Application Notes

hp StorageWorks Fabric Interoperability:

Merging Fabrics Based on M-Series and B-Series Fibre Channel Switches

Product Version: 2.4

Third Edition (February 2004)

Part Number: AA-RUQQC-TE

This document summarizes information for planning a merge of separate SAN fabrics, where one fabric consists of M-Series Product Line switches, and the other SAN fabric consists of B-Series Product Line switches. This guide provides the techniques and best practices for such an implementation.

For the latest version of these Application Notes and other SAN documentation, access the HP storage website at: http://www.hp.com/country/us/eng/prodserv/storage.html.

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Fabric Interoperability Application Notes
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About this Document

This section describes the content reflected in this document, including:

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Topics

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Intended Audience

This document is intended for customers who have separate SAN fabrics composed of M-Series or B-Series Fibre Channel switches, and who wish to merge these fabrics.

Related Documentation

Related documents with relevant information include:

- Online Help/User Guide (accessible via the Web browser interface)
- Installation Guide

Additional documentation, including white papers and best practices documents, are available via the HP website at: http://www.hp.com..

Checklist for Merging Fabrics

Complete the steps below before actually merging the fabrics:

- Verify the correct version of firmware is installed on the HP M-Series and HP B-Series products and also the correct version of High Availability Fabric Manager (HAFM) is installed.
- Ensure there are no duplicate domain ID's.
- Select an M-Series Director as the Principal Switch.
- Ensure there are no duplicate zone/zone set names.
- Ensure that B-Series and M-Series products have fabric zoning configured with WWN.
- Ensure that M-Series and B-Series products comply with proper zone naming.
- Ensure the fabrics are in the proper operating mode.
- Ensure HP default settings are in effect on both B-Series and M-Series switches
- Ensure M-Series ports are 1 Gbps for B-Series SAN Switch 8 and 16 models
- Ensure M-Series ports are 2 Gbps for the B-Series SAN Switch 2/8 and 2/16 models
- Disable Management Server if it is present
- Ensure Fabric Binding and Enterprise Fabric Mode are disabled
- Add the switches to the fabric one at a time.
- Use HAFM for Zoning Activities.

Step 1: Verify Application and Firmware Versions

Before merging the two fabrics (M-Series and B-Series), make sure:

- The correct versions of HAFM is installed.
- The correct versions of firmware are installed.

Refer to Tables 2, 3, 4, and 5 to determine what versions are needed and if necessary, obtain the latest versions of applications and firmware.

Step 2: Ensure There Are No Duplicate Domain ID's

When merging fabrics, you must ensure that no duplicate domain ID's exist among the switches between the two fabrics. For example, Figure 1 on page 5 shows two fabrics and the domain ID's assigned to the switches in each fabric. In the example, the M-Series domain IDs of 1 and 2 are equivalent to the B-Series domain IDs of 97 and 98. If you tried to merge these two fabrics, the merger would fail as the ISL's would segment due to the duplicate domain ID's.

A requirement for merging fabrics is that all domain ID's must be unique. In the example, you would change the M-Series domain ID's. See Figure 2 on page 5 for acceptable domain IDs. Please note that M-Series and B-Series use different numbering schemes for their domain ID numbers. For example, the M-Series domain 1 is equivalent to B-Series domain 97. See Table 1 on page 6 for a chart showing the correlation between M-Series's and B-Series's domain ID's.

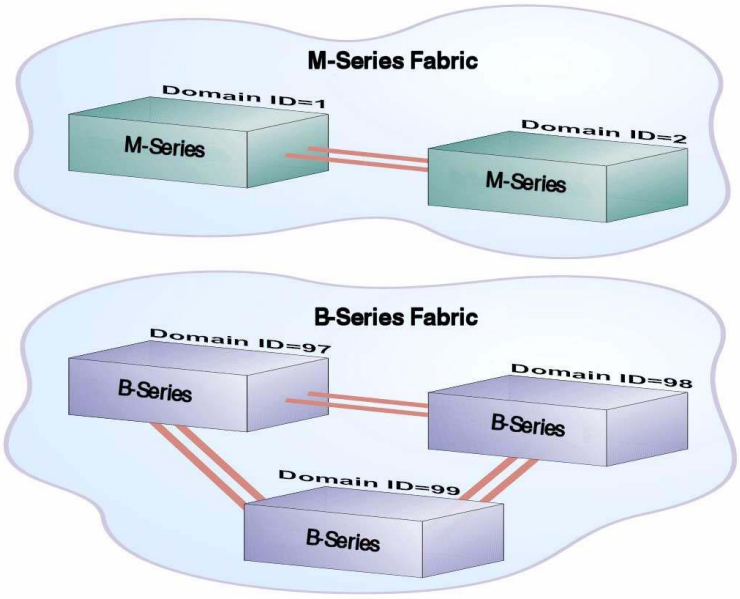


Figure 1: Example of Duplicate Domain IDs (M-Series Conflicts with B-Series)

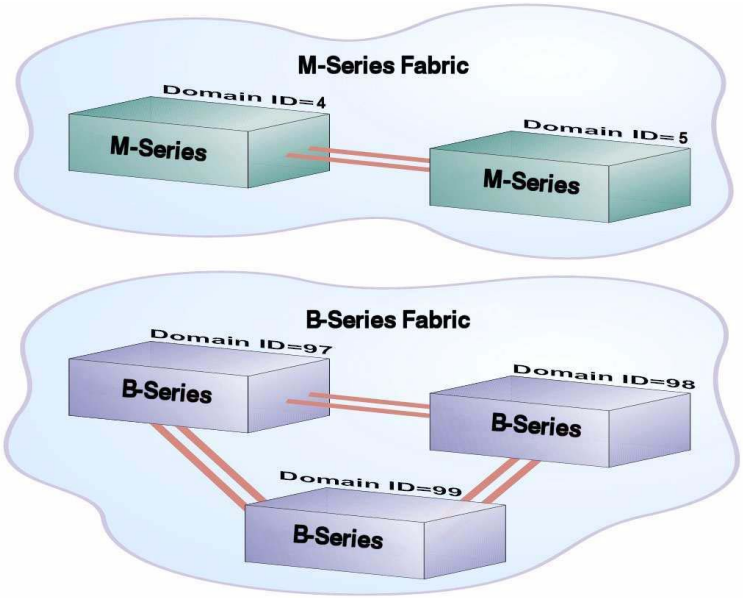


Figure 2: Example of Unique Domain IDs (M-Series Changed to Domains 4 & 5)

Table 1: Domain ID Correlation Table (all numbers are Base 10)

M-Series Domain ID Number	B-Series Domain ID Number
1	97
2	98
3	99
4	100
5	101
6	102
7	103
8	104
9	105
10	106
11	107
12	108
13	109
14	110
15	111
16	112
17	113
18	114
19	115
20	116
21	117
22	118
23	119
24	120
25	121
26	122
27	123
28	124
29	125
30	126
31	127

To change the domain ID on a M-Series switch, use HAFM or embedded webtools. This is an OFFLINE operation; therefore, plan accordingly. For B-Series switches, open a B-Series TELNET session.

HAFM Method to change an M-Series domain ID

To change an M-Series domain ID using HAFM, perform the following steps:

Note: Setting the product offline terminates all Fibre Channel connections.

1. From HAFM, select Maintenance, Set Online State
2. From the Set Online State dialog box, select Set Offline.
3. From HAFM, select Configure, Operating Parameters, Switch Parameters.
4. From the Configure Switch Parameters dialog box, change the number in Domain ID Preferred box to the appropriate domain ID. (You may want to review Table 1 on page 6 for information on M-Series and B-Series domain IDs before changing the domain ID.) Click Activate.

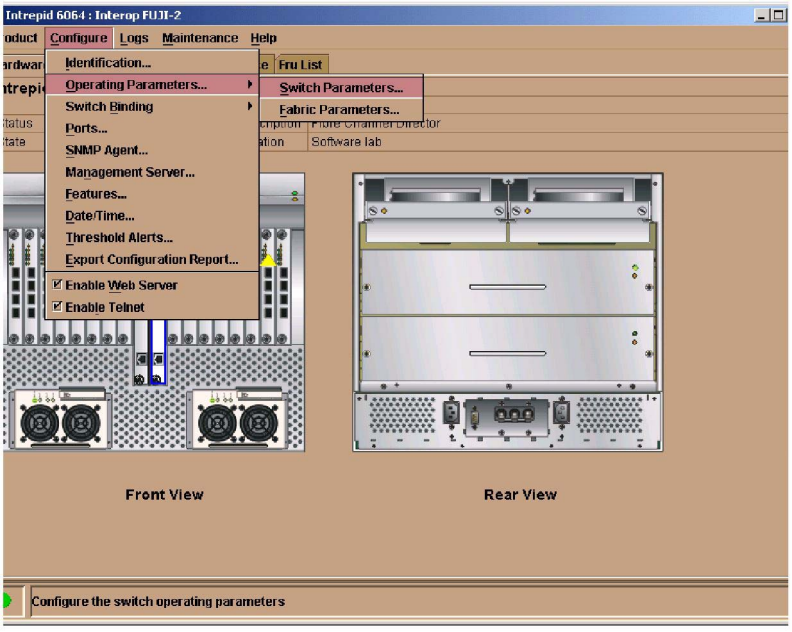


Figure 3: HAFM: Selecting Configure Operating Parameters

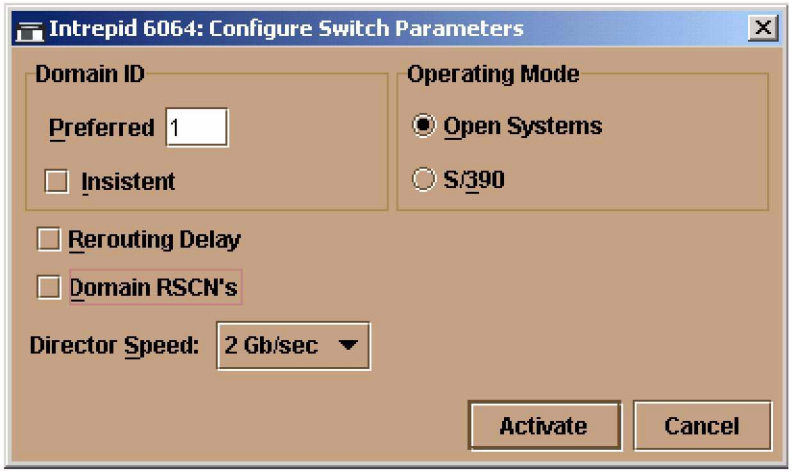


Figure 4: HAFM: Changing Domain ID Preferred Field

TELNET method to change a B-Series domain ID

The following provides a method of changing the domain IDs for B-Series switches. Follow these steps:
You can use a TELNET session to configure the operating parameters on a B-series product. This requires disabling the B-series products, so plan accordingly. The following is an example of this process:

```
login: admin
Password:

admin>switchdisable
admin>configure

Configure...

   Fabric parameters (yes, y, no, n): [no] y

   Domain: (97..127)[117]97[127]
```

Note: Refer to Table 1 on page 6.

```
   BB credit: (1..16)[16]
   R_A_TOV: (4000..120000)[10000]
   E_D_TOV: (1000..5000)[2000]
   Data field size: (256..2112)[2112]
   Sequence Level Switching: (0..1)[0]
   Disable Device Probing: (0..1)[0]
   Suppress Class F Traffic: (0..1)[0]
   SYNC 10 mode: (0..1)[0]
   VC Encoded Address Mode: (0..1)[0]
```

```
    Per-frame Route Priority (0..1)[0]
    Long Distance Fabric (0..1)[0]

Virtual Channel parameters (yes, y, no, n):[no]
Switch Operating Mode (yes, y, no, n):[no]
Zoning Operation parameters (yes, y, no, n):[no]
Arbitrated Loop parameters (yes, y, no, n):[no]
System services (yes, y, no, n):[no]
Portlog events enable (yes, y, no, n):[no]
Committing configuration...done.

admin>switchenable
```

EWS Method to change an M-Series domain ID

To use EWS to change domain ID, perform these steps:

1. Access the M-Series product by typing the IP address of the M-Series product into the Web Address field on your web browser, on a computer that has LAN access to the M-Series product. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

Figure 5: EWS: Entering Network User Name and Password

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. Select the Configure option and the following screen displays.

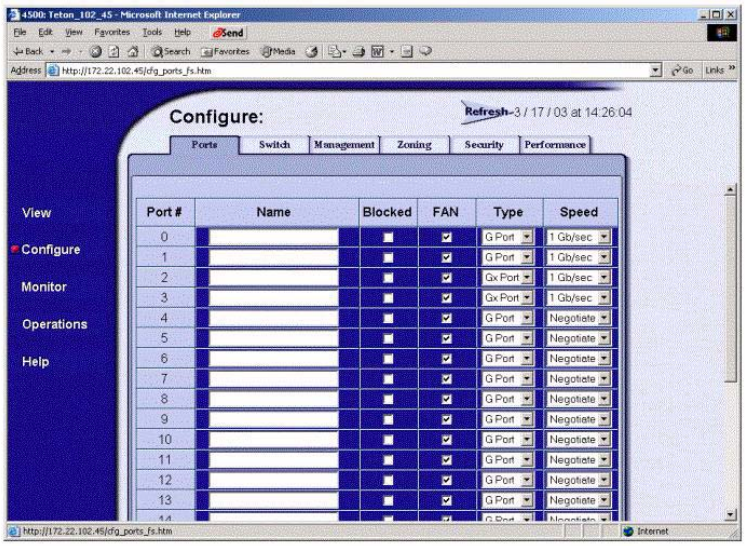


Figure 6: EWS: Selecting Configure Option

4. Select the Switch tab and the following screen displays.

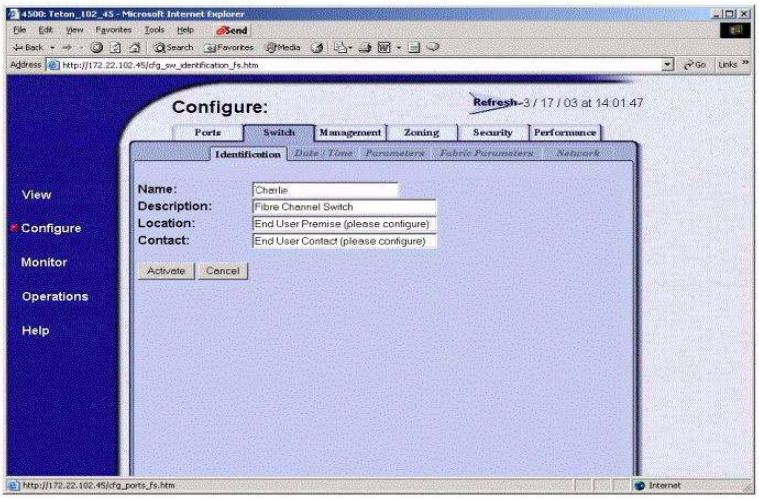


Figure 7: EWS: Selecting Switch Tab

5. Select the Parameters tab and the following screen displays.

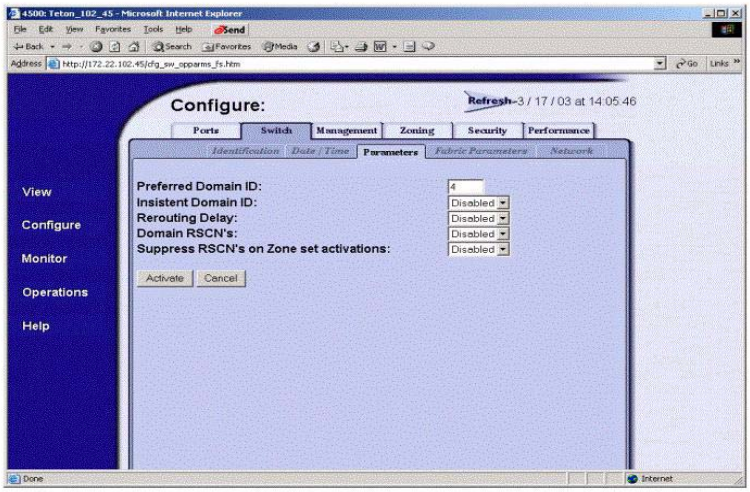


Figure 8: EWS: Selecting Parameters Tab

6. In the Preferred Domain ID field, enter the domain ID for the switch you want to use. In the example above, the domain ID is 4.

Step 3: Select M-Series Director as the Principal Switch

You must select an M-Series Director as the Principal Switch. Below are reasons for making the M-Series Director the Principal Switch:

- Reduces build fabric traffic and hop count. If the M-Series Director is the Principal Switch, then build fabric traffic will go directly from the Director to B-series switches. If the B-series product is the Principal Switch, build fabric traffic will first go from B-series through the M-Series Director and then to B-series. This results in an additional hop in traffic that is not needed.
- Ensures that Fabric Address Zoning is not used.

At present, HP only supports an M-Series switch as a principal switch.

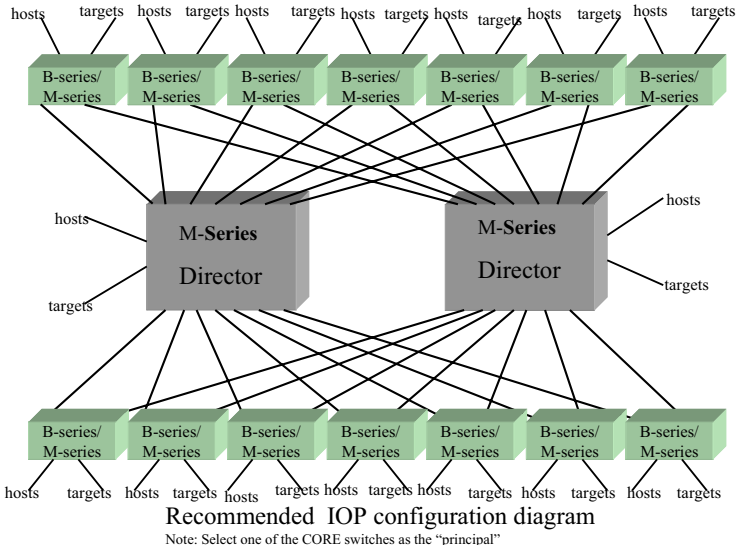


Figure 9: Core/Edge SAN Configuration with M-Series Director at the Core

There are two methods to select M-Series Director as the principal switch. HP recommends that you use HAFM. You can also use EWS.

HAFM Method

To use HAFM, to select the M-Series switch as the Principal Switch, then perform these steps. Please note, this is an OFFLINE operation, so plan accordingly.

Caution: Setting the product offline terminates all Fibre Channel connections.

---

1. From HAFM, select Maintenance, Set Online State
2. From the Set Online State dialog box, select Set Offline.
3. Using HAFM, select Configure Operating Parameters, Fabric Parameters.
4. In the Configure Fabric Parameters dialog box, change Switch Priority to Principal.

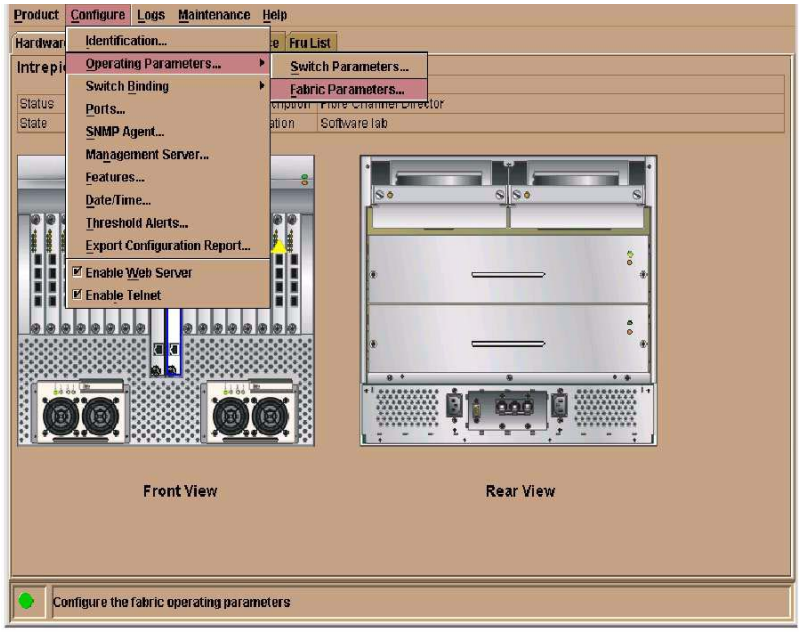


Figure 10: HAFM: Selecting Configure Operating Parameters and Fabric Parameters

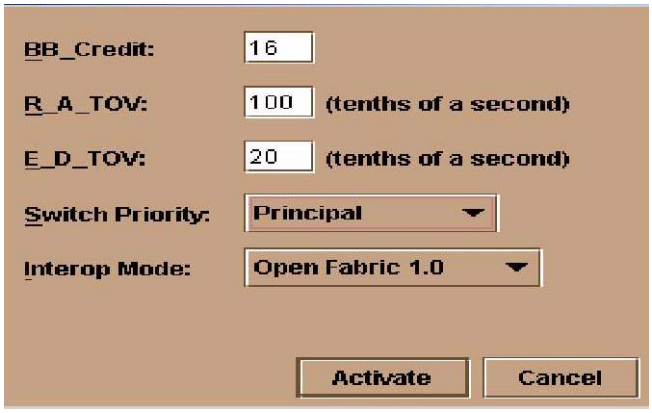


Figure 11: HAFM: Changing Switch Priority to Principal

EWS Method

To use EWS, to select the M-Series as the Principal Switch, perform these steps.

1. Access the M-Series product, by typing the IP address of the M-Series product into the Web Address field on your web browser. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

Figure 12: EWS: Entering Network User Name and Password

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. To set the switch offline from the EWS interface:
   a. When the EWS interface opens, the View panel and Switch page appear as the default. At the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Switch or Director page displayed.
   b. Click the Online State tab. The Switch page displays.
   c. Click Set Offline. The switch goes offline and the message `Your changes have been successfully activated` appears.
4. Select the Configure option and the following screen displays.

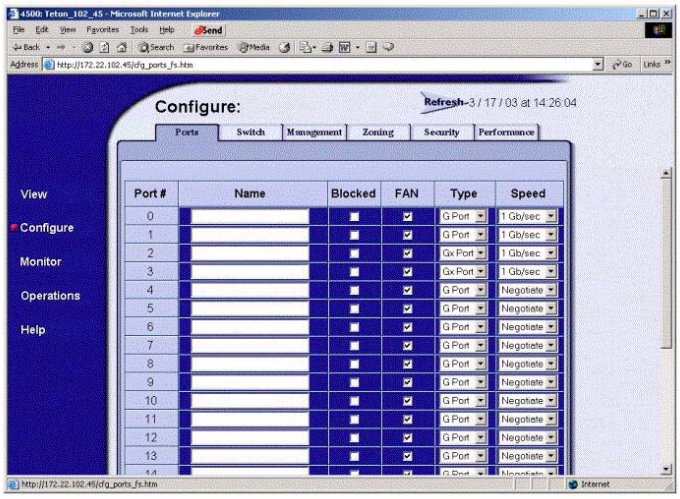


Figure 13: EWS: Selecting Configure Option

5. Select the Switch or Director tab and the following screen displays.

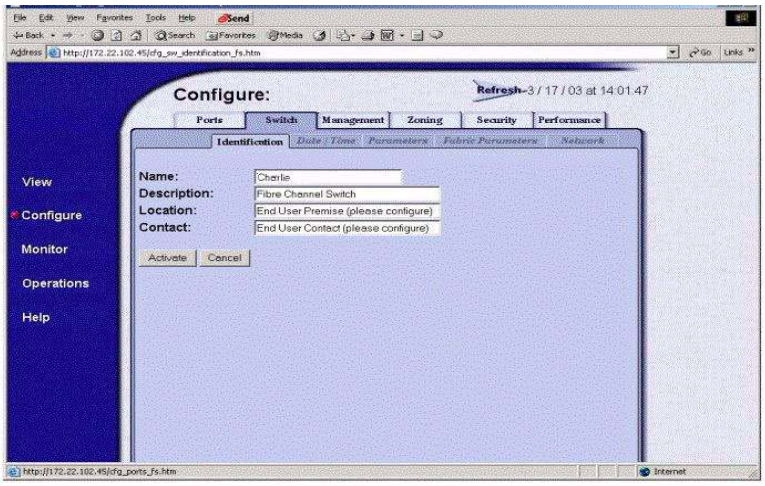


Figure 14: EWS: Selecting Switch Tab

6. From the Switch or Director screen, select the Fabric Parameters tab and the following screen displays.

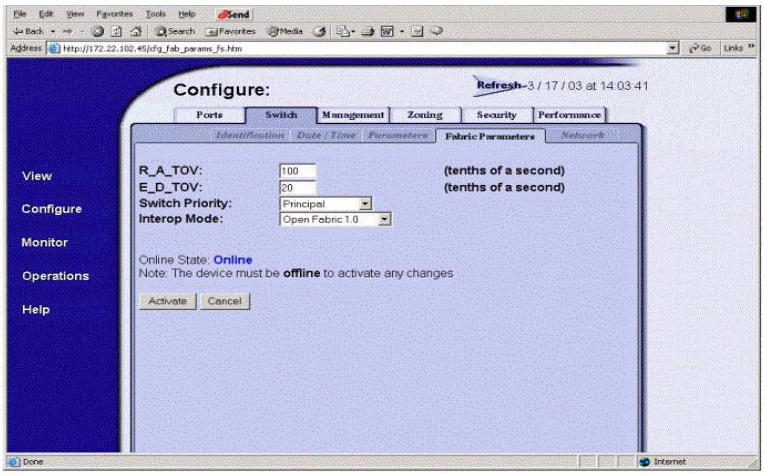


Figure 15: EWS: Selecting Fabric Parameters Tab

7. From the Fabric Parameters screen, ensure that the Switch Priority field displays Principal. If the Switch Priority field requires a change, then click Activate.
8. To set the switch online from the EWS interface:
   a. From the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Switch or Director page displayed.
   b. Click the Online State tab. The Switch or Director page displays.
   c. Click Set Online. The switch goes online and the message `Your changes have been successfully activated` appears. You can refresh the web browser to verify that the change has been made.

Step 4: Check for Duplicate Active Zone Names

To make sure there are no zoning problems, you should verify that there are no duplicate active zone (or zone set) names between M-Series and B-series. If duplicate zone names exist, simply rename one of the zones via HAFM and B-series webtools.

For M-Series and B-series, you can check zone (and zone set) names via HAFM and B-series webtools. Review all active zone sets for any switches you plan to merge together.

Step 5: Ensure All Switches Are Set Up with WWN Zoning

For merged fabrics, zoning must be managed by using the world-wide naming (WWN) technique. **You cannot use Fabric Addressing, Domain, Port, or Area zoning techniques.** Therefore, the M-Series and B-series cannot have Fabric Addressing, Domain, Port, or Area zoning. If anything other than WWN zoning is used, you must convert to WWN zoning.

Step 6: Ensure Fabrics Comply with Proper Zone Naming

For heterogeneous fabrics, you must adhere to specific zone naming conventions. Before merging the fabrics, ensure all zones meet the specifications listed below (this information is compliant with ANSI FC-MI and FC-SW2 (Version 5.4 Table 10.4.5.3):

- A name must be between 1 and 64 characters in length.
- All characters must be ASCII characters.
- The first character of a given name must be a letter. A letter is defined as either an upper case (A-Z) or a lower case (a-z) character.
- Any character other than the first character must be a lower case character (a-z), an upper case character (A-Z), a number (0-9), or the following symbol (_).
- Normally, the following three characters, ($-^), are allowed for zone names as defined in ANSI SW2 specification, but some switch vendors do not support those characters.

Step 7: Ensure Proper Operating Mode

To merge B-series and M-Series fabrics, you must use the proper mode. For M-Series, use the "Open Fabric Mode." For B-series, you must use INTEROPMODE 1.

There are two methods to select the proper operating mode for M-Series edge switches and directors. HP recommends that you use HAFM. You can also use EWS.

HAFM Method: M-Series

To use HAFM, do the following:

Caution: Setting the product offline terminates all Fibre Channel connections.

1. From HAFM, select Maintenance, Set Online State
2. From the Set Online State dialog box, select Set Offline.
3. From HAFM, select Configure, Advanced Zoning, Configure Default Zoning Set. Make sure the Default Zone Set is disabled.
4. From HAFM, select Configure, Operating Parameters, Fabric Parameters.

5. From the Configure Fabric Parameters dialog box, select Open Fabric 1.0.

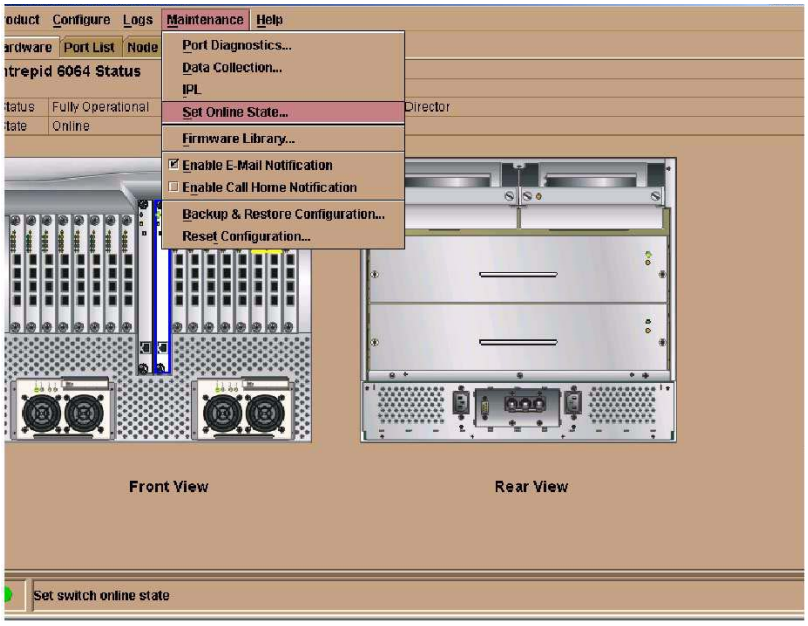


Figure 16: HAFM: Selecting Set Online State

Figure 17: HAFM: Setting Product Offline

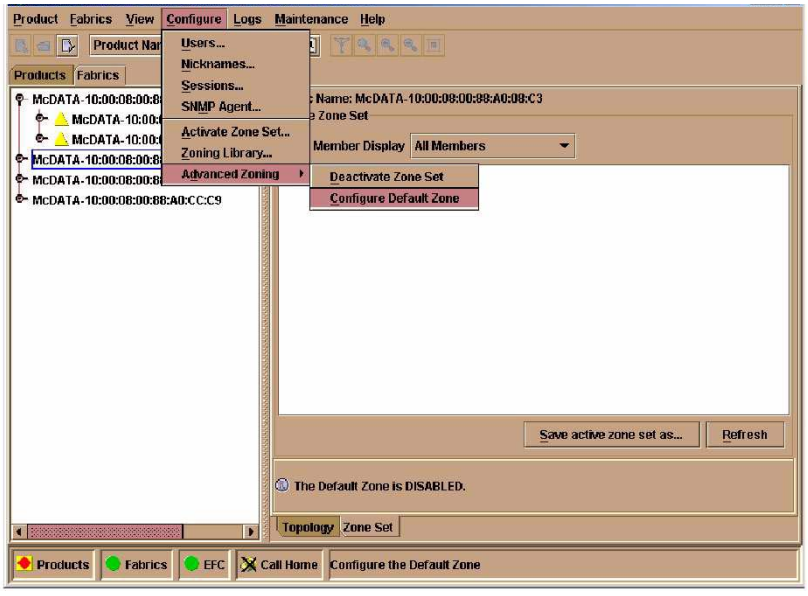


Figure 18: HAFM: Disabling (Deactivating) the Default Zone

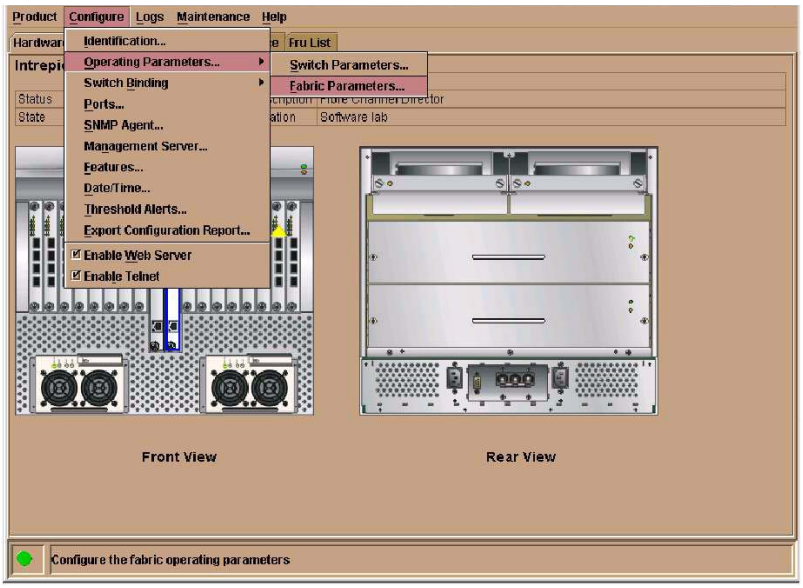


Figure 19: HAFM: Selecting Configure Operating Parameters for Fabric

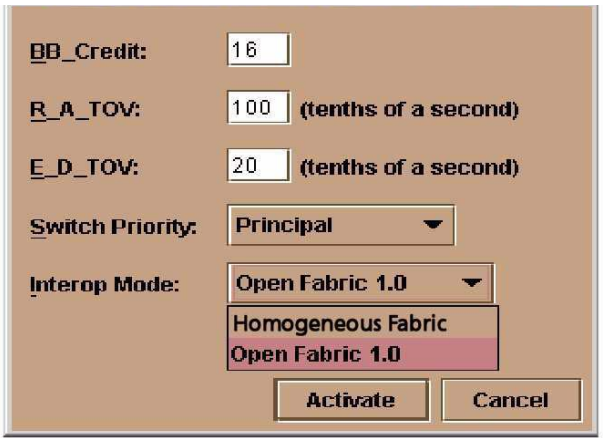


Figure 20: HAFM: Changing Interop Mode to Open Fabric 1.0

EWS Method: M-Series

You can use EWS to select the proper operating mode. Perform these steps:

1. Access the M-Series product, by typing the IP address of the M-Series product into the Web Address field on your web browser. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

Figure 21: EWS: Entering Network User Name and Password

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. To set the switch offline from the EWS interface:
   a. When the EWS interface opens, the View panel and Switch or Director page appear as the default. At the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Switch or Director page displayed.
   b. Click the Online State tab. The Switch or Director page displays.
   c. Click Set Offline. The switch goes offline and the message `Your changes have been successfully activated` appears.
4. Select the Configure option and the following screen displays.

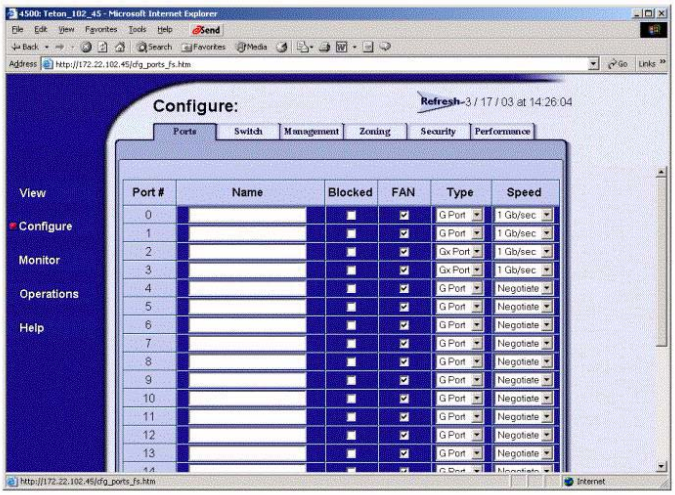


Figure 22: EWS: Selecting Configure Option

5. Select the Zoning tab and the following screen displays.

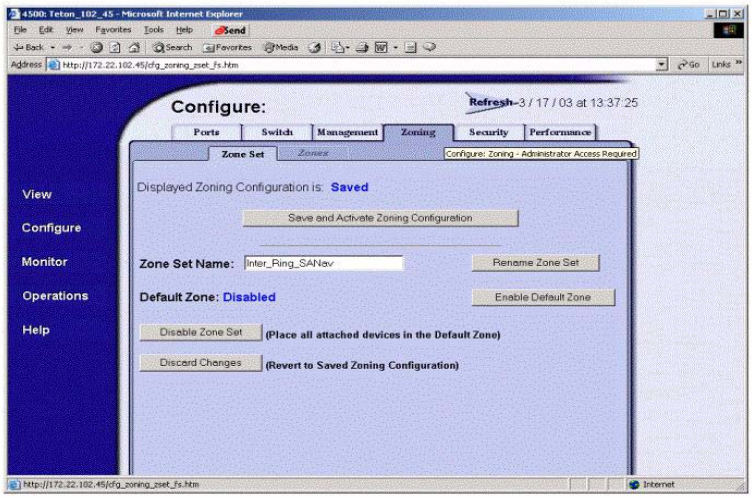


Figure 23: EWS: Selecting Zoning Tab

6. Ensure that the Default Zone field displays Disabled.

7. Select the Switch or Director tab and the following screen displays.

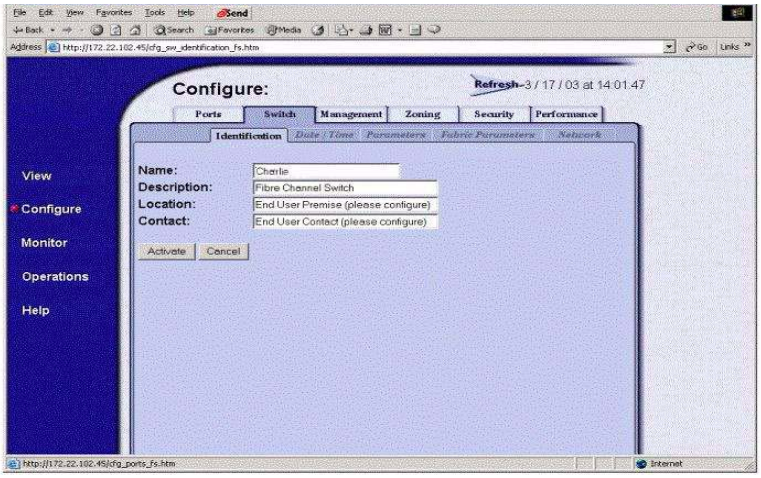


Figure 24: EWS: Selecting Switch Tab

8. Select the Fabric Parameters tab and the following screen displays.

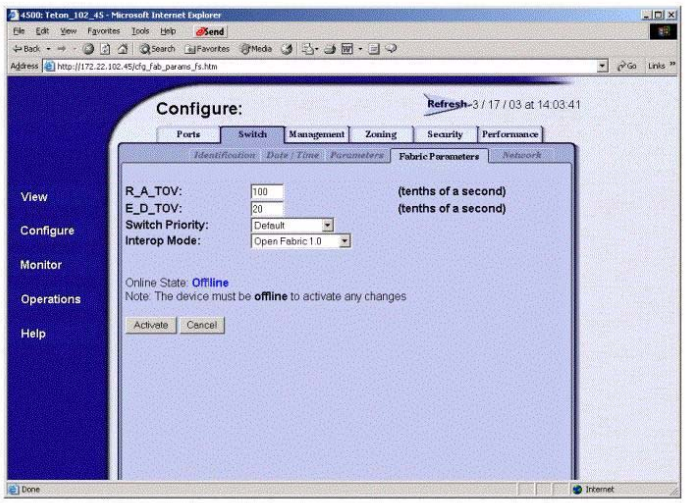


Figure 25: EWS: Selecting Fabric Parameters Tab

9. In the Interop Mode field, select Open Fabric 1.0 and click Activate.
10. To set the switch online from the EWS interface:
    a. From the View panel, select the Operations option at the left side of the panel. The Operations panel opens with the Switch or Director page displayed.
    b. Click the Online State tab. The Switch or Director page displays.
    c. Click Set Online. The switch goes online and the message `Your changes have been successfully activated` appears. You can refresh the web browser to verify that the change has been made.

TELNET Method: B-Series

For B-series, use the TELNET session to enable interopmode as show below: [Text in **bold** represents information you must enter or default values you can use. If you need to change the default value, the text will be shown next to the default value in ***bold italics***.] Follow these steps:

```
login: admin
password: xxxxxxxxx

Admin> switchdisable
Admin)> interopmode 1
Admin> reboot
Remember to reboot after changing the mode on B-series.
```

Step 8: Ensure Rerouting Delay is Set

The rerouting delay is set by default for HP switches. Verify that all switches have the rerouting delay set.

B-series switches:

Telnet into the B-series switch and verify:

```
login: admin
password: xxxxxxxx
admin> iodShow
admin> IOD is set
```

If IOD is not set, use the following command

```
admin> iodSet
admin> iodShow
```

M-series switches:

Using EWS or HAFM, verify that "Rerouting Delay" is enabled.

EWS:

1. Use EWS and select View/Operating Parameters
2. Verify "Rerouting Delay" is "Enabled"
3. If not select Configure/Switch or Director/Parameters/Rerouting Delay and Enable it.

HAFM:

1. Use HAFM and select products and double click icon for edge switch or director to display Hardware View.
2. Select Configure/Operating Parameters/Switch Parameters/Rerouting Delay
3. Verify "Rerouting Delay" is enabled or selected.
4. If not mark it and click on "Activate"

Step 9: Ensure HP M-Series ISL Ports are 1 Gb for B-Series SAN Switch 8 and16 Models

It is recommended that the speed of the M-Series ports for the SAN Switch 8 and 16 be lowered. Change the M-Series ports from 2 Gb to 1 Gb when you attach the SAN Switch 8 and 16. This is only required for the ports that attach to the SAN Switch 8 and 16. All other ports on M-Series can remain at Negotiate.

There are two methods to ensure that M-Series ports for the SAN Switch 8 and 16 are lowered to 1 Gb. HP recommends that you use HAFM. You can also use EWS.

HAFM Method

To ensure that M-Series ports are 1 Gb, use HAFM and perform these steps:

1. From HAFM, select Configure Ports.
2. From the Configure Ports dialog box, select 1 Gb for the port you want to attach to the SAN Switch 8 and 16 and click Activate.

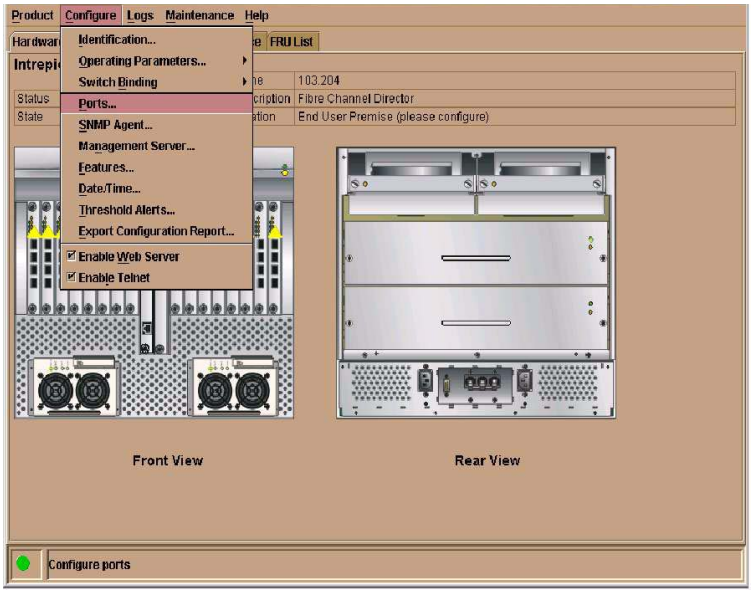


Figure 26: HAFM: Selecting Configure Ports

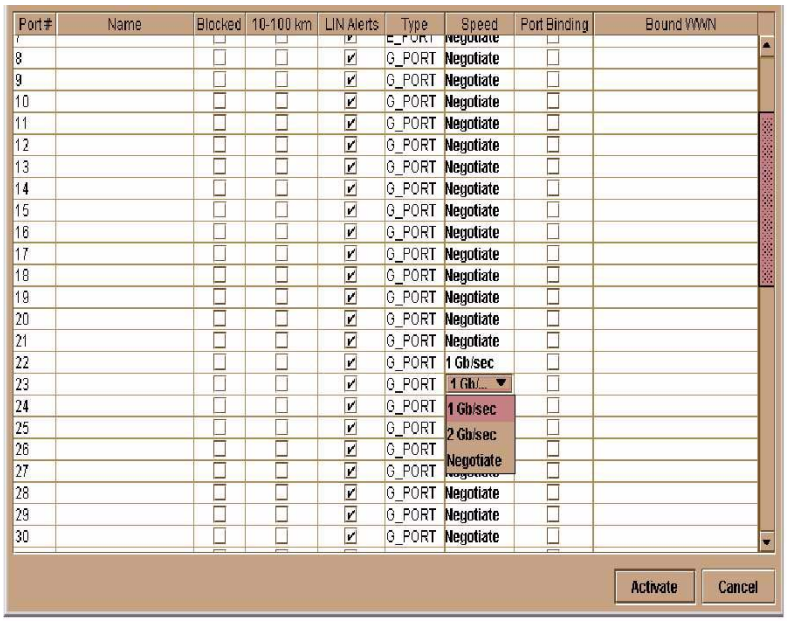


Figure 27: HAFM: Verifying Port Speed of 1 Gb is Selected

EWS Method

To use EWS, to ensure that M-Series ports are 1 Gb, perform these steps:

1. Access the M-Series product, by typing the IP address of the M-Series product into the Web Address field on your web browser. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

Figure 28: EWS: Entering Network User Name and Password

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. Select the Configure option and the following screen displays.

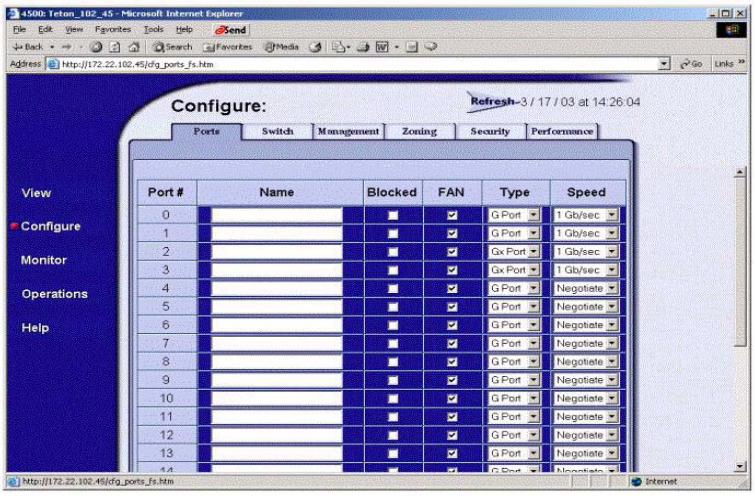


Figure 29: EWS: Selecting Port Properties Tab

4. From the Port screen, select the port speed for each port. Any ports connected to a SAN Switch 16 must be set to 1 Gb/sec. For an example, see ports 0-3.
   Next, click "Activate" to make the port speed effective.

Step 10: Ensure M-Series Ports are 2 Gb for B-Series SAN Switch 2/8 and 2/16 Models

It is recommended that you configure the speed of the M-Series ports for the B-Series SAN Switch 2/8 and 2/16. Therefore, change the M-Series ports from Negotiate to 2 Gb/s for attachment of the SAN Switch 2/8 and 2/16. This is only required for the ports attaching to the SAN Switch 2/8 and 2/16 (HP B-series FW 3.1 and above.) All other ports on M-Series can remain at Negotiate. It is also recommended that you configure the ports on the SAN Switch 2/8 and 2/16 for 2 Gb/s.

For the SAN Switch 2/8 and 2/16, this is accomplished via the ***portcfgspeed*** command. For example, configuring port 3 to run at 2Gb/s would be:

```
login: admin
password: xxxxxxx
Admin> portcfgspeed 3,2
```

To change the ports on M-Series, use HAFM or EWS (Embedded Web Server)

HAFM Method

To ensure that M-Series ports are 2 Gb/s, use HAFM and perform these steps:

1. From HAFM, select Configure Ports.
2. From the Configure Ports dialog box, select 2 Gb/s for the port you want to attach to the SAN Switch 2/8 and 2/16 and click Activate.

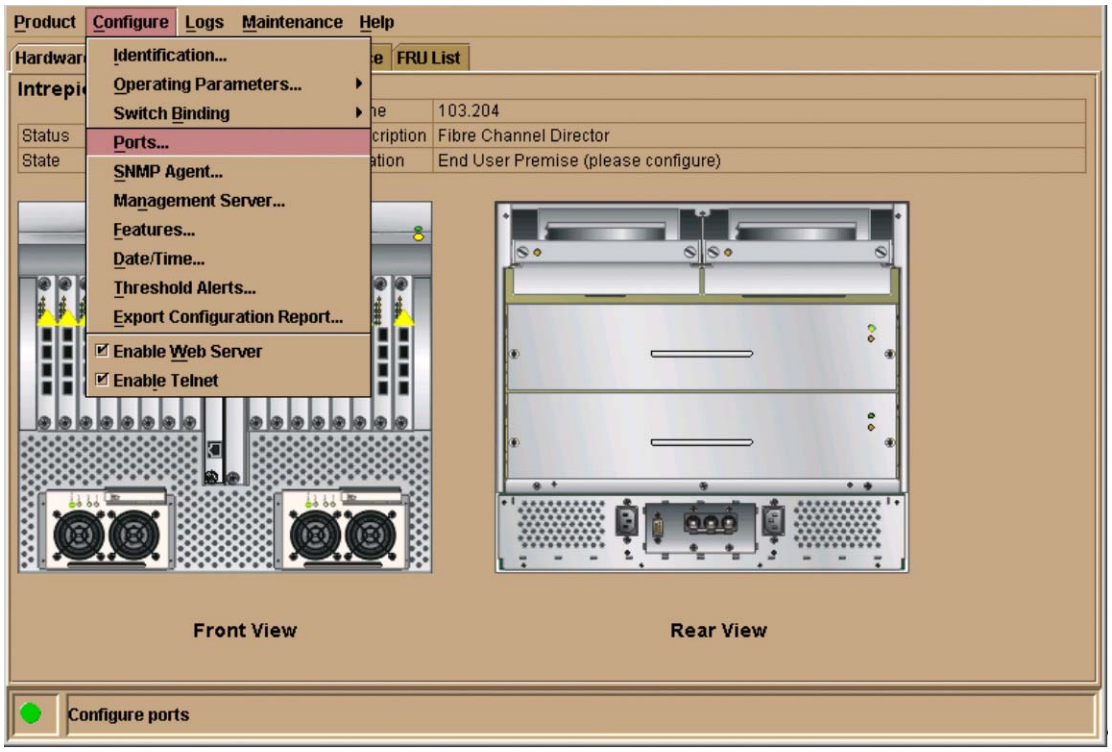


Figure 30: HAFM: Select Configure > Ports

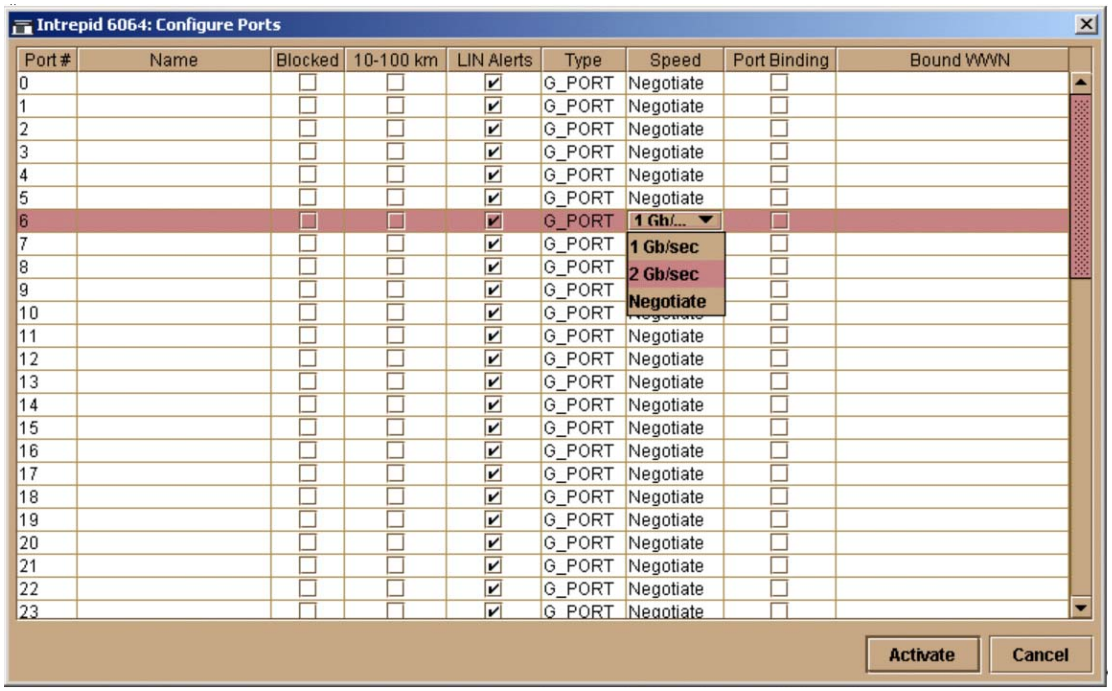


Figure 31: HAFM: Select Port Speed

EWS Method

To use EWS, to ensure that M-Series ports are 2 Gb, perform these steps:

1. Access the M-Series product, by typing the IP address of the M-Series product into the Web Address field on your web browser. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. Select the Configure option and the following screen displays.

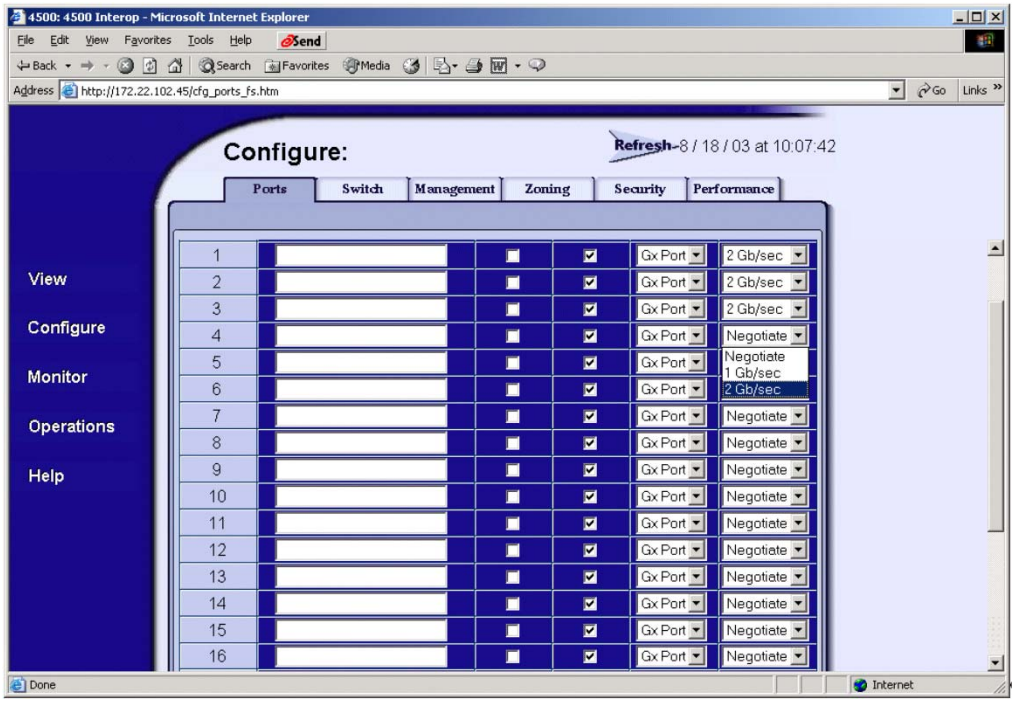


Figure 32: Configure Screen with Ports Tab Open

4. From the Ports screen, select the port speed for each port. Any ports connected to a SAN Switch 2/16 must be set to 2 Gb/sec. For an example, see ports 0-3.
   Next, click “Activate” to make the port speed effective.

Step 11: Ensure Management Server is Disabled

If the M-Series product has a license key for Open Systems Management Server (OSMS), ensure the Management Server is disabled. Perform these steps:

1. To disable the Management Server, use HAFM and select Configure Management Server. If this feature is not installed, no further is action required. Go to item #3.
2. From the Configure Open Systems Management Server dialog box, make sure the Enable Management Server box and the Host Control Prohibited box are not selected (unchecked).

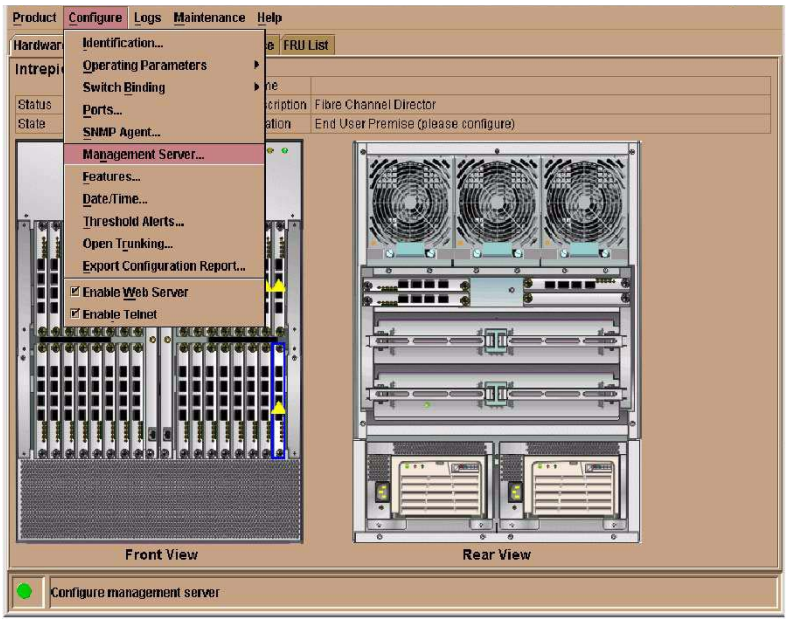


Figure 33: HAFM: Selecting Management Server

Figure 34: HAFM: Disabling Management Server

Note: Verify that both features are disabled.

---

3. If the B-series product has Platform Management Services Enabled, you will need to disable it. To disable it, follow these steps:

```
login: admin
password: xxxxxxx

Admin> switchdisable
Admin>msPlMgmtDeactivate
Admin>switchenable
Admin>reboot
```

Step 12: Ensure Fabric Binding and Enterprise Fabric Mode are Disabled

If the M-Series product has a license key for SANtegrity Binding, ensure Fabric Binding and Enterprise Fabric Mode are disabled. Perform these steps:

1. To disable Fabric Binding and Enterprise Fabric Mode, use HAFM and select Fabrics, Enterprise Fabric Mode and Fabric Binding. If this feature is not installed, no further action is required.
2. From the Enterprise Fabric Mode dialog box, click "Start" to deactivate Enterprise Fabric Mode. When complete, click "Close" to close the dialog box..
3. From the Fabric Binding dialog box, make sure the Enable Fabric Binding box is not selected (not checked).

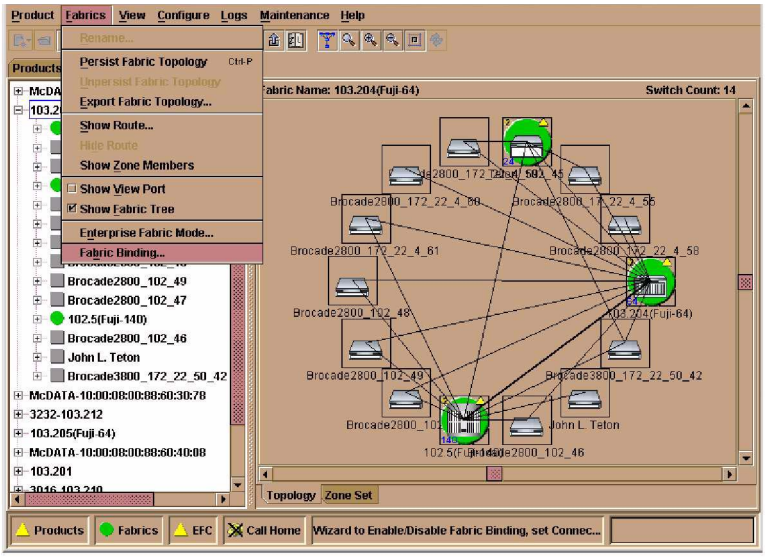


Figure 35: HAFM: Selecting Fabric Binding and Enterprise Fabric Mode

Figure 36: HAFM: Disabling Fabric Binding

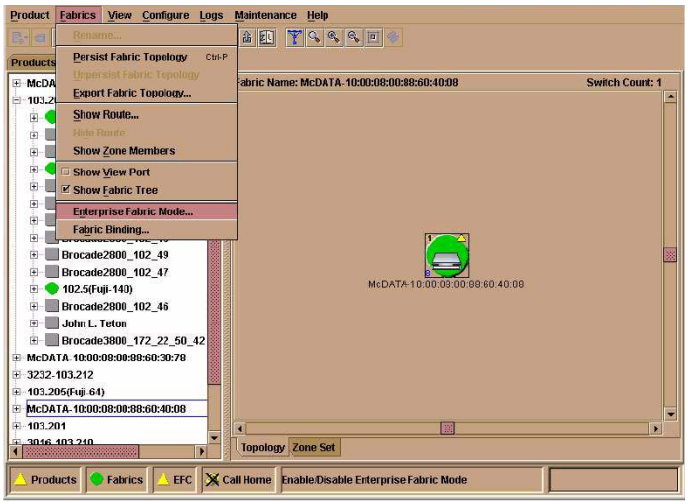


Figure 37: HAFM: Disabling Enterprise Fabric Mode

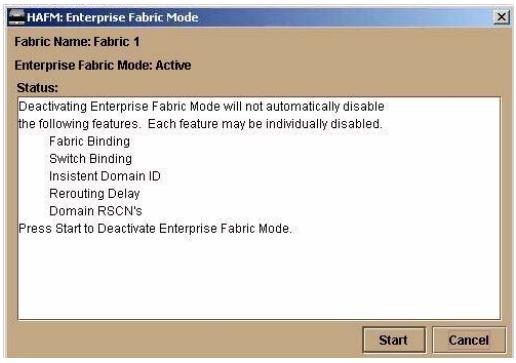
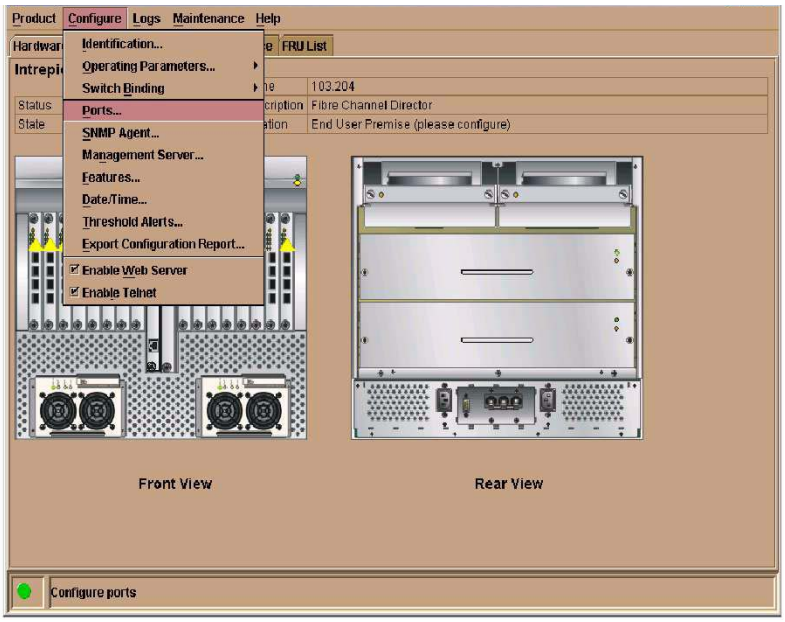


Figure 38: Disable Enterprise Fabric Mode Dialog Box

Step 13: Add Switches to the Fabric One at a Time

It is recommended you add one switch at a time to the fabric. This is not a technical requirement; it is simply a recommendation. For example, before adding the ISL cables, you can block each port. After the cables are installed, you can then unblock each port "one at a time." Between each unblocking, ensure the fabric is up and operational by using HAFM to verify the fabric is up. Perform these steps:

1. To block ports on the M-Series, launch HAFM.
2. From HAFM, select Configure Ports and then check the Blocked box for the port or ports that you wish to block or unblock. Click Activate to change the port configuration to what was selected each time you change the configuration.



Step 14: Merging and Managing Zoning Activities

To merge the Zone Sets (and their associated zones) properly:

1. Ensure that all the requirements, as specified in step-5 and step-6, are properly met
2. Ensure that an active Zone Set is present in both the fabrics after interopmode is enabled on B-series and all operating parameters are set on M-series as specified in the previous steps.
3. Join the fabrics and the active Zone Sets should merge
4. Once the merge is complete, to view and manage zones using HAFM, save the Zone Set. Use the "Save active zone set as.." button in "HAFM/Fabrics/Zone Set" for this purpose. Once you save it, the Zone Set and all zones will then be saved in the zone library.

After successfully merging the fabrics, you must use HAFM or EWS for further management of zoning activities.

HAFM Method

To use HAFM, perform these steps:

After you successfully merge the fabrics (M-Series & B-series), any further configuring of zones must be done using HAFM. **Do Not** use other software products for zoning the merged fabric.

EWS Method

You can use EWS to manage your zoning. Perform these steps:

1. Access the M-Series product, by typing the IP address of the M-Series product into the Web Address field on your web browser. For example, http://172.22.102.45.

   A dialog box similar to the following displays.

Figure 39: EWS: Entering Network User Name and Password

2. From the Enter Network Password dialog box, enter the User Name and Password and click OK.
3. Select the Configure option and the following screen displays.

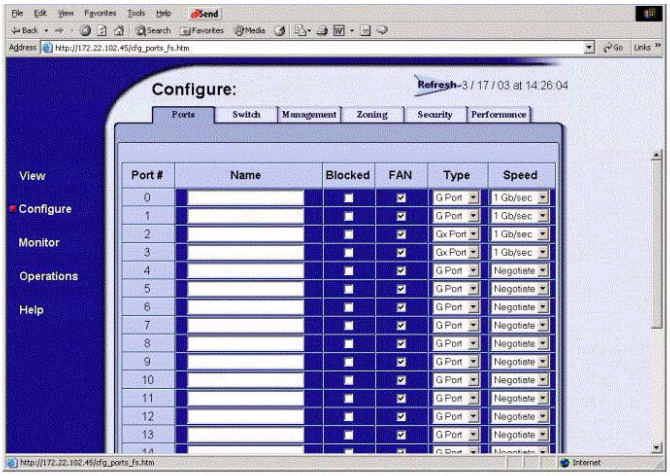


Figure 40: EWS: Selecting Configure Option

4. Select the Zoning tab and the following screen displays.

Figure 41: EWS: Selecting Zoning Tab

5. You can create, edit, and delete zones. You can also, activate and deactivate zoning.

Segmentation Errors

To view segmentation reasons, you can launch HAFM. Following are the segmentation reason and code as defined for HAFM.

Reason Code	Reason
0	Segment not defined
1	Incompatible Link Parameters
2	Duplicate Domain ID's
3	Incompatible Zoning Configuration
4	Build Fabric Protocol Error
5	No Principal Switch
6	No Response from the attached switch

For M-Series products, segmentation reasons are indicated in the Event Log list (HAFM).

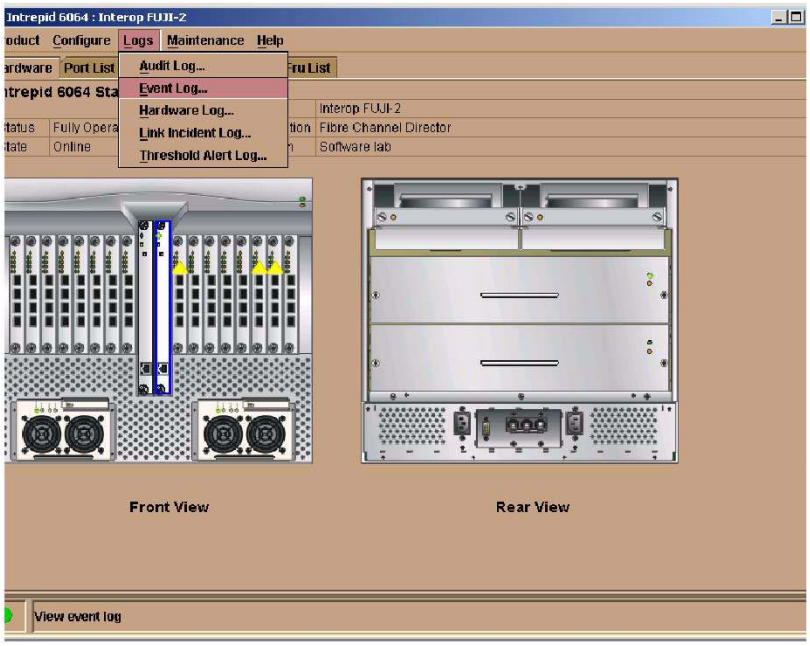
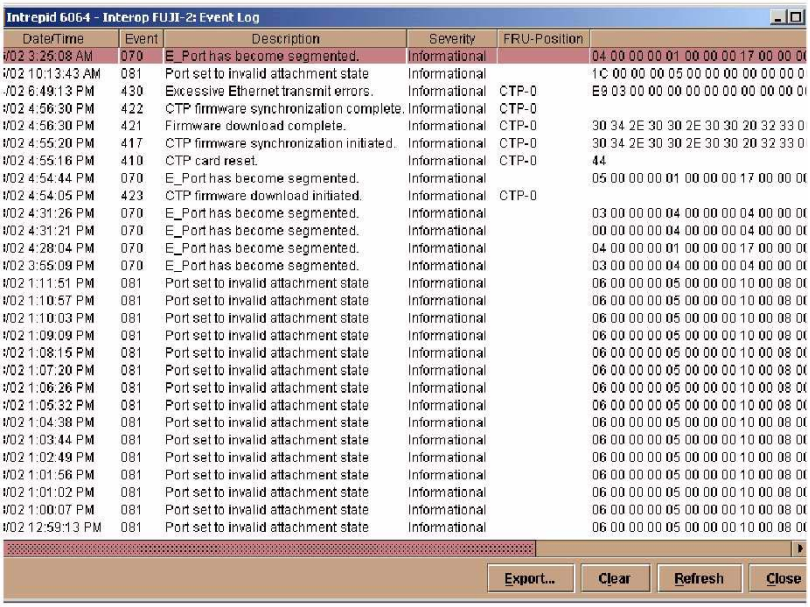


Figure 42: HAFM: Selecting View Event Log for Segmentation Errors



Date/Time	Event	Description	Severity	FRU-Position	
/02 3:25:08 AM	070	E_Port has become segmented.	Informational		04 00 00 00 01 00 00 00 17 00 00 0
/02 10:13:43 AM	081	Port set to invalid attachment state	Informational		1C 00 00 00 05 00 00 00 00 00 00 0
/02 6:49:13 PM	430	Excessive Ethernet transmit errors.	Informational	CTP-0	E8 03 00 00 00 00 00 00 00 00 00 0
/02 4:56:30 PM	422	CTP firmware synchronization complete.	Informational	CTP-0	
/02 4:56:30 PM	421	Firmware download complete.	Informational	CTP-0	30 34 2E 30 30 2E 30 30 20 32 33 0
/02 4:55:20 PM	417	CTP firmware synchronization initiated.	Informational	CTP-0	30 34 2E 30 30 2E 30 30 20 32 33 0
/02 4:55:16 PM	410	CTP card reset.	Informational	CTP-0	44
/02 4:54:44 PM	070	E_Port has become segmented.	Informational		05 00 00 00 01 00 00 00 17 00 00 0
/02 4:54:05 PM	423	CTP firmware download initiated.	Informational	CTP-0	
/02 4:31:26 PM	070	E_Port has become segmented.	Informational		03 00 00 00 04 00 00 00 04 00 00 0
/02 4:31:21 PM	070	E_Port has become segmented.	Informational		00 00 00 00 04 00 00 00 04 00 00 0
/02 4:28:04 PM	070	E_Port has become segmented.	Informational		04 00 00 00 01 00 00 00 17 00 00 0
/02 3:55:09 PM	070	E_Port has become segmented.	Informational		03 00 00 00 04 00 00 00 04 00 00 0
/02 1:11:51 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:10:57 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:10:03 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:09:09 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:08:15 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:07:20 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:06:26 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:05:32 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:04:38 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:03:44 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:02:49 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:01:56 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:01:02 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 1:00:07 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0
/02 12:59:13 PM	081	Port set to invalid attachment state	Informational		06 00 00 00 05 00 00 00 10 00 08 0

Figure 43: HAFM: Viewing Event Log for Segmentation

Note: the Description Field provides the activity. The event data field (byte 4) provides the reason. For this example, byte 4 of the Event Data is 01. By looking at the segmentation table on *Segmentation Errors* on page 32, you find the segmentation reason is due to an Incompatible Link Parameters error. Byte 0 of the Event Data provides the port number. For this example, byte 0 is 04, which is port 4.

Supported Configuration Rules

To obtain a list of supported configurations, please contact your local HP Customer Representative. They can tell you the exact firmware and software versions and the specific models that are recommended for both M-Series and B-series.

Fabric Rules

- Up to 16 switches and 3 hops maximum per fabric
- Each fabric can consist of a mix of the switch models listed in Table 2 and Table 3
- B-Series switches must utilize all the default HP configuration settings with the exception of `INTEROPMODE 1`.
- M-Series switches must utilize all the default HP configuration settings.

Note: CA/DRM products are not supported in a merged SAN fabric.

Configuration Restrictions:

If you are using EVA and its Management Appliance, ensure the following:

1. Make sure the Appliance is connected on M-Series switches only
2. The EVA can be on either B-Series or M-series switches

This is a restriction with the current B-series firmware versions only and will be resolved soon.

Table 2: StorageWorks B-Series Product Line Switches

HP StorageWorks Switch Name		Firmware Version	Number of Ports
HP StorageWorks SAN Switch 2/8 EL, 2/8 Power Pak		3.1	8
HP StorageWorks SAN Switch 2/16, 2/16 EL, 2/16 Power Pak			16
HP StorageWorks SAN Switch 2/32, 2/32 Power Pak		4.1	32
HP Switch Name	**Compaq StorageWorks Switch Name**		**Number of Ports**
HP Brocade 2400 (HP reseller)	CPQ StorageWorks SAN Switch 8	2.6.1	8
N/A	CPQ StorageWorks SAN Switch 8-EL		8
HP Brocade 2800 (HP reseller)	CPQ StorageWorks SAN Switch 16		16
N/A	CPQ StorageWorks SAN Switch 16-EL		16
HP Surestore FC Switch 6164 (64 ISL Ports)	CPQ StorageWorks SAN Switch Integrated/32 (64 ISL Ports)		32 (counts as 6 switches and 2 hops when applying configuration rules)
HP Surestore FC Switch 6164 (32 ISL Ports)	CPQ StorageWorks SAN Switch Integrated/64 (32 ISL Ports)		64 (counts as 6 switches and 2 hops when applying configuration rules)

Table 2: StorageWorks B-Series Product Line Switches (Continued)

HP StorageWorks Switch Name		Firmware Version	Number of Ports
HP Surestore FC 1Gb/2Gb Entry Switch 8B	N/A	3.1	8
N/A	CPQ StorageWorks SAN Switch 2/8-EL		8
N/A	CPQ StorageWorks SAN Switch 2/16-EL		16
HP Surestore FC 1Gb/2Gb Switch 8B	N/A		8
HP Surestore FC 1Gb/2Gb Switch 16B	CPQ StorageWorks SAN Switch 2/16		16

Table 3: HP StorageWorks M-Series Product Line Switches

hp StorageWorks Switch Name	Firmware Version	Number of Ports
hp StorageWorks edge switch 2/16	05.02.00-13	16
hp StorageWorks edge switch 2/24	HAFM 07.01.00-9 (Notebook HAFM server only)	24
hp StorageWorks edge switch 2/32		32
hp StorageWorks director 2/64	07.02.00-9 (1U HAFM server only)	64
hp StorageWorks director 2/140		140

Table 4: O/S and Storage Systems Versions

Operating System	HBA	"Driver, FW, BIOs"	Multi-path	Storage	Storage FW
HP-UX 11.00	A6795A	B11.00.10	SP 3.0b	EVA	VCS 2.005
HP-UX 11.00	A6795A	B11.00.10	AP 2.01.02	XP128/1024	21.05.06.00/00
HP-UX 11.11	A6795A	B11.11.09	SP 3.0b	EVA	VCS 2.005
HP-UX 11.11	A6795A	B11.11.09	AP 2.01.02	XP128/1024	21.05.06.00/00
Windows 2000 SP3	FCA2101	"5-4.82a16, 3.91a1, 1.63a1"	SP 4.0a	EVA	VCS 2.005
Windows 2000 SP3	LP9002	"5-4.82a16, 3.91a1, 1.63a1"	AP 2.01.00	XP128/1024	21.05.06.00/00
Sun Solaris 8	FCA2257P	"3.26, 3.1.2, 1.18.5 (FCODE)"	SP 3.0b	EVA	VCS 2.005
Sun Solaris 8	QLA2310	"3.26, 3.1.2, 1.18.5 (FCODE)"	Veritas DMP	XP128/1024	21.05.06.00/00
Linux AS 2.1	FCA2214	"6.0.4, 1.33"		EVA	VCS 2.005

Table 5: B-Series and M-Series Interoperable Features

Feature Description	B-Series only Fabric	M-Series only Fabric	Interoperating Fabric based on existing T11 standards documents
StorageWorks Fabric Watch: Monitor fabric elements for fabric events, errors, performance thresholds.	Supported	N.A.	Works in interoperating fabric on B-Series switches.
SAN/Fibre Channel Switch Management: IP connections to switch management GUIs.	Supported	N.A.	Works in interoperating fabric on B-Series switches.
HP StorageWorks HAFM	N.A.	Supported	Works in interoperating fabric, identifies B-Series as generic switches
ISL Trunking: Multiple ISL between a switch pair are grouped to look like one fast ISL.	B-Series ISL Trunking: Works on ISLs connected to ports on one ASIC pair.	Not supported at this time.	Not Supported.
Frame Level Zoning: Provides isolation between groups of ports by controlling admission of frames to fabric based on zone definitions and frame destination addresses.	B-Series Hardware Enforced Zoning: Checks incoming frames to see whether delivery is allowed. Backs off to name server zoning if many entries.	M-Series Hardware Enforced Zoning: Checks incoming frames to see whether delivery is allowed. Hard Zoning introduced with firmware version 05.01.00-24	No public protocol for per-frame zoning is defined.
Name Server Zoning: Prevents discovery of unauthorized addresses, but does not prevent frame delivery if addresses are found out some other way.	Supported	Supported.	Name Server Zoning is a mandatory features of the T11 interoperability standards.
Fabric performance monitoring: Gives insight into performance of the SAN.	Advanced Performance Monitoring: Provides information on end-to-end performance of fabric.	Port Level Monitoring	Not Supported
Real-time monitoring of fabric events.	Fabric Watch: Tracks a variety of SAN fabric elements, events, and counters	HAFM tool: Tracks a variety of SAN fabric elements and events.	Management server talks to switch agents independently.

Table 5: B-Series and M-Series Interoperable Features (Continued)

Feature Description	B-Series only Fabric	M-Series only Fabric	Interoperating Fabric based on existing T11 standards documents
FC-AL support.	QuickLoop: supports Fibre Channel Arbitrated Loop devices.	Supported on M-Series 2/24	Operates on individual switches.
Support for traditional SNMP management method.	Switch MIBs.	Switch MIBs.	Each switch is managed independently.
Simple Name Server: Provides centralized control of device addresses.	Simple Name Server	Simple Name Server	Interoperate under T11 standards.
Alias Server: Supports broadcast function.	B-Series Alias Server.	Broadcast.	Interoperate under T11 standards.
Fabric Security	B-Series Secure Fabric OS: 2.6x/3.1/4.1 code streams	M-Series: SANtegrity	Will interoperate under T11 standards when they are agreed upon. M-Series Switch Binding feature of SANtegrity will operate in an interoperating fabric.
Stand-alone switch management console.	Not available.	Embedded Web Server	Not applicable: Switch feature.
Port Error reporting.	Yes.	Yes.	Yes.
Alerts and Traps.	Yes.	Yes.	Yes.
Port Statistics.	Yes.	Yes.	Yes.
Event Logs.	Yes.	Yes.	Yes.
Telnet.	Yes.	Yes.	Yes.
Phone Home Feature.	No.	Yes.	Yes.
Email Home Feature.	Yes.	Yes.	Yes.

Troubleshooting

1. If you see an ISL on the M-Series product that segments due to a Build Fabric Protocol Error, you can recover by blocking, then unblocking the port. You may need to do this several times.
2. If you see an ISL on the M-Series product that segments due to Incomp Zoning Config, and you believe this is incorrect, you can recover by blocking, then unblocking the port. You may need to do this several times.
3. If you see fabric segmentation errors and messages like "Platform Management Database inconsistency" on B-Series switches, then disable management server on B-Series using "msPlMgmtDeactivate", and then reboot the B-Series switch as shown in step-11, item #3.
4. If you have zone merging problems, check the following:
   - Remember the Active Zone set in the M-Series and the Active Zone set in the B-series must be unique. You cannot have the same zone name with different WWN members.
   - Only WWN zoning is permitted for heterogeneous fabrics. Domain, Port, or Area zoning are not supported.
   - Make sure the zones are compatible between the M-Series and B-series. See Step 5: Ensure All Switches Are Set Up with WWN Zoning, page 16 for more details.

Glossary

ISL

Interswitch Link. This is the link that connects two switches.

Operating Mode

This is the mode of the fabric. For M-Series, two modes exist (Homogeneous Fabric or Open Fabric). “Homogeneous Fabric” mode is designed for a fabric that consists only of M-Series products. The “Open Fabric” mode is designed for fabrics that consist of M-Series and other vendor switches.

Segmentation

The act of “Non-Connection” between two switches. Numerous reasons exist for an ISL to segment. See *Segmentation Errors* on page 32 for more details.