iSR6142
Intelligent Storage Router

Installation Guide

SN0051102-00 A

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Document Revision History

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1 Introduction

This manual describes the features and installation of the QLogic iSR6142 Intelligent Storage Router (iSR-6142), also referred to as the *iSR6142 router* or simply *router*.

Intended Audience

This guide is for users who are responsible for installing, managing, and servicing the iSR6142 router and the storage area network (SAN) equipment to which it is attached.

Related Materials

- *iSR6142 Router CLI User's Guide*, part number SN0054659-00
- *iSR6142 Router Manager User's Guide*, part number SN0054660-00
- *Internet Protocol, Version 6 (IPv6) Specification*, RFC2460
- *Neighbor Discovery for IP Version 6 (IPv6),* RFC2461
- *IPv6 Stateless Address Autoconfiguration*, RFC2462
- *Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification*, RFC2463
- *Transmission of IPv6 Packets over Ethernet Networks*, RFC2464
- iSCSI draft standard draft-ietf-ips-iSCSI-20
- *Internet engineering task force (IETF) – iSCSI Requirements and Design Considerations, iSCSI Naming and Discovery, Internet Protocol Specification (IPv4)*, RFC793
- *Transmission Control Protocol (TCP) Specification, RFC1122, Requirements for Internet Hosts-Communication Layers*
- *TCP Extensions for High Performance*, RFC1323
- *TCP Congestion Control*, RFC2581
- *NewReno Modification to TCP's Fast Recovery Algorithm*, RFC2582

- *ANSI SCSI – SCSI-3 Architecture Model (SAM), X3T10/994D/Rev 18, SCSI-3 Controller Command Set, X3T10/Project 1047D/Rev 6c. IEEE – 802.1Q Virtual LAN (VLAN), 802.1p Priority of Service, 802.3x Flow Control, 802.3ad Link Aggregation*
- *SCSI-3 Fibre Channel Protocol (SCSI-FCP)*, X3.269:1996
- *Fibre Channel Physical and Signaling Interface (FC-PH)*, X3.230:199
- *Fibre Channel 2nd Generation (FC-PH-2)*, X3.297:1997
- *Third Generation Fibre Channel Physical and Signaling Interface (FC-PH-3), X3.303:1998, Fibre Channel-Arbitrated Loop (FC-AL-2)*, working draft, revision 6.4, August 28, 1998
- *Fibre Channel Fabric Loop Attachment Technical Report (FC-FLA) NCITS/TR-20:1998, Fibre Channel-Private Loop Direct Attach Technical Report (FC-PLDA)*
- *SCSI Fibre Channel Protocol-2 (FCP-2)* working draft, revision 3, October1, 1999
- *Fibre Channel over TCP/IP (FCIP)*, RFC3821
- *ANSI Information Technology-SCSI 3 Architecture Model*, revision 18, November 27, 1995

Safety

WARNING!!

A **Warning** notice indicates a hazard that has the potential of causing minor personal injury.

CAUTION!

A **Caution** notice indicates the presence of a hazard that has the potential of causing damage to the equipment.

Communications Statements

The following statements apply to this product. The statements for other products intended for use with this product appear in their accompanying manuals.

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause unacceptable interference, in which case the user will be required to correct the interference at their own expense.

Neither the provider nor the manufacturer is responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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This equipment does not exceed Class A limits for radio emissions for digital apparatus, set out in Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps necessary to correct the interference.

Avis de conformité aux normes du ministère des Communications du Canada

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The CE symbol on the equipment indicates that this system complies with the EMC (Electromagnetic Compatibility) directive of the European Community (89/336/EEC) and to the Low Voltage (Safety) Directive (73/23/EEC). Such marking indicates that this system meets or exceeds the following technical standards:

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- EN 55022:1998, A1:2000, A2:2003 – “Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment”
- EN 55024:1998, A1:2001, A2:2003 – “Electromagnetic compatibility - Generic immunity standard Part 1 – Residential commercial, and light industry.”
  - EN 61000-4-2 – 1995, A1:1998, A2 – 2001 – “Electrostatic Discharge Immunity Test”
  - EN 61000-4-3 – 2002 – “Radiated, Radio-Frequency, Electromagnetic Field Immunity Test”
  - EN 61000-4-4 – 1995, A1:2001, A2:2001 – “Electrical Fast Transient/Burst Immunity Test”
  - EN 61000-4-5 – 1995, A1:2001 – “Surge Immunity Test”
  - EN 61000-4-6 – 1996, A1:2001 – “Immunity To Conducted Disturbances, Induced By Radio-Frequency Fields”
  - EN 61000-4-8 – 1993, A1:2001 – "Power Frequency Magnetic Field Immunity Test”
  - EN 61000-4-11 Second Edition – 2004 – “Voltage Dips, Short Interruptions And Voltage Variations Immunity Tests”
- EN 61000-3-2 – 2000 – “Limits For Harmonic Current Emissions (Equipment Input Current Less Than/Equal To 16 A Per Phase)” Class A
- EN 61000-3-3 – 1995, A1:2001 – “Limitation Of Voltage Fluctuations And Flicker In Low-Voltage Supply Systems For Equipment With Rated Current Less Than Or Equal To 16 A”

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This product may use Class 1 laser optical transceivers to communicate over the fiber optic conductors. The U.S. Department of Health and Human Services (DHHS) does not consider Class 1 lasers to be hazardous. The International Electrotechnical Commission (IEC) 825 Laser Safety Standard requires labeling in English, German, Finnish, and French stating that the product uses Class 1 lasers. Because it is impractical to label the transceivers, the following label is provided in this manual.

Electrostatic Discharge Sensitivity (ESDS) Precautions

The assemblies used in the switch chassis are ESD sensitive. Observe ESD handling procedures when handling any assembly used in the switch chassis.

Accessible Parts

The following field replaceable units (FRUs) are supported by the iSR6142 router:

- Small form-factor pluggable (SFP) optical transceivers

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2 General Description

This section describes the following features and capabilities of the iSR6142 router:

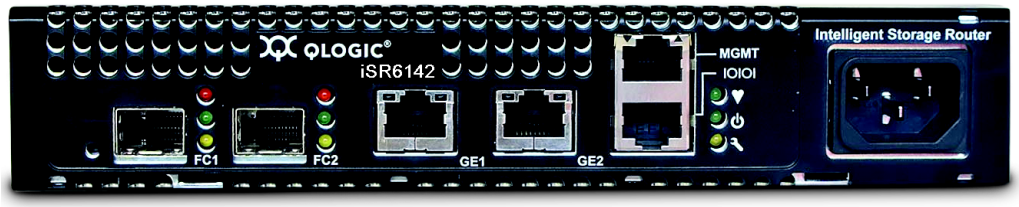


Figure 2-1 iSR6142 Router

Router Capabilities

The iSR6142 is a bi-directional FC-to-iSCSI router. It supports the following topologies:

- Two remote SAN islands (single or multi-vendor fabrics) (see page 2-4)
- Local connectivity (see page 2-6)
  - FC SAN islands (single or multi-vendor fabrics)
  - iSCSI Servers to FC SAN
  - FC servers to iSCSI SAN
- FCIP – Fibre Channel over IP (see page 2-6)

When using the iSR6142 to connect two Fibre Channel SANs, E-ports are not required on the Fibre Channel switches. This allows you to connect multi-vendor FC SANs (switches) without concern for the compatibility of the E-Ports and/or N-Ports between different switch vendors.

The iSR6142 has the following optional features:

- SmartWrite™ – Provides write performance improvements.
- Additional Server/Ports – Provides additional connectivity (see page 2-3).

Licensed Features

The iSR6142 router has two features that are available by a license key:

- SmartWrite
- Additional Server/Ports

SmartWrite

When connecting SAN over long distances, round-trip delays create significant impact to the performance. Typically, data writes involve two or more round-trip latencies that create a significant barrier to the data replication performance.

SmartWrite technology is designed to minimize the round-trip latency of any write I/O to a single round-trip latency.

This Feature Key offers the following benefits:

- Minimizes round-trip delays for any data write operation to a single round-trip latency.
- Allows load balancing over multiple IP links.

- Provides failover and failback between two gigabit Ethernet links.
- Allows data compression. This is very useful when data round-trip latencies between two routers exceed more than 50 ms or long distance link rate is equal or less than 4500 Mbits/sec (DS-3 line rate)

SmartWrite is an optional feature that requires purchasing a license key.

You may enter the **SmartWrite** feature key using the Router Manager (see the *iSR6142 Router Manager User's Guide*) or Command Line Interface (CLI) (see the *iSR6142 Router CLI User's Guide*).

Qualified applications using SmartWrite include:

- Server connected to Remote FC Storage array
- Array Data Replication applications
  - EMC – Mirrorview™ - EMC
  - EMC – SAN Copy™
  - HDS / Hitachi – True Copy™ with Fabric connect
  - HP – CA for XP

All other Data replication applications like IBM Shadow Copy™, EMC - SRDF, etc. should use the router's FCIP mode.

Additional Server/Ports

iSR6142 supports mapping of up to 62 server/ports between two SANs. The default configuration supports mapping 16 server/ports between SANs. For example, you may map eight iSCSI initiators to FC SAN and map eight FC devices from one FC SAN to another FC SAN. If your network requires more mappings, you can add a feature key to support additional mappings in 23 server/port increments as follows:

- 16 server/port mappings - the default configuration.
- 39 server/port mappings - includes the default 16 plus one "23 server/port license".
- 62 server/port mappings - includes the default 16 plus two "23 server/port licenses".

Additional Server/Ports is an optional feature that requires purchasing a license key. You may purchase up to two feature keys.

You can enter the **Additional Server/Ports** feature key using the SANsurfer Router Manager (see the *iSR6142 Router Manager User's Guide*) or Command Line Interface (CLI) (see the *iSR6142 Router CLI User's Guide*).

Remote SAN Island Connectivity

The iSR6142 router supports inter-connecting remote SAN islands (see Figure 2-2).

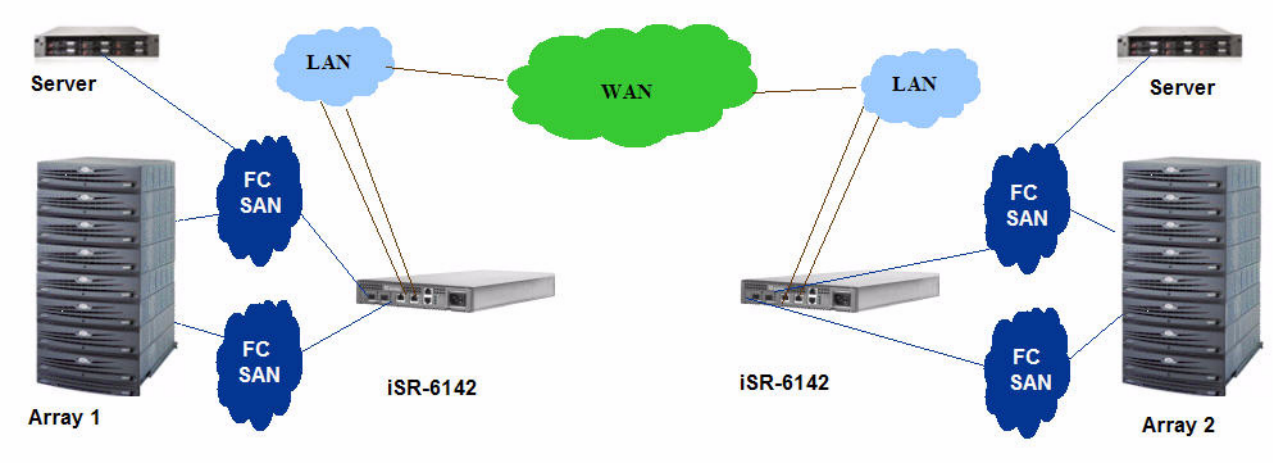


Figure 2-2 Remote SAN Island Connectivity

This configuration has the following additional requirements:

- At least one FC port of iSR6142 connected to FC SAN.
- Accessibility between the iSCSI/GE (Gigabit Ethernet ports on the router) port IP addresses of remote router and iSCSI/GE port IP addresses of local routers.
- Accessibility between the remote iSR6142 management port IP address and local iSR6142 management port IP address.

When connecting SANs over long distances, you must determine the round-trip latencies between two router connections. You can discover these round-trip latencies using the `ping` command in CLI. (See *iSR6142 Router CLI User's Guide*.)

Using this round-trip latency number, you can determine the window scaling factor for GE (iSCSI) port, as described in Performance Tuning on page 3-4. By default, window scaling is set to 1 (64K) TCP window size.

To map remote FC devices to local SAN:

1. If the remote router is not already associated with a local router, use either the Add Remote Router wizard (see the *iSR6142 Router Manager User's Guide*) or the CLI command `remotepeer add` (see the *iSR6142 Router CLI User's Guide*) to associate the two routers with each other.
2. Use the Map Remote Initiator/Target wizard (see the *iSR6142 Router Manager User's Guide*) or the CLI `remotemap add` command (see the *iSR6142 Router CLI User's Guide*) to create the initiator to target mapping.

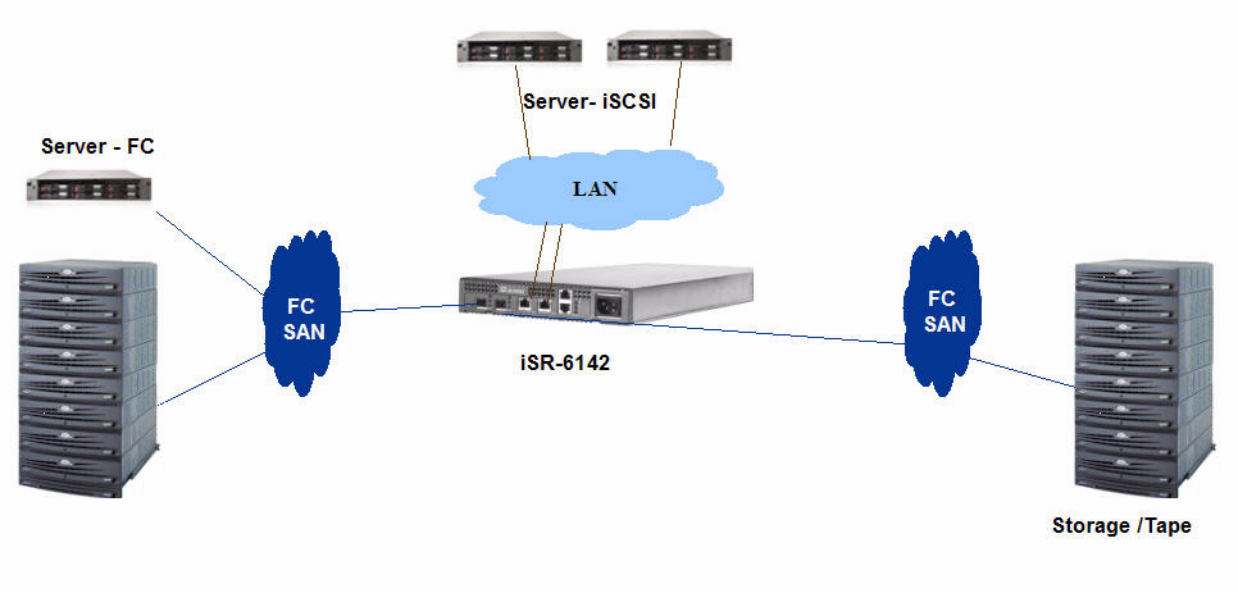


Figure 2-3 Local SAN Island Connectivity

The iSR6142 Intelligent Router supports inter-connecting local FC SAN islands. It also supports bridging iSCSI devices on the LAN-to-FC devices on the SAN (see Figure 2-3). It provides:

- FC storage from one SAN to an FC server on a different SAN.
- FC storage to iSCSI servers.
- SCSI storage to FC servers.

Local SAN Island Connectivity

You can use either the the SANsurfer Router Manager (see the *iSR6142 Router Manager User's Guide*) or Command Line Interface (CLI) (see the *iSR6142 Router CLI User's Guide*) to map any of the following connections:

- iSCSI server to an FC device (target)
- FC server to an iSCSI device (target)
- FC server from one SAN to FC target on another SAN

CAUTION!

When adding multiple routers in the same physical SAN, you must import a given FC device from a remote SAN on only one iSR6142 in the local physical SAN. If you import the same FC device from multiple iSR6142s into the same physical SAN, the system duplicates FC world-wide port names (WWPNs). This can disrupt the SAN.

FCIP - Fibre Channel over IP

The iSR6142 router supports FCIP, Fibre Channel over IP. The FCIP protocol as implemented in the router is not guaranteed nor has it been tested to be compatible with other vendor FCIP implementations. The router supports up to two FCIP routes; each route requires a dedicated FC and GE port pair.

- Merge FC fabrics over LAN/WAN
- N-port to fabric over LAN/WAN
- N-port to N-port over LAN/WAN

Chassis LEDs

The chassis LEDs shown in Figure 2-4 provide information about the router's operational status. These LEDs include the input power LED, heartbeat LED, and the system fault LED. To apply power to the router, plug the power cord into the router AC power receptacle and into a 100 VAC to 240 VAC, 50 Hz to 60 Hz power source.

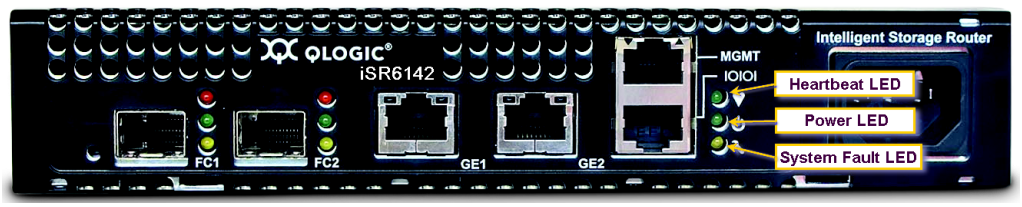


Figure 2-4 Chassis LEDs

Heartbeat LED (Green)

The heartbeat LED blinks once a second as long the router firmware is operational.

Input Power LED (Green)

The power LED shows the voltage status at the router logic circuit board. During normal operation, this LED lights up to show that the router logic circuit board is receiving the DC voltage from the power supply.

System Fault LED (Amber)

The system fault LED lights up to show that a fault exists in the router firmware or hardware. Fault conditions include POST errors and over-temperature conditions. The LED shows a blink code for POST errors and the over-temperature condition. See Figure 2-4 and Table 2-1.

Table 2-1. System Fault LED Blink Patterns

System Fault LED	Condition
OFF	OK (operational)
3 Blinks	System error
4 Blinks	Management port IP address conflict
5 Blinks	Over temperature
1 Blink	Beacon - synchronized with the Heartbeat LED

Chassis Controls

The maintenance button shown in Figure 2-5 is the only chassis control. Pressing this button resets the router or recovers the router if it has become disabled.

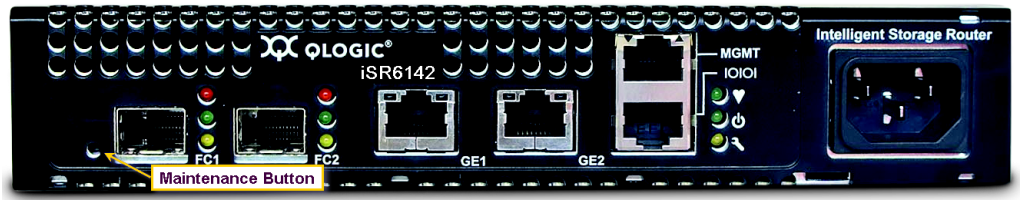


Figure 2-5 Chassis Controls

Maintenance Button

The maintenance button is a multifunction momentary switch on the front panel. It has the following functions:

- Reset a Router (see page 2-9)
- Reset and Select Boot Image (see page 2-9)
- Reset IP Address (see section page 2-9)
- Enable DHCP (see section page 2-9)
- Restore Factory Defaults (see page 2-9)

Reset a Router

To reset the router, use a pointed, nonmetallic tool to momentarily press and release (less than two seconds) the maintenance button. The router responds as follows:

1. All the chassis LEDs illuminate.
2. After about two seconds, the POST begins, turning off the heartbeat and system fault LEDs.
3. When the POST is complete, the power LED is on and the heartbeat LED flashes once per second.

Reset and Select Boot Image

You can reset the router using either the primary or secondary boot image:

- **Primary Image** – To reset the router and select the primary boot image, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes once, then release the button. The router boots from the primary boot image. The boot time is less than one minute.
- **Secondary Image** – To reset the router and select the secondary boot image, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes twice, then release the button. The heartbeat LED flashes twice. The router boots from the secondary boot image. The boot time is less than one minute.

Reset IP Address

To reset the router and restore the maintenance port IP address to the default (`10.0.0.1`), use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes six times, then release the button. The router boots and sets the maintenance port to IP address `10.0.0.1`. The boot time is less than one minute.

The IP address set by this method is not persistent; to make the change persistent, use the command line interface (CLI) or the SANsurfer Router Manager to set the IP address. For more information, see the *iSR6142 Router Manager User's Guide* or the *iSR6142 Router CLI User's Guide*.

Enable DHCP

To reset the router and configure the maintenance port to use DHCP to acquire its IP address, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes seven times, then release the button. The router boots and configures the maintenance port for DHCP. The boot time is less than one minute.

Enabling DHCP by this method is not persistent; to make the change persistent, use the command line interface (CLI) or the SANsurfer Router Manager to enable DHCP. For details, see the *iSR6142 Router Manager User's Guide* or the *iSR6142 Router CLI User's Guide*.

Restore Factory Defaults

To reset the router and restore it to the factory default configuration, use a pointed, nonmetallic tool to press the maintenance button and hold it until the heartbeat LED flashes 20 times, then release the button. The router boots and is restored to the factory defaults. The boot time is less than one minute.

The router does the following when restored to the factory defaults:

- Resets all passwords.
- Resets the maintenance port IP address to 10.0.0.1.
- Disables the iSCSI ports and sets the IP address to 0.0.0.0.
- Erases all presentations.
- Erases all discovered initiators and targets.

Fibre Channel Ports

The iSR6142 router has two Fibre Channel ports, labeled FC1 and FC2, as shown in Figure 2-6.

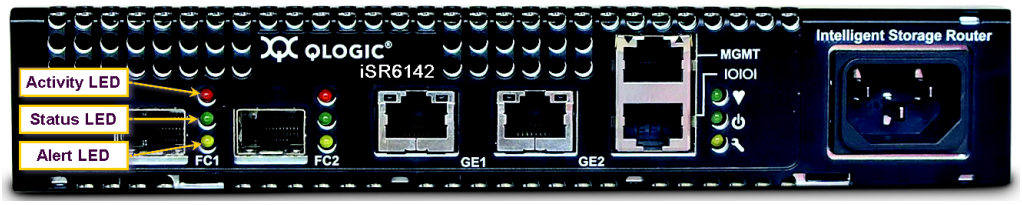


Figure 2-6 Fibre Channel LEDs

Each port is served by a small form-factor pluggable (SFP) optical transceiver and is capable of 1-Gbps or 2-Gbps transmission. SFPs are hot-pluggable. FC ports can self-discover both the connection type and transmission speed when connected to public devices or switches. The port LEDs are located to the right of their respective ports and provide status and activity information.

Fibre Channel Port LEDs

Each port has three LEDs:

- The amber LED (top) shows activity (data is passing through the port).
- The green LED (middle) shows the logged-in or initialization status of the connected devices. This LED flashes off to show the link rate, once for 1-Gbps speed, and twice for 2-Gbps speed.
- The yellow (bottom) LED shows an alert (port fault) condition.

Table 2-2 describes the LED blink patterns and their meanings.

Table 2-2. Port LEDs

Activity	Amber LED	Green LED	Yellow LED
Power OFF	OFF	OFF	OFF
Power ON (before firmware initialization)	ON	ON	ON
Online Link established at 1Gbit	OFF	3 seconds ON Flashes OFF once	OFF
Activity at 1 Gbps	ON	3 seconds ON Flashes OFF once	OFF
Online Link established at 2 Gbps	OFF	3 seconds ON Flashes OFF twice	OFF
Activity at 2 Gbps	ON	3 seconds ON Flashes OFF twice	OFF
Power ON (after firmware initialization and/or loss of synchronization)	OFF	ON	ON
Firmware error	OFF	OFF	ON

Fibre Channel SFP Transceivers

The iSR6142 router supports SFP optical transceivers for the Fibre Channel ports. A transceiver converts electrical signals to and from optical laser signals to transmit and receive data. Duplex fibre optic cables plug into the transceivers, which then connect to the devices. The Fibre Channel ports are capable of transmitting at 1-Gbps or 2-Gbps; the transceiver must also be capable of delivering these rates.

The SFP transceivers are hot pluggable – you can remove or install a transceiver while the router is operating without harming the router or the transceiver. However, this interrupts communication with the connected device. For information about installing and removing SFP optical transceivers, see page 4-5.

iSCSI/Gigabit Ethernet Port LEDs

The iSCSI/gigabit Ethernet ports shown in Figure 2-7 are RJ-45 connectors that provide connection to an Ethernet SAN through a 10/100/1000 Base-T Ethernet cable. The ports are labeled GE1 and GE2.

These ports have two LEDs – the link status LED (green) and the activity LED (also green).

- The link status LED lights up continuously after the router establishes an Ethernet connection.
- The activity LED lights up when the router sends or receives data over the connection.

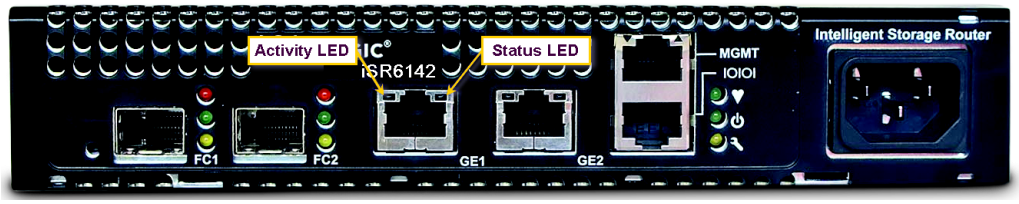


Figure 2-7 Gigabit Ethernet (iSCSI) Ports

Ethernet Port – Management

The Ethernet management port shown in Figure 2-8 is an RJ-45 connector that provides a connection to a management workstation through a 10/100 Base-T Ethernet cable. The port is labeled MGMT.

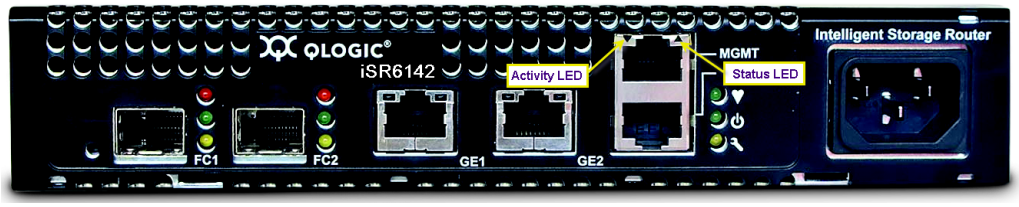


Figure 2-8 Ethernet Management Port

You can use a Windows®, Solaris™, or Linux™ workstation to configure and manage the router over an Ethernet connection using the SANsurfer Router Manager, CLI, or simple network management protocol (SNMP).

The management Ethernet port has two LEDs:

- The link status LED (green) is on continuously after the router establishes an Ethernet connection.
- The activity LED (green) is on when the router sends or receives data over the Ethernet connection.

Serial Port

The iSR6142 router is equipped with an RS-232 serial port for maintenance purposes. Figure 2-9 shows the serial port location. It is labeled IOIOI. You can manage the router through the serial port using the CLI.

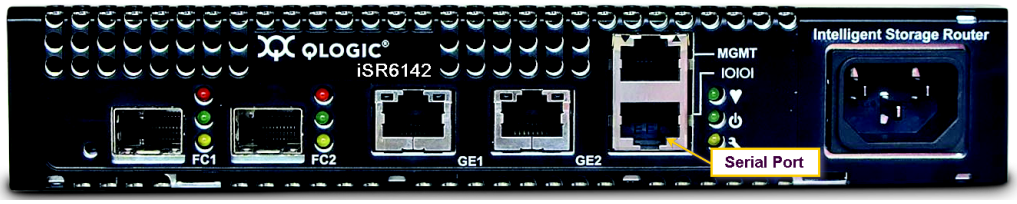


Figure 2-9 Serial Port

The serial port connection requires a standard, eight-wire Ethernet cable and the RJ45-to-DB9F adapter (supplied) to convert the Ethernet RJ45 connector to a female DB9 connector. Table 2-3 defines the serial port pins for the router's RJ45 connector. Table 2-4 defines the pinout for the RJ45 to DB9 adapter.

Table 2-3. Serial Port Pin Identification

RJ45 Pin Number	RJ-45 Pin Description
1	Clear to send (CTS)
2	Data set ready (DSR)
3	Receive data (RxD)
4	Signal ground (GND)
5	Data carrier detect (DCD)
6	Transmit data (TxD)
7	Data terminal ready (DTR)
8	Request to send (RTS)

Table 2-4. RJ-45 to DB-9 Adapter Pin Identification

RJ-45 Pin Number	DB-9F Pin Definition	DB-9 Pin Number	DB-9 Pin Definition
1	CTS	7	Request to send (RTS)
2	DSR	4	Data terminal ready (DTR)

Table 2-4. RJ-45 to DB-9 Adapter Pin Identification (Continued)

RJ-45 Pin Number	DB-9F Pin Definition	DB-9 Pin Number	DB-9 Pin Definition
5	DCD		
3	RxD	3	Transmit data (TxD)
4	GND	5	Signal ground (GND)
6	TxD	2	Receive data (RxD)
7	DTR	1	Data carrier detect (DCD)
		6	Data set ready (DSR)
8	RTS	8	Clear to send (CTS)
		9	Ring indicator (RI)

3 Planning

This section describes how to plan for the iSR6142 router. This includes the following considerations:

Devices

When planning to use the router, consider the number of devices and the anticipated demand. This will determine the required number of ports and in turn the number of routers.

The router uses SFP transceivers in the 1-Gbps/2-Gbps Fibre Channel (FC) ports, but some Fibre Channel (FC) devices may not use the same transceivers. Consider whether the FC device to be connected to the router uses SFP or gigabit interface converters (GBIC) transceivers, and choose fiber optic cables accordingly. Use LC-type cable connectors for small form-factor pluggable (SFP) transceivers and SC-type cable connectors for GBIC transceivers. Also consider the transmission speed compatibility of your devices, host bus adapters (HBAs), switches, and SFPs.

Device Access

Consider device access needs within the FC and iSCSI SANs. Access to an FC device is controlled by mapping FC device to specific iSCSI initiators. FC devices may be mapped to more than one initiator. Giving multiple initiators access to an FC device requires access management.

Fibre Channel

The Fibre Channel ports automatically discover all FC target devices, whether connected directly (loop) or by fabric (switch).

iSCSI

When an iSCSI initiator logs on, the router records the initiator's iSCSI name and IP address. The management interface (command line interface [CLI] or SANsurfer Router Manager) uses the initiator's information to simplify the mapping process.

FC Performance

The iSR6142 router supports Fibre Channel service at transmission rates of 1 Gbps or 2 Gbps with a maximum frame size of 2148 bytes. It supports Ethernet service at transmission rates of 1000-, 100- or 10-Mbps with a maximum transmission unit (MTU) size of 1500 or 9000 (jumbo frames).

NOTE:

An MTU size greater than 1500 should only be used when the router is connected to a 1000 Mbps Ethernet network.

Related performance characteristics include the following:

- Distance (see page 3-3)
- Bandwidth (see page 3-3)
- Latency (see page 3-3)

Distance

Consider the physical distance between Fibre Channel devices. Choose SFP transceivers that are compatible with the cable type and distance you need.

Each Fibre Channel port is supported by a data buffer with a three-credit capacity; that is, three maximum sized frames. For fibre optic cables, this enables full bandwidth over the following approximate distances:

- 5 kilometers at 1 Gbps (0.6 credits/Km)
- 2.5 kilometers at 2 Gbps (1.2 credits/Km)

Transmitting data beyond these distances reduces efficiency because the transmitting port must wait for an acknowledgement before sending the next frame.

Bandwidth

Bandwidth measures the amount of data transmitted over a channel or network. A 1-Gbps/2-Gbps FC port can transmit or receive at nominal rates of 1- or 2-Gbps, depending on the device to which it is connected. This corresponds to actual bandwidth values of 106 MB and 212 MB, respectively. WAN data rates range from 1.5 Mbps (T1) to greater than 600 Mbps (OC-12).

Latency

Latency measures how long a transaction takes to travel through the router or over a communication link.

iSCSI/Gigabit Ethernet Performance

The iSR6142 router supports Ethernet service at transmission rates of 1000-, 100- or 10-Mbps with a MTU size of 1500 or 9000 (jumbo frames).

NOTE:

An MTU size greater than 1500 should only be used when the router is connected to a 1000 Mbps Ethernet network.

Related performance characteristics include the following:

- Distance
- Bandwidth
- Latency

Distance

Consider the physical distance between routers. This is usually measured in round-trip delay. Round-trip delay ranges anywhere from less than 1 ms to as great as 250 ms.

Performance Tuning

Properly configuring the router maximizes its performance. Knowing the round-trip delay (distance) between routers and the WAN effective data rate (connection type) allows you to tune the routers for optimal performance. The following tables provide **TCP Window Scaling Factor** and **Window Size** settings for specific WAN environments.

NOTE:

For high loss networks, QLogic recommends decreasing the **TCP Window Size** from the initial recommended setting until the network achieves optimal performance.

Table 3-1. T1 / DS-1 – 1.554 Mbits/Sec

Round Trip delay (ms)	Total Window Size (bytes)	Scaling Factor
250	64 K	1
100	32 K	0
50	32 K	0
25	32 K	0
20	32 K	0
15	32 K	0
10	32 K	0
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 3-2. T3 / DS-3 – 45 Mbits/Sec

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1 MB	5
100	512 K	4
50	256 K	3
25	128 K	2
20	128 K	2
15	64-128 K	1 or 2
10	64 K	1
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 3-3. DS-5 – 400 Mbits/Sec

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1 MB	5
100	1 MB	5
50	1 MB	5
25	1 MB	5
20	1 MB	5
15	1 MB	5
10	512 K	4
5	256 K	3
2.5	128 K	2
1 or less	64 K	1

Table 3-4. OC-1 – 50 Mbits/Sec

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1 MB	5
100	512 K	4
50	256 K	3
25	128 K	2
20	128 K	2
15	64-128 K	1 or 2
10	64 K	1
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 3-5. OC-3 – 150 Mbits/Sec

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1 MB	5
100	1 MB	5
50	1 MB	5
25	512 K	4
20	512 K	4
15	256 K	3
10	256 K	3
5	128 K	2
2.5	64 K	1
1 or less	32 K	0

Table 3-6. OC-12 and Above – 621 Mbits/Sec

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1 MB	5
100	1 MB	5
50	1 MB	5
25	1 MB	5
20	1 MB	5
15	1 MB	5
10	1 MB	5
5	512 K	4
2.5	256 K	3
1 or less	64 K	1

Topology

The iSR6142 router supports two distinct topologies: interconnecting local SANs (see Figure 3-1) and interconnecting remote SANs (see Figure 3-2).

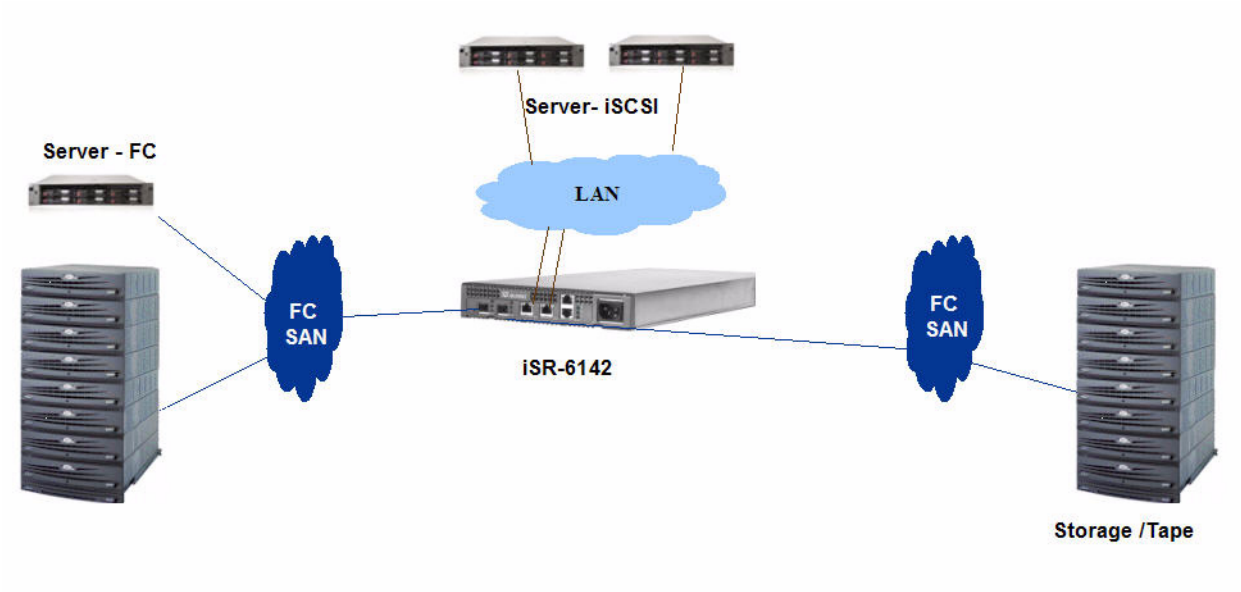


Figure 3-1 LAN Topology - Local SAN Interconnect

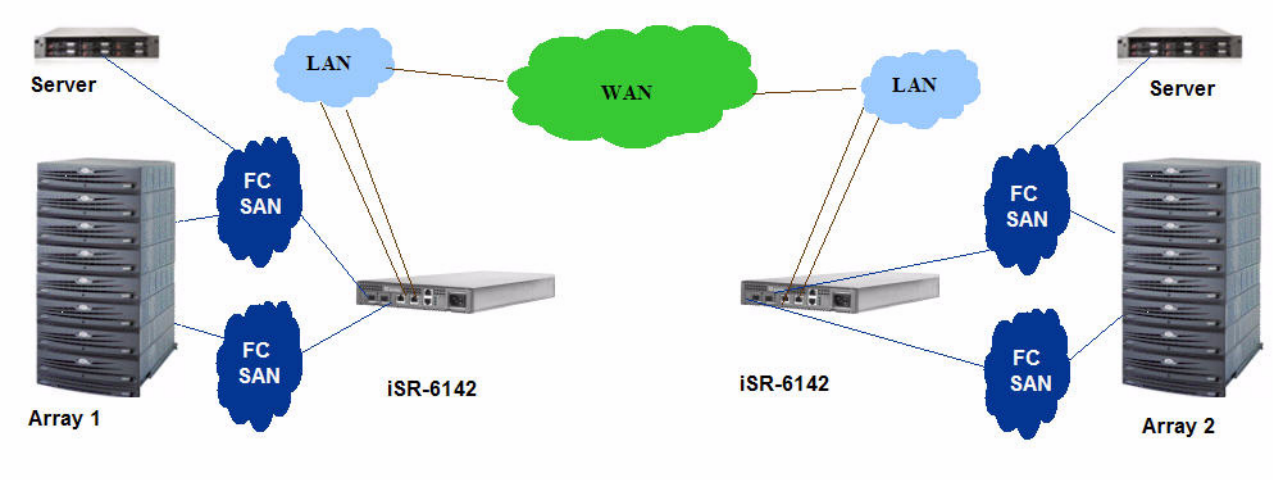


Figure 3-2 WAN Topology - Remote SAN Interconnect

Fibre Channel Switch Ports and Zoning Requirements

The iSR6142 FC ports are configured as loop ports. Therefore, the FC switch port, (where iSR6142 FC port is connected) must be configured to support a loop topology such as fibre loop port (FL-Port) or generic port (G-Port).

The iSR6142 uses its local FC ports for discovering local FC devices in the SAN.

We recommend that any FC switch connected to the iSR6142 use Fibre Channel World Wide Port name (WWPN) based zoning. This requires adding the router's FC world wide port names (WWPN) in all local switch zones and the remote router's FC WWPNs in all remote switch zones.

Multiple Routers

By connecting multiple routers between your Fibre Channel SANs and iSCSI SANs, you can eliminate any router as a single point of failure.

Management

The SANsurfer Router Manager application and CLI run on a management workstation that enables you to configure, control, and maintain the router. Support platforms include Windows, Solaris, and Linux.

The router supports the following management interfaces:

- **SANsurfer Router Manager** – Graphical user interface application, which runs on a management workstation (see the *iSR6142 Router Manager User's Guide*).
- Command line interface (**CLI)** – Runs on the router, which you can access using telnet or the serial port (see the *iSR6142 Router CLI User's Guide*).
- **SNMP** – Provides router status, traps, and alerts (see Appendix B)

Recovery

It is prudent to have a recovery process in case a router fails. Consider the following when developing a router recovery process:

- Save all firmware image files (updates) in a safe, well-known place, because you may:
  - Want to revert to a previous firmware version.
  - Need the firmware image when replacing a router.
  - Need the firmware image when adding a router to your site.
- Save the router's configuration (as a new file) after every configuration change, because you may:
  - Want to revert to a previous configuration.
  - Need to configure a replacement router.
- Save the router's mappings (as a new file) after every mapping change, because you may:
  - Want to revert to a previous mapping.
  - Need to map a replacement router.
  - Want to duplicate the mapping on a second router (for backup).

Services

You can configure the iSR6142 router to suit the demands of your environment using a variety of router services. Familiarize yourself with the following router services and determine which ones you need:

- **Telnet** – Enables router management over a telnet connection.
- **Router management** – Provides for out-of-band router management using the SANsurfer Router Manager.
- **Simple network management protocol (SNMP)** – Provides monitoring of the router using third-party applications that use SNMP.
- **Network time protocol (NTP)** – Enables synchronizing the router and the workstation dates and times with an NTP server. NTP is disabled (and not configured) by default.
- **File transfer protocol (FTP)** – Enables transferring files rapidly between the workstation and router using FTP.

Security

Passwords provide router security. The SANsurfer Router Manager requires a password each time a user logs into the application. Once connected, the SANsurfer Router Manager prompts for an administrative password before it accepts configuration changes.

The CLI also requires the user to enter a user ID and password to start. CLI must be in an admin session to perform any set operations. An admin session requires a password.

The default password for both these management tools is “password” for the default user ID of “guest.” The default administrative password is “config.”

Once logged on, you can change the password using the application’s security features.

4 Installation

This section describes how to install and configure an iSR6142 router. It also includes firmware installation instructions. This includes the following topics:

Site Requirements

The following sections identify the site requirements for installing an iSR6142 router:

Management Workstation

The management workstation running the SANsurfer Router Manager must meet the requirements listed in Table 4-1.

Table 4-1. Management Workstation Requirements

Item	Description
Operating system	One of the following: ■ Windows® 2000/2003/XP ■ Solaris 8/9/10 ■ Linux® Red Hat EL 3.x ■ SuSE® Linux 9.0 Enterprise ■ Mac OS® X 10.3
Memory	256 MB or more
Disk space	150 MB per installation

Table 4-1. Management Workstation Requirements (Continued)

Item	Description
Processor	500 MHz or faster
Hardware	CD-ROM drive, RJ-45 Ethernet port, RS-232 serial port (optional)
Internet browser	One of the following: ■ Microsoft Internet Explorer 5.0 and later ■ Netscape Navigator® 4.72 and later ■ Mozilla® 1.02 and later ■ Safari™ ■ Java 2 runtime environment to support the web applet

Power Requirements

Power requirements for the iSR6142 router are 0.5 Amps at 100-125 VAC, 50 Hz to 60 Hz or 0.25 Amps at 200-240 VAC, 50 Hz to 60 Hz.

Environmental Conditions

Consider the factors that affect the climate in your facility, such as equipment heat dissipation and ventilation. The router requires the following operating conditions:

- Operating temperature range – 5–40°C (41–104°F)
- Relative humidity – 15–90 percent, non-condensing

iSR6142 Router Installation

Prior to installing the router, unpack the router and accessories. The iSR6142 router is shipped with the following components, shown in Figure 4-1:

- Power cord.
- Adapter (RJ45 to DB9F) for connecting the router's serial port to a workstation used for configuring and managing the router. A standard Cat5 Ethernet cable is required (not supplied) to connect the adapter to the router. The adapter connects directly to the workstation's serial (COM) port.

Figure 4-1 iSR6142 Router and Accessories

To install the iSR6142 router:

1. Complete the pre-installation checklist (see page 4-4).
2. Mount the router (see page 4-4).
3. Install the transceivers (see page 4-5).
4. Connect the management workstation to the router (see page 4-5).
5. Configure the management workstation (see page 4-5).
6. Install the management application (see page 4-7).
7. Start the management application (see page 4-8).
8. Connect the router to AC power (see page 4-9).
9. Configure the router (see page 4-10).
10. Cable FC and iSCSI devices to the router (see page 4-11).

Pre-installation Check List

During the initial configuration process, the system prompts you for the parameters listed in Table 4-2. Fill out the table before installation to expedite the configuration process.

Table 4-2. Pre-installation Checklist

Symbolic name of this router	
Management port IP address (if not using DHCP)	
Management port subnet mask (if not using DHCP)	
Management port gateway IP address (if not using DHCP)	
iSCSI Port 1 (GE-1) IP address	
iSCSI Port 1 (GE-1) subnet mask	
iSCSI Port 1 (GE-1) gateway IP address	
iSCSI Port 1 (GE-1) iSNS[a] IP address	
iSCSI Port 2 (GE-2) IP address	
iSCSI Port 2 (GE-2) subnet mask	
iSCSI Port 2 (GE-2) gateway IP address	
iSCSI Port 2 (GE-2) iSNS IP address	

[a] Internet Storage Name Service

Mount the Router

You can place the router on a flat surface or mount it in a standard 19-inch Electronic Industries Association (EIA) rack. See the product specification for weight and dimensions. Rack mounting requires a QLogic rack mounting kit (Part No. ISR614X-RACKKIT). Contact QLogic for more information.

If you mount the router in a closed or multi-unit rack assembly, make sure that the operating temperature inside the rack enclosure does not exceed the maximum rated ambient temperature for the router.

Install the Transceivers

The router supports a variety of SFP transceivers.

- To install a transceiver, insert the transceiver into the port and gently press until it snaps in place.
- To remove a transceiver, gently press the transceiver into the port to release tension, then pull the release tab or lever and remove the transceiver. Different transceiver manufactures have different release mechanisms. Consult the documentation of your transceiver.

NOTE:

The transceiver fits only one way. If the transceiver does not install under gentle pressure, flip it over and try again.

Connect the Management Workstation to the Router

You can manage the router using the SANsurfer Router Manager or the command line interface (CLI). The SANsurfer Router Manager requires an Ethernet connection to the router. The CLI can use an Ethernet connection or a serial connection. Choose the router management method, then connect the management workstation to the router in one of the following ways:

- Indirect Ethernet connection from the management workstation to the router RJ-45 connector through an Ethernet switch or hub. This requires a 10/100 Base-T straight-through cable.
- Direct Ethernet connection from the management workstation to the router RJ-45 Ethernet connector. This requires a 10/100 Base-T crossover cable.
- Serial port connection from the management workstation to the router RS-232 serial port connector. This requires a 10/100 Base-T straight-through cable and an RJ45-to-DB9F adapter (included with the router).

Configure the Management Workstation

The router comes from the factory with a default IP address (10.0.0.1). Prior to product installation, follow the procedures based on your configuration method:

- If you plan to configure the router through the management Ethernet port (using the GUI or CLI via telnet), you must initially configure the workstation as described in “Setting the Workstation IP Address” on page 4-6.
- If you plan to configure the router using the management COM port, configure the workstation as described in “Configuring the Workstation Serial Port” on page 4-6.

Setting the Workstation IP Address

The IP address of a new router is `10.0.0.1`. To ensure that your workstation is configured to communicate with the `10.0.0` subnet, refer to the following instructions for your workstation:

- Steps for different versions of Windows vary. For a Windows 2000 workstation, do the following:
  a. From the Windows **Start** menu, select **Settings>Control Panel>Network and Dial-up Connections**.
  b. Click **Make New Connection**.
  c. Click **Connect to a private network through the Internet**, then click **Next**.
  d. Enter `10.0.0.253` for the IP address.
- For different versions of Windows, consult the Windows Help files.
- For Linux or Solaris workstation, open a command window and enter the following command, where `<interface>` is your interface name:
  `ifconfig <interface> ipaddress 10.0.0.253 netmask 255.255.255.0 up`

Configuring the Workstation Serial Port

To configure the workstation serial port:

1. Connect the cable with RJ45-to-DB9F adapter from a COM port on the management workstation to the serial port on the router.
2. Configure the workstation serial port according to your platform. These steps may vary according to the version of operating system you use:
   - For Windows:
     a. Open the HyperTerminal application. From the Windows **Start** menu, select **Programs> Accessories>HyperTerminal>HyperTerminal**.
     b. Enter a name for the router connection, choose an icon in the Connection Description window, then click **OK**.
     c. Enter the following COM Port settings in the COM Properties window and click **OK**.
     Bits per second – 115200
     Data Bits – 8
     Parity – None
     Stop Bits – 1
     Flow Control – None

- For Linux:

  a. Set up minicom to use the serial port. Create or modify the `/etc/minirc.dfl` file with the following content:
  ```
  pr portdev/ttyS0
  pu minit
  pu mreset
  pu mhangup
  ```
  `pr portdev/ttyS0` specifies port 0 on the workstation. Choose the pr setting to match the workstation port to which you connected the router.

  b. Verify that all users have permission to run minicom. Review the `/etc/minicom.users` file and confirm that the line ALL exists or that there are specific user entries.

- For Solaris – Modify the `/etc/remote` file to include the following lines. `/dev/term/a` refers to serial port `a`. Choose the "`dv`" setting to match the workstation port to which you connected the router. For example:

  ```
  \:dv=/dev/term/a:br#115200:el=^C^S^Q^U^D:ie=%$:oe=^
  D:
  ```

3. Connect the router to the power (see page 4-9).

Install the SANsurfer Router Manager

You can manage the router using the SANsurfer Router Manager application. The following sections describe how to install the application on either a Windows or Linux workstation. See the *iSR6142 Router Manager User's Guide* for information on how to use the SANsurfer Router Manager.

Windows Installation

Perform the following steps to install the SANsurfer Router Manager application from the QLogic website to a PC workstation:

1. Close all programs currently running.
2. Go to the QLogic download site: http://support.qlogic.com/support/drivers_software.aspx
3. Select the **Intelligent Storage Routers** icon.
4. Select **iSR6142** in the product selection window and click **Go**.
5. Under the product name column, select the link to the SANsurfer Router Manager for your operating system.
6. Read the license agreement and click **Agree**.
7. Follow the system prompts to uncompress and install the application.

Linux Installation

Perform the following steps to install the SANsurfer Router Manager application from the QLogic website to a Linux workstation:

1. Go to the QLogic download site: http://support.qlogic.com/support/drivers_software.aspx
2. Select the **Intelligent Storage Routers** icon.
3. Select **iSR6142** in the product selection window and click **Go**.
4. Under the product name column, select the link to the SANsurfer Router Manager for your operating system.
5. Read the license agreement and click **Agree**.
6. Save the file to your local system.
7. Uncompress the downloaded file and execute the `Linux_x.xx.bin` install program.
8. Follow the installation instructions.

Start the SANsurfer Router Manager

For Windows, double-click the SANsurfer Router Manager shortcut, or select **SANsurfer Router Manager** from the **Start** menu, depending on how you installed the SANsurfer Router Manager application. From a command line, enter the command for your operating system.

- On Windows, enter the following command:
  `<install_directory>SANsurfer_Router_Manager.exe`
- On Linux, enter the following command:
  `<install_directory>./SANsurfer_Router_Manager`

Connect the Router to AC Power

WARNING!!

This product is supplied with a three-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded outlet to avoid electrical shock. An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the router chassis. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent electrical shock.

You may require a different power cable in some countries because the plug on the cable supplied with the equipment will not fit your electrical outlet. In this case, you must supply your own power cable. The cable must meet the following requirements:

- For 125 Volt electrical service – the cable must be rated at 10 Amps and be approved by UL and CSA.
- For 250 Volt electrical service – the cable must be rated at 10 Amps, meet requirements of H05VV-F, and be approved by VDE, SEMKO, and DEMKO.

To power up the router, connect the power cord to the power receptacle on the router chassis and to a grounded AC outlet. The router responds in the following sequence:

1. The chassis LEDs (input power, heartbeat, system fault) light up, then all port LEDs light up.
2. After a couple of seconds the heartbeat and system fault LEDs go off, while the input power LED stays on. The router is executing the POST.
3. The POST completes after about 45 seconds and the heartbeat LED starts flashing at a one second rate. If an error has occurred, the System Fault LED will blink a pattern that indicates the fault reason. For more information about error blink patterns, see page 5-3.

Configure the Router

You can configure the router using the SANsurfer Router Manager application or the command line interface (CLI).

The SANsurfer Router Manager provides a Configuration Wizard you can use to configure the GE ports. If either of the router's GE ports have not been configured (IP address is 0.0.0.0), the Configuration Wizard starts automatically when the SANsurfer Router Manager first connects with the router. The system uses the information collected in Table 4-2.

To configure the router using the command line interface:

1. Open a command window according to the type of workstation and connection:
   - Ethernet (all platforms) – Open a telnet session with the default router IP address and log in to the router with the default account name and password (guest/password).
     ```
     telnet 10.0.0.1
     username – guest
     password – ********
     ```
   - Serial – On Windows, open the HyperTerminal application. The next few steps may vary according to the version of Windows you use.
     a. From the Windows **Start** menu, select **Programs>Accessories>HyperTerminal>HyperTerminal**.
     b. Select the connection you created earlier and click **OK**.
   - Serial – On Linux, open a command window and enter the following command:
     ```
     minicom
     ```
2. Open an Admin session and enter the commands to set up both iSCSI ports and the management interface. See the *iSR6142 Router CLI User's Guide* for command descriptions.

```
QRouter #> admin start
Password  –  ******
QRouter (admin) #> set mgmt
……
QRouter (admin) #> set iscsi 1
……
QRouter (admin) #> set iscsi 2
……
```

Cable Devices to the Router

Connect cables to the SFP transceivers and their corresponding devices. Devices can have small form-factor pluggable (SFP) or small form-factor (SFF) transceivers or gigabit interface converters (GBIC). Lucent (LC)-type duplex fiber optic cable connectors are designed for SFP transceivers, while subscriber-connector (SC)-type connectors are designed for GBICs. Choose the fiber optic cable with the connector combination that matches the device you are connecting to the router.

Firmware Installation

The router comes with current firmware installed. You can upgrade the firmware from the management workstation as new firmware becomes available. You can use the SANsurfer Router Manager application or the CLI to install new firmware.

WARNING!!

Installing new firmware disrupts the router connectivity since you must reboot the router to activate the new firmware. The reboot may result in the transfer of incorrect data between devices connected to the router. QLogic recommends that you suspend activity on the interfaces before activating the new firmware.

Using the SANsurfer Router Manager to Install Firmware

To install firmware using the SANsurfer Router Manager:

1. Double-click the desired router in the topology display.
2. In the Firmware Upload window, click **Select** to browse for and select the firmware file you want to upload.
3. Click **Start** to begin the firmware load process. A message displays a warning that the router will be reset to activate the firmware.
4. Click **OK** to continue firmware installation or click the **Cancel** button to cancel the firmware installation.

Using the CLI to Install Firmware

To use the CLI to install the firmware, transfer the firmware image file from a workstation to the router. Then use the CLI `image unpack` command to install the new firmware image:

1. At the workstation prompt, use the `ftp` command to go to the location on the router where you want to transfer the firmware image. For example:
```
C:\fwImage>ftp 172.17.137.190
Connected to 172.17.137.190.
220 (none) FTP server (GNU inetutils 1.4.2) ready.
```
2. Enter your username and password. For example:
```
User (172.17.137.190:(none)) – ftp
331 Guest login ok, type your name as password.
Password – ftp
230 Guest login ok, access restrictions apply.
```
3. At the `ftp` prompt, type `BIN` to set binary mode. For example:
```
ftp> bin
200 Type set to I.
```
4. Use the `put` command to transfer the firmware image file from the workstation to the router. For example:
```
ftp> put isr-6142-2_2_0_x.bin
200 PORT command successful.
150 Opening BINARY mode data connection for
'isr-6142-2_2_0_x.bin'.
226 Transfer complete.
ftp – 4822816 bytes sent in 0.41Seconds
11878.86Kbytes/sec.
```
5. Type `quit`. The firmware image has been transferred to the router.
6. Log on to the router as an `administrator`.
```
(none) login – guest
Password – password
*****************************************************
*                                                   *
*    QLogic Router Command Line Interface (QRCLI)   *
* *
*****************************************************
QRouter#> admin start
Password      – config
QRouter (admin) #>
```

7. Type the following command from the router, where *x* stands for the firmware image name:
   `image unpack isr-6142-2_2_0_x.bin`
   The following message displays:
   `Unpack Completed. Please reboot the system for FW to take affect.`
8. Type `reboot`. The following message displays:
   `Are you sure you want to reboot the System (y/n):`
9. Type `y` to reboot the system.

Notes

5 Diagnostics and Troubleshooting

Diagnostic information about the router is available through the chassis LEDs and the port LEDs. Diagnostic information is also available through the Router Manager and CLI event logs and error displays. This section provides the following diagnostic information:

- Chassis Diagnostics (this page)
- Power-On Self-Test Diagnostics (see page 5-2)
- LED Blink Patterns (see page 5-3)

This section also describes how to use maintenance mode to recover a disabled router (see page 5-5).

Chassis Diagnostics

The chassis LEDs show chassis diagnostics as shown in Figure 5-1.

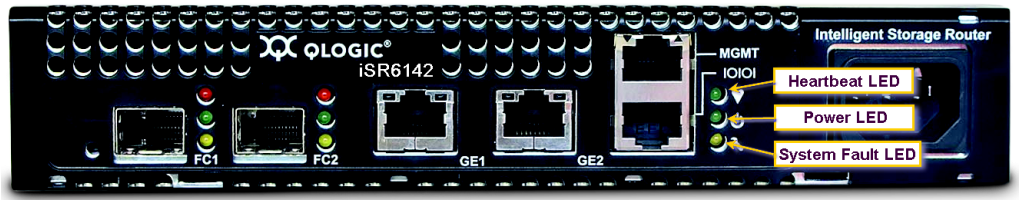


Figure 5-1 Chassis Diagnostic LEDs

This section describes the following conditions:

- Input Power LED is Off (see page 5-2)
- System Fault LED is On (see page 5-2)

Input Power LED is Off

The input power LED lights up to show that the router logic circuitry is receiving proper voltages. If the input power LED is off, do the following:

- Inspect power cord and connectors. Is the cord unplugged? Is the cord or connector damaged?
  - **Yes** – Make necessary corrections or repairs. If the condition remains, continue.
  - **No** – Continue.
- Inspect AC power source. Is the power source delivering the proper voltage?
  - **Yes** – Continue.
  - **No** – Make the necessary repairs. If the condition remains, continue.
- Replace the router.

System Fault LED is On

The system fault LED will blink a specific pattern to indicate the problem. If the system fault LED lights up, take necessary actions (see page 5-3).

Power-On Self-Test Diagnostics

The router performs a series of tests as part of its power-on procedure. The POST diagnostic program performs the following tests:

- Memory
- FLASH validation
- PCI device discovery
- Management Ethernet port

LED Blink Patterns

The heartbeat and system fault LEDs show the operational status of the router. When the POST completes with no errors, the heartbeat LED will blink once every second. When the router is in maintenance mode, the heartbeat and system fault LEDs are on continuously.

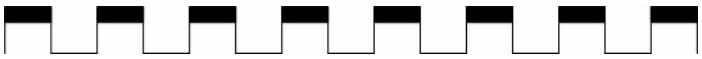
All other system fault blink patterns show critical errors. The heartbeat LED shows an error blink pattern for the conditions listed in Table 5-1.

Table 5-1. System Fault LED Blink Patterns

System Fault LED	Condition
OFF	OK - Operational
3 Blinks, followed by pause	System error
4 Blinks, followed by pause	Management port IP address conflict
5 Blinks, followed by pause	Over temperature

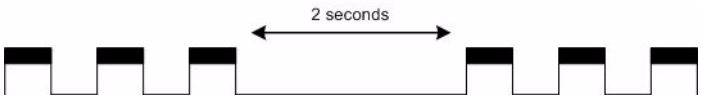
Heartbeat Blink Pattern

A blink pattern on the heartbeat LED of one second ON followed by one second OFF means that the router is operating normally. The heartbeat LED shows this pattern when the router firmware is operational.



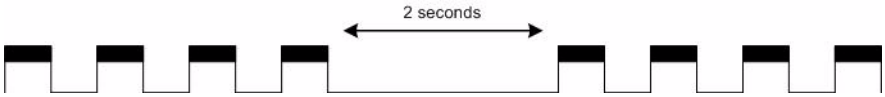
System Error Blink Pattern

The system fault LED generates a three-blink pattern (once per second) followed by a two second pause to indicate a system error.



Management Port IP Address Conflict Blink Pattern

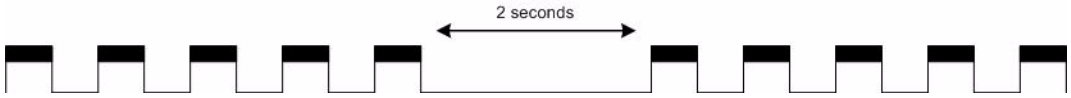
The system fault LED generates a four-blink pattern (once per second) followed by a two second pause when the router detects an IP address conflict on the management Ethernet port.



You can clear the IP address conflict blinking using the CLI or the Router Manager. Use the beacon OFF function.

Over-Temperature Blink Pattern

The system fault LED generates a five-blink pattern (once per second) followed by a two-second pause when the router is in an over-temperature condition. For example, this occurs when the air temperature inside the router is over the failure temperature of 70°C (158°F).



If the system alert LED shows the over-temperature blink pattern, do the following:

- Inspect the chassis air vents. Are the intake and exhaust vents clear?
  - **Yes** – Continue.
  - **No** – Remove any debris from the fan intake and exhaust if necessary. If the condition remains, continue.
- Consider the ambient air temperature near the router and clearance around the router. Make necessary corrections. If the condition remains:
  a. Open a command line window and log on to the router.
  b. Enter the `shutdown` command.
  c. Power down the router.
  d. Contact your authorized maintenance provider.

Recovering a Router

You may have to recover a router for one of the following reasons:

- The password was changed and has been forgotten.
- The router's management IP address is unknown.

To recover the router's password, reset the password to the default by using the maintenance button (see page 2-8).

You can recover the router's IP address using either of the following methods:

- Connect to the serial console port (see page 2-13), then use the `CLI set mgmt` command reconfigure the management port (see the *iSR6142 Router CLI User's Guide*).
- Use the maintenance button to reset the management port's IP to the factory default of `10.0.0.1` (see page 2-8).

Notes

6 Removal/Replacement

This section describes the removal and replacement procedures for the following field replaceable units (FRU):

- SFP transceivers
- The router (see page 6-2)

SFP Transceiver Removal and Replacement

You can remove and replace the SFP transceivers while the router is operating without damaging the router or the transceiver. However, doing so will interrupt transmission on the affected port until the transceiver is installed.

- To remove a transceiver, gently press the transceiver into the port to release the tension, then pull the release tab or lever and remove the transceiver. Different transceiver manufactures have different release mechanisms. Consult the documentation for your transceiver.
- To install a transceiver, insert the transceiver into the port and gently press until it snaps in place.

NOTE:

The SFP transceiver will fit only one way. If the SFP does not install under gentle pressure, flip it over and try again.

Router Removal and Replacement

Before you can remove and replace the router, you must turn off the power to the router and disconnect its power cable. The router will lose all the Fibre Channel and iSCSI connections.

Removal

To remove and replace a router, perform the following steps, as applicable:

1. Make sure all traffic (I/O operations to the router) subsides at the iSCSI initiator systems.
2. Save the configuration data of the router using the CLI FRU command (see the *iSR6142 Router CLI User's Guide*).
3. Power down the router.
4. Disconnect the power cable.
5. Label all the cables so you can connect them to the same ports on the replacement router.
6. Remove all the Fibre Channel and Ethernet cables.
7. Remove the router from the enclosure where it is mounted.

Replacement

Before replacing a router, you must first remove the previously installed router (as described above).

To install a replacement router:

1. Mount the router in the enclosure.
2. Reconnect the Fibre Channel and Ethernet cables to the ports where they were previously connected.
3. Connect the power cable to the router.
4. Using a management station, configure the management port IP address (see page 4-2).
5. Using a management workstation, restore the saved configuration or reconfigure the router as desired (see the *iSR6142 Router CLI User's Guide*).

The replacement router should now be operational.

A Log Messages

This appendix provides reference material on messages logged to a file.

You can retrieve these message logs using either the command line interface (CLI) (see the *iSR6142 Router CLI Users Guide*) or the Router Manager (see the *iSR6142 Router Manager Users Guide*).

Log Data

The message log is persistent, maintained across router power cycles and reboots. The three log message categories are:

- Informational
- Error (see page A-10)
- Fatal (see page A-10)

The following sections describe the log message categories.

Informational Log Messages

The following sections list and describe the informational log messages by reporting module:

Application Modules

The application modules generate the informational log messages listed in Table A-1 and described following the table.

Table A-1. Application Modules—Informational Log Messages

ID	Log Message	No.
53254	System (router) Booting up	6
53357	QLBA_ProcessTpb: De-compression failed. Disabling compression temporarily	109
54274	QLFC_Login: Origin 0x%x, VP Index 0x%x, Id 0x%x	1026
54275	QLFC_Login: Port ID %.2x%.2x%.2x	1027
54276	QLFC_Login: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1028
54277	QLFC_Login: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1029
54306	QLFC_Logout: Origin 0x%x, VP Index 0x%x, Id 0x%x	1058
54307	QLFC_Logout: Port ID %.2x%.2x%.2x	1059
54308	QLFC_Logout: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1060
54309	QLFC_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1061
54359	QLFC_HandleTeb: FC Login. VP 0x%x	1111
54368	QLFC_CreateVirtualInitiatorObject: Maximum host (%d) limit reached.	1120
54938	QLIS_HandleTeb: UTM_EC_OPEN_CONNECTION	1690
54939	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION or UTM_EC_CONNECTION_CLOSED	1691
54940	QLIS_HandleTeb: UTM_EC_CONNECTION_OPENED	1692
54941	QLIS_HandleTeb:iSNS Server Open Connection succeeded	1693
54943	QLIS_HandleTeb: UTM_EC_ISNS_SCN	1695
54945	QLIS_HandleTeb: UTM_EC_ISNS_CLIENT_DISCOVERED	1697
54947	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION	1699
54948	QLIS_HandleTeb: UTM_EC_CONNECTION_CLOSED	1700

Table A-1. Application Modules—Informational Log Messages (Continued)

ID	Log Message	No.
54963	QLIS_SetDdbEntryContinue:[%d:%d] Remote system connection established	1715
54986	QLIS_HandleSessionTimer: Re-enabling compression	1738
55299	QLSC_CollectBUVUIO: Freeing dead TRB: State 0x%02X, AbortReason %d, Flags 0x%02X	2051

6	Router is booting up.
109	De-compression failed and will be temporarily disabled.
1026	FC login occurred, origin xx (1 = HBA, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) xx.
1027	FC login occurred with port ID xx.xx.xx.
1028	FC login occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx.
1029	FC login occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx.
1058	FC logout occurred, origin xx (1 = HBA, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) x.
1059	FC logout occurred with port ID xx.xx.xx.
1060	FC logout occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx.
1061	FC logout occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx.
1111	FC login event notification, VP (virtual port) xx.
1120	Maximum number of support hosts dd has been reached.
1690	Event notification: iSCSI open connection request.
1691	Event notification: iSCSI close connection request or connection closed.
1692	Event notification: iSCSI connection opened.
1693	Event notification: connection opened with iSNS server.
1695	Event notification: iSNS SCN received.
1697	Event notification: iSNS client discovered.
1699	iSCSI close connection request received.

1700	iSCSI connection closed.
1715	Remote system connection established using DDB d:d.
1738	Re-enabling compression.
2051	TRB freed, State xx, Abort Reason d, Flags xx.

iSCSI Driver

The following informational log messages are common to both iSCSI ports: 1 (GE1) and 2 (GE2). The messages are listed in Table A-2 and described following the table. Log messages beginning with #0 denote iSCSI port 1 (GE1) and log messages beginning with #1 denote iSCSI port 2 (GE2).

Table A-2. iSCSI Driver—Informational Log Messages

ID	Log Message	No.
86343	#%d: QLPortUp: Set link configuration 0x%x	327
86347	#%d: QLDisable: Restart RISC	331
86349	#%d: QLEnable: Restart RISC to update EEPROM	333
86352	#%d: QLPortDown: Set link configuration 0x%x	336
86874	#%d: QLIsrDecodeMailbox: Link up	858

327	iSCSI port enabled, port up.
331	Restart iSCSI processor (RISC).
333	EEPROM updated, restart iSCSI processor (RISC).
336	iSCSI port disabled, port down.
858	Link up reported by iSCSI processor for GE1 or GE 2.

Fibre Channel Driver

The following informational log messages are common to both Fibre Channel ports: 1 (FC1) and 2 (FC2). The messages are listed in Table A-3 and described following the table. Log messages beginning with #0 denote Fibre Channel port 1 (FC1). Log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table A-3. Fibre Channel Driver—Informational Log Messages

ID	Log Message	No.
118882	#%d: QLIoctlDisable: Reset adapter	98
119088	#%d: QLIsrEventHandler: LIP occurred (%x): mailbox1 = %x	304
119089	#%d: QLIsrEventHandler: LIP reset occurred (%x): mailbox1 = %x	305
119090	#%d: QLIsrEventHandler: Link up (%x) mailbox1 = %x	306
119092	#%d: QLIsrEventHandler: Link mode up (%x): RunTimeMode=%x	308
119093	#%d: QLIsrEventHandler: RSCN update (%x) rscnInfo: %x	309
119097	#%d: QLIsrEventHandler: Port update (%x) mb1-3 %x %x %x	313
119552	#%d: QLFcipIsrEventHandler: Link up (%x) mailbox1 = %x	768
119553	#%d: QLFcipIsrEventHandler: Link down (%x)	769
119554	#%d: QLFcipIsrEventHandler: Link mode up (%x)	770

98	Request to reset the FC processor (adapter) received from IOCTL interface.
304	Fibre Channel loop initialization procedure (LIP) occurred. The LIP type is reported, as is the contents of the FC processor's mailbox 1 register.
305	Fibre Channel LIP reset occurred. The LIP reset type is reported, as is the contents of the FC processor's mailbox 1 register.
306	Fibre Channel link up occurred. Event status is reported, as is the contents of the FC processor's mailbox 1 register.
308	Fibre Channel link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).
309	A RSCN was received. Event status is reported, as is the RSCN information.
313	Fibre Channel port update. Event status is reported, as is the contents of the FC processor's mailbox 1, 2, and 3 registers.

768	FCIP - Fibre Channel link up occurred. Event status is reported, as is the contents of the FC processor's mailbox 1 register.
769	FCIP - Fibre Channel link down occurred.
770	FCIP - Fibre Channel link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).

User Modules

The user modules generate the log messages listed in Table A-4 and described in the following table.

Table A-4. User Modules—Informational Log Messages

ID	Log Message	No.
151842	FW Upgrade performed: new version is: %d.%d.%d.%d	290
151843	REBOOT/SHUTDOWN Command from user. Code=%d	291
151889	#%d: qapisetfcinterfaceparams_1_svc: FC port configuration changed	337
151890	#%d: qapisetiscsiinterfaceparams_1_svc: iSCSI port configuration changed	338
151891	#%d: qapisetisns_1_svc:iSNS configuration changed	339
151892	qapisetntpparams_1_svc: NTP configuration changed	340
151893	#%d: qapisetvlanparams_1_svc: VLAN configuration changed	341
151896	qapisetmgmintfcparams_1_svc:Management port configuration changed	344
151897	qapisetbridgebasicinfo_1_svc:Bridge configuration changed	345
151898	qapimapremote_1_svc: Remotemap added for local device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	346
151899	qapimapremote_1_svc: Remotemap added to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	347
151900	qapiunmapremote_1_svc: Remotemap removed for local device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	348
151901	qapiunmapremote_1_svc: Remotemap removed to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	349
151902	qapimaptargettoinitiator_1_svc: Localmap added for initiator %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	350

Table A-4. User Modules—Informational Log Messages (Continued)

ID	Log Message	No.
151903	qapimaptargettoinitiator_1_svc: Localmap added to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	351
151904	qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	352
151905	qapiunmaptargettoinitiator_1_svc: Localmap removed to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	353
151906	qapimaptargettoinitiator_1_svc: Localmap added for initiator %s	354
151907	qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator %s	355
151908	GE%d: Port status changed by user to ENABLED.	356
151909	GE%d: Port status changed by user to DISABLED.	357
151910	FC%d: Port status changed by user to ENABLED.	358
151911	FC%d: Port status changed by user to DISABLED.	359
152069	qapisetfcipparams_1_svc: FCIPROUTE %d Added	517
152070	qapisetfcipparams_1_svc: FCIPROUTE %d Modified	518
152071	qapisetfcipparams_1_svc: FCIPROUTE %d Removed	519

290	Performed router firmware upgrade, new version number is d.d.d.d.
291	User performed a router reboot or shutdown.
337	FC port configuration has been modified.
338	iSCSI port configuration has been modified.
339	iSNS configuration has been modified.
340	NTP configuration has been modified.
341	VLAN configuration has been modified.
344	Management Ethernet port configuration has been modified.
345	Router configuration has been modified.
346	Remotemap added for local FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
347	Remotemap added for remote FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx.

348	Remotemap removed for local FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
349	Remotemap removed for remote FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
350	Localmap added for FC initiator WWPN xx.xx.xx.xx.xx.xx.xx.xx.
351	Localmap added to FC target device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
352	Localmap removed for FC initiator.
353	Localmap removed to FC target device.
354	Localmap added for iSCSI initiator "iqn.dddd-dd.ttt.ttt.ttt.....".
355	Localmap removed for iSCSI initiator "iqn.dddd-dd.ttt.ttt.ttt.....".
356	User enabled GE port d.
357	User disabled GE port d.
358	User enabled FC port d.
359	User disabled FC port d.
517	FCIP route #d added.
518	FCIP route #d modified.
519	FCIP route #d removed.

FCIP

The FCIP module generates the informational log messages listed in Table A-5 and described following the table.

Table A-5. FCIP—Informational Log Messages

ID	Log Message	No.
184524	qlFcip_Linkchange#%d: GigE Link Down	204
184525	qlFcip_Linkchange#%d: GigE Link Up	205

204	FCIP Route GigE link d (1 or 2) is down.
205	FCIP Route GigE link d (1 or 2) is up.

TOE Driver

The TOE driver generates the informational log messages listed in Table A-6 and described following the table.

Table A-6. TOE—Informational Log Messages

ID	Log Message	No.
217350	QL3022:eth%x: Interface is down	262

262 The GigE interface d (0 or 1) used for an FCIP route is down.

System

The system modules generate the informational log messages listed in Table A-7 and described following the table.

Table A-7. System—Informational Log Messages

ID	Log Message	No.
249862	“Temperature is back to normal range %d\n"	6

6 The router temperature has returned to the normal operating range and is d (C).

Error Log Messages

The following sections list and describe the error log messages by reporting module:

Application Modules

The application modules generate the error log messages listed in Table A-8 and described following the table.

Table A-8. Application Module—Error Log Messages

ID	Log Message	No.
40967	QLBA_NullDoorbell: driver unloaded, port disabled	7
40996	QLBA_ProcessTrb: Processing unsupported ordered tag command	36
41004	QLBA_ProcessTrb: Processing unsupported head of queue tag command	44
41058	QLBA_CreateTargetDeviceObject: Too many devices	98
41060	QLBA_CreateTargetNodeObject: Too many devices	100
41067	QLBA_CreateLunObject: LunObject memory unavailable	107
41077	QLBA_CreateInitiatorObject: Too many initiators	117
41096	QLBA_DisplayTargetOperationStatus: PCI Error, Status 0x%.2x	136
41106	QLBA_DisplayInitiatorOperationStatus: DMA Error, Status 0x%.2x	146
41107	QLBA_DisplayInitiatorOperationStatus: Transport Error, Status 0x%.2x	147
41111	QLBA_DisplayInitiatorOperationStatus: Data Overrun, Status 0x%.2x	151
41234	QLIS_LoginPduContinue: Operation failed. Initiator 0x%x, TPB status 0x%x	274
41238	QLKV_ValidateLoginTransitCsgNsgVersion failed (status 0x%x)	278

Table A-8. Application Module—Error Log Messages (Continued)

ID	Log Message	No.
41257	QLIS_LoginPduContinue: Invalid initiator name. Initiator:	297
41265	QLIS_LoginPduContinue: Target not configured for Portal	305
41267	QLIS_LoginPduContinue: Target not found. Target name:	307
41268	QLIS_LoginPduContinue: Missing target name	308
41270	QLIS_LoginPduContinue: TSIH is 0 but InitiatorName key/value not provided	310
41272	QLIS_LoginPduContinue: CONN_STATE_IN_LOGIN, Unknown InitTaskTag	312
41283	QLIS_LoginPduContinue: TSIH 0x%x out of range	323
41284	QLIS_LoginPduContinue: Session does not exist, invalid TSIH 0x%x	324
41353	QLIS_LoginPduContinue CHAP Validation Failure	393
41354	QLIS_LoginPduContinue Unexpected CHAP key detected	394
41508	QLBI_SetPortInfo: QLUT_AllocatePortalObject failed (PortType 0x%x, PortId 0x%x)	548
41626	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	666
41629	QLBI_GetLunInfo: QLBI_PassthruCommand failed for INQUIRY (page code 0x83)	669
41635	QLBI_GetLunInfo: QLBI_PassthruCommand failed for READ CAPACITY	675
41636	QLBI_GetLunInfo: READ CAPACITY failed, TPB status 0x%x	676
41696	QLBI_PassthruCommandCompletion: Passthru command aborted	736
41700	QLBI_Passthru: Invalid CDB length %d bytes	740
41701	QLBI_Passthru: Invalid data length %d bytes	741
41717	QLBI_PassthruCommand: command interrupted or timed out	757
41750	QLBI_Ioctl: ERROR: Operation (0x%x) not supported in this mode	790
41768	QLBI_GetLunList: REPORT LUNS command failed	808
41769	QLBI_GetLunList: REPORT LUNS command failed with CHECK CONDITION, SCSI STATUS 0x%02X	809

Table A-8. Application Module—Error Log Messages (Continued)

ID	Log Message	No.
41771	QLBI_GetLunList: Lun allocation failed for LunId %d	811
41994	QLFC_Login: VpIndex (%d) out of range	1034
41995	QLFC_Login: VP Index 0x%x not configured	1035
42002	QLFC_Login: Can't open connection	1042
42024	QLFC_Logout: No active path to device. WWPN: %.2X%.2X%.2X%.2X%.2X%.2X%.2X%.2X	1064
42027	QLFC_Logout: VP Index 0x%x not configured	1067
42068	QLFC_HandleTeb: System Error	1108
42069	QLFC_HandleTeb: Driver Fatal Error	1109
42072	QLFC_HandleTeb: FC Logout	1112
42242	QLIS_AllocateSessionObject: Out of session resources	1282
42252	QLIS_EnqueueiScsiPdu: Duplicate PDU, CmdSN %d (0x%x), dropping it	1292
42258	QLIS_InstantiateSession: Can't add Initiator to the database	1298
42404	QLIS_ProcessStartTrb: [%d] CmdSN %ld is out of range (%ld - %ld), Cdb[0] 0x%02X, DataXferLen 0x%x.	1444
42648	QLIS_HandleTeb: Driver Fatal Error	1688
42649	QLIS_HandleTeb: Unload Driver	1689
42654	QLIS_HandleTeb: iSNS Connection Failed	1694
43012	QLSC_CollectBUVUIO: Allocation of DSD failed	2052
43013	QLSC_CollectBUVUIORecover: Allocation of DSD failed	2053
43265	QLUT_AllocateTpbExtension: TPB allocation failed	2305
43267	QLUT_AllocateTpbExtension: Data buffer allocation failed (length %d)	2307
43268	QLUT_AllocateTpbExtension: Alloc of DSD failed for buffer len %d	2308
43269	QLFCIP_IncomingFrame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x)	2309
43270	QLFCIP_IncomingFrame: GetFcipMapPortal failed	2310

Table A-8. Application Module—Error Log Messages (Continued)

ID	Log Message	No.
43271	QLFCIP_IncomingFrame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x	2311
43272	QLFCIP_SystemError: System error	2312
43273	QLFCIP_SystemError: QLOP_IssuePortEnable failed	2313
43280	QLFCIP_HandleTeb: Driver Fatal error	2320
43281	QLFCIP_ConfigPortal: Find portal object failed for QLUT_TYPE_FC, PortId (%d)	2321
43282	QLFCIP_ConfigPortal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d)	2322
43283	QLUT_AllocateFcipTrbPool: Allocation failed (size 0x%x))	2323
43284	QLUT_GetFcipTrb: Null portal object in map table	2324
43285	QLUT_GetFcipTrb: Unable to get the Free Trb	2325
43286	QLUT_GetFcipTrb: Duplicate allocation of FcipTrb (0x%p)	2326
43287	QLUT_FreeFcipTrb: Null portal object in map table	2327
43288	QLUT_FreeFcipTrb: Duplicate Free of FcipTrb (0x%p)	2328
43289	QLUT_InitializeFcipBufDescPool: Memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x)	2329
43296	QLUT_FreeFcipDataBuffers: Duplicate Freeing of DataBuf (0x%p)	2336
43297	QLUT_AllocateFcipDataBuffers: Duplicate allocation of DataBuffer (0x%p)	2337
43298	QLUT_AllocateFcipDataBuffer: Got NULL PORTAL Object in map table MEM LEAK!!!!!	2338
43299	QLUT_DeallocateFcipDataBuffer: Null portal object in map table	2339
43300	QLUT_CreateFcipDataBufferpool: Allocation of 32K buffers from LargeBufferPool failed	2340
43521	QLSC_BreakupVUIOAllocPhase: TPB allocation failed	2561
43522	QLSC_BreakupVUIOAllocPhase: Data buffer and TPB allocation failed	2562

7	NULL doorbell routine for unloaded drivers. When a driver is unloaded, the doorbell routine is redirected to this NULL routine.
36	Processing unsupported ordered tag task management command.
44	Processing unsupported head-of-queue task management command.
98	Unable to create an object for the target device: exceeded the maximum number of target devices.
100	Unable to create an object for the target node: exceeded the maximum number of target devices.
107	Memory unavailable for LUN object.
117	Unable to create an object for initiator object: exceeded the maximum number of initiators.
136	Process control block status indicates that a PCI error occurred during a target operation.
146	Process control block status indicates that a DMA error occurred during an initiator operation.
147	Process control block status indicates that a transport error (protocol) occurred during an initiator operation.
151	Process control block status indicates that a data overrun error occurred during an initiator operation.
274	iSCSI login failed between receipt of PDU and request for the data segment.
278	iSCSI login failed due to unsupported version number in received login PDU.
297	iSCSI Login PDU contains invalid initiator name. The format and character set used to form the initiator name is invalid.
305	iSCSI target login was attempted to a portal (iSCSI1 or iSCSI2) on which the target is not presented.
307	iSCSI Login PDU received for a target with a target name unknown to the router.
308	iSCSI Login PDU received without a target name for a normal session.
310	iSCSI Login PDU received without an initiator name key/value.
312	iSCSI Login PDU received with an incorrect initiator task tag for a session which is partially logged in. This would occur if a login PDU other than the initial login PDU used an initiator task tag which was different than the initiator task tag provided in the initial login PDU.

323	iSCSI Login PDU was received with a TSIH out of range. This would occur if the iSCSI initiator attempting the login failed to used the TSIH value provided in the Target Login Response PDU (router is target) in subsequent login PDUs.
324	iSCSI Login PDU was received with an invalid TSIH value. The TSIH is invalid because there is no session with that TSIH value. This would occur if the iSCSI initiator attempting the login failed to used the TSIH value provided in the target login response PDU (router is target) in subsequent login PDUs.
393	CHAP validation failed during login.
394	Unexpected CHAP key.
548	Failed to allocate an object for *Set Port Info* IOCTL processing: PortType: 0 = FC, 1 = iSCSI PortId: 0 = FC1 or iSCSI1(GE1), 1 = FC2 or iSCSI2 (GE2)
666	Inquiry command failed. The Inquiry command was issued by the router as part of its discovery process.
669	Pass-Through command for Inquiry command for page 83 failed. The Inquiry command was issued by the router as part of its discovery process.
675	Pass-Through command for Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
676	Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
736	Pass-Through command issued by management application (such as the SANsurfer Router Manager) was aborted.
740	Pass-Through command issued by management application (such as the SANsurfer Router Manager) failed due to invalid CDB length.
741	Pass-Through command issued by management application (such as the SANsurfer Router Manager) failed due to invalid data length.
757	Pass-Through command issued by management application (such as the SANsurfer Router Manager) was interrupted or timed out.
790	IOCTL operation unsupported. Operation code provided in log message.
808	Report LUNs command failed. The Report LUNs command was issued by the router as part of its discovery process.
809	Report LUNs command failed with check condition status. The Report LUNs command was issued by the router as part of its discovery process.
811	Failed to allocate LUN object: out of resources.

1034	Login attempted using Fibre Channel virtual port (VP) index that is out-of-range (range = 0–31). Index reported in log message.
1035	Login attempted using Fibre Channel VP index that has not been configured. Operation attempted on an unconfigured VP.
1042	Attempting login but Fibre Channel connection cannot be opened.
1064	Attempting logout of device for which there is no active path (WWPN not found).
1067	Logout attempted using Fibre Channel VP index that has not been configured. Operation attempted on an unconfigured VP.
1108	Event notification: Fibre Channel processor encountered a system error (unrecoverable firmware error).
1109	Event notification: Fibre Channel driver encountered a fatal error.
1112	Event notification: Fibre Channel port logged out.
1282	Failed to allocate object for iSCSI session: out of session resources.
1292	Received iSCSI PDU with duplicate command sequence number (CmdSN). Command PDU will be dropped.
1298	Unable to allocate iSCSI initiator object while instantiating session.
1444	Failed to execute iSCSI Command PDU because its CmdSN is out-of-range. Log message contains the incorrect CmdSN, the valid CmdSN range, the first byte of the CDB, and the data length.
1688	Event notification: iSCSI driver encountered a fatal error.
1689	Event notification: an IOCTL request was received to unload the iSCSI driver.
1694	Event notification: attempt to connect to the iSNS server failed.
2052	iSNS connection failed.
2053	Break up I/O DSD allocation failed.
2305	Break up I/O recover DSD allocation failed.
2307	Data buffer allocation failed (length %d) during tpb extension allocation.
2308	Allocation of DSD failed during Tpb extension allocation. Buffer length %d.
2309	FCIP incoming frame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x).
2310	FCIP incoming frame: GetFcipMapPortal failed.

2311	FCIP incoming frame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x.
2312	FCIP system error.
2313	FCIP system error: QLOP_IssuePortEnable failed.
2320	FCIP handle Teb: Driver Fatal error.
2321	FCIP configure portal: Find portal object failed for QLUT_TYPE_FC, PortId (%d).
2322	FCIP configure portal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d).
2323	FCIP allocate TRB pool: Allocation failed (size 0x%x).
2324	FCIP Trb: Null portal object in map table.
2325	FCIP get TRB: Null portal object in map table.
2326	FCIP get TRB: Duplicate allocation of FcipTrb (0x%p).
2327	FCIP free TRB: Null portal object in map table.
2328	FCIP free TRB: Duplicate Free of FcipTrb (0x%p).
2329	FCIP initialize buffer descriptor pool: memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x).
2336	FCIP free data buffers: Duplicate Freeing of DataBuf (0x%p).
2337	FCIP allocate data buffers: Duplicate allocation of DataBuffer (0x%p).
2338	FCIP allocate data buffer: Got NULL PORTAL Object in map table MEM LEAK.
2339	FCIP de-allocate data buffer: Null portal object in map table.
2340	FCIP create data buffer pool: Allocation of 32K buffers from LargeBufferPool failed.
2561	Break up I/O: TPB allocation failed.
2562	Break up I/O: Data buffer and TPB allocation failed.

iSCSI Driver

The following error log messages are common to both iSCSI ports, 1 (GE1) and 2 (GE2). They are listed in Table A-9 and described following the table. Log messages beginning with #0 denote iSCSI port 1 (GE1). Log messages beginning with #1 denote iSCSI port 2 (GE2).

Table A-9. iSCSI Driver—Error Log Messages

ID	Log Message	No.
73990	#%d: QLUtmIoctlEnable: Initialize FW failed	262
74046	#%d: QLPortUp: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x	318
74056	#%d: QLRunDiag: MBOX Diag test internal loopback failed %x %x	328
74057	#%d: QLRunDiag: MBOX Diag test external loopback failed %x %x	329
74065	#%d: QLPortDown: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x	337
74241	#%d: QLiSNSEnableCallback: iSNS Server TCP Connect failed	513
74577	#%d: QLIsrDecodeMailbox: NVRAM invalid	849
74587	#%d: QLIsrDecodeMailbox: Link down	859
74656	#%d: QLReadyTimer: Adapter missed heartbeat for %d seconds. Time left %d	928
74661	#%d: QLTimer: Abort pTpb=%p, Type %x, Timeout 0x%x DrvCount 0x%x, DdbIndex 0x%x	933
74663	#%d: QLReadyTimer: MBOX_CMD %04x %04x %04x %04x %04x %04x %04x %04x timed out	935
74665	#%d: QLReadyTimer: QLiSNSReenable failed.	937
74784	#%d: QLUpdateInitiatorData: No more room in Initiator Database.	1056
74800	#%d: QLSetTargetData: No more room in Target Database.	1072

262	The iSCSI processor failed firmware initialization.
318	The iSCSI processor command to enable a GE port failed.
328	The iSCSI processor failed the internal loopback test.

329	The iSCSI processor failed the external loopback test.
337	The iSCSI processor command to disable a GE port failed.
513	The iSCSI processor could not connect with the iSCSI name server (iSNS).
849	The iSCSI processor reported that the iSCSI port NVRAM contains invalid data (checksum error).
859	The iSCSI processor reported a link down condition.
928	The driver failed to receive a heartbeat from the iSCSI processor for the specified number of seconds.
933	The driver timed out an iSCSI processor operation and is aborting the operation.
935	The driver timed out an iSCSI processor mailbox command.
937	The driver timed out while attempting to reconnect with the iSNS.
1056	The driver's initiator database is full. The driver is capable of storing 1024 iSCSI initiators in its database. Use the CLI or the SANsurfer Router Manager to remove unwanted/unused iSCSI initiators.
1072	The driver's target database is full. Use the CLI or the SANsurfer Router Manager to remove unwanted/unused iSCSI targets.

Fibre Channel Driver

The following error log messages are common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). They are listed in Table A-10 and described in this section. Log messages beginning with #0 denote Fibre Channel port 1 (FC1) and log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table A-10. Fibre Channel Driver—Error Log Messages

ID	Log Messages	No.
106583	#%d: QLUtmReceiveIo: Path invalid/FW No resource count %x	87
106589	#%d: QLIoctlEnable: Adapter disabled	93
106590	#%d: QLIoctlEnable: Initialize FW error	94
106592	#%d: QLIoctlRunDiag: Diagnostic loopback command failed %x % %x %x	96
106593	#%d: QLIoctlDisable: Re-initialize adapter failed	97
106595	#%d: QLUtmReceiveIo: Invalid VP Loop Id 0x%x	99
106803	#%d: QLIsrEventHandler: Link down (%x)	307
106813	#%d: QLIsrEventHandler: Unexpected async event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	317
106846	#%d: QLProcessResponseQueueFS: TRB is NULL: %d	350
106853	#%d: QLTimer: Link error count (0x%x) exceeded, link down	357
106912	#%d: QLReserveLoopId: out of loop Ids	416
106928	#%d: QLMarkDeviceOffline: Device Id: %x marked offline, cLinkDownTimeout = %x, cPortDownRetryCount=%x	432
106948	#%d: QLSnsGetAllNext: Name server login FAILED %x	452
107029	#%d: QLUpdateDeviceData: out of slots in host database	533
107030	#%d: QLUpdateDeviceData: out of slots in target database	534
107041	#%d: QLUpdateDeviceDatabase 0x%x: GET_ID failed %x	545
107056	#%d: QLUpdateDeviceDatabase 0x%x: out of slots in host database	560
107058	#%d: QLUpdateDeviceDatabase 0x%x: MBOX_CMD_GET_VP_DATABASE failed %x	562
107078	#%d: QLUpdatePort 0x%x: out of slots in host database	582

Table A-10. Fibre Channel Driver—Error Log Messages (Continued)

ID	Log Messages	No.
107254	#%d: QLUpdateSinglePortCont 0x%x: out of slots in host database	758
107267	#%d: QLFcipIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	771

87	The FC processor received a SCSI command for an unknown target path or has run out of resources to execute additional commands.
93	The FC processor was disabled by an IOCTL request to the driver.
94	The FC processor firmware failed initialization. The request to initialize was received by the driver in an IOCTL request.
96	The FC processor failed the external loopback test.
97	The FC processor failed to re-initialize in response to an IOCTL disable request.
99	Invalid Virtual Port loop ID.
307	The FC processor reported a link down condition.
317	The FC processor reported an unexpected asynchronous event. The mailbox registers provide status, event code, and data related to the event.
350	FCIP Response queue entry TRB pointer is NULL.
357	The driver has determined that the FC link is unreliable and unusable due to the number of errors encountered. The link has been taken down.
416	The FC processor was unable to obtain the number of loop IDs required. This failure occurs only when the FC processor is running multi-ID firmware.
432	The driver was unable to re-establish connection to the target within the timeout and retry counts, and is therefore marking it *offline*.
452	The FC processor is unable to log into the FC fabric name server.
533	The driver’s host (initiator) database is full.
545	The driver’s target database is full.
560	The driver’s host (initiator) database is full. Maximum host database is 64.
562	FC processor "Get VP Database entry command" failed.

582	The drivers host (initiator) database is full.
758	No slots available in host database.
771	FCIP system error event.

User Modules

The user modules generate the error log messages listed in Table A-11 and described following the table.

Table A-11. User Modules—Error Log Messages

ID	Log Message	No.
139265	QBRPC_Initialize: Entered	1
139266	QBRPC_Initialize:GetBridge Mem Allocation error	2
139267	QBRPC_Initialize:GetBridgeAdv Mem Allocation error	3
139268	QBRPC_Initialize:GetMgmt Mem Allocation error	4
139269	QBRPC_Initialize:GetIscsi Mem Allocation error	5
139270	QBRPC_Initialize:GetIscsiAdv Mem Allocation error	6
139271	QBRPC_Initialize:GetIsns Mem Allocation error	7
139272	QBRPC_Initialize:GetFcIntfc Mem Allocation error	8
139273	QBRPC_Initialize:GetFcAdv Mem Allocation error	9
139280	QBRPC_Initialize:GetFcSfp Mem Allocation error	16
139281	QBRPC_Initialize:GetLog Mem Allocation error	17
139282	QBRPC_Initialize:GetStats Mem Allocation error	18
139283	QBRPC_Initialize:InitListMem Allocation error	19
139284	QBRPC_Initialize:TargetList Mem Allocation error	20
139285	QBRPC_Initialize:LunList MemAllocation error	21
139286	QBRPC_Initialize:PresTarget Mem Allocation error	22
139287	QBRPC_Initialize:LunMask Mem Allocation error	23
139288	QBRPC_Initialize:Init Mem Allocation error	24
139289	QBRPC_Initialize:TgtDevice Mem Allocation error	25
139296	QBRPC_Initialize:FcTgt Mem Allocation error	32

Table A-11. User Modules—Error Log Messages (Continued)

ID	Log Message	No.
139297	QBRPC_Initialize:BridgeStatus Mem Allocation error	33
139298	QBRPC_Initialize:Diag Mem Allocation error	34
139299	QBRPC_Initialize:DiagLog Mem Allocation error	35
139300	QBRPC_Initialize:FruImage Mem Allocation error	36
139301	QBRPC_Initialize:OemMfg Mem Allocation error	37
139302	QBRPC_Initialize:Status Mem Allocation error	38
139303	QBRPC_Initialize:TcpIpStats Mem Allocation error	39
139304	QBRPC_Initialize:NtpStats Mem Allocation error	40
139305	QBRPC_Initialize:LunList MemAlloc error	41
139315	QBRPC_FreeResources:Entered	51
139553	checkDuplicateIp: Detected Error %08x %08x%04x	289

1	RPC (remote procedure call) server initialization entry point.
2	Get System API memory allocation failed.
3	Get System Advanced API memory allocation failed.
4	Get Management API memory allocation failed.
5	Get iSCSI API memory allocation failed.
6	Get iSCSI advanced API memory allocation failed.
7	Get iSNS API memory allocation failed.
8	Get FC Interface API memory allocation failed.
9	Get FC Advanced API memory allocation failed.
16	Failed memory allocation for Get FC SFP API.
17	Failed memory allocation for Get Log API.
18	Failed memory allocation for Get Statistics API.
19	Failed memory allocation for Get Initiator List API.
20	Failed memory allocation for Get Target List API.

21	Failed memory allocation for Get LUN List API.
22	Failed memory allocation for Get Presented Targets List API.
23	Failed memory allocation for Get LUN Mask API.
24	Failed memory allocation for Initiator API.
25	Failed memory allocation for Target Device API.
32	Failed memory allocation for FC Target API.
33	Failed memory allocation for System Status API.
34	Failed memory allocation for Diagnostic API.
35	Failed memory allocation for Diagnostic Log API.
36	Failed memory allocation for FRU Image API.
37	Failed memory allocation for OEM Manufacturing API.
38	Failed memory allocation for Status API.
39	Failed memory allocation for TCP/IP Statistics API.
40	Failed memory allocation for NTP Status API.
41	Failed memory allocation for LUN List API.
51	RPC free resources entry point.
289	Detected duplicate IP address for management port.

System

The system modules generate the error log messages listed in Table A-12 and described following the table.

Table A-12. System—Error Log Messages

ID	Log Message	No.
237572	"Failed to kill sys killer %d\n"	4
237573	"Temperature over high threshold %d\n"	5

4	Failed to kill system task.
5	Reporting router exceeds maximum operating temperature.

Fatal Log Messages

The following sections list and describe the fatal log messages by reporting module:

iSCSI Driver

The following fatal log messages are common to both iSCSI ports, 1 (GE1) and 2 (GE2). They are listed in Table A-13 and described following the table. Log messages beginning with #0 denote iSCSI port 1 (GE1). Log messages beginning with #1 denote iSCSI port 2 (GE2).

Table A-13. iSCSI Driver—Fatal Log Messages

ID	Log Message	No.
69652	#%d: qlutm_init: Diagnostic failed, invalid SRAM	20
69653	#%d: qlutm_init: Diagnostic failed, fail reboot	21
69654	#%d: qlutm_init: Diagnostic failed, invalid NVRAM	22
69655	#%d: qlutm_init: Diagnostic failed, invalid DRAM	23
69656	#%d: qlutm_init: Failed to return diagnostic result to Bridge	24

Table A-13. iSCSI Driver—Fatal Log Messages (Continued)

ID	Log Message	No.
69941	#%d: QLUtmProcessResponseQueue: Invalid handle %x EntryType %x	309
69951	#%d: QLSetNvram: QLRebootTimer failed AF %x RS %x Time %d	319
69964	#%d: QLDisable: QLRebootTimer failed AF %x RS %x Time %d	332
69966	#%d: QLEnable: QLRebootTimer failed AF %x RS %x Time %d	334
70224	#%d: QLProcSrblessiSNSResponse: Invalid handle %x	592
70400	#%d: QLInitializeDevice: QLStartAdapter failed	768
70417	#%d: QLInitializeAdapter: QLInitializeFW failed	785
70432	#%d: QLDoInterruptServiceRoutine: PortFatal interrupt. PortFatalErrorStatus %08x CSR %08x AS %x AF %x	800
70448	#%d: QLStartAdapter: QLRebootTimer failed AF %x RS %x Time %d	816
70489	#%d: QLIsrDecodeMailbox: System Error 8002 MB[1-7] %04x %04x %04x %04x %04x %04x %04x	857
70499	#%d: QLProcessResponseQueue: Invalid handle for ET_PASSTHROUGH_STATUS	867
70501	#%d: QLProcessResponseQueue: Invalid entry type in response queue %x	869
70502	#%d: QLProcessResponseQueue: Invalid handle %x EntryType %x	870
70524	#%d: QLProcessAen: Invalid event %x	892
70544	#%d: QLRebootTimer: Reboot failed!	912
70563	#%d: QLReadyTimer: Adapter missed heartbeat for 0x%x seconds. Rebooting	931
70564	#%d: QLReadyTimer: Abort pTpb=%p failed, DrvCount 0x%x	932
70609	#%d: QLProcessSystemError: Restart RISC	977
70610	#%d: QLProcessSystemError: RebootHba failed	978
70784	#%d: QLConfigChip: invalid NVRAM	1152
70835	#%d: QLStartFw: MBOX_CMD_SET_FLASH failed %x	1203

Table A-13. iSCSI Driver—Fatal Log Messages (Continued)

ID	Log Message	No.
70836	#%d: QLStartFw: Invalid Fw loader state 0x%x	1204
70837	#%d: QLStartFw: Load Fw loader timeout	1205

20	iSCSI processor SRAM test failed.
21	iSCSI processor failed diagnostic reboot.
22	iSCSI processor failed NVRAM diagnostic.
23	iSCSI processor failed DRAM diagnostic.
24	iSCSI processor failed to return diagnostic results.
309	Response queue entry contains an invalid handle.
319	Set NVRAM reboot timer failed.
332	Port disable reboot timer failed.
334	Port enable reboot timer failed.
592	iSNS response contains an invalid handle.
768	Start iSCSI processor failed.
785	iSCSI processor firmware initialization failed.
800	iSCSI processor port fatal error.
816	Start iSCSI processor reboot timer failed.
857	iSCSI processor fatal system error.
867	Response queue invalid handle for ET pass-through.
869	Response queue invalid entry type.
870	Response queue invalid handle for specified entry type.
892	Asynchronous event for unknown event type.
912	Reboot timer failed.
931	iSCSI driver missed iSCSI processor heartbeat. iSCSI processor rebooted.
932	iSCSI processor failed to complete operation before timeout.
977	iSCSI processor system error restart.

978	iSCSI processor reboot failed.
1152	iSCSI processor NVRAM invalid (checksum error).
1203	iSCSI FLASH (NVRAM) command failed.
1204	iSCSI firmware loader invalid state.
1205	iSCSI failed to load firmware in time allotted.

FC Driver

The following fatal log messages are common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). They are listed in Table A-14 and described following the table. Log messages beginning with #0 denote Fibre Channel port 1 (FC1). Log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table A-14. Fibre Channel Driver—Fatal Log Messages

ID	Log Message	No.
102419	#%d: qlutm_init: Diagnostic failed, port 1 invalid SRAM	19
102420	#%d: qlutm_init: Diagnostic failed, port 1 POST failed	20
102421	#%d: qlutm_init: Diagnostic failed, port 2 invalid SRAM	21
102422	#%d: qlutm_init: Diagnostic failed, port 2 POST failed	22
102423	#%d: qlutm_init: Failed to return diagnostic result to Bridge	23
102656	#%d: QLInitializeAdapter: Reset ISP failed	256
102657	#%d: QLInitializeAdapter: Load RISC code failed	257
102658	#%d: QLInitializeAdapter: Load ISP2322 receive sequencer code failed	258
102659	#%d: QLInitializeAdapter: Load ISP2322 transmit sequencer code failed	259
102662	#%d: QLInitializeAdapter: Verify Checksum command failed (%x)	262
102680	#%d: QLInitializeFW: FAILED	280
102688	#%d: QLInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter	288
102689	#%d: QLInterruptServiceRoutine: Invalid interrupt status: %x	289
10691	#%d: QLFcipInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter	291

Table A-14. Fibre Channel Driver—Fatal Log Messages (Continued)

ID	Log Message	No.
10692	#%d: QLFcipInterruptServiceRoutine: Invalid interrupt status: %x	292
102716	#%d: QLIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	316
102746	#%d: QLProcessResponseQueue: Invalid handle %x, type %x	346
102747	#%d: QLProcessResponseQueueFS: Invalid buffer type: %x	347
102748	#%d: QLProcessResponseQueueFS: Invalid EntryType (0x%x)	348
102749	#%d: QLProcessResponseQueueFS: Invalid handle 0x%x, type 0x%x	349
102752	#%d: QLTimer: Ext Ram parity error exceed limit cnt 0x%x, limit 0x%x, Disabled adapter	352
102755	#%d: QLTimer: Heartbeat failed	355
102800	#%d: QLRestartRisc: restart RISC	400

19	FC1 processor SRAM test failed.
20	FC1 processor power-on self-test (POST) failed.
21	FC2 processor SRAM test failed.
22	FC2 processor POST failed.
23	FC processor failed to return diagnostic results.
256	FC processor failed reset.
257	FC processor firmware load failed.
258	FC processor receive sequencer code load failed.
259	FC processor transmit sequencer code load failed.
262	FC processor firmware checksum failed.
280	FC processor firmware initialization failed.
288	FC processor paused due to internal parity error.
289	FC processor returned an invalid interrupt status.
291	FC processor invalid interrupt status.

292	FC processor paused due to RAM parity error.
316	FC processor system error.
346	Response queue entry contains an invalid handle.
347	FCIP: Response queue entry contains an invalid buffer type.
348	FCIP: Response queue entry contains an invalid entry type.
349	FCIP: Response queue entry contains an invalid handle.
352	FC processor external SRAM parity error count exceeded limit: FC port disabled.
355	FC processor heartbeat failed.
400	FC processor being restarted.

TOE Driver

The TOE driver generates the fatal log messages listed in Table A-15 and described following the table.

Table A-15. TOE—Fatal Log Messages

ID	Log Message	No.
200721	QL3022:ql3xxx_probe: Adapter eth#%d, Invalid NVRAM parameters	17
200725	QL3022:eth%x: Resetting chip. PortFatalErrStatus register = 0x%x	21

17	Encountered invalid parameters in TOE NVRAM.
21	TOE chip reset due to detection of fatal error.

System

The system modules generate the fatal log messages listed in Table A-16 and described following the table.

Table A-16. System—Fatal Log Messages

ID	Log Message	No.
233473	"memory monitor: Detected Uncorrectable Ecc %08lx system is rebooting in 5 secs\n"	1
233474	"Failed to register interrupt handler!\n"	2
233475	"%s class_simple_create failed\n"	3

1	Uncorrectable memory error detected at address provided in log message.
2	Attempt to register the interrupt handler failed.
3	Failed class_simple_create system call from memory monitor initialization routine.

Notes

B Simple Network Management Protocol (SNMP)

Introduction

Simple network management protocol (SNMP) provides monitoring and trap functions for managing the router through third-party applications that support SNMP. The router firmware supports SNMP versions 1 and 2 and a QLogic (see page B-3). You may format the traps using SNMP version 1 or 2 (see page B-11).

SNMP Properties

You can set the SNMP properties using either the command line interface (CLI) (see the *iSR6140 Router CLI Users Guide*) or the SANsurfer Router Manager (see the *iSR6140 Router Manager Users Guide*).

Table B-1 describes the SNMP properties.

Table B-1. SNMP Properties

Parameter	Description
Read community	A password that authorizes an SNMP management server to read information from the router. This is a write-only field. The value on the router and the SNMP management server must be the same. The read community password can be up to 32 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default is password is *public*.
Trap community	A password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the router and the SNMP management server must be the same. The trap community password can be up to 32 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default password is *public*.
System location	Specifies the name of the router location. The name can be up to 64 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default is undefined.

Table B-1. SNMP Properties (Continued)

Parameter	Description
System contact	Specifies the name of the person to be contacted to respond to trap events. The name can be up to 64 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default is undefined.
Authentication traps	Enables or disables authentication trap generation in response to authentication failures. The default is disabled.

SNMP Trap Configuration

SNMP trap configuration supports setting up to eight trap destinations. Choose from Traps 1–Trap 8 to configure each trap. Table B-2 describes the parameters for configuring a SNMP trap.

Table B-2. SNMP Trap Configuration Parameters

Parameter	Description
Trap *n* enabled	Enables or disables trap *n*. If disabled, the trap is not configured.
Trap address*	Specifies the IP address to which the SNMP traps are sent. A maximum of eight trap addresses are supported. The default address for traps is 0.0.0.0.
Trap port*	The port number on which the trap is sent. The default is 162.
Trap version	Specifies the SNMP version (1 or 2) with which to format traps.

*Trap address (other than 0.0.0.) and trap port combinations must be unique. For example, if trap 1 and trap 2 have the same address, then they must have different port values. Similarly, if trap 1 and trap 2 have the same port value, they must have different addresses.

Management Information Base (MIB)

The following sections describe the QLogic management information base (MIB). The MIB consists of four object groups:

- System Information
- Network Port Table
- Fibre Channel Port Table
- Fibre Channel Port Table

System Information

The system information objects provide the system serial number, version numbers (hardware/software/agent), and number of ports (FC/GE).

qsrSerialNumber

Syntax	SnmpAdminString
Access	Read only
Description	The system serial number.

qsrHwVersion

Syntax	SnmpAdminString
Access	Read only
Description	The system hardware version number.

qsrSwVersion

Syntax	SnmpAdminString
Access	Read only
Description	The system software (firmware) version number.

qsrNoOfFcPorts

Syntax	Unsigned32
Access	Read only
Description	The number of Fibre Channel ports on the system.

qsrNoOfGbEPorts

Syntax	Unsigned32
Access	Read-only
Description	The number of gigabit Ethernet ports on the system.

qsrAgentVersion

Syntax	SnmpAdminString
Access	Read only
Description	The version number of the agent software on the system.

Network Port Table

The network port table contains a list of network ports that are operational on the router. The entries in this table include the management port, the iSCSI ports, and the TOE ports on the router. A single gigabit Ethernet port can function as an iSCSI port and a TOE simultaneously; therefore, there may be up to two entries for a given gigabit Ethernet port.

qsrNwPortTable

Syntax	**Sequence of** QsrNwPortEntry
Access	Not accessible
Description	The entries in this table include the management port, and the iSCSI, and TOE ports on the router.

qsrNwPortEntry

Syntax	QsrNwPortEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific network port.

QsrNwPortEntry

A network port entry consists of the following sequence of objects:

qsrNwPortRole	QsrPortRole
qsrNwPortIndex	unsigned32
qsrNwPortAddressMode	INTEGER
qsrIPAddressType	InetAddressType
qsrIPAddress	InetAddress

qsrNetMask	InetAddress
qsrGateway	InetAddress
qsrMacAddress	MacAddress
qsrNwLinkStatus	QsrLinkStatus
qsrNwLinkRate	QsrLinkRate

qsrNwPortRole

Syntax	QsrPortRole
Access	Not accessible
Description	The operational role of this port: management port, iSCSI port, a TOE.

qsrNwPortIndex

Syntax	Unsigned32
Access	Not accessible
Description	A positive integer indexing each network port in a given role.

qsrNwPortAddressMode

Syntax	INTEGER 1 = Static 2 = DHCP 3 = Bootp 4 = RARP
Access	Read only
Description	The method by which the port gets its IP address.

qsrIPAddressType

Syntax	InetAddressType
Access	Read only
Description	The IP address type: ipv4 or ipv6.

qsrIPAddress

Syntax	InetAddress
Access	Read only
Description	The IP address of the port.

qsrNetMask

Syntax	InetAddress
Access	Read only
Description	The subnet mask for this port.

qsrGateway

Syntax	InetAddress
Access	Read only
Description	The gateway for this port.

qsrMacAddress

Syntax	IMacAddress
Access	Read only
Description	The MAC address for this port.

qstNwLinkStatus

Syntax	QsrLinkStatus
Access	Read only
Description	The operational link status for this port.

qsrNwLinkRate

Syntax	QsrLinkRate
Access	Read only
Description	The operational link rate for this port.

Fibre Channel Port Table

This table contains a list of the Fibre Channel (FC) ports on the router.There are as many entries in this table as there are FC ports on the router.

qsrFcPortTable

Syntax	**Sequence of** QsrFcPortEntry
Access	Not accessible
Description	A list of the FC ports on the router.There are as many entries in this table as there are FC ports on the router.

qsrFcPortEntry

Syntax	QsrFcPortEntry
Access	Not accessible
Description	Each entry (row) contains information about a specific FC port.

QsrFcPortEntry

A Fibre Channel port entry consists of the following sequence of objects:

qsrFcPortRole	QsrPortRole
qsrFcPortIndex	Unsigned32
qsrFcPortNodeWwn	PhysAddress
qsrFcPortWwn	PhysAddress
qsrFcPortId	PhysAddress
qsrFcPortType	Unsigned32
qsrFcLinkStatus	QsrLinkStatus
qsrFcLinkRate	QsrLinkRate

qsrFcPortRole

Syntax	QsrPortRole
Access	Not accessible
Description	The operational role of this port: FCP mode or frame shuttle mode.

qsrFcPortIndex

Syntax	Unsigned32
Access	Not accessible
Description	A positive integer indexing each FC port in a given role.

qsrFcPortNodeWwn

Syntax	PhysAddress
Access	Read only
Description	The world-wide name of the node that contains this port.

qsrFcPortWwn

Syntax	PhysAddress
Access	Read only
Description	The world-0wide name for this port.

qsrFcPortId

Syntax	PhysAddress
Access	Read only
Description	The interface's 24-bit FC address identifier.

qsrFcPortType

Syntax	Unsigned32
Access	Read only
Description	The type of FC port, as indicated by the use of the appropriate value assigned by IANA. The IANA-maintained registry for FC port types can be found at: www.iana.org/assignments/fc-port-types

qsrFcLinkStatus

Syntax	QsrLinkStatus
Access	Read only
Description	The current link status for this port.

qsrFcLinkRate

Syntax	QsrLinkRate
Access	Read only
Description	The current link rate for this port.

Sensor Table

This table contains a list of all the sensors on the router. There are as many entries (rows) in this table as there are sensors.

qsrSensorTable

Syntax	**Sequence of** QsrSensorEntry
Access	Not accessible
Description	A list of all the sensors on the router. There are as many entries (rows) in this table as there are sensors.

qsrSensorEntry

Syntax	QsrSensorEntry
Access	Not accessible
Description	Each entry (row) corresponds to a single sensor.

QsrSensorEntry

A sensor entry consists of the following sequence of objects:

qsrSensorType	INTEGER
qsrSensorIndex	Unsigned32
qsrSensorUnits	INTEGER
qsrSensorValue	Integer32
qsrUpperThreshold	Integer32
qsrLowerThreshold	Integer32
qsrSensorState	INTEGER

qsrSensorType

Syntax	INTEGER Temperature = 1
Access	Not accessible
Description	The type of data being measured by this sensor.

qsrSensorIndex

Syntax	Unsigned32
Access	Not accessible
Description	A positive integer identifying each sensor of a given type.

qsrSensorUnits

Syntax	INTEGER Celsius = 1
Access	Read only
Description	The unit of measurement for the sensor.

qsrSensorValue

Syntax Integer32

Access Read only

Description The current value of the sensor.

qsrUpperThreshold

Syntax Integer32

Access Read only

Description The upper-level threshold for this sensor.

qsrLowerThreshold

Syntax Integer32

Access Read only

Description The lower-level threshold for this sensor.

qsrSensorState

Syntax INTEGER

Access Read only

Description The state of this sensor, indicating the health of the system.

- **Unknown –** The sensor value/thresholds cannot be determined.
- **Normal –** The sensor value is within normal operational limits.
- **Warning –** The sensor value is approaching a threshold.
- **Critical –** The sensor value has crossed a threshold.

Notifications

The router provides the following notification types:

- Notification Objects
- Agent Start Up Notification
- Agent Shut Down Notification
- Network Port Down Notification
- Fibre Channel Port Down Notification
- Sensor Notification
- Generic Notification

The following sections describe these notifications and objects they use.

Notification Objects

This section defines the objects used in notifications.

qsrEventSeverity

Syntax	INTEGER
Access	Accessible for notify
Description	This notification indicates the severity of the event. The value *clear* specifies that a condition that caused an earlier trap is no longer present.

qsrEventDescription

Syntax	SnmpAdminString
Access	Accessible for notify
Description	A textual description of the event that occurred.

qsrEventTimeStamp

Syntax	DateAndTime
Access	Accessible for notify
Description	This notification indicates when the event occurred.

Agent Start Up Notification

The agent startup notification indicates that the agent on the router has started running.

qsrAgentStartup uses the following object:

- qsrEventTimeStamp

Agent Shut Down Notification

The agent shut down notification indicates that the agent on the router is shutting down.

qsrAgentShutdown uses the following object:

- qsrEventTimeStamp

Network Port Down Notification

The network port down notification indicates that the specified network port is *down*. The next time the port comes up, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrNwPortDown uses the following objects:

- qsrNwLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Fibre Channel Port Down Notification

The Fibre Channel port down notification indicates that the specified Fibre Channel port is *down*. The next time the port comes up, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrFcPortDown uses the following objects:

- qsrFcLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Sensor Notification

The sensor notification indicates that the state for the specified sensor is not *normal*. When the sensor returns to the normal state, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrSensorNotification uses the following objects:

- qsrSensorValue
- qsrSensorState
- qsrEventTimeStamp
- qsrEventSeverity

Generic Notification

The generic notification reports events other than the defined event types. It provides a description object that identifies the event in clear text.

qsrGenericEvent uses the following objects:

- qsrEventTimeStamp
- qsrEventSeverity
- qsrEventDescription

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