003 LRR, 2 NOS, 0 loop inits
  12 receive B2B credit remaining
  2 transmit B2B credit remaining
```

Is the Port UP and Is the Correct Mode Displayed?

FCID Assigned to the HBA

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## show port internal info int fc 2/1

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```
Moose-9216# sh port internal info interface fc 2/1

fc2/1 - if_index: 0x01080000, phy_port_index: 0x20
Admin Config - state(up), mode(F), speed(auto), trunk(on)
beacon(off), snmp trap(on), tem(false)
rx bb_credit(default), rx bb_credit multiplier(default)
rx bb_credit performance buffers(default)
rxbufsize(2112), encap(default), user_cfg_flag(0x1)
description()
Operational Info - state(up), mode(F), speed(1 Gbps), trunk(off)
state reason(None)
phy port enable (1), phy layer (FC), port_rate_mode(OSM)
participating(1), port_vsan(1), fcid(0x650500), hb_ssn(0)
rx bb_credit(12), rx bb_credit multiplier(400)
rx bb_credit performance buffers(0), tx bb_credit(2)
not first time port bringup is 1
current state [PT_PSM_ST_F_PORT_UP]
port_init_eval_flag(0x00003001), cfg wait for none
Mts mode id 0x202
Lock Info: resource [fc2/1]
  type[0] p_gwrap(nil)
    FREE @ 11012 usecs after Sun May  2 09:18:38 2004
  type[1] p_gwrap(nil)
    FREE @ 3314 usecs after Sun May  2 09:18:35 2004
  type[2] p_gwrap(nil)
    FREE @ 62317 usecs after Mon Apr 26 15:33:52 2004
0x10001200
Timer active for PT_PSM_EV_PORT_VSAN_CHG_TIMER_EXPIRED
cnt_link_failure(16), cnt_link_success(28), cnt_port_up(16)
cnt_cfg_wait_timeout(0), cnt_port_cfg_failure(0), cnt_init_retry(0)
nos link failures (0), debounce window (300 ms), elp wait tout (550 ms)
link fail reason (0x0)
```

Link Speed

FCID Assigned

Current State

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## show port internal info inter fc 2/1 (Cont.)

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```
Port Capabilities -
Modes: E,TE,F,FL,TL,SD,ST
Min Speed: 1000
Max Speed: 2000
Max Sourceable Pkt Size: 2112
Max Tx Bytes: 2112
Max Rx Bytes: 2112
Max Tx Buffer Credit: 255
Rx Buffer Credit: Min(12), Max(12), Default(12)
Rx Buffer Credit Multiplier: Min(400), Max(3133), Default(400)
Rx Buffer Credit performance buffers: Min(1), Max(0), Default(0)
Rx Buffer Credit change not allowed
Rx Buffer Credit performance buffer change not allowed
Port rate mode change not allowed
BB_SCN processing not supported
Max BB_SCN 0
Max Private Devices: 63
Hw Capabilities: 0xb
Connector Type: 0x0
FCOT info - flags 0x1
Min Speed: 1000
Max Speed: 2000
Module Type: 8
Connector Type: 7
Gigabit Eth Compliance Codes: 0
FC Transmitter Type: Shortwave Laser(3)
Vendor Name: CISCO-AGILENT
Vendor ID: 0:48:255
Vendor Part Num: QFBR-5784L
Vendor Revision Level:
Trunk Info -
trunk vsans (allowed active) (1,4,20,50,67,100)
Pacer: stat up, mode unknown
RNID info not found.
```

What This Port  
Is Capable of, Not  
How It Is Currently  
Operating

From FCOT EEPROM

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## Debugging Name Server Issues

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If a host is not receiving a proper response, or if not able to discover a target, enable the following debug and shut/no shut the host interface

1. **debug fcns events** (this will give the request and response from the fabric name server)
2. **Check if the host and the disk are in the same zone** (show zoneset active vsan x); look for the \* next to each device FCID; missing \* means device is not in the fabric
3. **Check if the host and the disk are in the same VSAN** (use fcping or fctrace, show VSAN membership)

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## FCANALYZER Run on MDS with HBA

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```
Moose-9216(config)# fcanalyzer local brief display-filter mdshdr.vsan==0x1
Warning: Couldn't obtain netmask info (eth2: no IPv4 address assigned).
Capturing on eth2
```

9.988278	00.00.00 -> ff.ff.fe	0x9b 0xffff FC ELS FLOGI
10.016042	ff.ff.fe -> 65.05.00	0x9b 0x0dc2 FC ELS ACC (FLOGI)
10.016598	ff.fc.65 -> 65.05.00	0x0dc4 0xffff FC ELS PLOGI
10.031302	65.05.00 -> ff.ff.fc	0x9c 0xffff FC ELS PLOGI
10.031502	ff.ff.fc -> 65.05.00	0x9c 0x0dc9 FC ELS ACC (PLOGI)
10.031307	65.05.00 -> ff.fc.65	0x0dc4 0x9d FC ELS LS_RJT (PLOGI)
10.031735	65.05.00 -> ff.ff.fc	0xa0 0xffff dNS GID_FT
10.035248	ff.ff.fc -> 65.05.00	0xa0 0x0dca dNS ACC (GID_FT)
10.035544	65.05.00 -> ff.ff.fc	0xa1 0xffff FC ELS LOGO
10.036667	ff.ff.fc -> 65.05.00	0xa1 0x0dcb FC ELS ACC (LOGO)
10.036862	65.05.00 -> ff.ff.fd	0xa2 0xffff FC ELS SCR
10.037116	ff.ff.fd -> 65.05.00	0xa2 0x0dcc FC ELS ACC (SCR)
11.310204	ff.fc.65 -> 65.05.00	0x0dce 0xffff FC ELS PLOGI
11.310350	65.05.00 -> ff.fc.65	0x0dce 0xa9 FC ELS LS_RJT (PLOGI)

**OX\_ID correlates  
Command and  
Response**

**You May Omit the Word 'Brief' to Obtain a 'Detailed' View of Each Frame**

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## FCANALYZER Run on MDS with Storage

Cisco.com

```
Musky-9506(config)# fcanalyzer local brief display-filter mdshdr.vsan==0x01
Warning: Couldn't obtain netmask info (eth2: no IPv4 address assigned).
Capturing on eth2
```

4.292015	00.00.00 -> ff.ff.fe	0x355 0xffff FC ELS FLOGI
4.311688	ff.ff.fe -> 68.01.00	0x355 0xb606 FC ELS ACC (FLOGI)
4.312309	ff.fc.68 -> 68.01.00	0xb608 0xffff FC ELS PLOGI
4.313079	68.01.00 -> ff.ff.fc	0x31d 0xffff FC ELS PLOGI
4.313221	68.01.00 -> ff.fc.68	0xb608 0xffff FC ELS ACC (PLOGI)
4.313275	ff.fc.68 -> 68.01.00	0xb607 0xffff FC ELS PRLI
4.313372	68.01.00 -> ff.fc.68	0xb607 0xffff FC ELS ACC (PRLI)
4.313609	ff.fc.68 -> 68.01.00	0xb60c 0xffff FC ELS PRLO
4.314140	ff.ff.fc -> 68.01.00	0x31d 0xb60a FC ELS ACC (PLOGI)
4.314400	68.01.00 -> ff.fc.68	0xb60c 0xffff FC ELS ACC (PRLO)
4.314547	68.01.00 -> ff.ff.fc	0x321 0xffff dNS RFT_ID
4.314899	ff.ff.fc -> 68.01.00	0x321 0xb60e dNS ACC (RFT_ID)
4.316056	ff.fc.68 -> 68.01.00	0xb610 0xffff FC ELS LOGO
4.316895	68.01.00 -> ff.fc.68	0xb610 0xffff FC ELS ACC (LOGO)

```
Musky-9506(config)#
```

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## FCANALYZER Detailed

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```
Frame 59 (84 bytes on wire, 84 bytes captured)
Arrival Time: May 2, 2004 09:18:38.619000000
Time delta from previous packet: 0.000636000 seconds
Time since reference or first frame: 6.208743000 seconds
Frame Number: 59
Packet Length: 84 bytes
Capture Length: 84 bytes
Fibre Channel
Exchange First In: 58
Time from Exchange First: 0.000636000 seconds
R_CTL: 0x3(Device_Data/Solicited Control)
Dest Addr: 65.05.00
CS_CTL: 0x00
Src Addr: ff.ff.fc
Type: FC_CT (0x20)
F_CTL: 0x980000 Exchange Responder, Seq Initiator, Exchg Last, Seq Last, CS_CTL, Last Data Frame - No Info, ABTS - Abort/MS,
1 ..... = ExgRpd: Exchange Responder
..0. .... = SeqRec: Seq Initiator
..0. .... = ExgFst: NOT exchg first
...1 ..... = ExgLst: Exchg Last
...1 ..... = SeqLst: Seq Last
....0 ..... = Pri: CS_CTL
....0 ..... = TSI: NOT transfer seq initiative
....00 ..... = LDP: Last Data Frame - No Info (0x000000)
....00 ..... = A01: no ack required (0x000000)
....0 ..... = RetSeq: NOT retransmitted sequence
....00 ..... = AA: ABTS - Cont (0x000000)
....0 ..... = RelOff: rel offset NOT set
SEQ_ID: 0x01
DF_CTL: 0x00
SEQ_CNT: 0
OX_ID: 0x00a0
RX_ID: 0xd0a5
Parameter: 0x00000000
FC_CT
Revision: 1
IN_ID: 00.00.00
GS Type: Directory Service (0xfc)
GS Subtype: 0x02
Server: dNS (0x01)
Options: 0x00
dNS
Opcode: MSG_ACC (0x8002)
Maximum/Residual Size: 0
Port Identifier: 65.00.00
Port Identifier: 68.01.00
```

The FCIDs in the Response are Limited by Zoning; Only Devices In the Zone with the HBA Are Returned

This Is the Answer to the GID\_FT; Here We See the FCID of the Storage Port Presented to the HBA; This Is How the HBA 'Discovers' Storage

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## Host Can Not See Storage Troubleshooting

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- Is host logged into the fabric?
- Is storage port logged into the fabric?
- Do both devices show up in the name server?
- Are both devices in the same zone?
- Is the zone with both devices in the active zoneset?

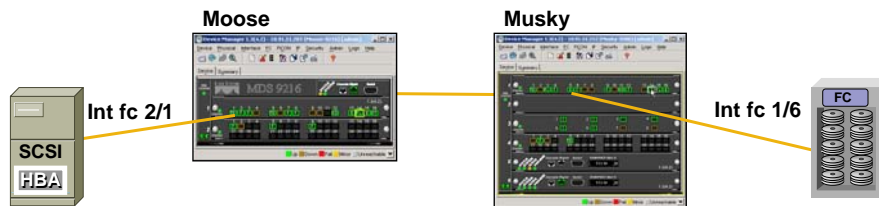
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## Host Can Not See Storage (Cont.)

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### On Moose:

Show interface 2/1  
Show flogi data vsan 1  
Show fcns database vsan 1  
Show zoneset active

### On Musky:

Show interface 1/6  
Show flogi data vsan 1  
Show fcns database vsan 1  
Show zoneset active

### Other actions:

FcAnalyzer on Moose and Musky  
SPAN or RSPAN for RX and TX on interfaces 2/1 and 1/6

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## Host Can Not See Storage (Cont.)

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```

Moose-9216# show interface fc 2/1
fc2/1 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:41:00:0d:65:b4:2a:00
  Admin port mode is F
  Port mode is F, FCID is 0x650500
  
```

This Is as Good  
as It Gets from  
the MDS Displays

```

Moose-9216# show flogi data vsan 1
  
```

INTERFACE	VSAN	FCID	PORT NAME	NODE NAME
fc2/1	1	0x650500	10:00:00:e0:69:f0:41:56	10:00:00:e0:69:f0:41:56

```

Moose-9216# show fcns data vsan 1
  
```

VSAN 1:

PCID	TYPE	PWWN	(VENDOR)	FC4-TYPE:FEATURE
0x680100	N	20:05:00:a0:b8:0c:64:51	(SymBios)	scsi-fcp:target
0x650500	N	10:00:00:e0:69:f0:41:56	(JN1)	

```

Moose-9216# show zoneset active vsan 1
  
```

```

zoneset name ZoneSet1 vsan 1
zone name LOON_HBA vsan 1
* fcid 0x680100 [pwwn 20:05:00:a0:b8:0c:64:51 lun 0004]
* fcid 0x650500 [pwwn 10:00:00:e0:69:f0:41:56]
  
```

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## Host Can Not See Storage

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- Frames from HBA to storage port require an analyzer of some sort; DS-PAA or inline FC trace tool along with SPAN
- If everything looks good from fabric, then suspect LUN masking, or storage-array security software
- Did it ever work? Did something like the storage port FCID change? This would impact AIX or HP\_UX operating systems

**Tip:** Allow Access for the VHBA of MDS to Query LUNs on the Array Controllers; this Gives the Network Troubleshooter One More Tool to Verify Access of the LUN by the Host; <show scsi-target internal lun>

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## Section Notes

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- Understand the roles of the FC devices as they relate to the switch services
- FCIDs are important, remember the FCID is also used to route frame through the network
- Many outputs from the fabric manager can help keep track of FCID to WWN mapping
- Always check zoning

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## SWITCH-TO-SWITCH NETWORK TROUBLESHOOTING



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## Inter-Switch Link Troubleshooting

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- Understanding the Inter-Switch Link (ISL) connection
- Troubleshooting domain issues
- Viewing and debugging Eports
- Using the tools

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## Troubleshooting ISLs

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## Show FC Domain Domain-List

```

VSAN 1
Number of domains: 3
Domain ID      WWN
0x60(104)      20:01:50:0d:ec:00:ea:41 [Local] [Principal]
0x61(105)      20:01:50:0d:ec:00:ea:42 [Local]
0x75(117)      20:01:50:0b:bc:77:72:41

VSAN 4
Number of domains: 4
Domain ID      WWN
0x01(1)         10:00:00:05:96:a6:93:c1
0xb2(2)         20:00:00:06:53:3b:cc:c1
0x1(3)          20:04:00:d2:55:b4:2a:01 [Principal]
0x2(4)          20:04:00:d2:ec:00:ea:41 [Local]

VSAN 13
Number of domains: 1
Domain ID      WWN
0x0a(210)       20:04:00:d2:ec:00:ea:41 [Local] [Principal]

VSAN 20
Number of domains: 1
Domain ID      WWN
0x25(37)        20:14:00:d2:55:b4:2a:01 [Principal]
0xb4(109)       20:14:00:d2:ec:00:ea:41 [Local]

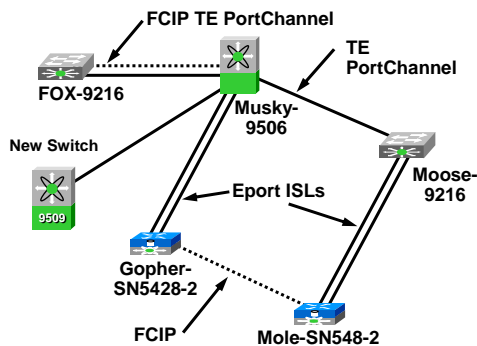
VSAN 50
Number of domains: 2
Domain ID      WWN
0xb1(177)       20:32:00:0d:45:b4:2a:01 [Principal]
0x30(48)        20:32:00:0d:45:b4:2a:01 [Local]

VSAN 67
Number of domains: 3
Domain ID      WWN
0x61(97)        20:43:00:0d:bc:77:72:41 [Principal]
0x47(3)         20:43:00:0d:ec:00:ea:41 [Local]
0x7a(122)       20:43:00:9d:45:b4:2a:01

VSAN 201
Number of domains: 2
Domain ID
0x06(96)        20:05:00:0d:bc:77:72:41 [Principal]
0xb0(105)       20:05:00:0d:ec:00:ea:41 [Local]

```

			Local Switch			Principal Switch		
Switch	Variant	State	Domain	VVNN	Priority	VVNN	Priority	
FCN-916	01	inactive	0076(1177)	201.00.00.06	77.72.41	128.01.00.04	00.00.01.41	
FCN-916	02	inactive	0076(1177)	201.00.00.06	77.72.41	128.01.00.04	00.00.01.41	
Moosie-9606	1	inactive	0086(104)	201.00.00.06	00.01.41	201.00.00.06	00.01.41	
Moosie-9216	4	inactive	01(13)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
Moosie-9216	5	inactive	00(24)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
Moosie-9216	6	inactive	00(81)189	201.00.00.06	64.28.01	128.01.00.06	64.28.01	
Moosie-9216	20	inactive	00(2537)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
Moosie-9216	20	inactive	00(3045)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
Moosie-9216	20	inactive	00(81177)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
FCN-9216	67	inactive	00(81397)	201.00.00.06	77.72.41	201.00.00.06	77.72.41	
FCN-9216	67	inactive	00(81397)	201.00.00.06	77.72.41	201.00.00.06	77.72.41	
Moosie-9216	67	inactive	00(74322)	201.00.00.06	64.28.01	128.01.00.06	64.28.01	
Moosie-9216	100	inactive/active/drop	00(30393)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
Moosie-9216	100	inactive/active/drop	00(30393)	201.00.00.06	64.28.01	201.00.00.06	64.28.01	
FCN-9216	201	inactive	00(6096)	201.00.00.06	77.72.41	201.00.00.06	77.72.41	



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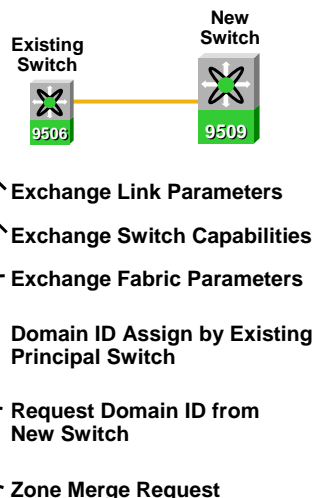
**TE EISL**

\*

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### FCAnalyzer Trace Taken from Switch Musky

01.508574	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.508646	FF.FF.FF	-> FF.FF.FF	0x1e6f	0x9565	FC_LINK_CLI	ACK1
01.508657	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.508705	FF.FF.FF	-> FF.FF.FF	0x1e6f	0x9565	FC_LINK_CLI	ACK1
01.508716	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.522546	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.522592	FF.FF.FF	-> FF.FF.FF	0x1e6f	0x9566	SM_ILS_SMRCD	ESC1
01.522603	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.602339	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_0x71	
01.602340	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_0x71	
01.627094	FF.FF.FF	-> FF.FF.FF	0x456b	0xffff	SM_ILS_0x71	
01.627105	FF.FF.FF	-> FF.FF.FF	0x456b	0xffff	SM_ILS_0x71	
01.628462	FF.FF.FF	-> FF.FF.FF	0x456b	0x1e6f	SM_ILS_SMRCD	OK07
01.628473	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.629635	FF.FF.FF	-> FF.FF.FF	0x1e6f	0x9567	SM_ILS_SMRCD	OK07
01.629928	FF.FF.FF	-> FF.FF.FF	0x1e6f	0x9567	FC_LINK_CLI	ACK1
01.629939	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.639731	FF.FF.FF	-> FF.FF.FF	0x4569	0x1e70	FC_LINK_CLI	ACK1
01.639742	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.646344	FF.FF.FF	-> FF.FF.FF	0x4569	0x1e70	FC_LINK_CLI	ACK1
01.646355	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.646370	FF.FF.FF	-> FF.FF.FF	0x1e71	0x956a	FC_LINK_CLI	ACK1
01.646382	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.646470	FF.FF.FF	-> FF.FF.FF	0x456b	0x1e72	FC_LINK_CLI	ACK1
01.647103	FF.FF.FF	-> FF.FF.FF	0x456b	0x1e72	SM_ILS_SMRD	ESC1
01.647114	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.673554	FF.FF.FF	-> FF.FF.FF	0x456b	0x1e72	FC_LINK_CLI	ACK1
01.673565	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.673833	FF.FF.FF	-> FF.FF.FF	0x1e73	0xffff	SM_ILS_EFP	OK
01.673844	FF.FF.FF	-> FF.FF.FF	0x1e73	0xffff	SM_ILS_EFP	OK
01.675295	FF.FF.FF	-> FF.FF.FF	0x456d	0x1e73	SM_ILS_EFP	OK
01.675306	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.675660	FF.FF.FF	-> FF.FF.FF	0x1e73	0x956b	SM_ILS_SMRCD	ESC1
01.675671	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.675682	FF.FF.FF	-> FF.FF.FF	0x456d	0x1e74	FC_LINK_CLI	ACK1
01.675693	FF.FF.FF	-> FF.FF.FF	0x1e73	0x956b	FC_LINK_CLI	ACK1
01.675704	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.675715	FF.FF.FF	-> FF.FF.FF	0x456e	0x1e75	FC_LINK_CLI	ACK1
01.681361	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.681372	FF.FF.FF	-> FF.FF.FF	0x456e	0x1e75	FC_LINK_CLI	ACK1
01.681383	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.682017	FF.FF.FF	-> FF.FF.FF	0x1e76	0x956f	FC_LINK_CLI	ACK1
01.682028	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.683120	FF.FF.FF	-> FF.FF.FF	0x1e76	0x956f	FC_LINK_CLI	ACK1
01.683130	FF.FF.FF	-> FF.FF.FF	0x4570	0x1e7f	SM_ILS_EFP	OK
01.683141	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.692358	FF.FF.FF	-> FF.FF.FF	0x4571	0xffff	SM_ILS_MR	
01.692369	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.699912	FF.FF.FF	-> FF.FF.FF	0x4570	0x1e77	SM_ILS_SMRCD	ESC1
01.699923	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.711291	FF.FF.FF	-> FF.FF.FF	0x1e71	0xffff	SM_ILS_MR	
01.711302	FF.FF.FF	-> FF.FF.FF	0x1e6f	0xffff	SM_ILS_EFP	OK
01.720914	FF.FF.FF	-> FF.FF.FF	0x4571			



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## E\_Port, TE\_Port Connection Problems

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- 1. Trunk E-Port configuration mismatch**  
Fabric parameters and timers mismatch switch
- 2. Zoning parameters mismatch per VSAN or switch**
- 3. VSAN configuration mismatch (MDS9000)**
- 4. Domain IDs must not conflict on either VSAN or switch**

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## E\_Port, TE\_Port Troubleshooting

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- 1. Isolation due to ELP (Exchange Link Parameters) failure**
  - ED\_TOV timer
  - RA\_TOV timer
  - Frame size
  - FS\_TOV timer
- 2. Isolation due to zone merge failure**
  - Same name used to describe two different types or content mismatch in the merging switches
  - If the same zones on two different switches contain different members
- 3. Isolation due to port VSAN mismatch**
  - E\_ports not in same VSAN (when not doing trunking)
  - MDS9000# sh vsan membership

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# E\_Port Troubleshooting Domain Assignment Failure

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- Each VSAN or FC switch has its own domain ID, what happens when they are the same?

E\_Port becomes isolated because of the domain ID's overlap on the two switches

New switch being added to the network will be assigned an ID if not managed with one
- If both switches are in production network, there are two ways to resolve the issue but both are disruptive to the FC network

A Cisco MDS9000 can be configured to force a RCF (Reconfigure Fabric); this will force a reselection of domain IDs and resolve the issue

Take the switch offline and manually configure domain ID and re-enable switch

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## TE EISL Interface

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### Working and VSAN Operational

```
Musky-9506# sh int fc 4/13
Fc4/13 is trunking
Port description is ISL to Bear
Hardware is Fibre Channel, FDI is short wave laser
Port NNN is 20:cd:00:0d:ec:00:ea:40
Peer port NNN is 20:41:00:0d:ec:01:40:80
Admin port mode is E, trunk mode is on
Port mode is TE
Speed is 2 Gbps
Transmit B2B Credit is 12
Receive B2B Credit is 12
Receive data Field Size is 2112
Beacon is turned off
Trunk vsans (admin allowed and active) (2)
Trunk vsans (up) (2)
Trunk vsans (isolated) (0)
Trunk vsans (initializing) (0)
5 minutes input rate 104 bits/sec, 15 bytes/sec, 0 frames/sec
5 minutes output rate 80 bits/sec, 10 bytes/sec, 0 frames/sec
8108 frames input, 54316 bytes
0 CRC, 0 unknown class
0 too long, 0 too short
8092 frames output, 378232 bytes
0 discards, 0 errors
40 input OLS, 34 LRR, 18 NOS, 271 loop inits
101 output OLS, 15 LRR, 52 NOS, 42 loop inits
12 receive B2B credit remaining
12 transmit B2B credit remaining
```

FCDOMAIN-2-EPORT\_ISOLATED: %\$VSAN 2%\$  
Isolation of interface fc4/13  
(Reason: Other Side Eport Indicates Isolation)

### Not Working and VSAN Isolated

```
Musky-9506# sh int fc 4/13
Fc4/13 is trunking (Not all VSANs UP on the trunk)
Port description is ISL to Bear
Hardware is Fibre Channel, FDI is short wave laser
Port NNN is 20:cd:00:0d:ec:00:ea:40
Peer port NNN is 20:41:00:0d:ec:01:40:80
Admin port mode is E, trunk mode is on
Port mode is TE
Speed is 2 Gbps
Transmit B2B Credit is 12
Receive B2B Credit is 12
Receive data Field Size is 2112
Beacon is turned off
Trunk vsans (admin allowed and active) (2)
Trunk vsans (up) (0)
Trunk vsans (isolated) (2)
Trunk vsans (initializing) (0)
5 minutes input rate 72 bits/sec, 9 bytes/sec, 0 frames/sec
5 minutes output rate 48 bits/sec, 6 bytes/sec, 0 frames/sec
8227 frames input, 555820 bytes
0 discards, 0 errors
0 CRC, 0 unknown class
0 too long, 0 too short
8211 frames output, 387060 bytes
0 discards, 0 errors
41 input OLS, 37 LRR, 20 NOS, 271 loop inits
109 output OLS, 18 LRR, 53 NOS, 42 loop inits
12 receive B2B credit remaining
12 transmit B2B credit remaining
```

FCDOMAIN-2-EPORT\_ISOLATED:  
Isolation of interface fc2/1  
(Reason: Domain ID Assignment Failure)—VSAN 2

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# Incorrect Domain ID

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**FCAnalyzer Trace**

```
31.974365 FF,FF,fd -> FF,FF,fd 0x1e2d 0xffff SM_ILS ELP
31.974454 FF,FF,fd -> FF,FF,fd 0x1e2d 0x4526 FC Link Ctl, ACK1
31.974985 FF,FF,fd -> FF,FF,fd 0x1e2d 0x4526 SM_ILS SM_ACC (ELP)
31.975207 FF,FF,fd -> FF,FF,fd 0x1e2d 0x4526 FC Link Ctl, ACK1
31.990308 FF,FF,fd -> FF,FF,fd 0x1e2e 0xffff SM_ILS ESC
```

**Existing Switch** 9506 **New Switch** 9509

**Same Domain ID as Existing Switch**

**SM\_ILS**  
Cad Code: SM\_ACC (0x02)  
Payload Len: 16  
Req Switch Name: 20:02:00:0d:ec:01:40:80 (00:0d:ec)  
Domain ID Record  
Switch Name: 20:02:00:0d:ec:01:40:81 (00:0d:ec)  
Domain ID: 0x0f

**SM\_ILS**  
Cad Code: DIR (0x12)  
Switch Name: 20:02:00:0d:ec:00:ea:41 (00:0d:ec)

**SM\_ILS**  
Cad Code: RDI (0x13)  
Payload Len: 16  
Req Switch Name: 20:02:00:0d:ec:01:40:81 (00:0d:ec)  
Requested Domain ID: 239

**SM\_ILS**  
Cad Code: SM\_ACC (0x02)  
Payload Len: 16  
Req Switch Name: 20:02:00:0d:ec:01:40:81 (00:0d:ec)  
Granted Domain ID: 231

**SM\_ILS**  
Cad Code: EFP (0x11)  
Payload Len: 48  
Principal Switch Priority: 2  
Principal Switch Name: 20:02:00:0d:ec:00:ea:41 (00:0d:ec)  
Domain ID Record  
Switch Name: 20:02:00:0d:ec:00:ea:41 (00:0d:ec)  
Domain ID: 0x0f

**SM\_ILS**  
Cad Code: SM\_RJT (0x01)  
Reason Code: Unable to Perform (0x09)  
Reason Code Explanation: E-Port Isolated (0x2f)  
Vendor Unique Error Code: 0x0d

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# E\_Port Domain Issues

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**Musky** 9506 **Bear** 9509

**Musky-9506# sh int fc 4/13**  
fc4/13 is down (Isolation due to domain other side eport isolated)  
Port description is ISL to Bear  
Hardware is Fibre Channel, FDDI is short wave laser  
Port MWW is 20:02:00:0d:ec:00:ea:40  
Admin port mode is E, trunk mode is on  
Port vsan is 2  
Receive data field Size is 2112  
Beacon is turned off  
5 minutes input rate 120 bits/sec, 15 bytes/sec, 0 frames/sec  
5 minutes output rate 120 bits/sec, 15 bytes/sec, 0 frames/sec  
8637 Frames input, 93212 bytes  
0 discards, 0 errors  
0 CRC, 0 unknown class  
0 too long, 0 too short  
8620 Frames output, 418388 bytes  
0 discards, 0 errors  
43 input OLS, 44 LRR, 22 NOS, 271 loop inits  
125 output OLS, 26 LRR, 53 NOS, 42 loop inits  
12 receive B2B credit remaining  
12 transmit B2B credit remaining

**Bear-9509# sh int fc 2/1**  
fc2/1 is down (Isolation due to domain overlap)  
Port description is ISL to Musky  
Hardware is Fibre Channel, FDDI is short wave laser  
Port MWW is 20:41:00:0d:ec:01:40:80  
Admin port mode is E, trunk mode is off  
Port vsan is 2  
Receive data field Size is 2112  
Beacon is turned off  
5 minutes input rate 176 bits/sec, 22 bytes/sec, 0 frames/sec  
5 minutes output rate 120 bits/sec, 16 bytes/sec, 0 frames/sec  
8623 Frames input, 587156 bytes  
0 discards, 0 errors  
0 CRC, 0 unknown class  
0 too long, 0 too short  
8622 Frames output, 424236 bytes  
0 discards, 0 errors  
20 input OLS, 22 LRR, 24 NOS, 3 loop inits  
72 output OLS, 25 LRR, 11 NOS, 4 loop inits  
12 receive B2B credit remaining  
12 transmit B2B credit remaining

**Log from Musky**

2004 May 4 12:40:14 Musky-9506 %FCDOMAIN-2-EPORT\_ISOLATED: %\$VSAN 2%\$ Isolation of interface fc4/13 (reason: other side Eport indicates isolation)

2004 May 4 12:40:14 Musky-9506 %ZONE-2-ZS\_MERGE\_FAILED: Zone merge failure, isolating interface fc4/13 (VSAN 2)

**Log from Bear**

May 4 20:14:04 Bear-9509 %FCDOMAIN-2-EPORT\_ISOLATED: Isolation of interface fc2/1 (reason: domain ID assignment failure) - VSAN 2.

May 4 20:14:04 Bear-9509 %PORT-5-IF\_DOWN\_DOMAIN\_OVERLAP\_ISOLATION: Interface fc2/1 is down (Isolation due to domain overlap)

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# Device Registration: RSCN

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## View of Registered State Change Notification Going Across ISL with FCAalyzer

```
10.299610 ff.fc.ee -> ff.fc.ee 0x1fa 0xffff SM_ILS SM_RSCN
10.299694 ff.fc.ee -> ff.fc.32 0x1fa 0x2b09 FC Link Ctl, ACK1
10.299870 ff.fc.ee -> ff.fc.32 0x1fa 0x2b09 SM_ILS SM_ACC (SM_RSCN)
10.300193 ff.fc.32 -> ff.fc.ee 0x1fa 0x2b09 FC Link Ctl, ACK1
10.300897 ff.fc.ee -> ff.fc.32 0x2bda 0xffff dms GE_ID
10.301045 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.301220 ff.fc.32 -> ff.fc.ee 0x2bda 0x1fc FC Link Ctl, ACK1
10.301292 ff.fc.ee -> ff.fc.32 0x2bda 0xffff dms GE_ID
10.301367 ff.fc.32 -> ff.fc.ee 0x2bda 0x1fc dms ACC (GE_ID)
10.301390 ff.fc.ee -> ff.fc.32 0x2bda 0x1fc FC Link Ctl, ACK1
10.301514 ff.fc.32 -> ff.fc.ee 0x2bda 0x1fd FC Link Ctl, ACK1
10.301905 ff.fc.32 -> ff.fc.ee 0x2bda 0x1fd dms ACC (GE_ID)
10.301981 ff.fc.ee -> ff.fc.32 0x2bda 0x1fd FC Link Ctl, ACK1
10.303060 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.303171 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.306349 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.306451 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.307090 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.308016 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS LOGO
10.308234 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.308399 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (LOGO)
10.308984 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.309029 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.311478 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.311576 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS PLOGI
10.312060 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (PLOGI)
10.312904 ff.fc.ee -> 32.01.e4 0x2bda 0xffff FC ELS LOGO
10.313379 32.01.e4 -> ff.fc.ee 0x2bda 0xffff FC ELS ACC (LOGO)
10.810715 ff.fc.32 -> ff.fc.ee 0x201 0xffff SM_ILS SM_RSCN
10.810807 ff.fc.ee -> ff.fc.32 0x201 0x2b04 FC Link Ctl, ACK1
10.810998 ff.fc.ee -> ff.fc.32 0x201 0x2b04 SM_ILS SM_ACC (SM_RSCN)
10.811299 ff.fc.32 -> ff.fc.ee 0x201 0x2b04 FC Link Ctl, ACK1
10.811770 ff.fc.ee -> ff.fc.32 0x2bda 0xffff dms GE_ID
10.812032 ff.fc.32 -> ff.fc.ee 0x2bda 0x202 FC Link Ctl, ACK1
10.812058 ff.fc.ee -> ff.fc.32 0x2bda 0xffff dms GE_ID
10.812034 ff.fc.ee -> ff.fc.ee 0x2bda 0x202 dms ACC (GE_ID)
10.812080 ff.fc.ee -> ff.fc.32 0x2bda 0x202 FC Link Ctl, ACK1
10.812327 ff.fc.32 -> ff.fc.ee 0x2bda 0x203 FC Link Ctl, ACK1
10.812328 ff.fc.32 -> ff.fc.ee 0x2bda 0x203 dms ACC (GE_ID)
10.812353 ff.fc.ee -> ff.fc.32 0x2bda 0x203 FC Link Ctl, ACK1
17.610419 ff.ff.fd -> ff.ff.fd 0x204 0xffff SM_ILS HLD
17.610905 ff.ff.fd -> ff.ff.fd 0x204 0x2b07 FC Link Ctl, ACK1
17.610728 ff.ff.fd -> ff.ff.fd 0x2bda 0xffff SM_ILS HLD
17.611002 ff.ff.fd -> ff.ff.fd 0x2bda 0x205 FC Link Ctl, ACK1
```

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## Show rscn scr-table Tells Us Who Is Causing Notifications

## Show rscn Stats Give You Overall View of All Device-State Change Information from that VSAN

Tip: Used SH FLOGI Database to See Which FC Port

```
Musky-9506# sh rscn scr-table vsan 20
SCR table for VSAN: 20
-----
FC-ID          REGISTERED FOR
-----
0xbd0200      fabric and nport detected rscns
0xbd0500      fabric detected rscns

Total number of entries = 2

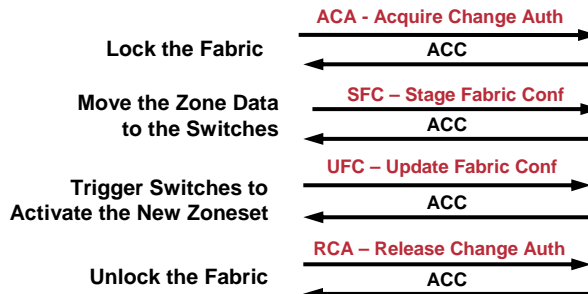
Musky-9506# sh rscn statistics vsan 20
Statistics for VSAN: 20
-----
Number of SCR received          = 0
Number of SCR ACC sent          = 0
Number of SCR RJT sent          = 0
Number of RSCN received         = 0
Number of RSCN sent             = 289
Number of RSCN ACC received     = 29
Number of RSCN ACC sent         = 0
Number of RSCN RJT received     = 0
Number of RSCN RJT sent         = 0
Number of SW-RSCN received      = 3
Number of SW-RSCN sent          = 107
Number of SW-RSCN ACC received  = 107
Number of SW-RSCN ACC sent      = 2
Number of SW-RSCN RJT received  = 0
Number of SW-RSCN RJT sent     = 1
```

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# Activate Zoneset Flow

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## Zoneset Distribution Would Go to Every Domain Within the VSAN



ACK1 Frames Are Not Shown Here

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# Activate Zoneset FC Analyzer

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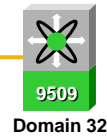
## FCAnalyzer Trace Switch Musky

5,724861	ff,fc,ef -> ff,fc,32	0x443b 0xffff SM_ILS RCR
5,725176	ff,fc,32 -> ff,fc,ef	0x443b 0x1d44 FC Link Ctl, ACK1
5,725321	ff,fc,32 -> ff,fc,ef	0x443b 0x1d44 SM_ILS SM_ACC (RCR)
5,725340	ff,fc,ef -> ff,fc,32	0x443b 0x1d44 FC Link Ctl, ACK1
5,726384	ff,fc,ef -> ff,fc,32	0x443c 0xffff SM_ILS SFC
5,726790	ff,fc,32 -> ff,fc,ef	0x443c 0x1d45 FC Link Ctl, ACK1
5,727080	ff,fc,32 -> ff,fc,ef	0x443c 0x1d45 SM_ILS SM_ACC (SFC)
5,727106	ff,fc,ef -> ff,fc,32	0x443c 0x1d45 FC Link Ctl, ACK1
5,727370	ff,fc,ef -> ff,fc,32	0x443d 0xffff SM_ILS UFC
5,727668	ff,fc,32 -> ff,fc,ef	0x443d 0x1d46 FC Link Ctl, ACK1
5,857274	ff,fc,32 -> ff,fc,ef	0x443d 0x1d46 SM_ILS SM_ACC (UFC)
5,857335	ff,fc,ef -> ff,fc,32	0x443d 0x1d46 FC Link Ctl, ACK1
5,857489	ff,fc,ef -> ff,fc,32	0x443e 0xffff SM_ILS RCR
5,857857	ff,fc,32 -> ff,fc,ef	0x443e 0x1d47 FC Link Ctl, ACK1
5,858296	ff,fc,32 -> ff,fc,ef	0x443e 0x1d47 SM_ILS SM_ACC (RCR)
5,858318	ff,fc,ef -> ff,fc,32	0x443e 0x1d47 FC Link Ctl, ACK1
8,843033	ff,ff,fd -> ff,ff,fd	0x1d48 0xffff SM_ILS HLO
8,843133	ff,ff,fd -> ff,ff,fd	0x1d48 0x443f FC Link Ctl, ACK1
9,104087	ff,ff,fd -> ff,ff,fd	0x4440 0xffff SM_ILS HLO
9,104422	ff,ff,fd -> ff,ff,fd	0x4440 0x1d49 FC Link Ctl, ACK1

## Musky



## Bear



Zoneset →

## FCAnalyzer Trace for New Switch Bear

0,000000	ff,fc,ef -> ff,fc,32	0x443b 0xffff SM_ILS RCR
0,000098	ff,fc,32 -> ff,fc,ef	0x443b 0x1d44 FC Link Ctl, ACK1
0,000293	ff,fc,32 -> ff,fc,ef	0x443b 0x1d44 SM_ILS SM_ACC (RCR)
0,000435	ff,fc,ef -> ff,fc,32	0x443b 0x1d44 FC Link Ctl, ACK1
0,001607	ff,fc,ef -> ff,fc,32	0x443c 0xffff SM_ILS SFC
0,001652	ff,fc,32 -> ff,fc,ef	0x443c 0x1d45 FC Link Ctl, ACK1
0,001964	ff,fc,32 -> ff,fc,ef	0x443c 0x1d45 SM_ILS SM_ACC (SFC)
0,002194	ff,fc,ef -> ff,fc,32	0x443c 0x1d45 FC Link Ctl, ACK1
0,002487	ff,fc,ef -> ff,fc,32	0x443d 0xffff SM_ILS UFC
0,002521	ff,fc,32 -> ff,fc,ef	0x443d 0x1d46 FC Link Ctl, ACK1
0,132197	ff,fc,32 -> ff,fc,ef	0x443d 0x1d46 SM_ILS SM_ACC (UFC)
0,132532	ff,fc,ef -> ff,fc,32	0x443d 0x1d46 FC Link Ctl, ACK1
0,132675	ff,fc,ef -> ff,fc,32	0x443e 0xffff SM_ILS RCR
0,132723	ff,fc,32 -> ff,fc,ef	0x443e 0x1d47 FC Link Ctl, ACK1
0,133227	ff,fc,32 -> ff,fc,ef	0x443e 0x1d47 SM_ILS SM_ACC (RCR)
0,133412	ff,fc,ef -> ff,fc,32	0x443e 0x1d47 FC Link Ctl, ACK1
3,118014	ff,ff,fd -> ff,ff,fd	0x1d48 0xffff SM_ILS HLO
3,118294	ff,ff,fd -> ff,ff,fd	0x1d48 0x443f FC Link Ctl, ACK1
3,379252	ff,ff,fd -> ff,ff,fd	0x4440 0xffff SM_ILS HLO
3,379331	ff,ff,fd -> ff,ff,fd	0x4440 0x1d49 FC Link Ctl, ACK1

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# Trunking

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- Note trunking configuration on the MDS ISL ports is different then the Catalyst switches, no desired option
- One side ON and other side AUTO has been used most with MDS TE ports
- Check log for any message indications of trunk issue

Your Trunk Mode Configuration		Resulting State and Port Mode	
Switch 1	Switch 2	Trunking State	Port Mode
On	Auto or on	Trunking (EISL)	TE port
Off	Auto, on, or off	No trunking (ISL)	E port
Auto	Auto	No trunking (ISL).	E port

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## Section Notes

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- Do not over look physical-layer issues when troubleshooting ISL problems
- Many displays available in fabric manager and device manager to monitor ISL issues
- Preplan domain ID assignments, knowing that each VSAN in each MDS requires a unique ID across that SAN; know that domain manager can distribute domain IDs but many users select to manually assign the domain ID
- Understand the FC-SW-2 or FC-SW-3 standard.

<ftp://ftp.t11.org/t11/pub/fc/sw-2/01-365v0.pdf>

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## ZONING TROUBLESHOOTING



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## Section Agenda

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- Internal Workings of Zones on the MDS Switch
- Proper Zone Uses
- Shows and Displays off GUI and CLI
- Debugging Zone Issues

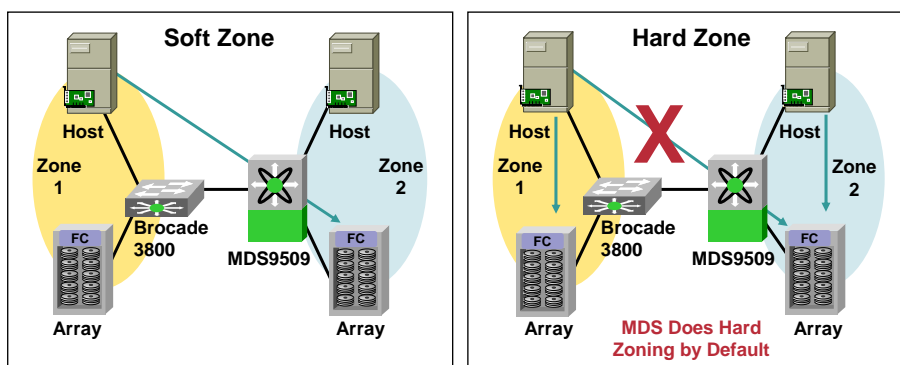
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## Zoning Examples

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- In a soft zone, we rely on the Host in Zone-1 to be a **good neighbor**, and not address frames to FC\_IDs outside of it's zone

- In a hard zone, we do not rely on the host in Zone 1 to be a **good neighbor**; even if it is a bad neighbor and directs frames to FC\_IDs outside of it's zone, they will be blocked

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[illegible]

Microsoft Exchange Mailbox (50402) - Local Mail Store (Mailbox)

✖ Mailbox-9506:Checking status, elapsed time 0 sec activating Mailbox(Mailbox) Deactivation failed. Reason: InvalidDateFormat, switch-Gopher-50402

OK

```
Musky-9506 %ZONE-2-ZS_CHANGE_SFC_FAILED: SFC failed on VSAN 4 : domain 0x1
returns INVALID_DATA
Musky-9506 %ZONE-2-ZS_CHANGE_ACTIVATION_FAILED: Activation failed on VSAN 4
Musky-9506 %ZONE-2-ZS_CHANGE_ACTIVATION_FAILED_RESN_DOM: Activation failed
on VSAN 4: reason: Invalid data domain 1
```

Domain 0x01  
to Domain  
0x2d Where  
the Zoning Is  
Taking Place  
in VSAN 4

### Invalid Data Issue Returns from Switch in the Accept Frame

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**Debug Shows Example of Issue When Trying to Activate a Zoneset Which Has Zoning Information not Compatible with Domain 1; in This Case We Were Doing LUN Zoning**

**Were Doing LUN Zoning**

```

Musky 9506# debug zone change events vsan 4
Musky9506# 2004 May 4 15:13:26 zone: Rcvd fabric change event for vsan 4, cmdnd = 0
2004 May 4 15:13:26 zone: Rcvd event (REQ_CHANGE) on vsan 4, current state = Idle, next state = Get Auth
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Get Auth, next state = Get Auth
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Get Auth, next state = Get Auth
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Get Auth, next state = Get Auth
2004 May 4 15:13:26 zone: Rcvd event (ALL_ACQ) on vsan 4, current state = Get Auth, next state = GET TZ
2004 May 4 15:13:26 zone: Number of consumers: 1
2004 May 4 15:13:26 zone: Sending req for TZ to SAP: 0x6e
2004 May 4 15:13:26 zone: rr-token: 0x1c53ed
2004 May 4 15:13:26 zone: Outstanding Count: 1
2004 May 4 15:13:26 zone: Received response from SAP: 0x6e for rr_token: 0x1c53ed retval: 0xd
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = GET TZ, next state = GET TZ
2004 May 4 15:13:26 zone: Rcvd event (ALL_ACQ) on vsan 4, current state = GET TZ, next state = Sent SFC
2004 May 4 15:13:26 Musky 9506 %ZONE-ZVS_CHANGE_SFC_FAILED: SFC failed on vsan 4: domain 0x1 returns INVALID_DATA
2004 May 4 15:13:26 zone: Rcvd event (RCVD_RJT/FAIL) on vsan 4, current state = Sent SFC, next state = Release Auth
2004 May 4 15:13:26 Musky 9506 %ZONE-ZVS_CHANGE_ACTIVATION_FAILED: Activation failed on VSAN 4
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Release Auth, next state = Release Auth
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Release Auth, next state = Release Auth
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Release Auth, next state = Release Auth
2004 May 4 15:13:26 zone: Rcvd event (ALL_ACQ) on vsan 4, current state = Release Auth, next state = Idle
2004 May 4 15:13:26 zone: Change Callback invoked: retval 0x02000008
2004 May 4 15:13:26 zone: received TCAM prog complete event on vsan = 4
2004 May 4 15:13:26 Musky 9506 %ZONE-ZVS_CHANGE_ACTIVATION_FAILED_RESN_DOM: Activation failed on VSAN 4: reason: Invalid data domain 1
2004 May 4 15:13:26 zone: Rcvd event (RCVD_ACQ) on vsan 4, current state = Idle, next state = Idle |

```

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## Viewing Default Zone Status

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**show zone status vsan 1**

This Switch Has the Default Set to Deny and Device in this VSAN Allowed to See Each Other

VSAN Is in Standards SW-2 Mode

Musky-9506# show zone status vsan 1

VSAN: 1 default-zone: deny distribute: active only Interop: 100

Full Zoning Database :

Zonesets:1 Zones:5 Aliases: 0

Full = Distribute All Zones to All Switches with this VSAN Number; **Active Only Setting** Only Updates Active Zonesets to Switches

Active Zoning Database :

Name: ZoneSet1 Zonesets:1 Zones:4

Status: / Configuration completed at 22:47:52 Apr 28 2004

You Can Have Multiple Zonesets Configured but Only One Active

List of All Active Zonesets and Count of Active Zones Will List Here

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## Useful show Commands

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### Verify the Zoning Information with the Following Commands

**MDS\_Switch # show zone vsan X**

**MDS\_Switch # show zoneset vsan X**

**MDS\_Switch # show zone statistics**

Use the show zone statistics command to display the number of control frames exchanged in the VSAN

**MDS\_Switch #show zone internal vsan X**

X = VSAN Number

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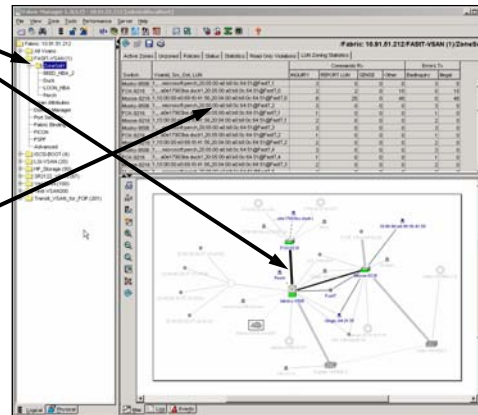
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## Using Fabric Manager to Monitor Zones

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1. Clicking zoneset highlights zone on map
2. Zone status, statistics, and general health of the zoneset with included zones can be monitored



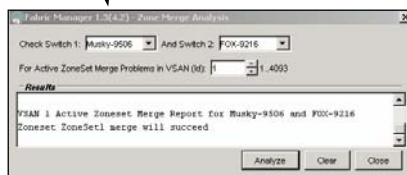
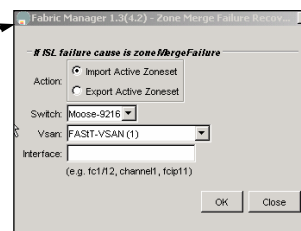
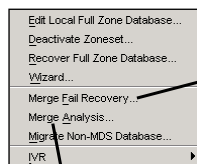
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## Merge Analysis and Recovery Tools

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## Section Notes

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- **Preplan zone configuration**
- **Keep documented backups of zone members and zones within zonesets**
- **Keep a perspective of where active zoning resides in your network**
- **Come up with a policy to use for zoning, keeping complete zone distributed everywhere or just active zoning on all the switches**
- **Using both CLI and fabric manager to help keep understanding of zone distribution straight within the VSANs and why problems exist with zone merging**

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## GENERAL SWITCH MAINTENANCE



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## Section Agenda

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- Understanding Core Dumps
- Understanding Logging
- Upgrading Recommendations
- Gathering Information for TAC

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## Setting Up Core Dumps

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- Core dumps are available in situations where unknown problems exist; dumps are set to TFTP server or to a flash card in slot0: of local switch
- Core dumps would be under the instruction of service and would require decoding by Cisco TAC engineers
- Best practice is to set up cores to go directed to TFTP server then core dumps can be directly emailed to Cisco

```
system cores tftp://10.91.51.200/mfrase_cores
```

```
FOX-9216# show system cores
```

```
Cores are transferred to tftp://10.91.51.200/mfrase_cores
```

Directory  
Must Exist on  
TFTP Server

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## What Happened?

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### Show system reset-reason

To Get Overall History of When and Why Expected and Unexpected Reloads Occurred

```
Musky-9506# show system reset-reason
----- reset reason for module 6 -----
1) No time
Reason: Reset triggered due to Switchover Request by User
Service: SAP(93): Switchover requested b
Version: 1.3(3)
2) At 111421 usecs after Mon Apr 26 14:40:52 2004
Reason: Reset triggered due to Switchover Request by User
Service: SAP(93): Switchover requested b
Version: 1.3(3)
3) At 69278 usecs after Tue Feb 10 17:42:20 2004
Reason: Reset by installer
Service:
Version: 1.3(2a)
4) No time
Reason: Reset Requested by management application
Service:
Version: 1.3(4)
----- reset reason for module 5 -----
1) No time
Reason: Reset triggered due to Switchover Request by User
Service: SAP(93): Switchover requested b
Version: 1.3(4a)
2) No time
Reason: Reset by installer
Service:
Version: 1.3(3)
3) No time
Reason: Reset triggered due to Switchover Request by User
Service: SAP(93): Switchover requested b
Version: 1.3(4)
4) No time
Reason: Reset Requested by management application
Service:
Version: 1.3(4)
```

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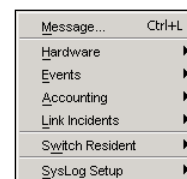
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## Understanding Logging

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- Use device manager to setup and view logs
- Use fabric manager logging tab to also view log information
- Learn to use threshold manager to alert you of event statistic counters



```
Musky-9506# show logging ?
console Show console logging configuration
info Show logging configuration
last Show last few lines of logfile
level Show facility logging configuration
logfile Show contents of logfile
module Show module logging configuration
monitor Show monitor logging configuration
nvram Show NVRAM log
server Show server logging configuration
<cr> Carriage Return
```

```
Musky-9506# show logging server
Logging server: enabled
{10.91.51.204}
server severity: critical
server facility: user
```

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## Upgrading Recommendations

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- Availability of FTP or TFTP server at install is important, put in place as part of the switch install
- Use of the software upgrade wizard tool in fabric manager is recommended but can be done many other ways
- Install all will run complete script and test image along with compatibility with hardware

Helpful commands for install:

show install all impact system bootflash:m9500-sf1ek9-mz.1.3.4a.bin

Check that new image is healthy and what impact new load will have on hardware with regards to compatibility

Image version checker available in device manager to view meta information of images in the directories of MDS file system

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## Gathering Information for TAC

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- Show tech-support detail at time of problem is most important
- Show Log
- Show log nvram
- Show system internal log install (for code upgrade)
- Access to network via TAC can narrow time to resolution
- Show ? (see anything that is related to your problem)
- Read release notes available with all code levels you are running, available on CCO
- Traces are ideal

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## Q AND A



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## Complete Your Online Session Evaluation!

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- WHAT:** Complete an online session evaluation and your name will be entered into a daily drawing
- WHY:** Win fabulous prizes! Give us your feedback!
- WHERE:** Go to the Internet stations located throughout the Convention Center
- HOW:** Winners will be posted on the onsite Networkers Website; four winners per day

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