BROCADE

Brocade Fabric Watch

User's Guide

Version 2.6

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Preface

Fabric Watch version 2.6 is an optionally licensed product, and requires a valid license key to function. It is supported on the SilkWorm® 2000 series of switches running Brocades Fabric OS™ v2.6 or later.

About This Guide

This guide provides the following information about Fabric Watch:

Chapter 1 About Fabric Watch	This chapter discusses the purpose of Fabric Watch software, how the software works, and the terms and components you must know to use the software.
Chapter 2 Activating Fabric Watch	This chapter discusses how to activate Fabric Watch with telnet commands and how to activate Fabric Watch with Brocade Web Tools.
Chapter 3 Using Fabric Watch	This chapter provides a description of user interfaces that you can use to access Fabric Watch software, instructions that you can use to configure Fabric Watch thresholds, and an explanation of Fabric Watch error messages.

Related Publications

Related product information can be found in the following Brocade publications:

- Brocade Fabric OS Procedures Guide

- Brocade Fabric OS Reference

- Brocade MIB Reference

- Brocade Web Tools User's Guide

- Brocade Zoning User's Guide

- Brocade QuickLoop User's Guide

- Brocade Fabric Watch User's Guide

- Brocade Distributed Fabrics User's Guide

- Brocade SES User's Guide

Information about fibre channel standards and fibre channel in general can be found on the Fibre Channel Association web site, located at:

http://www.fibrechannel.com

Getting Help

Contact your switch supplier for technical support. This includes hardware and software support, all product repairs, and ordering of spare components.

Be prepared to provide the following information to support personnel:

- Switch serial number
- Switch worldwide name
- Topology configuration
- Output from the `supportShow` telnet command
- Detailed description of the problem
- Troubleshooting steps already performed

Getting Software Updates

Contact your switch supplier for software updates and maintenance releases. New switch firmware can be installed from the following host operating systems:

- UNIX
- Windows 2000
- Windows NT
- Windows 98
- Windows 95

Utility programs to facilitate loading firmware, sample Fabric Watch configurations, and MIB files for switch management by SNMP can be accessed on the Brocade Web site through the following steps:

1. Open a web browser at:
    http://www.brocade.com

2. Click **Support**.

3. Click **MIBs and RSH Utilities**.

4. Click the link for the desired product.

About Brocade Fabric Watch

Chapter

1

This chapter discusses the following:

- The purpose of Fabric Watch software
- How the software works
- The terms and components you need to know to use the software

Purpose

Brocade Fabric Watch software monitors the performance and status of fibre channel networks and SilkWorm switches, and alerts SAN managers when problems arise. The real-time alerts from Fabric Watch software help SAN managers solve problems before they become costly failures. SAN managers can configure Fabric Watch software to monitor any of the following:

- Fabric events (such as topology reconfigurations and zone changes)
- Physical switch conditions (such as fans, power supplies, and temperature)
- Port behavior (such as state changes, errors, and performance)
- GBICs (for switches equipped with SMART GBICs, such as the Finisar SMART GBIC FTR-8519-3)

How it works

Fabric Watch software lets SAN managers place limits, or *thresholds*, on the behavior of different switch and fabric elements. Fabric Watch then monitors these behavior variables, or *counters*, and issues an alarm to address problems when a counter exceeds a threshold. An alarm may email the SAN manager or lock out a port log, depending on how the manager configures the alarm.

Critical Terms and Components

Fabric Watch software uses a number of terms and components to identify, classify, monitor, and handle fabric and switch activity.

Element Categories

Fabric Watch elements include any component of the fabric or switch that Fabric Watch software monitors. To monitor elements, Fabric Watch software groups them into *areas*, and groups areas into *classes*.

Classes

Classes (also known as agents) are high-level categories of elements. Fabric Watch software monitors elements that compose the following classes:

- Fabric
- Environment
- Port (includes E_Port, Optical F/FL_Port, Copper F/FL_Port)
- GBIC

Areas

Areas are the behaviors that Fabric Watch software monitors. Table 1-1 lists all Fabric Watch classes, the areas within those classes, and a description of each area.

Table 1-1   Fabric Watch Areas

Class	Area	Area Description
Fabric	Loss of E Port	Monitors E_Port status.
	Fabric reconfiguration	Monitors changes to the fabric configuration.
	Segmentation changes	Monitors segmentation changes.
	Domain ID changes	Monitors forcible DOMAIN ID changes.
	Zoning changes	Monitors changes to currently enabled zoning configurations.
	Fabric logins	Monitors the number of host device fabric logins (flogi).
	GBIC change	Monitors insertion/removal of GBIC.
	Fabric<->QL	Monitors the state of the loop port.
Environmental	Temperature	Monitors switch temperature in degrees Celsius.
	Fan	Monitors switch fan speed in RPMs.
	Power supply	Monitors whether the power supply is functional or faulty.

Table 1-1   Fabric Watch Areas (Continued)

Class	Area	Area Description
Port	Link failure count	Monitors the link failure rate of each port. Tracks the number of link failures per configured time interval.
	Loss of synchronization count	Monitors the number of synchronization loss errors per configured time interval.
	Loss of signal count	Monitors the number of signal loss errors per configured time interval.
	Primitive sequence protocol error	Monitors the number of protocol errors per configured time interval.
	Invalid transmission word	Monitors the number of invalid words transmitted (from a device to a port) per configured time interval.
	Invalid CRC count	Monitors the number of CRC errors per configured time interval.
	Receive performance	Monitors receive performance in KB/sec.
	Transmit performance	Monitors transmit rate in KB/sec.
	State changes	Monitors state changes.
GBIC	Temperature	Monitors GBIC temperature in degrees Celsius.
	Receiver power	Monitors GBIC receiver power in uwatts.
	Transmitter power	Monitors GBIC transmitter power in uwatts
	Current	Monitors GBIC current in mamps.

Monitoring Tools

Fabric Watch uses a number of tools to monitor switch and fabric performance and to alert
SAN managers to potential problems.

Counters

Counters represent the value of a behavior variable. Counters can be cumulative or current. For
instance, a counter may represent the total number of times that a given error occurred since Fabric
Watch began logging occurrences of that error, or it may represent the current speed in RPMs of a
fan. Fabric Watch measures counters against thresholds to determine when events occur.

Thresholds

A threshold is a value or range of values to which Fabric Watch compares a behavior counter to
determine if the behavior value is correct or warrants an alarm.

Range Threshold

A range threshold consists of a maximum and minimum boundary, and all values between the boundaries form a "normal" region. If a behavior counter exceeds either boundary, that exception registers as an event. SAN managers can also configure Fabric Watch to register an *event* when a counter returns to a "normal" value.

Counters may oscillate around the upper or lower boundary of a range threshold, and as a result cause numerous events in a short period of time. To reduce the number of events, you can configure a *buffer*, or a range of values just below the upper boundary and just above the lower boundary, in which a counter will not register an event if it returns to a "normal" value. An event will only register if the counter returns to a "normal" value beyond the buffer.

Figure 1-1 illustrates a range threshold with buffers. The values at 1 second, 3 seconds, and 5 seconds will generate events because they exceed boundaries. The value at 2 seconds will not generate an event because, though it crosses the boundary, it remains in the buffer zone. The value at six seconds will generate an event because it crosses the lower boundary and returns to a value beyond the buffer zone.

A. Upper Boundary
B. Upper Buffer
C. Buffer Zones
D. Lower Boundary
E. Lower Buffer
F. Normal Zone
G. Counter Value
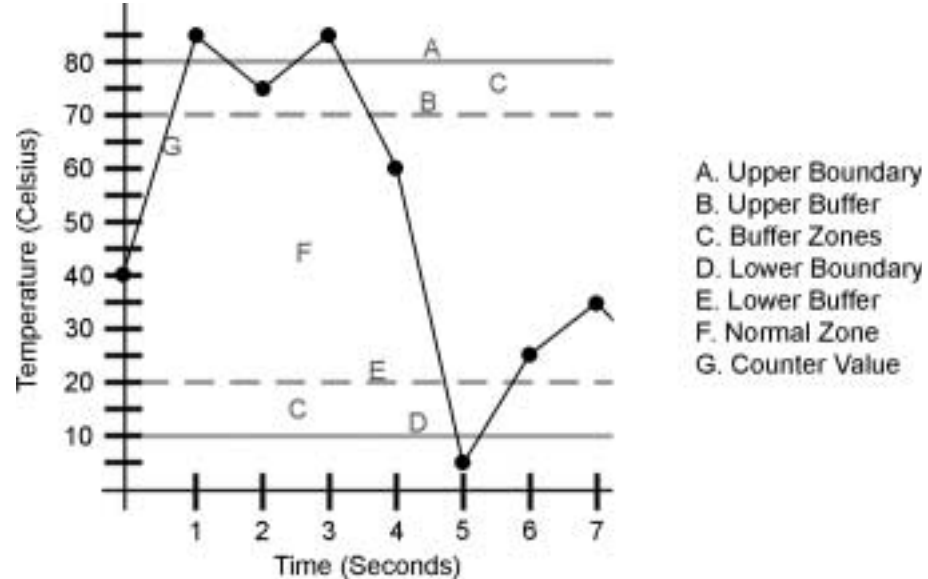
Figure 1-1   Range Threshold

Rising/Falling Threshold

A rising/falling threshold has only one boundary, not two like the range threshold. Where a range threshold has a "normal" state where a counter stays in between two boundaries, a rising/falling threshold is "normal" as long as the value of the counter does not exceed the value of the one boundary.
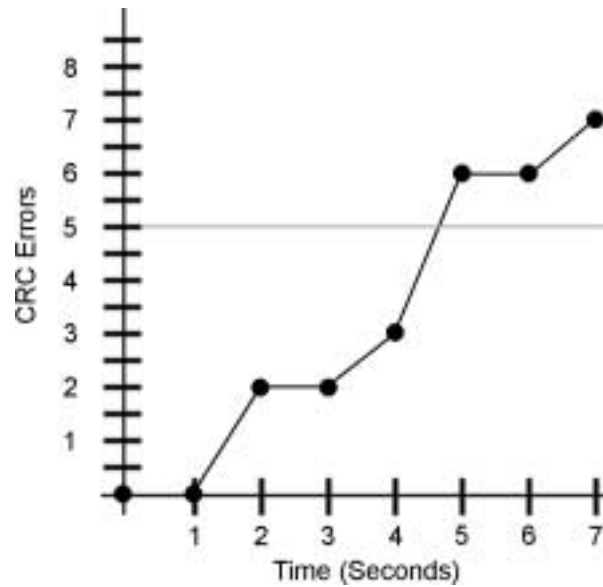
Figure 1-2 Rising/Falling Threshold

Change Monitor Threshold

A change monitor threshold consists of a number of distinct values, not a range of values. Whenever a behavior variable changes from one value to another, that change registers as an event.

Threshold Naming Conventions

You need to recognize threshold naming conventions so you can identify thresholds that appear in Fabric Watch error messages. All threshold names consist of the following three items, with no separators:

1. Abbreviation of the threshold's class name, in lower case, as shown in Table 1-2.

Table 1-2   Class Name Abbreviations

Class	Abbreviation
Fabric	fabric
Environment	env
Port	port
E_Port	eport
Optical F/FL_Port	fopport
Copper F/FL_Port	fcuport
GBIC	gbic

2. Abbreviation for the area name as shown in Table 1-3

Table 1-3   Area Name Abbreviations

Area	Abbreviation
Power supply	PS
Temperature (sensor)	Temp
Fan speed sensor	Fan
Receiver power	RXP
Transmitter power	TXP
Current	Crnt
Invalid CRCs	CRCs
Link Failures	Link
Protocol Errors	ProtoErr
RX Performance	RXPerf
Loss of Signal	Signal
State Changes	State
Loss of Sync	Sync
TX Performance	TXPerf
Invalid Words	Words
Domain ID	DI
E-port down	ED
Fabric login	FL
Fabric<->QL	FQ

Table 1-3   Area Name Abbreviations (Continued)

Area	Abbreviation
Reconfigure	FR
GBIC change	GS
Segmentation	SC
Zoning change	ZC

3. Index number for the element involved. The index number consists of three digits, and corresponds to where the element appears in respect to others in a series. For instance, if the element in question is the third temperature sensor on a switch, its number would be 003.

Note: Numbering for all Port and GBIC classes begin with index number 000, but environment class index numbers begin with 001. Therefore, the first element in a series of ports will be 000, but the first element in a series of thermometers will be 001. For the Fabric class, the index number is always 000.

Example: fopportState003 represents a state threshold of the fourth optical port.

Threshold Boundaries

Boundaries are the characteristics that define a threshold. Table 1-4 lists the boundaries that can define a threshold and what each boundary identifies.

Table 1-4   Threshold Boundaries

Boundary	Definition
Unit string	Unit of measurement that Fabric Watch software will display in alarms concerning the value of a particular element.
Time base	Basic unit of time in which events are recorded.
Low boundary	Lowest limit at which the monitored value of an element will not register as an event.
High boundary	Highest limit at which the monitored valued of an element will not register as an event.
Buffer size	Size of a threshold buffer.

Threshold Values

You configure threshold values to determine whether and when an event registers against a given threshold. Threshold values determine the behavior mode of a threshold. Table 1-5 lists and explains threshold values.

Table 1-5   Threshold Values

Value	Definition
Status	Configures a threshold as enabled or disabled. Thresholds are enabled by default.
Behavior mode	Configures a threshold as continuous or triggered. Thresholds are triggered by default.
Behavior interval	Configures the minimum time interval (in seconds) between two instances of the same type of alarm. The default interval is 1 second.

Behavior Modes

The behavior of a variable determines the conditions under which Fabric Watch software registers an event. You can configure an area to respond to triggered or continuous behavior.

Triggered Behavior Mode

In triggered behavior mode, Fabric Watch only registers an event when a variable exceeds a threshold. To trigger another event, the variable must fall within the threshold, then exceed the threshold again. For example, if the temperature of a switch exceeds its threshold while in triggered behavior mode, Fabric Watch will only register one event until the temperature falls within the threshold, then exceeds the threshold again.

Continuous Behavior Mode

In continuous behavior mode, Fabric Watch registers an event when a variable exceeds a threshold and continues to register an event every designated time interval until the variable falls within the threshold again. SAN managers designate the time interval, or *behavior interval*.

Events

Whenever a counter exceeds a threshold, Fabric Watch software identifies that occurrence as an *event*. Events trigger alarms that notify SAN managers that the event took place. Fabric Watch software recognizes six types of events. Table 1-6 describes Fabric Watch event types.

Table 1-6   Event Types

Event Type	Explanation	Associated Behavior Mode
Started	Element monitoring is in a started condition. A started event is not referenced. No alarms are available.	triggered/continuous
Below	A counter is below the lower boundary.	triggered/continuous

Table 1-6   Event Types (Continued)

Event Type	Explanation	Associated Behavior Mode
Above	A counter is above the upper boundary.	triggered/continuous
Exceeded	A counter is below the lower boundary or above the upper boundary.	triggered/continuous
Changed	A counter value has changed. A changed event is not referenced to any threshold boundary level. Changed events will be reported in reference to the behavioral interval time setting.	triggered/continuous
In-between	A counter falls below the upper boundary minus the buffer, or rises above the lower boundary plus the buffer. Must be preceded by an above or below event. If the buffer is set to zero, this event is suppressed.	triggered

Alarms

Fabric Watch software can notify SAN managers of events with any of four types of alarm. The four alarm types are as follows:

SNMP Trap

An SNMP trap forwards the following information to an SNMP management station:

- Name of the element involved in the event
- Class, area, and index of the threshold
- Type of event
- Value of the element that exceeded the threshold
- State of the element

This alarm stores event information for SAN managers, but does not actively alert SAN managers to events.

Switch Event Log Entry

The switch event log holds up to 64 entries. You can configure Fabric Watch software to forward event log entries to the SYSLOGD facility. This alarm stores event information for SAN managers, but does not actively alert SAN managers to events.

Port Log Lock

The port log locks to retain detailed information about an event. This alarm stores event information for SAN managers, but does not actively alert SAN managers to events.

RapiTrap

RapiTrap is the only alarm that actively alerts SAN managers to events. Once you enable RapiTrap, Fabric Watch forwards all event information to a designated proxy switch. (The host API automatically configures the proxy switch based on firmware version.) The switch then forwards the information to a server and alerts the SAN manager to event activity.

Configurations

SAN managers can use configuration files and profiles to customize Fabric Watch and store those customized instructions.

The Configuration File

The configuration file of a switch includes all Fabric Watch configurations. You can manually configure Fabric Watch thresholds and alarms if you edit the configuration file in a text editor.

Profiles

Profiles are preset configuration files that cater to particular types of networks. You can download profiles to your switch and then configure Fabric Watch software to run from a profile or from your configuration file.

Activating Fabric Watch

This chapter provides the following information:
- How to activate Fabric Watch with telnet commands
- How to activate Fabric Watch with Brocade Web Tools

Brocade Fabric Watch software is optionally licensed software that resides on all Brocade switches, and that you can activate with the proper license. A license may have been installed in the switch at the factory. If not, contact your switch supplier to obtain a license key.

Fabric Watch version 2.6 requires a SilkWorm 2000 series switch or above running Brocade Fabric OS v. 2.6. You can use telnet commands or Brocade Web Tools to install a Fabric Watch license.

Activating with Telnet

To install Fabric Watch using telnet commands perform the following steps:

1. Log onto the switch by telnet (refer to *Brocade Fabric OS User's Guide* for details), using an account that has administrative privileges.

2. Type `licenseShow` at the telnet command line to determine whether a Fabric Watch license is already installed on the switch. A list displays all the licenses currently installed on the switch.

   Example:

   ```
   dev170:admin> licenseShow
   SbS9S9zyQQmcTMUj:
        Web license
        Zoning license
        SES license
        QuickLoop license
        Fabric license
        Remote Switch license
        Remote Fabric license
        Extended Fabric license
        Entry Fabric license
        Fabric Watch license
        Security license
        Release v2.2 license
   ```

   If the Fabric Watch license is not included in the list or is incorrect, continue with step 3.

3. Enter the following on the command line:

   ```
   licenseAdd "key"
   ```

   where `key` is the license key provided to you, surrounded by double quotes. The license key is case sensitive and must be entered exactly as given.

4. Verify the license was added by entering the following on the command line:

   ```
   licenseShow
   ```

   If the license is not listed, repeat step 3.

5. Enter the `fwClassInit` command or reboot the switch to load Fabric Watch classes and areas.

Installing with Brocade Web Tools

To install Fabric Watch using Web Tools, perform the following steps:

1. Launch the web browser, enter the switch name or IP address in the **Location/Address** field (for example: `http://111.222.33.1`), and press Enter. Brocade Web Tools launches, displaying the Fabric View.

2. Click the **Admin** button on the relevant switch panel. The logon window appears.

3. Enter a logon name and password with administrative privileges and press Enter. The Administration View window appears.

4. Select the License Admin tab, enter the license key in the **License Key:** field, and click **Add License**.

Using Fabric Watch

This chapter provides the following information:

• A description of user interfaces that you can use to access Fabric Watch software

• Instructions that you can use to configure Fabric Watch thresholds

• An explanation of Fabric Watch error messages

Overview

You can configure Fabric Watch software with several user interfaces. The sections that follow describe the various interfaces and explain how to configure various elements of Fabric Watch using the telnet interface. For more information on Brocade Web Tools, refer to the *Brocade Web Tools User's Guide*.

User Interfaces

Brocade Fabric OS software provides the following interfaces that you can use to monitor and manipulate Fabric Watch:

• Brocade Web Tools
• Telnet
• SNMP-Based Enterprise Managers
• Configuration File

Brocade Web Tools

With Brocade Web Tools you can

• View fabric and switch events with the fabric-wide Event View.
• View and modify threshold and alarm configurations with the Fabric Watch view.
• Upload and download the configuration file with the Config Admin tab.

Telnet

With a telnet session you can

• Query fabric and switch events with the `fwShow` command.

- Query and modify threshold and alarm configurations (whether default or customized) with the `fwConfigure` command.
- Upload and download the configuration file with the `configUpload` and `configDownload` command.

SNMP-Based Enterprise Managers

With SNMP-based enterprise managers you can

- Query the MIB variable for individual fabric and switch elements.
- Query and modify threshold and alarm configurations.
- Receive generated SNMP traps when threshold conditions are met

The Configuration File

You can upload a configuration file, make any changes in a text editor, and then download the file to all switches in a fabric to ensure a uniform configuration file throughout the fabric, with uniform Fabric Watch configurations. You can upload and download the configuration file via a telnet session or with Web Tools.

How To

The sections below discuss how to use telnet commands to configure and use Fabric Watch software.

Configure Threshold Boundaries

To configure Fabric Watch thresholds, use telnet commands to set boundaries.

1. Open a telnet session to your switch.

2. Enter the `fwConfigure` command. A list of Fabric Watch classes appears

   Example:

   ```
   dev170:admin> fwConfigure

   1 : Environment class
   2 : GBIC class
   3 : Port class
   4 : Fabric class
   5 : E-Port class
   6 : F/FL Port (Copper) class
   7 : F/FL Port (Optical) class
   8 : quit
   Select a class => : (1..8) [8]
   ```

3.   Select the class of the threshold that you want to configure. A list of the areas in that class appears.

Example:

```
1 : Environment class
2 : GBIC class
3 : Port class
4 : Fabric class
5 : E-Port class
6 : F/FL Port (Copper) class
7 : F/FL Port (Optical) class
8 : quit
Select a class => : (1..8) [8] 1

1 : Temperature
2 : Fan
3 : Power Supply
4 : return to previous page
Select an area => : (1..4) [4]
```

4.   Select the area of the threshold that you want to configure. A status display of that area and a list of configuration options appear.

Example:

```
1 : Temperature
2 : Fan
3 : Power Supply
4 : return to previous page
Select an area => : (1..4) [4] 1

Index ThresholdName                    Status    CurVal
        LastEvent            LastEventTime  LastVal           LastState
==============================================================================
   1    envTemp001                     enabled      28 C
        inBetween    15:20:03 on 11/08/2001      25 C     Normal
   2    envTemp002                     enabled      34 C
        inBetween    15:20:03 on 11/08/2001      27 C     Normal
   3    envTemp003                     enabled      33 C
        inBetween    15:20:03 on 11/08/2001      26 C     Normal

1 : refresh
2 : disable a threshold
3 : enable a threshold
4 : advanced configuration
5 : return to previous page
Select choice => : (1..5) [5]
```

5. Select **advanced configuration** to view configurable boundaries.

    Example:

    ```
    1 : refresh
    2 : disable a threshold
    3 : enable a threshold
    4 : advanced configuration
    5 : return to previous page
    Select choice => : (1..5) [5] 4

    Index ThresholdName    BehaviorType    BehaviorInt
        1    envTemp001       Triggered              1
        2    envTemp002       Triggered              1
        3    envTemp003       Triggered              1

    Threshold boundary level is set at : Default

                     Default         Custom
         Unit           C               C
    Time base
           Low           0               0
          High          75              75
      BufSize           10              10

    Threshold alarm level is set at : Default

    Errlog-1, SnmpTrap-2, PortLogLock-4
    RapiTrap-8
    Valid alarm matrix is 11

                     Default         Custom
      Changed           0               0
     Exceeded           0               0
        Below           3               3
        Above           3               3
    InBetween           3               3

    1  : change behavior type            11 : change threshold alarm level
    2  : change behavior interval        12 : change changed alarm
    3  : change threshold boundary level 13 : change exceeded alarm
    4  : change custom unit              14 : change below alarm
    5  : change custom time base         15 : change above alarm
    6  : change custom low               16 : change inBetween alarm
    7  : change custom high              17 : apply threshold alarm changes
    8  : change custom buffer            18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19]
    ```

6. Select the boundary that you want to change. Fabric Watch presents a range of new values that you can choose.

    Example:

    ```
    1  : change behavior type            11 : change threshold alarm level
    2  : change behavior interval        12 : change changed alarm
    3  : change threshold boundary level 13 : change exceeded alarm
    4  : change custom unit              14 : change below alarm
    5  : change custom time base         15 : change above alarm
    6  : change custom low               16 : change inBetween alarm
    7  : change custom high              17 : apply threshold alarm changes
    8  : change custom buffer            18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19] 7
    Enter high threshold => : (-999999999..999999999) [75]
    ```

7. Enter the new boundary value.

    Example:

    ```
    Enter high threshold => : (-999999999..999999999) [75] 80

    Index ThresholdName     BehaviorType     BehaviorInt
        1     envTemp001        Triggered               1
        2     envTemp002        Triggered               1
        3     envTemp003        Triggered               1

    Threshold boundary level is set at : Default

                      Default          Custom
          Unit            C                C
     Time base
          Low             0                0
          High           75               80
      BufSize            10               10

    Threshold alarm level is set at : Default

    Errlog-1, SnmpTrap-2, PortLogLock-4
    RapiTrap-8
    Valid alarm matrix is 11

                      Default          Custom
       Changed           0                0
      Exceeded           0                0
         Below           3                3
         Above           3                3
     InBetween           3                3

    1  : change behavior type              11 : change threshold alarm level
    2  : change behavior interval          12 : change changed alarm
    3  : change threshold boundary level   13 : change exceeded alarm
    4  : change custom unit                14 : change below alarm
    5  : change custom time base           15 : change above alarm
    6  : change custom low                 16 : change inBetween alarm
    7  : change custom high                17 : apply threshold alarm changes
    8  : change custom buffer              18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19]
    ```

8. Repeat step 6 and step 7 until you have configured each boundary that you want to change.

9. Select **apply threshold boundary** `changes` to configure Fabric Watch to use the boundary
    settings that you customized.

Example:

```
1  : change behavior type           11 : change threshold alarm level
2  : change behavior interval       12 : change changed alarm
3  : change threshold boundary level 13 : change exceeded alarm
4  : change custom unit             14 : change below alarm
5  : change custom time base        15 : change above alarm
6  : change custom low              16 : change inBetween alarm
7  : change custom high             17 : apply threshold alarm changes
8  : change custom buffer           18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
```
Select choice => : (1..19) [19] 9

```
Index ThresholdName    BehaviorType    BehaviorInt
    1    envTemp001       Triggered              1
    2    envTemp002       Triggered              1
    3    envTemp003       Triggered              1


Threshold boundary level is set at : Default


                 Default        Custom
      Unit          C              C
 Time base
       Low          0              0
      High          75             80
   BufSize          10             10


Threshold alarm level is set at : Default

Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 11

                 Default        Custom
   Changed          0              0
  Exceeded          0              0
     Below          3              3
     Above          3              3
 InBetween          3              3

1  : change behavior type           11 : change threshold alarm level
2  : change behavior interval       12 : change changed alarm
3  : change threshold boundary level 13 : change exceeded alarm
4  : change custom unit             14 : change below alarm
5  : change custom time base        15 : change above alarm
6  : change custom low              16 : change inBetween alarm
7  : change custom high             17 : apply threshold alarm changes
8  : change custom buffer           18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
Select choice => : (1..19) [19]
```

Configure Behavior Modes with Threshold Values

1. Run Fabric Watch and navigate to the advanced configuration menu (see *Configure Threshold Boundaries* on page 3-2).

2. Select **change behavior type**. Fabric Watch displays a range of threshold indexes.

   Example:

   ```
   1  : change behavior type         11 : change threshold alarm level
   2  : change behavior interval      12 : change changed alarm
   3  : change threshold boundary level 13 : change exceeded alarm
   4  : change custom unit            14 : change below alarm
   5  : change custom time base       15 : change above alarm
   6  : change custom low             16 : change inBetween alarm
   7  : change custom high            17 : apply threshold alarm changes
   8  : change custom buffer          18 : cancel threshold alarm changes
   9  : apply threshold boundary changes 19 : return to previous page
   10 : cancel threshold boundary changes
   Select choice => : (1..19) [19] 1
   Select threshold index => : (1..3) [1]
   ```

3. Select the index number of the threshold that you want to configure.

   Example:

   ```
   Select threshold index => : (1..3) [1] 1
   1  : triggered
   2  : continuous
   Enter behavior type => : (1..2) [1]
   ```

4. Select a behavior type.

Example:

```
1  : triggered
2  : continuous
Enter behavior type => : (1..2) [1] 1

Index ThresholdName    BehaviorType    BehaviorInt
    1    envTemp001        Triggered              1
    2    envTemp002        Triggered              1
    3    envTemp003        Triggered              1

Threshold boundary level is set at : Default

                 Default         Custom
      Unit           C              C
 Time base
       Low           0              0
      High          75             80
   BufSize          10             10

Threshold alarm level is set at : Default

Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 15

                 Default         Custom
   Changed           0              0
  Exceeded           0              0
     Below           3              3
     Above           3              3
 InBetween           3              3

1  : change behavior type              11 : change threshold alarm level
2  : change behavior interval          12 : change changed alarm
3  : change threshold boundary level   13 : change exceeded alarm
4  : change custom unit                14 : change below alarm
5  : change custom time base           15 : change above alarm
6  : change custom low                 16 : change inBetween alarm
7  : change custom high                17 : apply threshold alarm changes
8  : change custom buffer              18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
Select choice => : (1..19) [19]
```

Configure Behavior Intervals with Threshold Values

1. Run Fabric Watch and navigate to the advanced configuration menu, as you did above.

2. Select **change behavior interval**.

    Example:

    ```
    1  : change behavior type         11 : change threshold alarm level
    2  : change behavior interval     12 : change changed alarm
    3  : change threshold boundary level  13 : change exceeded alarm
    4  : change custom unit           14 : change below alarm
    5  : change custom time base      15 : change above alarm
    6  : change custom low            16 : change inBetween alarm
    7  : change custom high           17 : apply threshold alarm changes
    8  : change custom buffer         18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19] 2
    Select threshold index => : (1..3) [1]
    ```

3. Select the index number of the threshold that you want to configure. Fabric Watch presents a range of new values that you can choose.

    Example:

    ```
    Select threshold index => : (1..3) [1] 1
    Enter behavior interval in seconds => : (1..1000) [1]
    ```

4. Enter a new behavior interval value.

Example:

```
Enter behavior interval in seconds => : (1..1000) [1] 2

Index ThresholdName     BehaviorType     BehaviorInt
    1    envTemp001       Triggered                 2
    2    envTemp002       Triggered                 1
    3    envTemp003       Triggered                 1

Threshold boundary level is set at : Default

                 Default          Custom
      Unit            C               C
 Time base
       Low            0               0
      High           75              80
   BufSize           10              10

Threshold alarm level is set at : Default

Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 15

                 Default          Custom
   Changed            0               0
  Exceeded            0               0
     Below            3               3
     Above            3               3
 InBetween            3               3

1  : change behavior type            11 : change threshold alarm level
2  : change behavior interval        12 : change changed alarm
3  : change threshold boundary level 13 : change exceeded alarm
4  : change custom unit              14 : change below alarm
5  : change custom time base         15 : change above alarm
6  : change custom low               16 : change inBetween alarm
7  : change custom high              17 : apply threshold alarm changes
8  : change custom buffer            18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
Select choice => : (1..19) [19]
```

Configure Status

Configure status to enable or disable thresholds.

1. Run Fabric Watch and navigate to the `select an area` menu (see *Configure Threshold Boundaries* on page 3-2).

Example:

```
1 : Temperature
2 : Fan
3 : Power Supply
4 : return to previous page
Select an area => : (1..4) [4]
```

2. Select an area. Fabric Watch displays a list of available thresholds in that area.

    Example:

    ```
    1 : Temperature
    2 : Fan
    3 : Power Supply
    4 : return to previous page
    Select an area => : (1..4) [4] 1

    Index ThresholdName                  Status    CurVal
            LastEvent          LastEventTime   LastVal          LastState
    ================================================================================
        1   envTemp001                   enabled      29 C
            inBetween     13:42:24 on 08/04/2001       29 C     Normal
        2   envTemp002                   enabled      29 C
            inBetween     13:42:24 on 08/04/2001       29 C     Normal
        3   envTemp003                   enabled      30 C
            inBetween     13:42:24 on 08/04/2001       30 C     Normal

    1 : refresh
    2 : disable a threshold
    3 : enable a threshold
    4 : advanced configuration
    5 : return to previous page
    Select choice => : (1..5) [5]
    ```

3. Select **disable a threshold** or **enable a threshold**.

    Example:

    ```
    1 : refresh
    2 : disable a threshold
    3 : enable a threshold
    4 : advanced configuration
    5 : return to previous page
    Select choice => : (1..5) [5] 2
    Select threshold index => : (1..3) [1]
    ```

4. Select a threshold index. Fabric Watch enables or disables the threshold that you select.

Example:

```
Select threshold index => : (1..3) [1] 1

Index ThresholdName                 Status    CurVal
        LastEvent          LastEventTime  LastVal        LastState
================================================================================
    1    envTemp001                 disabled       29 C
         inBetween    13:42:24 on 08/04/2001       29 C       Normal
    2    envTemp002                 enabled        29 C
         inBetween    13:42:24 on 08/04/2001       29 C       Normal
    3    envTemp003                 enabled        30 C
         inBetween    13:42:24 on 08/04/2001       30 C       Normal

1 : refresh
2 : disable a threshold
3 : enable a threshold
4 : advanced configuration
5 : return to previous page
Select choice => : (1..5) [5] 4

Index ThresholdName    BehaviorType    BehaviorInt
    1    envTemp001      Triggered             2
    2    envTemp002      Triggered             1
    3    envTemp003      Triggered             1

Threshold boundary level is set at : Default

                 Default        Custom
      Unit           C             C
 Time base
       Low           0             0
      High           75            80
   BufSize           10            10

Threshold alarm level is set at : Default

Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 15

                 Default        Custom
   Changed          0             0
  Exceeded          0             0
     Below          3             3
     Above          3             3
 InBetween          3             3

1  : change behavior type            11 : change threshold alarm level
2  : change behavior interval        12 : change changed alarm
3  : change threshold boundary level 13 : change exceeded alarm
4  : change custom unit              14 : change below alarm
5  : change custom time base         15 : change above alarm
6  : change custom low               16 : change inBetween alarm
7  : change custom high              17 : apply threshold alarm changes
8  : change custom buffer            18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
Select choice => : (1..19) [19]
```

Configure Alarms

When you configure alarms, you change the custom alarm configuration. Once you change the configuration, you must configure Fabric Watch to use the custom configuration.

To configure alarms, you must choose what alarms each event type will trigger. Fabric Watch uses a binary matrix to assign a numerical value to each alarm. To assign alarms to an event type, choose the alarms you want, add the numerical values of the alarms, and use the total value to map the alarms to the event. Table 3-1 lists the numerical values of each type of alarm.

Table 3-1   Alarm Value Matrix

Alarm	Matrix Value
None	0
Log Entry	1
SNMP Trap	2
Port Lock	4
RapiTrap	8

1. Run Fabric Watch and navigate to the advanced configuration menu (see *Configure Threshold Boundaries* on page 3-2).

2. Select the event type that will trigger the alarm(s) that you choose.

    Example:

    ```
    1  : change behavior type          11 : change threshold alarm level
    2  : change behavior interval      12 : change changed alarm
    3  : change threshold boundary level 13 : change exceeded alarm
    4  : change custom unit            14 : change below alarm
    5  : change custom time base       15 : change above alarm
    6  : change custom low             16 : change inBetween alarm
    7  : change custom high            17 : apply threshold alarm changes
    8  : change custom buffer          18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19] 13

    Errlog-1, SnmpTrap-2, PortLogLock-4
    RapiTrap-8
    Valid alarm matrix is 11
    Enter exceeded alarm matrix => : (0..11) [0]
    ```

3. Choose which alarms you want the event type to trigger (see Table 3-1 on page 3-13). Locate the matrix values for each alarm. Add the matrix values and enter the sum at the telnet prompt. For instance, if you want an event to trigger a log entry (matrix value: 1) and a port lock (matrix value: 4), enter 5 at the prompt.

Example:

```
Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 11
Enter exceeded alarm matrix => : (0..11) [0] 3

Index ThresholdName    BehaviorType    BehaviorInt
    1    envTemp001       Triggered             1
    2    envTemp002       Triggered             1
    3    envTemp003       Triggered             1

Threshold boundary level is set at : Default

                  Default          Custom
       Unit          C                C
 Time base
       Low           0                0
      High          75                80
    BufSize         10                10

Threshold alarm level is set at : Default

Errlog-1, SnmpTrap-2, PortLogLock-4
RapiTrap-8
Valid alarm matrix is 11

                  Default          Custom
    Changed           0                0
   Exceeded           0                3
      Below           3                3
      Above           3                3
  InBetween           3                3

1  : change behavior type           11 : change threshold alarm level
2  : change behavior interval       12 : change changed alarm
3  : change threshold boundary level 13 : change exceeded alarm
4  : change custom unit             14 : change below alarm
5  : change custom time base        15 : change above alarm
6  : change custom low              16 : change inBetween alarm
7  : change custom high             17 : apply threshold alarm changes
8  : change custom buffer           18 : cancel threshold alarm changes
9  : apply threshold boundary changes 19 : return to previous page
10 : cancel threshold boundary changes
Select choice => : (1..19) [19]
```

4. Select **apply threshold alarm** `changes` to configure Fabric Watch to use the alarm settings that you customized.

    Example:

    ```
    1  : change behavior type            11 : change threshold alarm level
    2  : change behavior interval        12 : change changed alarm
    3  : change threshold boundary level 13 : change exceeded alarm
    4  : change custom unit              14 : change below alarm
    5  : change custom time base         15 : change above alarm
    6  : change custom low               16 : change inBetween alarm
    7  : change custom high              17 : apply threshold alarm changes
    8  : change custom buffer            18 : cancel threshold alarm changes
    9  : apply threshold boundary changes 19 : return to previous page
    10 : cancel threshold boundary changes
    Select choice => : (1..19) [19] 17
    Committing configuration...done.
    ```

Edit the Configuration File

To edit the configuration file, upload the file to a host, then edit the file in a text editor and download the file to your switch.

1. Use the `configUpload` command to upload your configuration file to a host.

    Example:

    ```
    sw5:admin> configUpload "citadel","jdoe","config.txt","passwwd"
    upload complete
    ```

2. Edit the configuration file in a text editor.

3. Use the `configDownload` command to download your configuration file to your switch.

    Example:

    ```
    sw5:admin> configDownload "citadel", "jdoe", "config.txt"
    Committing configuration...done.
    download complete
    ```

4. Use the `fwConfigReload` command to load the new configuration.

    Example:

    ```
    dev174:admin> fwConfigReload
    fwConfigReload: Fabric Watch configuration reloaded
    ```

Download a Profile

You can download available profiles from the following site:

http://www.brocade.com/support/mibs_rsh/

Reading Error Messages

To read an error message, you must identify the components of the message to understand the following:

- Error number
- Date and time that the error occurred
- Type of error
- Threshold to which the error applies

Note: Remember, Threshold name in error messages = class name + area name + element index. Example: FopportLink003, fabricFL000, alpaPerfCRC004

> **Example**:
>
> class name = **env,**
>
> area name **= Fan,**
>
> element index = **000-002**
>
> threshold name is **envFan000 – envFan002**

For a complete list of class and area abbreviations, see Table 1-2 and Table 1-3 under *Thresholds* on page 1-3.

Fabric Watch Telnet Commands

This appendix discusses Fabric Watch telnet commands.

Overview

You can access telnet commands through the shell *admin* account when you install the license key. To use a telnet command, log into the relevant switch with administrative privileges, enter the command along with any required operands, and press Enter.

Note: You can access Fabric Watch software simultaneously from different connections by telnet, SNMP, Brocade Web Tools, or by modifying and uploading the Fabric swatch configuration file to the switch. If this happens, changes from one connection might not be updated to the other, and some may be lost. If "committing configuration..." displays during a telnet session, then the configuration may have recently been modified from another connection.

Table A-1 summarizes the Fabric Watch telnet commands.

Table A-1   Fabric Watch Telnet Commands

Command	Description	Page
fwClassInit	Initializes all classes under Fabric Watch.	A-2
fwConfigReload	Reloads the Fabric Watch configuration.	A-3
fwConfigure	Displays threshold information and lets the user configure threshold behaviors.	A-4
fwShow	Displays the thresholds that Fabric Watch monitors.	A-5

fwClassInit

Synopsis	`fwClassInit`
Availability	Administrator
Description	Initializes all classes under Fabric Watch. This command should only be used after installing a Fabric Watch license to initialize the licensed Fabric Watch classes
Operands	None
Example	`dev174:admin> fwClassInit` `fwClassInit: Fabric Watch has been updated`
See Also	fwConfigReload fwConfigure fwShow

fwConfigReload

Synopsis	`fwConfigReload`
Availability	Administrator
Description	Use to reload the Fabric Watch configuration. This command should only be used after you download a new Fabric Watch configuration file from a host.
Operands	None
Example	`dev174:admin> fwConfigReload` `fwConfigReload: Fabric Watch configuration reloaded`
See Also	configUpload configDownload fwClassInit fwConfigure fwShow

fwConfigure

Synopsis	`fwConfigure`
Availability	Administrator
Description	This command allows the admin account to display and modify threshold information and the Fabric Watch configuration. Switch elements monitored by Fabric Watch are divided into classes, which are further divided into areas. In addition, each area can include from 0 to 16 thresholds. For a complete list of Fabric Watch classes and areas, see Table 1-1 *Fabric Watch Areas* on page 1-2.
Operands	None

Example

```
dev174:admin> fwConfigure

1  : Environment class
2  : GBIC class
3  : Port class
4  : Fabric class
5  : E-Port class
6  : F/FL Port (Copper) class
7  : F/FL Port (Optical) class
8  : Alpa Performance Monitor class
9  : End-to-End Performance Monitor class
10 : Filter Performance Monitor class
11 : quit
Select a class => : (1..11) [11]
```

See Also   fwConfigReload
fwConfigure
fwShow

fwShow

Synopsis	`fwShow`
Availability	Administrator
Description	This command displays the thresholds that Fabric Watch monitors. If no parameters are entered, a summary of all thresholds is displayed. If a valid threshold name is entered as a parameter, detailed information pertaining only to that threshold is displayed and printed.
Operands	The following operand is optional:

- threshold-name: If you do not provide this operand, fwShow prints all thresholds available. You may also specify a particular threshodl by giving a full name or with a wild card.

  Note: threshold-name is case sensitive.

Example

```
dev174:admin> fwShow
=========================================================================
Name             Label                   Last value
---------------- ----------------------- ----------------------------
envFan001        Env Fan 1                      5610 RPM
envFan002        Env Fan 2                      3060 RPM
envFan003        Env Fan 3                      3450 RPM
envFan004        Env Fan 4                      5520 RPM
envPS001         Env Power Supply 1             0 (1 OK/0 FAULTY)
envPS002         Env Power Supply 2             1 (1 OK/0 FAULTY)
envTemp001       Env Temperature 1              29 C
envTemp002       Env Temperature 2              29 C
envTemp003       Env Temperature 3              30 C
fabricDI000      Fabric Domain ID               0 DID Change(s)
fabricED000      Fabric E-port down             0 Down(s)
fabricFL000      Fabric Fabric login            39 Login(s)
fabricFQ000      Fabric Fabric<->QL             0 Change(s)
fabricFR000      Fabric Reconfigure             0 Reconfig(s)
fabricGS000      Fabric GBIC change 0           2 Change(s)
fabricGS001      Fabric GBIC change 1           0 Change(s)
fabricGS002      Fabric GBIC change 2           0 Change(s)
fabricGS003      Fabric GBIC change 3           0 Change(s)
fabricGS004      Fabric GBIC change 4           0 Change(s)
fabricGS005      Fabric GBIC change 5           0 Change(s)
fabricGS006      Fabric GBIC change 6           0 Change(s)
fabricGS007      Fabric GBIC change 7           0 Change(s)
fabricGS008      Fabric GBIC change 8           0 Change(s)

vxTarget:admin> fwShow "envTemp001"

Env Temperature 1:

   Monitored for:      424082 (4 days, 21:48)
    Last checked:   10:09:43 on 12/04/2001

     Lower bound:           0 C
     Upper bound:          75 C
     Buffer Size:          10

   Value history:          31 C

  Threshold Disabled? No
    Threshold Locked? No
vxTarget:admin> fwShow "envTemp*"
=========================================================================
Name             Label                   Last value
---------------- ----------------------- ----------------------------
envTemp001       Env Temperature 1              31 C
envTemp002       Env Temperature 2              28 C
envTemp003       Env Temperature 3              28 C
envTemp004       Env Temperature 4              28 C
envTemp005       Env Temperature 5              29 C
```

See Also   fwClassInit
fwConfigReload
fwConfigure

Example Error Messages

B

This appendix lists sample Fabric Watch error messages and explains the significance of each message.

Environment Class Error Messages

0x10e67e30 (tThad): May 30 07:54:09
WARNING FW-BELOW1, 3, envFan002 (Env Fan 2) is below low boundary. current value: 3030 RPM. (faulty)

This error log indicates that the number of RPMs of fan 2 has fallen below the low threshold boundary, therefore the fan is in a faulty state.

0x10e65950 (tThad): May 22 17:00:1
WARNING FW-BELOW1, 3, envPS002 (Env Power Supply 2) is below low boundary. Current value: 0 (1 OK/0 FAULTY). (faulty)

This error log has a severity of 3 which is a warning indicating Power Supply 2 is either missing or is bad and the state is a *faulty condition.*

GBIC
0x10e630d0 (tThad): May 31 12:15:01
WARNING FW-EXCEEDED, 3, gbicRXP006 (Gbic RX power 6) exceeded boundary. current value: 396 uWatts. (info)

This error log is a warning that indicates that the GBIC on port 6 receiver has exceeded a boundary level missing or is bad and the state is informative.

0x10e630d0 (tThad): May 31 11:52:24
WARNING FW-ABOVE, 3, gbicTemp006 (Gbic Temperature 5) is above high boundary. current value: 37 C. (faulty)

This error log is a warning that indicates that the temperature GBIC on port 5 is above the high threshold boundary and is in a faulty state.

Fabric Port Error Messages

0x10e63880 (tThad): Jul 5 08:10:37
WARNING FW-BELOW, 3, portRXPerf000 (Port RX Performance 0) is below low boundary. current value: 25000 KB/s. (info)

In this example the low receive data rate threshold for port 0 has been crossed and current value of the receive rate is 25,000 KB/s. This is an informational warning.

0x10e63880 (tThad): Jul 5 08:08:13
 WARNING FW-ABOVE, 3, portRXPerf015 (Port RX Performance 15) is above high bound-ary. current value: 71576 KB/s. (info)
In this example the high receive rate threshold has been crossed and current value of the receive rate is 71,576 KB/s. This is an informational warning.

Fabric E-Port Error Messages

0x10e63880 (tThad): Jul 3 08:36:06
 WARNING FW-ABOVE, 3, eportWords008 (E Port Invalid Words 8) is above the high boundary. current value: 1 Error(s)/minute. (faulty)
This error is a warning that indicates that E_Port 8 has detected an invalid word, which is above the high boundary. The State of the message is reported as faulty.

0x10e63880 (tThad): Jul 3 08:36:06
 WARNING FW-ABOVE, 3, eportLink008 (E Port Link Failures 8) is above high boundary. current value: 1 Error(s)/minute. (faulty)
This error is a warning that indicates that E_Port 8 has had a link failure, which is above the high boundary. The State of the message is reported as faulty.

0x10e63880 (tThad): Jul 3 08:33:49
 WARNING FW-ABOVE, 3, eportCRCs008 (E Port Invalid CRCs 8) is above high boundary. current value: 1 Error(s)/minute. (faulty)
This error is a warning that indicates that E_Port 8 has detected one CRC error, which is above the high boundary. The State of the message is reported as faulty.

Fabric Copper Port Error Messages

0x10e67e30 (tThad): May 30 10:15:05
 WARNING FW-BELOW, 3, fcuportState014 (FCU Port State Changes 14) is below low boundary. current value: 0 Change(s)/minute. (normal)
Indicates that the number of State Changes, "0 changes per minute" on Fabric (copper) port14 is below the lower threshold boundary, and the state is normal.

0x10e67e30 (tThad): May 30 10:14:26
WARNING FW-BELOW, 3, fcuportSignal014 (FCU Port Loss of Signal 11) is below low boundary. current value: 0 Error(s)/second. (normal)
This error log has a severity level of 3, warning that the fabric copper port11 has had a loss of sig-nal. The state is normal.

Fabric Optical Port

0x1003f2d0 (tThad): May 22 17:31:33
WARNING FW-ABOVE, 3, fopportSync002 (FOP Port Loss of Sync 2) is above high boundary. current value: 4 Error(s)/minute. (faulty)
This error log indicates that 4 port loss of sync errors per minute, on fabric (optical) port2, is above the upper threshold boundary, and the state is a faulty condition.

0x1003f2d0 (tThad): May 22 17:31:33
WARNING FW-ABOVE, 3, fopportLink003 (FOP Port Link Failures 3) is above high boundary. current value: 1 Error(s)/minute. (faulty)
This error log indicates that 1 link failure per minute, on fabric (optical) port3, is above the upper threshold boundary, and the state is a faulty condition.

0x101d4c60 (tThad): Jul 10 15:17:38
WARNING FW-INBETWEEN, 3, fopportRXPerf003 (FOP Port RX Performance 3) is between high & low boundaries. current value: 44030 KB/s. (info)
This error indicates that receive performance data rate is in-between the high and low boundaries, this element is in the informative state.

Fabric Error Messages

0x10e63880 (tThad): Jul 3 08:35:51
WARNING FW-CHANGED, 4, fabricDI000 (Fabric Domain ID) value has changed. current value: 2 DID Change(s). (info)
This error reports that the switch has detected a domain id has change in the fabric. There has been two domain id changes and the state of the message is informational.

0x10e63880 (tThad): Jul 3 08:33:43
WARNING FW-CHANGED, 4, fabricFR000 (Fabric Reconfigure) value has changed. current value: 2 Reconfig(s). (info)
This error indicates that the fabric has been reconfigured twice. This message is informational.

0x1003f2d0 (tThad): May 22 17:31:33
WARNING FW-CHANGED, 4, fabricFL000 Fabric login) value has changed. current value: 23 Login(s). (info)
This error log indicates that a fabric login has occurred and the current value is 23 logins and this is an informative state.

0x10e63880 (tThad): Jul 3 08:14:27
WARNING FW-CHANGED, 4, fabricZC000 (Fabric Zoning change) value has changed. current value: 3 Zone Change(s). (info)
This error reports that there has been three zoning changes. This is an informational message.

0x10e67e30 (tThad): May 30 16:26:35
WARNING FW-CHANGED, 4, fabricGS005 (Fabric GBIC change 5) value has changed.

current value: 1 Change(s). (info)

In this example a GBIC was removed from the fabric. The error log indicates that the GBIC on port 5 value has changed and the state is informative.

0x10e63880 (tThad): Jul 5 07:39:26
 WARNING FW-CHANGED, 4, fabricSC000 (Fabric Segmentation) value has changed. current value: 9 Segmentation(s). (info)

This a informational error warning indicating that 9 fabric segmentations have occurred.

Glossary

8b/10b encoding An encoding scheme that converts each 8-bit byte into 10 bits. Used to balance ones and zeros in high-speed transports.

address identifier A 24-bit or 8-bit value used to identify the source or destination of a frame.

AL_PA Arbitrated loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

alias An alternate name for an element or group of elements in the fabric. Aliases can be used to simplify the entry of port numbers and WWNs when creating zones.

alias address identifier An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports. See also *alias*.

alias AL_PA An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port. See also *AL_PA*.

alias server A fabric software facility that supports multicast group management.

ANSI American National Standards Institute. The governing body for fibre channel standards in the U.S.A.

API Application programming interface. A defined protocol that allows applications to interface with a set of services.

arbitrated loop A shared 100 MBps fibre channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also *topology*.

ASIC Application specific integrated circuit.

ATM Asynchronous transfer mode. A transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.

authentication The process of verifying that an entity (such as a switch) in a fabric is what it claims to be. See also *digital certificate, switch-to-switch authentication*.

AW_TOV Arbitration wait time-out value. The minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

backup FCS switch Backup fabric configuration server switch. The switch or switches assigned as backup in case the primary FCS switch fails. See also *FCS switch, primary FCS switch*.

bandwidth The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a link or system. See also *throughput*.

BB_Credit Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available. See also *buffer-to-buffer flow control, EE_Credit*.

beacon	When all the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by telnet command or through Brocade Web Tools.
beginning running disparity	The disparity at the transmitter or receiver when the special character associated with an ordered set is encoded or decoded. See also *disparity*.
BER	Bit error rate. The rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also *error*.
block	As applies to fibre channel, upper-level application data that is transferred in a single sequence.
broadcast	The transmission of data from a single source to all devices in the fabric, regardless of zoning. See also *multicast, unicast*.
buffer-to-buffer flow control	Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. See also *BB_Credit*.
CA	Certificate authority. A trusted organization that issues digital certificates. See also *digital certificate*.
cascade	Two or more interconnected fibre channel switches. SilkWorm 2000 and later switches can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches). See also *fabric, ISL*.
chassis	The metal frame in which the switch and switch components are mounted.
circuit	An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also *link*.
Class 1	The class of frame switching service for a dedicated connection between two communicating ports (also called connection-oriented service), with acknowledgement of delivery or nondelivery of frames.
Class 2	A connectionless class of frame switching service that includes acknowledgement of delivery or nondelivery of frames.
Class 3	A connectionless class of frame switching service that does not include acknowledgement of delivery or nondelivery of frames. Can be used to provide a multicast connection between the frame originator and recipients, with acknowledgement of delivery or nondelivery of frames.
Class F	The class of frame switching service for a direct connection between two switches, allowing communication of control traffic between the E_Ports, with notification of delivery or nondelivery of data.
class of service	A specified set of delivery characteristics and attributes for frame delivery.
CLI	Command line interface. Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.
comma	A unique pattern (either 1100000 or 0011111) used in 8B/10B encoding to specify character alignment within a data stream. See also *K28.5*.
community (SNMP)	A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. See also *SNMP*.

CRC	Cyclic redundancy check. A check for transmission errors that is included in every data frame.
credit	As applies to fibre channel, the number of receive buffers available for transmission of frames between ports. See also *BB_Credit, EE_Credit.*
cut-through	A switching technique that allows the route for a frame to be selected as soon as the destination address is received. See also *route.*
data word	A type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words. See also *frame, ordered set, transmission word.*
defined zone configuration	The set of all zone objects defined in the fabric. May include multiple zone configurations. See also *enabled zone configuration, zone configuration.*
digital certificate	An electronic document issued by a CA (certificate authority) to an entity, and containing the public key and identity of the entity. Entities in a secure fabric are authenticated based on these certificates. See also *authentication, CA, public key.*
disparity	The proportion of ones and zeros in an encoded character. "Neutral disparity" means an equal number of each, "positive disparity" means a majority of ones, and "negative disparity" means a majority of zeros.
DLS	Dynamic load sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.
domain ID	Unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch, but can be assigned manually. The domain ID for a SilkWorm switch can be any integer between| 1 and 239.
E_D_TOV	Error detect time-out value. The minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared. See also *R_A_TOV, RR_TOV.*
E_Port	Expansion port. A type of switch port that can be connected to an E_Port on another switch to create an ISL. See also *ISL.*
EE_Credit	End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination. See also *BB_Credit, end-to-end flow control.*
EIA rack	A storage rack that meets the standards set by the Electronics Industry Association.
enabled zone configuration	The currently enabled configuration of zones. Only one configuration can be enabled at a time. See also *defined zone configuration, zone configuration.*
end-to-end flow control	Governs flow of class 1 and 2 frames between N_Ports. See also *EE_Credit.*
error	As applies to fibre channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors). See also *loop failure.*
exchange	The highest level fibre channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F_Port   Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. See also *FL_Port, Fx_Port.*

fabric   A fibre channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also *cascade, SAN, topology.*

fabric name   The unique identifier assigned to a fabric and communicated during login and port discovery.

FC-AL-3   The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-FLA   The Fibre Channel Fabric Loop Attach standard defined by ANSI.

FCIA   Fibre Channel Industry Association. An international organization of fibre channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards.

FCP   Fibre channel protocol. Mapping of protocols onto the fibre channel standard protocols. For example, SCSI FCP maps SCSI-3 onto fibre channel.

FC-PH-1, 2, 3   The Fibre Channel Physical and Signalling Interface standards defined by ANSI.

FC-PI   The Fibre Channel Physical Interface standard defined by ANSI.

FC-PLDA   The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.

FCS switch   Fabric configuration server switch. One or more designated SilkWorm switches that store and manage the configuration and security parameters for all switches in the fabric. FCS switches are designated by WWN, and the list of designated switches is communicated fabric-wide. See also *backup FCS switch, primary FCS switch.*

FC-SW-2   The second generation of the Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of fibre channel switches in order to create a multi-switch fibre channel fabric.

fibre channel transport   A protocol service that supports communication between fibre channel service providers. See also *FSP.*

Fill Word   An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the fibre channel link active.

firmware   The basic operating system provided with the hardware.

FL_Port   Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch. See also *F_Port, Fx_Port.*

FLOGI   Fabric login. The process by which an N_Port determines whether a fabric is present, and if so, exchanges service parameters with it. See also *PLOGI.*

frame   The fibre channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, any optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.

FRU   Field-replaceable unit. A component that can be replaced on site.

FS	Fibre channel service. A service that is defined by fibre channel standards and exists at a well-known address. For example, the Simple Name Server is a fibre channel service. See also *FSP*.
FSP	Fibre channel service protocol. The common protocol for all fabric services, transparent to the fabric type or topology. See also *FS*.
FSPF	Fabric shortest path first. Brocade's routing protocol for fibre channel switches.
full-duplex	A mode of communication that allows the same port to simultaneously transmit and receive frames. See also *half-duplex*.
Fx_Port	A fabric port that can operate as either an F_Port or FL_Port. See also *F_Port, FL_Port*.
G_Port	Generic port. A port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.
GBIC	Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for fibre channel and gigabit ethernet.
Gbps	Gigabits per second (1,062,500,000 bits/second).
GBps	GigaBytes per second (1,062,500,000 bytes/second).
half-duplex	A mode of communication that allows a port to either transmit or receive frames at any time, but not simultaneously (with the exception of link control frames, which can be transmitted at any time). See also *full-duplex*.
hard address	The AL_PA that an NL_Port attempts to acquire during loop initialization.
hardware translative mode	A method for achieving address translation. The following two hardware translative modes are available to a QuickLoop enabled switch: • Standard translative mode: Allows public devices to communicate with private devices that are directly connected to the fabric. • QuickLoop mode: Allows initiator devices to communicate with private or public devices that are not in the same loop.
HBA	Host bus adapter. The interface card between a server or workstation bus and the fibre channel network.
hub	A fibre channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.
idle	Continuous transmission of an ordered set over a fibre channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.
initiator	A server or workstation on a fibre channel network that initiates communications with storage devices. See also *target*.
Integrated Fabric	The fabric created by a SilkWorm 6400, consisting of six SilkWorm 2250 switches cabled together and configured to handle traffic as a seamless group.
IOD	In-order delivery. A parameter that, when set, guarantees that frames are either delivered in order or dropped.
ISL	Interswitch link. A fibre channel link from the E_Port of one switch to the E_Port of another. See also *cascade, E_Port*.

isolated E_Port	An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs). See also *E_Port*.
IU	Information unit. A set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.
JBOD	Just a bunch of disks. Indicates a number of disks connected in a single chassis to one or more controllers. See also *RAID*.
K28.5	A special 10-bit character used to indicate the beginning of a transmission word that performs fibre channel control and signaling functions. The first seven bits of the character are the comma pattern. See also *comma*.
key	A string of data (usually a number) shared between two entities and used to control a cryptographic algorithm. Usually selected from a large pool of possible keys to make unauthorized identification of the key difficult. See also *key pair*.
key pair	In public key cryptography, a pair of keys consisting of an entity's public and private key. The public key can be publicized, but the private key must be kept secret. See also *public key cryptography*.
L_Port	Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes: - Fabric mode: Connected to a port that is not loop capable, and using fabric protocol. - Loop mode: In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode. See also *non-participating mode, participating mode*.
latency	The period of time required to transmit a frame, from the time it is sent until it arrives. Together, latency and bandwidth define the speed and capacity of a link or system.
LED	Light emitting diode. Used to indicate status of elements on switch.
link	As applies to fibre channel, a physical connection between two ports, consisting of both transmit and receive fibres. See also *circuit*.
link services	A protocol for link-related actions.
LIP	Loop initialization primitive. The signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.
LM_TOV	Loop master time-out value. The minimum time that the loop master waits for a loop initialization sequence to return.
loop failure	Loss of signal within a loop for any period of time, or loss of synchronization for longer than the time-out value.
loop initialization	The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.
Loop_ID	A hex value representing one of the 127 possible AL_PA values in an arbitrated loop.
looplet	A set of devices connected in a loop to a port that is a member of another loop.
LPSM	Loop port state machine. The logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.

LWL	Long wavelength. A type of fiber optic cabling that is based on 1300mm lasers and supports link speeds of 1.0625 Gbps. May also refer to the type of GBIC or SFP. See also *SWL.*
MIB	Management information base. An SNMP structure to help with device management, providing configuration and device information.
multicast	The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network). See also *broadcast, unicast.*
multimode	A fiber optic cabling specification that allows up to 500 meters between devices.
N_Port	Node port. A port on a node that can connect to a fibre channel port or to another N_Port in a point-to-point connection. See also *NL_Port, Nx_Port.*
name server	Frequently used to indicate Simple Name Server. See also *SNS.*
NL_Port	Node loop port. A node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. See also *N_Port, Nx_Port.*
node	A fibre channel device that contains an N_Port or NL_Port.
node name	The unique identifier for a node, communicated during login and port discovery.
non-participating mode	A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired. See also *L_Port, participating mode.*
Nx_Port	A node port that can operate as either an N_Port or NL_Port.
ordered set	A transmission word that uses 8B/10B mapping and begins with the K28.5 character. Ordered sets occur outside of frames, and include the following items: • Frame delimiters: Mark frame boundaries and describe frame contents. • Primitive signals: Indicate events. • Primitive sequences: Indicate or initiate port states. Ordered sets are used to differentiate fibre channel control information from data frames and to manage the transport of frames.
packet	A set of information transmitted across a network. See also *frame.*
participating mode	A mode in which an L_Port in a loop has a valid AL_PA and can arbitrate, send frames, and retransmit received transmissions. See also *L_Port, non-participating mode.*
path selection	The selection of a transmission path through the fabric. Brocade switches use the FSPF protocol. See also *FSPF.*
phantom address	An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.
phantom device	A device that is not physically in an arbitrated loop but is logically included through the use of a phantom address.
PKI	Public key infrastructure. An infrastructure that is based on public key cryptography and CA (certificate authority), and uses digital certificates. See also *CA, digital certificate, public key cryptography.*

PKI certification utility	Public key infrastructure certification utility. A utility that makes it possible to collect certificate requests from switches and load certificates to switches. See also *digital certificate, PKI.*
PLOGI	Port login. The port-to-port login process by which initiators establish sessions with targets. See also *FLOGI.*
point-to-point	A fibre channel topology that employs direct links between each pair of communicating entities. See also *topology.*
Port_Name	The unique identifier assigned to a fibre channel port. Communicated during login and port discovery.
POST	Power on self-test. A series of tests run by a switch after it is turned on.
primary FCS switch	Primary fabric configuration server switch. The switch that actively manages the configuration and security parameters for all switches in the fabric. See also *backup FCS switch, FCS switch.*
private device	A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.
private key	The secret half of a key pair. See also *key, key pair.*
private loop	An arbitrated loop that does not include a participating FL_Port.
private NL_Port	An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.
protocol	A defined method and set of standards for communication.
public device	A device that supports arbitrated loop protocol, can interpret 8-bit addresses, and can log into the fabric.
public key	The public half of a key pair. See also *key, key pair.*
public key cryptography	A type of cryptography which uses a key pair, with the two keys in the pair called at different points in the algorithm. The sender uses the recipient's public key to encrypt the message, and the recipient uses the recipient's private key to decrypt it. See also *key pair, PKI.*
public loop	An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.
public NL_Port	An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.
quad	A group of four adjacent ports that share a common pool of frame buffers.
R_A_TOV	Resource allocation time-out value. The maximum time a frame can be delayed in the fabric and still be delivered. See also *E_D_TOV, RR_TOV.*
RAID	Redundant array of independent disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking. See also *JBOD.*
request rate	The rate at which requests arrive at a servicing entity. See also *service rate.*
route	As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination. See also *FSPF.*

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routing	The assignment of frames to specific switch ports, according to frame destination.
RR_TOV	Resource recovery time-out value. The minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator. See also *E_D_TOV, R_A_TOV*.
RSCN	Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes.
SAN	Storage area network. A network of systems and storage devices that communicate using fibre channel protocols. See also *fabric*.
sectelnet	A protocol similar to Telnet but with encrypted passwords for increased security.
security policy	A set of rules that determine how security is implemented in a fabric. Security policies can be customized.
sequence	A group of related frames transmitted in the same direction between two N_Ports.
service rate	The rate at which an entity can service requests. See also *request rate*.
SI	Sequence initiative.
SilkWorm	The brand name for the Brocade family of switches.
single mode	The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.
SNMP	Simple network management protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. See also *community (SNMP)*.
SNS	Simple name server. A switch service that stores names, addresses, and attributes for up to 15 minutes, and provides them as required to other devices in the fabric. SNS is defined by fibre channel standards and exists at a well-known address. May also be referred to as directory service. See also *FS*.
switch	Hardware that routes frames according to fibre channel protocol and is controlled by software.
switch name	The arbitrary name assigned to a switch.
switch port	A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.
switch-to-switch authentication	The process of authenticating both switches in a switch-to-switch connection using digital certificates. See also *authentication, digital certificate*.
SWL	Short wavelength. A type of fiber optic cabling that is based on 850mm lasers and supports 1.0625 Gbps link speeds. May also refer to the type of GBIC or SFP. See also *LWL*.
target	A storage device on a fibre channel network. See also *initiator*.
tenancy	The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.
throughput	The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second). See also *bandwidth*.

topology	As applies to fibre channel, the configuration of the fibre channel network and the resulting communication paths allowed. There are three possible topologies: • Point to point: A direct link between two communication ports. • Switched fabric: Multiple N_Ports linked to a switch by F_Ports. • Arbitrated loop: Multiple NL_Ports connected in a loop.
translative mode	A mode in which private devices can communicate with public devices across the fabric.
transmission character	A 10-bit character encoded according to the rules of the 8B/10B algorithm.
transmission word	A group of four transmission characters.
trap (SNMP)	The message sent by an SNMP agent to inform the SNMP management station of a critical error. See also *SNMP.*
tunneling	A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.
U_Port	Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.
UDP	User datagram protocol. A protocol that runs on top of IP and provides port multiplexing for upper-level protocols.
ULP	Upper-level protocol. The protocol that runs on top of fibre channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.
ULP_TOV	Upper-level time-out value. The minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.
unicast	The transmission of data from a single source to a single destination. See also *broadcast, multicast.*
well-known address	As pertaining to fibre channel, a logical address defined by the fibre channel standards as assigned to a specific function, and stored on the switch.
workstation	A computer used to access and manage the fabric. May also be referred to as a management station or host.
WWN	Worldwide name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.
zone	A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone.
zone configuration	A specified set of zones. Enabling a configuration enables all zones in that configuration. See also *defined zone configuration, enabled zone configuration.*

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