InfiniBand Menu Tasks

This chapter desribes the InfiniBand menu tasks for Element Manager and contains these sections:

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- Configuring Max Hops, page 8-11
- Understanding Partitions, page 8-12
- Viewing Partition Details, page 8-16
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- Viewing InfiniBand Services, page 8-19
- Viewing Switch Route Details, page 8-20
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- Adding a Subnet Manager, page 8-21
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- Viewing Device Management, page 8-63

Note This section provides information to familiarize you with the InfiniBand technology. For hardware-specific information, consult the relevant hardware documentation.

Understanding InfiniBand

InfiniBand (IB) is a high speed, high density serial interconnect that increases CPU utilization, decreases latency, and eases the management pain of data centers. The term "InfiniBand" refers to the entire hardware, communication, and management infrastructure. Use of this technology increases the communication speed between the following:

- CPUs
- devices within servers
- subsystems located throughout a network.

InfiniBand combines high-speed hardware, specialized protocols, and Remote Data Memory Access (RDMA) techniques to increase CPU utilization and decrease latency. Operations of the InfiniBand Architecture are managed by the SM.

InfiniBand Components

One or more of the following hardware components may be used to maximize your server network.

- InfiniBand switch—Passes traffic between IB-capable devices over the InfiniBand network
- Host channel adapters (installed in host)—Serves an IB version of a network interface card (NIC) to connect the host to the IB network
- Ethernet gateway—Provides Ethernet connectivity to an IB network
- Fibre Channel gateway—Provides Fibre Channel connectivity to an IB network

Protocols

InfiniBand requires a new set of protocols. All of the necessary protocol drivers are included with the Server Switch solution.

IPoIB

The IP over IB (IPoIB) link driver provides standardized IP encapsulation over InfiniBand fabrics. IPoIB can transparently use IP over InfiniBand technology, similar to the way that IP runs over Ethernet.

The primary responsibilities of the IPoIB driver are to perform address resolution and the management of multicast membership.

SDP

The Sockets Direct Protocol (SDP) is a transparent protocol used on InfiniBand networks to allow sockets-based applications to take advantage of the RDMA performance over an InfiniBand network. SDP provides: a reduction in the amount of software running inside a process context and zero copy SDP

protocol support enables databases, application servers, and CPUs to operate more efficiently because the databases spends less time waiting for work, the application servers spend less time waiting for responses, and the CPUs have more cycles free for other work.

SRP

SCSI RDMA Protocol (SRP) is an upper-layer storage protocol for InfiniBand that runs SCSI commands across RDMA-capable networks for InfiniBand hosts to communicate with Fibre Channel storage devices. This protocol allows InfiniBand hosts to natively send SCSI commands as if the storage was directly attached.

The SRP protocol operate using an RDMA communication service that provides communication between pairs of consumers; it uses messages for control information and RDMA operations for data transfers.

The SRP protocol is used only if you have a Fibre Channel Gateway installed in your InfiniBand system.

uDAPL

The user Direct Access Programming Library (uDAPL) is a standardized user mode API that natively supports InfiniBand fabrics. uDAPL performs name to address translations, establishes connections, and transfers data reliably. The primary responsibilities of uDAPL are: connection management and low latency data transfer and completion

Architectural Elements

The following structures serve as foundational elements of InfiniBand architecture:

- Remote Direct Memory Access (RDMA)
- Queue Pairs
- Services

RDMA

InfiniBand utilizes RDMA technology. RDMA allows one computer to place information directly into the memory of another computer. RDMA is specifically characterized by two important features: allows user space applications to directly access hardware and zero-copy data movement

A combination of hardware and software allows user space applications to read and write the memory of a remote system without kernel intervention or unnecessary data copies. This results in lower CPU utilization per I/O operation and more efficient use of machine resources because applications place most of the messaging burden upon InfiniBand's high-speed network hardware.

Queue Pairs

A verb is used to define the functionality of the Host Channel Adapter (HCA). A verb consumer refers to the direct user of the verb.

A work queue provides a consumer with the ability to queue up a set of instructions that are executed by the Channel Adapter. There are two types of Work Queues: Send Work Queue (outbound) and a Receive Work Queue (inbound). Together these Work Queues create a Queue Pair.

The Queue Pair (QP) is one of the primary architectural elements of InfiniBand. In InfiniBand, communication occurs between QPs, instead of between ports.

A QP is an addressable entity that consists of two Work Queues: a Send Work Queue and a Receive Work Queue. (A work queue provides a verb consumer with the ability to queue up a set of instructions that are executed by the Channel Adapter.) The Channel Adapter hardware takes over the task of arbitrating communication by multiplexing access to the send queue or demultiplexing messages on the receive queue.

A connection is made by linking a local queue pair to a remote queue pair. Applications do not share QPs; once you set them up, you can manage them at the application level without incurring the overhead of system calls.

Send and Receive work queues have these characteristics:

- Always created as a pair
- Always remain a pair
- Known as QPs
- Identified by a QP number, which is within the Channel Adapter.

Queue pairs have:

- A region of memory to be used as buffers (numbers of QPs are only limited by memory).
- A key that must match on each incoming packet (the Q_Key) to verify the validity of the packet,
- (Potentially) a partition key, which specifies the portion of the fabric that this queue pair may access.

The QP is the mechanism by which you define quality of service, system protection, error detection and response, and allowable services.

Each QP is independently configured for a particular type of service. These service types provide different levels of service and different error-recovery characteristics as folows:

- Reliable connection
- Unreliable connection
- Reliable Datagram
- Unreliable Datagram

Once the fabric connections are discovered, QPs and protection domains are established, and the type and quality of service are defined for each queue pair, the fabric operates reliably and securely at full performance without impact on system hardware or software resources.

Understanding the Subnet Manager

The Subnet Manager (SM) configures and maintains fabric operations. There can be multiple SMs, but only one master. The SM is the central repository of all information that is required to set up and bring up the InfiniBand fabric.

The master SM does the following:

- Discovers the fabric topology.
- Discovers end nodes.
- Configures switches and end nodes with their parameters, such as the following:
  - Local Identifiers (LIDs)
  - Global Unique Identifier (GIDs)

  - Partition Key (P_Keys)
- Configures switch forwarding tables.
- Receives traps from **Subnet** Management Agents (SMAs).
- Sweeps the **subnet**, discovering topology changes and managing changes as nodes are added and deleted.

Subnet Management Agents

SMAs are part of the SM. An SMA is provided with each node and process packets from the SM.

If a SM is elected master, all of its components, including SA, are implicitly elected master. If a SM ceases to be master, all of its components cease responding to messages from clients.

Subnet Manager Hot Standby

The master and slave SMs can be synchronized so the information in the master is carried over to the slave in the event of a fail-over. Refer to the "Enabling SM Database Synchronization" section on page 8-25 to configure SM hot standby.

The hot standby/database sync feature is used to synchronize the databases between SMs running on separate chassis.

The SM maintains a database in the volatile memory of the master SM containing all required information. The database synchronization is accomplished in two stages:

- Cold Synchronization—This stage is initiated by the master SM when it is ready to start a synchronization session with a standby SM. In this stage, all out of sync tables are copied from the master SM to the standby SM.
- Transactional Synchronization—This stage is entered following successful completion of the cold synchronization stage. In this stage, all database update transaction requests that are processed by the master, are replicated to the standby.

A standby SM can become the master in this situation.

- A crash of the node running the current master SM.
- Partitioning of the **subnet** (such as due to link failure).
- Graceful shutdown of the master (such as for maintenance purposes).

The following occurs in the event of a failure:

- The standby SM becomes the new master.
- The new master rebuilds the database from information retrieved during the **subnet** discovery phase.
- Existing LID assignments are retained, where possible.
- All ports are reset to force them to rejoin multicast groups, readvertise services, rerequest event forwarding, and re-establish connections.
- A "SlaveToMaster" event trap is generated to trigger any necessary processing by external management applications.

Subnet Manager Routing

There are two different concepts associated with InfiniBand routing:

- Routing internally within a switch (hops between switch chips)
- Routing between whole switches (hops between nodes). This is also referred to as routing between "switch elements."

Internal switch routing can be configured to provide the highest performance in passing traffic and to minimize the threat of congestion within the switch.

The routing process proceeds as follows:

Step 1 The SM first discovers all the InfiniBand switch chips in the network.

Step 2 The SM groups the internal switch chips within each chassis into a "switch element."

Step 3 The SM process continues until all the InfiniBand switches are grouped into switch elements.

Step 4 After all the switch chips are grouped, the SM will route the switch elements according to the routing algorithm discussed in the "Minimum Contention, Shortest Path and Load Balancing Algorithm" section on page 8-7.

Step 5 The internal network of each InfiniBand switch is then routed based on the best algorithm for each switch element.

Multiple Paths

The SM allows you to define the Local Identifier Mask Control (LMC) value per **subnet**. The default value of the LMC is 0. By default, only one Local Identifier (LID) is assigned to each host port.

Once the LMC value has been assigned, the SM will route different paths for each LID associated with the same host port. The result of these paths is based on the routing algorithm applied.

Understanding SM Routing Terms

The following terms are important to understand before distinguishing the various types of algorithms that the SM uses for routing:

- Distance is defined as the number of hops (InfiniBand switches or switch elements) between source and destination.
- Tolerance is used when deciding if a particular path is better in distance than the already selected path. You can choosethe tolerance to be used for shortest path calculation as follows:
  - If the tolerance is set to 0, a path has equal distance in calculating the route as the shortest path route only if it has an equal number of hops.
  - If the tolerance is set to 1, a path has equal distance in calculating the route as the shortest path route only if the path has a number of hops equal to either the shortest path or the shortest path plus 1.
- Contention is declared for every switch port on the path that is already used for routing another LID associated with the same host port.

Minimum Contention, Shortest Path and Load Balancing Algorithm

Minimum Contention, Shortest Path and Load Balancing is the algorithm that is used by default to route between the switch elements and for routing between the internal InfiniBand switch chips within each switch element.

The following algorithm is used for the calculation:

Step 1 The shortest path for each of the host ports is calculated.

Step 2 Contention is calculated for all the available paths that are within the (shortest path + tolerance) distance.

a. The path with the least contention is selected.

b. If two paths have the same contention, the path with less distance is selected.

c. If two paths have the same contention and the same distance, the port usage count is used to provide load balancing over the two paths. The usage count is a measure of how many LIDs have been configured to use that particular port.

Deterministic Source Based Routing Algorithm

The Deterministic Source Based Routing is used in some HPC environments where the requirements may need to be more stringently defined. An administrator can identify the exact route that a given port and LID takes for traversing through the network.

Currently, only the internal routing for the Cisco SFS 7008 (a 96 port switch) supports this routing scheme. Refer to the Cisco SFS 7008 *Hardware Guide*, or contact technical support for more information.

Configuring Your Network For Optimal Routing

For optimal routing, we recommend that you do the following:

- Create equal paths between switch elements
- Determine the first path that will be discovered

We recommend that InfiniBand switch elements be connected so that all paths between any pair of switch elements are the same distance (i.e. same number of hops), if possible. This enables you to obtain the optimal paths using the default tolerance of 0. If the paths are of different lengths, then the tolerance value will need to be determined.

The SM Routing Algorithm selects the first best path that it finds. If multiple paths with the same properties are available, then the first of these paths found is the one that is selected. Therefore, it is possible to set up the cabling between switch elements to force the algorithm to prioritize certain paths. Depending on the network requirements, the prioritized paths can either be concentrated on a particular switch element or spread across multiple switch elements to improve fault tolerance.

Viewing Subnet Manager Properties

To view SM properties, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears. Table 8-1 lists and describes the elements in this window.

Table 8-1 Subnet Manager Properties Window Fields

Element	Description
Subnet Prefix field	Displays the **subnet** prefix of the Subnet Manager.
GUID field	Displays the GUID of the networking device on which the SM runs.
Status field	Status of the Subnet Manager. It may appear as master, standby, inactive, or discovery.
Activity Count field	Activity counter that increments each time the SM issues an **subnet** management packet (SMP) or performs other management activities.
SM Key field	64-bit **subnet** management key assigned to the Subnet Manager. The SM key serves as the prefix of all GIDs and "brands" nodes as members of this **subnet**.
Priority field	Priority of the SM relative to other SMs in the IB network. The higher the number, the greater the priority.
Sweep Interval field	Specifies how frequently the SM queries the InfiniBand fabric for network changes.
Response Timeout field	Maximum amount of time that the SM waits for a response after it sends a packet to a port. If the SM does not receive a response in time, the SM identifies the port as unresponsive.
Master Poll Interval field	Interval at which the slave SM polls the master to see if it still runs.
Master Poll Retries field	Number of unanswered polls that cause the slave to identify the master as dead.
Max Active SMs field	Maximum number of standby SMs that the master supports. A value of 0 indicates unlimited SMs.
LID Mask Control field	Number of path bits present in the base LID to each channel adapter port. Increasing the LMC value increases the number of LIDs assigned to each port to increase the number of potential paths to reach each port.
Switch Life Time field	The life time of a packet inside a Server Switch. This value defaults to 20.
Switch Link HoQ Life field	The life time of a packet at the head-of-queue of a switch port. This value defaults to 20.
CA Link HoQ Life field	The life time of a packet at the head-of-queue of the host port. This value defaults to 20. **Note** Element Manager does not currently support this field.
Max Hops field	Specifies the maximum hops.

Configuring the Subnet Manager Priority

To configure the SM priority, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of Subnet Manager properties appears.

Step 3 Highlight the value in the Priority column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Subnet Manager Sweep Interval

To configure the SM sweep interval, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Sweep Interval column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Subnet Manager Response Timeout

To configure the SM response timeout, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of Subnet Manager properties appears.

Step 3 Highlight the value in the Response Timeout column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Subnet Manager Master Poll Interval

To configure the interval at which the switch polls the master switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Master Poll Interval column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Subnet Manager Master Poll Retries

To configure the number of failed polls that prompts the slave to identify the master as "down," perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Master Poll Retries column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Maximum Number of Active Subnet Managers

To configure the maximum number of active SMs on the IB network, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the **Max Active SMs** column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the LID Mask Control

To configure LID mask control, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the LID Mask Control column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Switch Lifetime

To configure the switch life time, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Switch Life Time column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring the Switch Link HoQ Life

To configure the switch link HoQ life, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Switch Link HoQ Life column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring CA Link HoQ Life

To configure the CA link HoQ life, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the CA Link HoQ Life column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Configuring Max Hops

To configure the maximum hops, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager tab. A table of SM properties appears.

Step 3 Highlight the value in the Max-Hops column and replace it with the value that you want to apply.

Step 4 Click the **Apply** button.

Viewing Database Synchronization Details

Element Manager provides multiple screens that you can use to configure database synchronization. Configuration details and field descriptions appear in the "Configuring Database Synchronization" section on page 8-25.

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Database Sync** tab. Details appear in the table below the tab.

Note Database synchronization is enabled by default.

Understanding Partitions

A partition defines a set of InfiniBand nodes that are permitted to communicate with one another. Partitions provide the following:

- Security
- Allows a large cluster to be divided and isolated into small sub-clusters.
- Maps IB nodes to selected VLANs

Note With database sync enabled on all chassis, only the chassis running the master SM will accept partition configuration from the user. For more information, see the "Configuring Database Synchronization" section on page 8-25.

How Partitions Work

A partition defines a set of InfiniBand nodes that are permitted to communicate with one another. Each node may be part of multiple partitions so that a system administrator can define overlapping partitions as the situation requires. Normal data packets carry a 16-bit P_Key, or partition key, that defines a unique partition. The Subnet Manager (SM) configures each node's channel adapter with its set of P_Keys. When a packet arrives at a node, the channel adapter checks that the packet's P_Key is valid based on the Subnet Manager's configuration. Packets with invalid P_Keys are discarded. P_Key validation prevents a server from communicating with another server outside of its partition.

InfiniBand partitions are comparable to hardware-enforced security features of conventional I/O networking technologies, such as Ethernet VLANs and Fibre-Channel zones.

Partition Members

Without members, a partition does not have meaning to the system. Ports are added to the partition, and become members of that partition. Each port may be part of multiple partitions so that the system administrator can define overlapping partitions as the situation requires.

At the time a port member is added to the partition, the administrator must decide whether that particular port will have full or limited membership.

Membership Types

A partition contains a group of members, but different types of members can exist within a single partition. Partition memberships allows even further control because it defines communication within the members of that group, and not just outside of it.

There are two types of partition memberships: full membership, and limited membership. A full-membership partition member can communicate with all other partition members, including other full members, as well as limited members. A limited-membership partition member cannot communicate with other limited-membership partition members. However, a limited partition member can communicate with a full member.

About the Default Partition

The SM automatically configures a default partition, which is always p_key ff:ff.

The default partition controls all connected ports, and by default, everything is a full member of the default partition. The default p_key cannot be altered or deleted as it is the controlling mechanism that manages the configuration of all the partitions.

Selecting a P_Key Value

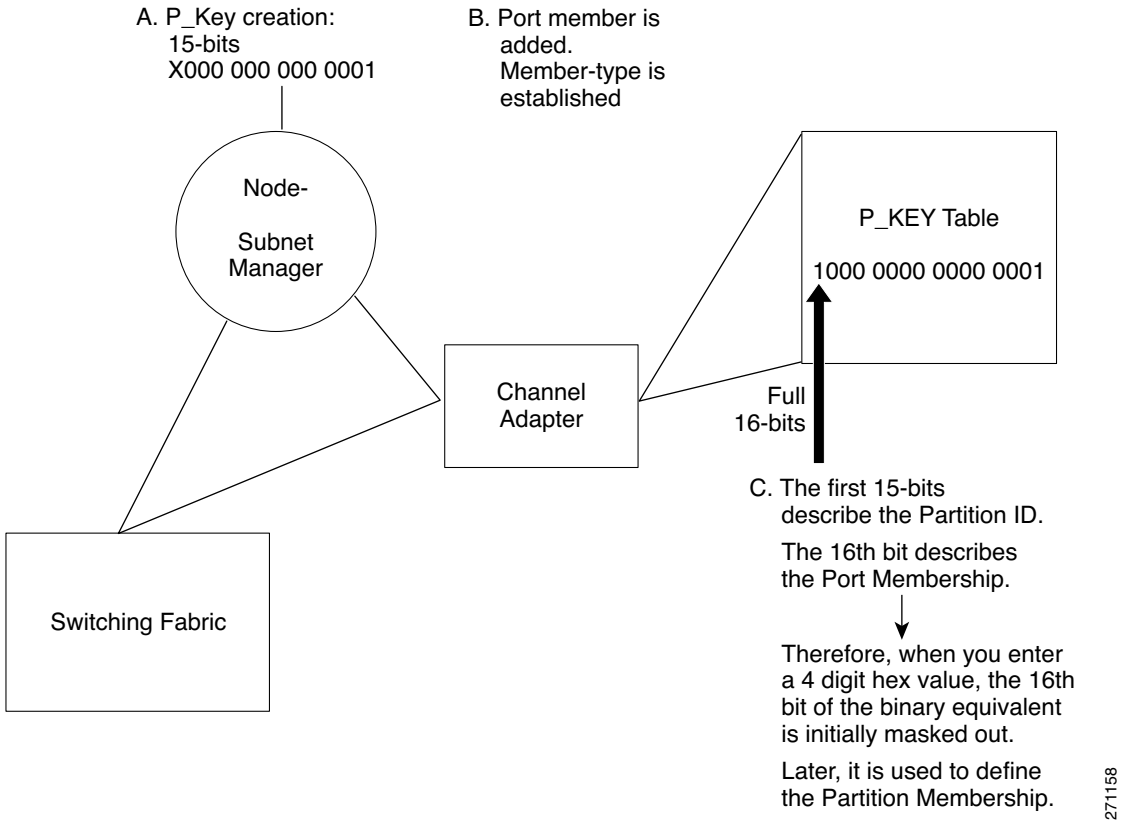
For a list of acceptable P_Key values, refer to Table 8-3 on page 8-15.

Upon creation, the p_key value, see Figure 8-1 is technically a 15-bit number. However, after the p_key is created and the port(s) membership type has been established, the entire value becomes 16 bits. The most significant bit (MSB) displays the type of membership (0 = Limited member, 1 = Full member).

When assigning a p_key value, you need to choose four hexadecimal numbers. However, because of the way that the 16th bit is used, only certain numbers can be used for the left-most variable (the MSB). For example, do not create two p_keys:

0 #:# # and 8#:# #, as they will be viewed as the same number by the system.

Figure 8-1 Partition Keys



Hexadecimal to Binary Conversions

Table 8-2 is provided to assist in the creation of P_keys.

When creating the partition p_key, enter a hexadecimal value that is the equivalent of 16 bits in binary. For example, enter 80:00 (hex) to be 10000000000000000 (binary).

The default partition (which cannot be altered) is 7f:ff.

Table 8-2 Binary Conversions

Hexadecimal	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000

Table 8-2 Binary Conversions (continued)

Hexadecimal	Binary
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

Examples of Valid P_Key Values

You can choose your own p_key values, or you can choose your values from the list in Table 8-3.

Table 8-3 Valid P_Key Numbers

00:01	00:11
00:02	00:12
00:03	00:13
00:04	00:14
00:05	00:15
00:06	00:16
00:07	00:17
00:08	00:18
00:09	00:19
00:10	00:20

Understanding how P_Keys are Saved

Partition information is saved persistently by the master Subnet Manager. P_key information can be synchronized between the master SM and a slave Subnet Manager. The synchronization of the **subnet** managers means that the partition configuration (and other information) is exchanged between the active and standby SMs. The partition configuration will be transferred if an InfiniBand switch fails.

The partition configuration is not saved persistently on a slave SM.

If you have more than one InfiniBand switch in your fabric, refer to the "Enabling SM Database Synchronization" section on page 8-25.

If you are configuring one InfiniBand switch, it will automatically be the master, and the partition configuration is saved persistently on the switch.

Viewing Partition Details

To view the attributes of the partitions on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Partitions** tab. Details appear in the table below the tab. Table 8-4 lists and describes the fields in the table.

Table 8-4 Partition Field Descriptions

Field	Description
SubnetPrefix	**Subnet** prefix of the **subnet** whose partitions you want to view.
Key	Partition key of the partition whose members the display prints below.
VectorIndex	Index identifier of the vector of the partition. This value is available for application purposes.
Vector	Vector of the partition table in which the partition resides. This value is available for application purposes.
VectorSize	Size, in bytes, of the current vector. This value is available for application purposes.
VectorElementSize	Size, in bytes, of each element of the vector. This value is available for application purposes.
LastChange	Indicates the time stamp when the partition table was last changed.

Configure Multicast Groups

To configure multicast groups, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Multicast Group Config** tab.

Step 3 Click the **CreateMulticastGroup** radio button in the Action field.

Step 4 Enter a MGID in the Multicast Group ID field.

Step 5 (Optional) Enter a queue key in the QKey field.

Step 6 Click a radio button in the MTU field to configure the maximum transmission unit of the group.

Step 7 Enter a Traffic Class integer value (between 0 and 255) in the TClass field.

Step 8 Enter a partition key in the PKey field.

Step 9 Click a data rate radio button in the Rate field.

Step 10 Enter an integer value (between 0 and 63) in the Packet Life Time field.

Step 11 Enter an integer value (between 0 and 15) in the Service Level field.

Step 12 Enter a 16-bit label in the Flow Label field.

Step 13 Enter an integer value (between 0 and 255) in the Hop Limit field.

Step 14 Click a scope radio button in the Scope field.

Step 15 Click the **Apply** button.

Note The TClass, Packet Lifetime, Flow Label, and Hop Limit attributes are not supported in this release.

Configuring IPoIB Broadcast Multicast Groups

To configure IPoIB broadcast multicast groups, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Multicast Group Config** tab.

Step 3 Click the **CreateIPoIBbroadcastMulticastGroup** radio button in the Action field.

Step 4 Enter a MGID in the Multicast Group ID field.

Step 5 (Optional) Enter a queue key in the QKey field.

Step 6 Click a radio button in the MTU field to configure the maximum transmission unit of the group.

Step 7 Enter a Traffic Class integer value (between 0 and 255) in the TClass field.

Step 8 Enter a partition key in the PKey field.

Step 9 Click a data rate radio button in the Rate field.

Step 10 Enter an integer value (between 0 and 63) in the Packet Life Time field.

Step 11 Enter an integer value (between 0 and 15) in the Service Level field.

Step 12 Enter a 16-bit label in the Flow Label field.

Step 13 Enter an integer value (between 0 and 255) in the Hop Limit field.

Step 14 Click a scope radio button in the Scope field.

Step 15 Click the **Apply** button.

Note The TClass, Packet Lifetime, Flow Label, and Hop Limit attributes are not relevant as of this release.

Viewing Multicast Group Details

To view the attributes of the multicast groups on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Multicast Group** tab. Details appear in the table below the tab. Table 8-5 lists and describes the fields in the table.

Table 8-5 Multicast Group Field Descriptions

Field	Description
SubnetPrefix	**Subnet** prefix of the Subnet Manager.
MGID	The 128-bit multicast GID address for this multicast group.
QKey	The 16-bit Q-Key of this multicast group.
MLID	The 16-bit LID of this multicast group.
MTU	Maximum transmission unit
TClass	The Tclass to be used in the GRH if GRH is used.
PKey	The 16-bit Partition Key for this multicast group.
Rate	Traffic rate of this multicast group.
PacketLifeTime	Packet life time of this multicast group.
SL	Service level of this multicast group.
FlowLabel	Flow label to be used on this multicast group if GRH Is used.
HopLimit	Hop limit to be used on this multicast group if GRH Is used.
Scope	Scope of this multicast group.
UserConfigured	Displays “true” if a user configured the entry; otherwise displays “false.”

Viewing Multicast Member Details

To view the attributes of the multicast members on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Multicast Member** tab. Details appear in the table below the tab. Table 8-5 lists and describes the fields in the table.

Table 8-6 Multicast Member Field Descriptions

Field	Description
SubnetPrefix	**Subnet** prefix of this IB **subnet**.
MGID	The 128-bit multicast GID address for this multicast group.
VectorIndex	Index identifier of the particular vector of the multicast member table that contains the multicast member. This value is available for application purposes.

Table 8-6 Multicast Member Field Descriptions (continued)

Field	Description
Vector	Vector of the multicast member table that contains the multicast member. This value is available for application purposes.
VectorSize	Size of the vector, in bytes, of the multicast member table that contains the multicast member. This value is available for application purposes.
VectorElementSize	Size of the multicast member entry (element) in the multicast member table. This value is available for application purposes.
LastChange	Indicates the time stamp when the multicast member table was last changed.

Viewing InfiniBand Services

Subnet services provide your IB fabric with various features, such as the ability to run particular protocols. To view the **subnet** services on your IB fabric, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **Services** tab. Details appear in the table below the tab. Table 8-7 lists and describes the fields in the Subnet Managers table.

Table 8-7 Services Table Fields

Field	Description
Subnet Prefix	**Subnet** prefix of the **subnet** service.
ID	Unique identifier that the SM assigns to the service.
GID	Services use the same GID as the IB controller (node) on which they run.
PKey	Partition key of the node on which the service runs.
Lease	Lease period remaining (in seconds) for this service. A value of 4294967295 means the lease is indefinite.
Key	The 64-bit service key.
Name	Name of the **subnet** service.
Data	Data associated with this service.

Viewing Switch Route Details

Switch routes represent the complete path that traffic takes through the IB fabric from the source LID to the destination LID. To view the attributes of the switch routes on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **SwitchRoute** tab. Details appear in the table below the tab. Table 8-8 lists and describes the fields in the table.

Table 8-8 Switch Route Fields

Field	Description
SubnetPrefix	**Subnet** prefix of the route.
SourceLID	Source LID of the route.
DestLID	Destination LID of the route.
VectorIndex	Index identifier of the particular vector of the route table that contains the route. This value is available for application purposes.
Vector	Vector of the route table that contains the route. This value is available for application purposes.
VectorSize	Size of the vector, in bytes, of the route table that contains the route. This value is available for application purposes.
VectorElementSize	Size of the route entry (element) in the route table. This value is available for application purposes.
LastChange	Indicates the time stamp when the route table was last changed.

Viewing Switch Element Route Details

To view the attributes of the switch element routes on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the **SwitchElementRoute** tab. Details appear in the table below the tab. Table 8-9 lists and describes the fields in the table.

Table 8-9 Switch Element Route Fields

Field	Description
SubnetPrefix	**Subnet** prefix of this IB **subnet**.
SourceLID	Source LID of the route.
DestLID	Destination LID of the route.

Table 8-9 Switch Element Route Fields

Field	Description
VectorIndex	Index identifier of the particular vector of the route table that contains the route. This value is available for application purposes.
Vector	Vector of the route table that contains the route. This value is available for application purposes.
VectorSize	Size of the vector, in bytes, of the route table that contains the route. This value is available for application purposes.
VectorElementSize	Size of the route entry (element) in the route table. This value is available for application purposes.
LastChange	Indicates the time stamp when the route table was last changed.

Adding a Subnet Manager

To add a Subnet Manager to your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 In the left-hand navigation bar, click **Subnet Managers**. The Subnet Managers display appears in the right-hand portion of the window.

Step 3 Click the **Add** button in the bottom-right-hand section of the window. The Add Subnet Manager window opens.

Step 4 Enter a **subnet** prefix in the Subnet Prefix field.

Step 5 Enter a **subnet** priority level in the Priority field.

Step 6 (Optional) Enter a **subnet** management key in the smKey field.

Step 7 (Optional) Enter a value in the **LID Mask Control** field to increase the number of LIDs assigned to each port to increase the number of potential paths to reach each port.

Step 8 Click the **Add** button. The new SM appears in the Summary table in the Subnet Managers display.

Removing a Subnet Manager

To add a Subnet Manager to your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 In the left-hand navigation bar, click Subnet Manager**s**. The Subnet Managers display appears in the right-hand portion of the window.

Step 3 In the Summary table in the Subnet Managers display, click the SM that you want to remove.

Step 4 Click the **Remove** button. The entry disappears from the display and the Server Switch configuration.

Configuring Subnet Manager Properties

SMs provide a number of user-configurable attributes. The sections that follow explain each attribute and describe how to configure it.

Configuring SM Priority

Every Subnet Manager in the InfiniBand network carries a priority value, and at any given time the Subnet Manager with the highest integer value priority becomes the master Subnet Manager. To configure the Subnet Manager priority on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the Priority field. The higher the integer value, the higher the priority.

Step 4 Click the **Apply** button.

Configuring Sweep Interval

The sweep interval specifies how frequently the SM queries the InfiniBand fabric for network changes. To configure the sweep interval on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the Sweep Interval field. This interval represents the number of seconds between sweeps.

Step 4 Click the **Apply** button.

Configuring Response Timeout

The response timeout of a SM specifies the maximum amount of time that the SM waits for a response after it sends a packet to a port. If the SM does not receive a response in the response-time interval, the SM identifies the port as unresponsive. To configure the response timeout, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the Response Timeout field. The SM measures response timeout in milliseconds.

Step 4 Click the **Apply** button.

Configuring the Master Poll Interval

The master poll interval determines the interval at which the slave SM polls the master to see if the master still runs. To configure the master poll interval, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the Master Poll Interval field. The value represents the interval, in seconds.

Step 4 Click the **Apply** button.

Configuring the Number of Master Poll Retries

The master poll retries value specifies the number of unanswered polls that cause the slave to identify the master as dead. To configure this value, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the Master Poll Retries field.

Step 4 Click the **Apply** button.

Configuring the Maximum Number of Active Standby SMs that the Master SM Supports

Note As of this release, the master SM supports sync with only one standby.

To configure an unlimited number of active standby (slave) SMs, enter a value of 0. To configure this value, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the **Max active SMs** field.

Step 4 Click the **Apply** button.

Configuring LID Mask Control

LID mask control assigns the number of path bits present in the base LID to each channel adapter port. Increasing the LMC value increases the number of LIDs assigned to each port to increase the number of potential paths to reach each port. To configure LID mask control, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the **LID Mask Control** field.

Step 4 Click the **Apply** button.

Configuring Switch Life Time

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the **Switch Life Time** field.

Step 4 Click the **Apply** button.

Configuring Switch Link HoQ Life

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the **Switch Link HoQ Life** field.

Step 4 Click the **Apply** button.

Configuring Max Hops

Step 1 Click the **InfiniBand** menu and choose **Subnet Management (tabular format)**. The Subnet Manager window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Enter an integer value in the **Max-Hops** field.

Step 4 Click the **Apply** button.

Configuring Database Synchronization

The database synchronization feature propagates information from the database of the master SM to the standby SMs. The sections that follow describe how to configure this feature.

Note With database sync enabled on all chassis, only the chassis running the master SM will accept partition configuration from the user. For more information, see <Link>"How Partitions Work" on page 12<Link>.

Enabling SM Database Synchronization

If you are configuring more than one InfiniBand chassis in your fabric, it is likely that you will want to enable database synchronization of the SMs.

Note This features is enabled by default.

Enable Subnet Manager database synchronization to update standby SMs with information in the master SM.

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the Subnet Manager that you want to configure. Each Subnet Manager appears in the left-hand navigation window with a Subnet Manager icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Check the **Enable** checkbox in the **SM Database Synchronization** field.

Step 5 Click the **Apply** button.

Configuring the Maximum Number of Backup Subnet Managers to Synchronize

To configure the maximum number of backup SMs that will synchronize with the master SM, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Max Backup SMs** field.

Step 5 Click the **Apply** button.

Configuring Session Timeout

To configure the interval, in seconds, during which a synchronization session status MAD packet must arrive at the master SM to maintain synchronization, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the Session Timeout field. This value determines the timeout duration, in seconds.

Step 5 Click the **Apply** button.

Configuring the Poll Interval

To configure the interval, in seconds, at which the master SM polls an active slave SM to verify synchronization, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Poll Interval** field. This value sets the poll interval, in seconds.

Step 5 Click the **Apply** button.

Configuring the Cold Sync Timeout Value

To configure the amount of time, in seconds, that a cold synchronization tries to initiate before it times out, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Cold Sync Timeout** field. This value sets the timeout interval, in seconds.

Step 5 Click the **Apply** button.

Configuring the Cold Sync Limit Value

To configure the maximum number of cold syncs to perform during a given cold sync period, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Cold Sync Limit** field. This value sets the maximum number of syncs that can occur during the sync period ("Configuring the Cold Sync Limit Period" section on page 8-27).

Step 5 Click the **Apply** button.

Configuring the Cold Sync Limit Period

To specify the length of the interval during which cold syncs may occur, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Cold Sync Limit Period** field. This value sets the length of the interval during which cold syncs may occur.

Step 5 Click the **Apply** button.

Configuring the New Session Delay

To specify the amount of time that the master SM waits before it attempts to initiate a synchronization session with a new SM, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **New Session Delay** field. This value determines the amount of time, in seconds, that the master SM waits before it attempts to initiate a synchronization session with a new SM.

Step 5 Click the **Apply** button.

Configuring the Resync Interval

To specify the interval at which the master SM sends a resynchronization request to all active sync sessions, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 Enter an integer value in the **Resync Interval** field. This value specifies the interval, in seconds, at which the master SM sends a resynchronization request to all active sync sessions.

Step 5 Click the **Apply** button.

Viewing the Database Synchronization State

To verify that the master SM and slave SM(s) are in sync, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Database Sync** tab in the right-hand panel of the display.

Step 4 View the **State** field.

Viewing Nodes

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the SM that you want to configure. Each SM appears in the left-hand navigation window with a SM icon.

Step 3 Click the **Nodes** icon**.**

Step 4 Click the **Nodes in Subnet** tab to display the Node GUID, Type, Description, Number of Ports, System Image GUID, and the Vendor ID information.

Viewing Partitions

To view the partitions on your IB network, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the **Partitions** branch. The partitions summary appears in the right-hand display. <Link>Table 8-10 lists and describes the fields in this display.

Table 8-10 Partitions Summary Field Descriptions

Field	Description
Partition Key	Partition key (numeric identifier) of the partition.
Full Member Count	Number of full partition members.
Limited Member Count	Number of limited partition members.

Creating a Partition

To create an IB partition, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the **Partitions** branch.

Step 4 Click the **Add** button. The **Add Partition** window opens.

Step 5 Enter a partition key for the new partition in the **PKey** field, then click the **Add** button.

Removing a Partition

To delete a partition, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the **Partitions** branch.

Step 4 Click the partition, in the **Summary** display, that you want to remove, then click the **Remove** button.

Viewing Partition Details

To view partition details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Partitions** branch to display all partitions in the left-hand navigation menu.

Step 4 Click the partition key of the partition whose details you want to view. The members (full and limited) of the partition appear in the display.

Note To view the GUIDs of the Server Switch management ports in the display, click the **Show Switch Mgmt Ports** button. Click the **Hide Switch Mgmt Ports** button to remove these GUIDs from the display.

Adding Full Members to a Partition

Full members of a partition can communicate to other full members and to limited members.

Adding Available Members

To add a port from the **Available Members** pool to a partition as a full member, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Partitions** branch to display all partitions in the left-hand navigation menu.

Step 4 Click the partition key of the partition to which you want to add members. The members (full and limited) of the partition appear in the display.

Step 5 Click the port, in the **Available Members** field, that you want to add to the partition, then click the right-pointing arrow next to the **Full Members** field.

Adding Unavailable Members

To add a partition member that does not appear in the Available Members pool, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Partitions** branch to display all partitions in the left-hand navigation menu.

Step 4 Click the partition key of the partition to which you want to add members. The members (full and limited) of the partition appear in the display.

Step 5 Click the Add Other button. The Add Other Partition Member window opens.

Step 6 Enter the GUID of the host that includes the port(s) that you want to add to the partition in the **Node GUID** field.

Step 7 Specify the port(s) that you want to add to the partition in the **Port** field.

Step 8 Click the **Full** radio button, then click the **Add** button.

Adding Limited Members to a Partition

Limited members of a partition can communicate with full members of the partition, but not with other limited members.

Adding Available Members

To add a port from the **Available Members** pool to a partition as a limited member, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Partitions** branch to display all partitions in the left-hand navigation menu.

Step 4 Click the partition key of the partition to which you want to add members. The members (full and limited) of the partition appear in the display.

Step 5 Click the port, in the **Available Members** field, that you want to add to the partition, then click the right-pointing arrow next to the **Limited Members** field.

Adding Unavailable Members

To add a partition member that does not appear in the Available Members pool, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Partitions** branch to display all partitions in the left-hand navigation menu.

Step 4 Click the partition key of the partition to which you want to add members. The members (full and limited) of the partition appear in the display.

Step 5 Click the Add Other button. The Add Other Partition Member window opens.

Step 6 Enter the GUID of the node that includes the port(s) that you want to add to the partition in the **Node GUID** field.

Step 7 Specify the port(s) that you want to add to the partition in the **Port** field.

Step 8 Click the **Limited** radio button, then click the **Add** button.

Viewing Multicast Groups

To view the multicast groups on your IB network, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose partitions you want to view. The left-hand navigation menu expands.

Step 3 Click the **Multicast Groups** branch. The multicast groups summary appears in the right-hand display. Table 8-11 lists and describes the fields in this display.

Table 8-11 Multicast Group Summary Field Descriptions

Field	Description
MGID	Numeric multicast group identifier of each multicast group on the IB fabric.
QKey	The 16-bit Q-Key of this multicast group.
MTU	Maximum transmission unit of the multicast group.
PKey	Partition key of the multicast group.

Viewing Multicast Group Details

To view multicast group details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose multicast groups you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Multicast Groups** branch to display all groups in the left-hand navigation menu.

Step 4 Click the MGID of the multicast group whose details you want to view, then click the **General** tab. MC group details appear in the display. Table 8-12 lists and describes the fields in this display.

Table 8-12 Multicast Group General Details Field Descriptions

Field	Description
QKey	The 16-bit Q-Key of this multicast group.
MLID	The 16-bit LID of this multicast group
MTU	Maximum transmission unit of the multicast group.
TClass	The Tclass to be used in the GRH if GRH is used.
PKey	Partition key of the multicast group.
Rate	Traffic rate of this multicast group.
Packet Life Time	Packet life time of this multicast group.
SL	Service level of this multicast group.
Flow Label	Flow label to be used on this multicast group if GRH Is used.
Hop Limit	Hop limit to be used on this multicast group if GRH Is used.
Scope	Scope of this multicast group.
User Configured	Displays **true** if a user configured the entry; otherwise displays **false**.

Viewing Multicast Group Members

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose multicast groups you want to view. The left-hand navigation menu expands.

Step 3 Click the plus-sign (+) next to the **Multicast Groups** branch to display all groups in the left-hand navigation menu.

Step 4 Click the MGID of the multicast group whose details you want to view, then click the **Members** tab. MC group members appear in the display. Table 8-13 lists and describes the fields in this display.

Table 8-13 Multicast Group Members Field Descriptions

Field	Description
Port GID	Global identifier of the member port.

Table 8-13 Multicast Group Members Field Descriptions

Field	Description
Join State	Displays whether the port is a full member or limited member of the group.
Proxy Join Status	Displays true or false.

Viewing Infiniband Services

To view the IB services that run on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose services you want to view. The left-hand navigation menu expands.

Step 3 Click the **Services** branch. Details of IB services appear in the right-hand display. Table 8-14 lists and describes the fields in the Summary section of the display.

Table 8-14 Services Summary Field Descriptions

Field	Description
Name	ASCII identifier of the service
Service Id	Numeric identifier that nodes use to call the service.
Service GID	64-bit ID of the service.
PKey	16-bit multicast GID address.

Table 8-15 lists and describes the fields in the Details section of the display.

Table 8-15 Services Details Field Descriptions

Field	Description
Service Name	ASCII identifier of the service
Service Id	Numeric identifier that nodes use to call the service.
Service GID	GID of the node that provides the service.
Service PKey	16-bit P-Key.
Lease	Lease period remaining (in seconds) for this service. A value of 4294967295 means the lease is indefinite.
Key	128-bit service key.
Data (8 bit)	Header of the data type 8
Data (16 bit)	Header of the data type 16
Data (32 bit)	Header of the data type 32
Data (64 bit)	Header of the data type 64

Viewing InfiniBand Routes

To view the IB routes that run on your Server Switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose services you want to view. The left-hand navigation menu expands.

Step 3 Click the **Routes** branch. IB routes fields appear in the right-hand display.

Step 4 Enter the source LID of the route in the **Source LID** field.

Step 5 Enter the destination lid of the route in the **Destination LID** field.

Step 6 Click the **Show Route** button.

Step 7 Click the **Switch Route** tab. Table 8-16 lists and displays the fields in the display.

Table 8-16 Switch Route Field Descriptions

Field	Description
Node GUID	Global unique ID of the node.
In Port	Port of ingress.
Out Port	Port of egress

Step 8 Click the **Switch Element Route** tab. Table 8-17 lists and displays the fields in the display.

Table 8-17 Switch Element Route Field Descriptions

Field	Description
Chassis GUID	Global unique ID of the node.
In Port	Port of ingress.
Out Port	Port of egress

Viewing Subnet Managers Information

To view the SM information, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose services you want to view. The left-hand navigation menu expands.

Step 3 Click the Subnet Manager**s Info** icon and the Port GUID, Priority, and SM state information appears in the right-hand display.

Viewing Event Subscriptions

To view the SM information, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose **Subnet Management**. The Subnet Management window opens.

Step 2 Click the plus-sign (+) next to the SM whose services you want to view. The left-hand navigation menu expands.

Step 3 Click the **Event Subscriptions** icon and the LID, Node GUID, and Port Number information appears in the right-hand display.

Enabling Performance Management

To enable InfiniBand-port performance management, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the **subnet** of the ports that you want to manage (for instance, fe:80:00:00:00:00:00:00). The **Port Counter Configuration** display appears in the right-hand pane of the window.

Step 3 Click the **Enable** radio button.

Disabling Performance Management

To disable performance management, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the **subnet** of the ports that you want to manage (for instance, fe:80:00:00:00:00:00:00). The **Port Counter Configuration** display appears in the right-hand pane of the window.

Step 3 Click the **Disable** radio button.

Monitoring Connections

To monitor connections, you must

- "Defining a Connection to Monitor" section on page 8-37
- "Viewing Monitored Connections" section on page 8-37
- "Viewing Connection Counters" section on page 8-38
- "Viewing Connection Monitor Counters" section on page 8-39
- "Testing Connections" section on page 8-40
- "Viewing Port Counters of Connections" section on page 8-40

Defining a Connection to Monitor

To create a connection to monitor, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the **Connection Counters** branch. The **Monitored Connection** tab appears in the right-hand pane of the window.

Step 4 Click the **Add** button. The **Add Connection** window opens.

Step 5 Enter a source LID in the **Source LID** field.

Note To view available source and destination LIDs, return to the main Element Manager display, click the **InfiniBand** menu, choose **Subnet Management (tabular format)**, then click the **SwitchRoute** tab. For more details, see "Viewing Switch Route Details" section on page 8-20.

Step 6 Enter a destination LID in the **Destination LID** field.

Step 7 Check the **Enable Connection Monitoring** checkbox.

Note If this checkbox is not selected, you an view only counter information and cannot view monitoring information.

Step 8 Click the **Add** button. The connection entry appears under the **Monitored Connections** tab.

Viewing Monitored Connections

These instructions assume that you have already defined connections to monitor. To view monitored connections, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the **Connection Counters** branch. The **Monitored Connection** tab appears in the right-hand pane of the window. Table 8-18 lists and describes the fields in this display.

Table 8-18 Monitored Connections Field Descriptions

Field	Description
Subnet Prefix	**Subnet** prefix of the monitored connection.
Source LID	16-bit source Local ID of the connection.
Destination LID	16-bit destination Local ID of the connection.
Error Status	Displays unknown, exceeded, or notExceeded to indicate if the error value has exceeded the threshold that you configured. To configure thresholds, refer to "Configuring Port Monitoring Thresholds" section on page 8-47.
Util Status	Displays unknown, exceeded, or notExceeded to indicate if the utilization value has exceeded the threshold that you configured. To configure thresholds, refer to "Configuring Port Monitoring Thresholds" section on page 8-47.

Viewing Connection Counters

To view connection counters, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands.

Step 4 Click the icon of the connection whose counters you want to view.

Step 5 Click the **Connection Counters** tab. Table 8-19 lists and describes the fields in the display.

Note Each hop in the display is a port on a node. When connections move through nodes, they enter the node in one hop (GUID A, port a), and exit in another hop (GUID A, port b). Though the GUIDs of subsequent hops may match, the ports do not match.

Table 8-19 Connection Counters Field Descriptions

Field	Description
Subnet Prefix	**Subnet** prefix of the **subnet** on which each hop resides.
Node Guid	Global unique ID of the node (switch chip, HCA, or TCA) of the next-hop port.
Port Number	Port number (on the appropriate node) of the hop.
Chassis Guid	Global Unique ID (GUID) of the chassis.
Slot Number	Slot of the port.

Table 8-19 Connection Counters Field Descriptions (continued)

Field	Description
Ext Port Number	External port number of the port.
Data Is Valid	Displays **true** or **false**.
Symbol Errors	Number of symbol errors on the port.
Link Recovery Errors	Number of link recovery errors on the port.
Link Downs	Number of link-down errors on the port.
Received Errors	Number of received errors that the port experienced.
Received Remote Physical Errors	Number of physical errors the the port experienced.
Received Switch Relay Errors	Number of switch relay errors that the port experienced.
Transmitted Discards	Number of transmitted discards that occurred on the port.
Transmitted Constraint Errors	Number of Transmitted Constraint errors that the port experienced.
Received Constraint Errors	Number of Received Constraint errors that the port experienced.
Local Link Integrity Errors	Number of logical link integrity errors on the port.
Excessive Buffer Overrun Errors	Number of excessive buffer overrun errors on the port.
VL15 Droppeds	Number of VL15 drops on the port.
Transmitted Data	Volume of transmitted data on the port.
Received Data	Volume of received data on the port.
Transmitted Packets	Volume of transmitted packets on the port.
Received Packets	Volume of received packets on the port.

Viewing Connection Monitor Counters

To view connection monitor counters, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands.

Step 4 Click the icon of the connection whose counters you want to view.

Step 5 Click the **Connection Monitor Counters** tab. Table 8-20 lists and describes the fields in the display.

Table 8-20 Connection Monitor Counters Field Descriptions

Field	Description
Node Guid	Global unique ID of the IB node of the hop port.
Port Number	Port number of the hop.
Chassis Guid	GUID of the chassis that includes the connection.
Slot Number	Slot number of the port(s) in the connection.
Ext Port Number	External port number of the connection port.
Error Type	Type of error that occurred.

Testing Connections

To test connections, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands.

Step 4 Click the icon of the connection whose counters you want to view.

Step 5 Click the **Test Connection** tab.

Step 6 Click the **Test** button.

Viewing Port Counters of Connections

To view port counters, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands.

Step 4 Click the plus-sign next to the icon of the connection whose port counters you want to view. The navigation tree expands.

Step 5 Click the port (in GUID - port-number format) whose counters you want to view. Table 8-21 lists and describes the fields in this display.

Table 8-21 Port Counters Field Descriptions

Field	Description
Subnet Prefix	**Subnet** prefix of the **subnet** on which each hop resides.
Node Guid	Global unique ID of the node (switch chip, HCA, or TCA) of the next-hop port.
Port Number	Port number (on the appropriate node) of the hop.
Chassis Guid	GUID of the chassis that includes the connection.
Slot Number	Slot number of the port(s) in the connection.
Ext Port Number	External port number of the connection port.
Symbol Errors	Total number of symbol errors detected on one or more lanes.
Link Recovery Errors	Total number of times the port training state machine has successfully completed the link error recovery process.
Link Downs	Total number of times the port training state machine has failed the link error recovery process and downed the link.
Received Errors	Total number of packets containing an error that were received on the port. These errors include: • Local physical errors (ICRC, VCRC, FCCRC, and all physical errors that cause entry into bad) • Malformed data packet errors (Lver, length, VL) • Malformed link packet errors (operand, length, VL) • Packets discarded due to buffer overrun
Received Remote Physical Errors	Total number of packets marked with the EBP delimiter received on the port.
Received Switch Relay Errors	Total number of packets received on the port that were discarded because they could be forwarded by the switch relay. Reasons for this include: • DLID mapping • VL mapping • Looping (output port = input port).
Transmitted Discards	Total number of outbound packets discarded by the port because the port is down or congested. Reasons for this include: • Output port is in the inactive state • Packet length exceeded neighbor MTU • Switch lifetime limit exceeds • Switch HOQ limit exceeds

Table 8-21 Port Counters Field Descriptions (continued)

Field	Description
Transmitted Constraint Errors	Total number of packets not transmitted from the port for the following reasons: • FilterRawOutbound is true and packet is raw • PatitionEnforcementOutbound is true and packet fails partition key check, IP version check, or transport header version check.
Received Constraint Errors	Total number of packets received on the port that are discarded for the following reasons: • FilterRawInbound is true and packet is raw • PartitionEnforcementInbound is true and packet fails partition key check, IP version check, or transport header version check.
Local Link Integrity Errors	The number of times that the frequency of packets containing local physical errors exceeded local_phy_errors.
Excessive Buffer Overrun Errors	The number of times that overrun errors' consecutive flow control update periods occurred with at least one overrun error in each period.
VL15 Droppeds	Number of incoming VL15 packets dropped due to resource limitations on port selected by PortSelect.
Transmitted Data	Optional; shall be zero if not implemented. Total number of data octets, divided by 4, transmitted on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets. Implementers may choose to count data octets in groups larger than four but are encouraged to choose the smallest group possible. Results are still reported as a multiple of four octets.
Received Data	Optional; shall be zero if not implemented. Total number of data octets, divided by 4, received on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets. Implementers may choose to count data octets in groups larger than four but are encouraged to choose the smallest group possible. Results are still reported as a multiple of four octets.
Transmitted Packets	Optional; shall be zero if not implemented. Total number of data packets, excluding link packets, transmitted on all VLs from the port selected by PortSelect.
Received Packets	Optional; shall be zero if not implemented. Total number of data packets, excluding link packets, received on all VLs from the port selected by PortSelect.

Viewing Port Counters

To view port counters, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Port Counters** branch. The navigation tree expands.

Step 4 View port counters with one of the following methods:

- Click the GUID whose port counters you want to view; all available port counters appear.
- Click the plus-sign next to the GUID of the node whose port counters you want to view, then click the port whose counters you want to view; counters appear for that individual port.

Table 8-22 lists and describes the fields in the port counters display.

Table 8-22 Port Counters Field Descriptions

Field	Description
Subnet Prefix	**Subnet** prefix of the **subnet** on which each hop resides.
Node Guid	Global unique ID of the node (switch chip, HCA, or TCA) of the next-hop port.
Port Number	Port number (on the appropriate node) of the hop.
Chassis Guid	GUID of the chassis that includes the connection.
Slot Number	Slot number of the port(s) in the connection.
Ext Port Number	External port number of the connection port.
Symbol Errors	Total number of symbol errors detected on one or more lanes.
Link Recovery Errors	Total number of times the port training state machine has successfully completed the link error recovery process.
Link Downs	Total number of times the port training state machine has failed the link error recovery process and downed the link.
Received Errors	Total number of packets containing an error that were received on the port. These errors include: • Local physical errors (ICRC, VCRC, FCCRC, and all physical errors that cause entry into the “bad” state) • Malformed data packet errors (Lver, length, VL) • Malformed link packet errors (operand, length, VL) • Packets discarded due to buffer overrun
Received Remote Physical Errors	Total number of packets marked with the EBP delimiter received on the port.

Table 8-22 Port Counters Field Descriptions (continued)

Field	Description
Received Switch Relay Errors	Total number of packets received on the port that were discarded because they could be forwarded by the switch relay. Reasons for this include: • DLID mapping • VL mapping • Looping (output port = input port).
Transmitted Discards	Total number of outbound packets discarded by the port because the port is down or congested. Reasons for this include: • Output port is in the inactive state • Packet length exceeded neighbor MTU • Switch lifetime limit exceeds • Switch HOQ limit exceeds.
Transmitted Constraint Errors	Total number of packets not transmitted from the port for the following reasons: • FilterRawOutbound is true and packet is raw • PatitionEnforcementOutbound is true and packet fails partition key check, IP version check, or transport header version check.
Received Constraint Errors	Total number of packets received on the port that are discarded for the following reasons: • FilterRawInbound is true and packet is raw • PartitionEnforcementInbound is true and packet fails partition key check, IP version check, or transport header version check.
Logical Link Integrity Errors	The number of times that the frequency of packets containing local physical errors exceeded local_phy_errors.
Excessive Buffer Overrun Errors	The number of times that overrun errors consecutive flow control update periods occurred with at least one overrun error in each period.
VL15 Droppeds	Number of incoming VL15 packets dropped due to resource limitations on port selected by PortSelect.
Transmitted Data	Optional; shall be zero if not implemented. Total number of data octets, divided by 4, transmitted on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets. Implementers may choose to count data octets in groups larger than four but are encouraged to choose the smallest group possible. Results are still reported as a multiple of four octets.

Table 8-22 Port Counters Field Descriptions (continued)

Field	Description
Received Data	Optional; shall be zero if not implemented. Total number of data octets, divided by 4, received on all VLs from the port selected by PortSelect. This includes all octets between (and not including) the start of packet delimiter and VCRC. It excludes all link packets. Implementers may choose to count data octets in groups larger than four but are encouraged to choose the smallest group possible. Results are still reported as a multiple of four octets.
Transmitted Packets	Optional; shall be zero if not implemented. Total number of data packets, excluding link packets, transmitted on all VLs from the port selected by PortSelect.
Received Packets	Optional; shall be zero if not implemented. Total number of data packets, excluding link packets, received on all VLs from the port selected by PortSelect.

Viewing Cumulative Port Counters

To view cumulative port counters, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Port Counters** branch. The navigation tree expands.

Step 4 Click the plus-sign next to the node of the port whose cumulative counters you want to view. The navigation tree expands.

Step 5 Click the port whose navigation counters you want to view.

Step 6 Click the Port Cumulative Counters tab. Table 8-23 lists and describes the fields in the display.

Table 8-23 Cumulative Port Counters Field Descriptions

Field	Description
Subnet Prefix	**Subnet** prefix of the **subnet** on which each hop resides.
Node Guid	Global unique ID of the node (switch chip, HCA, or TCA) of the next-hop port.
Port Number	Port number (on the appropriate node) of the hop.
Chassis Guid	Global Unique ID (GUID) of the chassis.
Slot Number	Slot of the port.
Ext Port Number	External port number of the port.

Table 8-23 Cumulative Port Counters Field Descriptions (continued)

Field	Description
Error Status	Displays **true** or **false**.
Util Status	Number of symbol errors on the port.
Symbol Errors	Number of link recovery errors on the port.
Link Recovery Errors	Number of link-down errors on the port.
Link Downs	Number of received errors that the port experienced.
Received Errors	Number of physical errors the the port experienced.
Received Remote Physical Errors	Number of switch relay errors that the port experienced.
Received Switch Relay Errors	Number of transmitted discards that occurred on the port.
Transmit Discards	Number of Transmit Constraint errors that the port experienced.
Transmit Constraint Errors	Number of Received Constraint errors that the port experienced.
Received Constraint Errors	Number of logical link integrity errors on the port.
Logical Link Integrity Errors	Number of excessive buffer overrun errors on the port.
Excessive Buffer Overrun Errors	Number of VL15 drops on the port.
VL15 Droppeds	Volume of transmitted data on the port.
Transmit Data	Volume of received data on the port.
Received Data	Volume of transmitted packets on the port.
Transmit Packets	Volume of received packets on the port.
Received Packets	**Subnet** prefix of the **subnet** on which each hop resides.
Transmit Rate	Global unique ID of the node (switch chip, HCA, or TCA) of the next-hop port.
Received Rate	Port number (on the appropriate node) of the hop.

Enabling Port Monitoring

To enable port monitoring, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the **Port Monitor** branch.

Step 4 Click the **General** tab.

Step 5 Select **Enable** from the **State** pulldown menu.

Note **Enable** will enable the port monitoring for only the ports that are configured in the Monitor Port Config table, where as **enableAll** will enable the port monitoring for all ports regardless of whether the port is configured in the Monitor Port Config table or not.

Step 6 Click the **Apply** button.

Configuring Port Monitoring

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the **Port Monitor** branch.

Step 4 Click the **General** tab.

Step 5 Enter an integer value, between 1 and 600, in the **Polling Period** field to configure the number of seconds between polls.

Step 6 Enter an integer value, between 1 and 600, in the **Start Delay** field to configure the delay between startup and polling.

Configuring Port Monitoring Thresholds

To configure port monitoring thresholds, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the **Port Monitor** branch.

Step 4 Click the **Threshold** tab.

Step 5 Enter an integer value in the fields where you want to apply a threshold. Enter **none** in the fields to which you do not want to apply a threshold.

Step 6 Click the **Apply** button.

Resetting Counters

You can reset counters for

- A hop.

- All ports on a node.
- All ports in a connection.
- All ports in a **subnet**.

Resetting Counters on a Hop

To reset counters on a hop, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands and connections appear.

Step 4 Click the plus-sign next to the connection that includes the hop that you want to clear. The navigation tree expands and hops appear.

Step 5 Right-click the hop whose counters you want to clear and choose**Clear counters on this Hop** from the right-click menu.

Resetting Counters on All Ports on a Node

To reset counters on a node, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands and connections appear.

Step 4 Click the plus-sign next to the connection that includes the node that you want to clear. The navigation tree expands and nodes appear.

Step 5 Right-click the node whose counters you want to clear and choose**Clear counters on this Node** from the right-click menu.

Resetting Counters on All Ports in a Connection

To reset counters on a hop, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Click the plus-sign next to the **Connection Counters** branch. The navigation tree expands and connections appear.

Step 4 Right-click the connection whose counters you want to clear and choose**Clear counters on this Connection** from the right-click menu.

Resetting All Counters in a Subnet

To reset all counters in a **subnet**, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Performance Management**. The **Performance Management** window opens.

Step 2 Click the plus-sign (+) next to the **subnet** of the connections that you want to monitor. The navigation tree expands.

Step 3 Right-click the **Connection Counters** branch and choose**Clear Counters for All Connections**.

Launching Topology View

To launch topology view, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** appears.

Note Navigation buttons appear at the top of the InfiniBand Topology window. Table 8-24 lists and describes these buttons.

Table 8-24 InfiniBand Topology Navigation Buttons

Button	Description
Refresh	Refreshes the topology display.
Layout	Evenly arranges the switch and HCA icons.
Zoom In	Enlarges the display.
Zoom Out	Condenses the display.
Fit to Screen	Zooms in or out to fit the topology in the window.
Specify Topspin Devices	Opens the **Specify Cisco Devices** dialog box to add Server Switches to the display.

Table 8-24 InfiniBand Topology Navigation Buttons (continued)

Button	Description
Legend	Displays the different colors that represent different types of links.
Subnet Details	Displays **subnet** details. For more information, refer to <Link>“Viewing Subnet Details” on page 51<Link>.
Help	Launches on-line help.

Viewing Internal Server Switch Components

To view the switches and target channel adapters (TCAs) inside a server switch, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Note Navigation buttons appear at the top of the InfiniBand Topology window. Table 8-25 lists and describes these buttons.

Table 8-25 Internal InfiniBand Topology Navigation Buttons

Button	Description
Layout	Evenly arranges the switch and HCA icons.
Zoom In	Enlarges the display.
Zoom Out	Condenses the display.
Fit to Screen	Zooms in or out to fit the topology in the window.
Layout	Evenly arranges the switch and HCA icons.
Subnet Management Agents	Displays SM agent details. For information, refer to <Link>“Viewing Subnet Management Agents” on page 54<Link>.
Help	Launches on-line help.

Viewing Subnet Details

You can view any of the following **subnet** details:

- nodes
- ports
- switches
- neighbors

Viewing Nodes

To view the nodes in the topology view, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Click the **Details** button. The **InfiniBand Subnet Details** window opens.

Step 5 Click the **Nodes** tab. Table 8-26 lists and describes the fields in this tab.

Table 8-26 Nodes Tab Field Descriptions

Field	Description
SubnetPrefix	The **subnet** prefix of the node.
GUID	The global unique ID (GUID) of the node.
Description	An optional text string describing this node.
Type	Type of node being managed.
NumPorts	Number of physical ports on this node.
SystemImageGUID	The system image GUID of this node. All nodes within a particular system (chassis) are assigned the same system image GUID.

Viewing Ports

To view the ports in the topology view, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Click the **Details** button. The **InfiniBand Subnet Details** window opens.

Step 5 Click the **Ports** tab. Table 8-27 lists and describes the fields in this tab.

Table 8-27 Ports Tab Field Descriptions

Field	Description
SubnetPrefix	The **subnet** prefix of the node.
NodeGUID	The global unique ID (GUID) of the node that includes the port.
Port	Local port number for this port.
LID	16-bit base LID of this port.
State	State of the port: • noStateChange • sleep • polling • disabled • portConfigurationTraining • linkup • linkErrorRecovery • reserved • active • down
LinkWidthActive	Currently active link width. Indicated as follows: • 1: 1x • 2: 4x • 8: 12x • 0, 3, 4-7, 9-255 reserved.

Viewing Switches

To view the switches in the topology view, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Click the **Details** button. The **InfiniBand Subnet Details** window opens.

Step 5 Click the **Switches** tab. Table 8-28 lists and describes the fields in this tab.

Table 8-28 Switches Tab Field Descriptions

Field	Description
SubnetPrefix	The **subnet** prefix of the node.
NodeGUID	The global unique ID (GUID) of the node that includes the switch.
LinearFdbCap	Number of entries supported in the Linear Unicast Forwarding table. Zero indicates that there is no Linear Forwarding Database.
RandomFdbCap	Number of entries supported in the Random Unicast Forwarding table. Zero indicates that there is no Random Forwarding Database.
McastFdbCap	Number of entries supported in the Multicast Forwarding table.
LinearFdbTop	Indicates the top of the linear forwarding table. Packets received with unicast DLIDs greater than this value are discarded by the switch. This component applies only to switches that implement linear forwarding tables and is ignored by switches that implement random forwarding tables.
DefaultPort	Forward to this port all the unicast packets from the other ports whose DLID does not exist in the random forwarding table.
DefPriMcastPort	Forward to this port all the multicast packets from the other ports whose DLID does not exist in the forwarding table.
DefNonPriMcastPort	Forward to this port all the multicast packets from the smDefPriMcastPort port whose DLID does not exist in the forwarding table.
LifeTimeValue	The time a packet can live in the switch.
PortStateChange	Identifies whether or not the port is in transition.
LIDPerPort	Number of LID/LMC combinations that may be assigned to a given external port for switches that support the random forwarding table.
PartitionEnfCap	The number of entries in this partition enforcement table per physical port. Zero indicates that partition enforcement is not supported by the switch.
InEnfCap	Indicates switch is capable of partition enforcement on received packets.
OutEnfCap	Indicates switch is capable of partition enforcement on transmitted packets.
InFilterRawPktCap	Indicates switch is capable of raw packet enforcement on received packets.
OutFilterRawPktCap	Indicates switch is capable of raw packet enforcement on transmitted packets.

Viewing Neighbors

To view the ports in the topology view, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Click the **Details** button. The **InfiniBand Subnet Details** window opens.

Step 5 Click the **Neighbors** tab. Table 8-29 lists and describes the fields in this tab.

Table 8-29 Neighbors Tab Field Descriptions

Field	Description
SubnetPrefix	Used to identify IB **subnet** this IB node is located in.
LocalNodeGuid	The global unique ID (GUID) of the IB node.
LocalPortId	Identifies the port id of the IB node.
LocalNodeType	Identifies the IB node's node-type. • channelAdapter • switch
RemoteNodeGuid	The global unique ID (GUID) of the remote IB node.
RemotePortId	Identifies the port id of the remote IB node.
RemoteNodeType	Identifies the remote IB node's node-type. • channelAdapter • switch
LinkState	Used to identify the state of the linkconnecting the neighbors. • noStateChange • down • initialize • active
LinkWidthActive	Used to identify the width of the link connecting the neighbors.

Viewing Subnet Management Agents

You can view any of the following SMA details:

- Nodes
- Switches
- Switch Cap
- Ports (1)
- Ports (2)
- Mcast
- Linear Forwarding
- PKey
- SLVL Map

Nodes

To view SMA node details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Nodes** tab. Table 8-30 lists and describes the fields in this tab.

Table 8-30 Nodes Tab Field Descriptions

Field	Description
Guid	**Subnet** prefix of this IB **subnet**.
BaseVersion	Supported base management datagram version.
ClassVersion	Supported **subnet** management class.
Type	Type of node being managed. • channelAdapter • switch
PortGuid	GUID of this port. One port within a node can return the nodeGUID as its PortGUID if the port is an integral part of the node and is not field-replaceable.
PartitionCap	Number of entries in the partition table for CA, router, and the switch management port. This is at a minimum set to 1 for all nodes including switch.
DeviceId	Device ID information as assigned by device manufacturer.
Revision	Device revision, assigned by manufacturer.
LocalPortNum	The link port number this SNMP packet came in on.
VendorId	Device vendor ID, per IEEE.
TrapBuffer	Special purpose string buffer for InfiniBand Trap Data.
String	Description of the node.
NumPorts	Number of physical ports on this node.

Switches

To view SMA switch details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Switches** tab. Table 8-31 lists and describes the fields in this tab.

Table 8-31 Switches Tab Field Descriptions

Field	Description
Guid	Global unique ID of the switch.
LftTop	Indicates the top of the linear forwarding table. Packets received with unicast DLids greater than this value are discarded by the switch. This component applies only to switches that implement linear forwarding tables and is ignored by switches that implement random forwarding tables.
DefaultPort	Forward to this port all the unicast packets from the other ports whose DLID does not exist in the random forwarding table
DefMcastPriPort	Forward to this port all the multicast packets from the other ports whose DLID does not exist in the forwarding table.
DefMcastNPPort	Forward to this port all the multicast packets from the Default Primary port whose DLID does not exist in the forwarding table.
LifeTimeValue	Time a packet can live in the switch.
PortStateChange	It is set to one anytime the PortState component in the PortInfo of any ports transitions from Down to Initialize, Initialize to Down, Armed to Down, or Active to Down as a result of link state machine logic. Changes in Portstate resulting from SubnSet do no change this bit. This bit is cleared by writing one, writing zero is ignored.
LidsPerPort	Specifies the number of LID/LMC combinations that may be assigned to a given external port for switches that support the Random Forwarding table.

Switch Cap

To view SMA switch cap details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Switch Cap.** tab. Table 8-32 lists and describes the fields in this tab.

Table 8-32 Switch Cap Tab Field Descriptions

Field	Description
LftCap	Number of entries supported in the Linear Unicast Forwarding Table.
RftCap	Number of entries supported in the Random Unicast Forwarding Table. RandomFDBCap = 0 indicates that there is no Random Forwarding Database.
MftCap	Number of entries supported in the Multicast Forwarding Table.
PartitionEnfCap	Specifies the number of entries in the partition enforcement table per physical port. Zero indicates that partition enforcement is not supported by the switch.
InboundEnfCap	Indicates switch is capable of partition enforcement on received packets.
OutboundEnfCap	Indicates switch is capable of partition enforcement on transmitted packets.
FilterRawPktInCap	Indicates switch is capable of raw packet enforcement on received packets.
FilterRawPktOutCap	Indicates switch is capable of raw enforcement on transmitted packets.

Ports (1)

To view SMA port details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Ports (1)** tab. Table 8-33 lists and describes the fields in this tab.

Table 8-33 Ports (1) Tab Field Descriptions

Field	Description
NodeGuid	64-bit GUID of the node that contains this port.
IbPort	The local port number of this port (relative to a particular node).
MKey	64-bit management Key for this port.
GidPrefix	64-bit global ID prefix for this port.
Lid	16-bit base LID of this port.
MasterSMLid	16-bit base LID of the master SM that is managing this port.

Table 8-33 Ports (1) Tab Field Descriptions (continued)

Field	Description
CapabilityMask	Supported capabilities of this node. • 0: Reserved, shall be zero • 1: IsSM • 2: IsNoticeSupported • 3: IsTrapSupported • 4: IsResetSupported • 5: IsAutomaticMigrationSupported • 6: IsSLMappingSupported • 7: IsMKeyNVRAM • 8: IsPKeyNVRAM • 9: IsLEDInfoSupported • 10: IsSMDisabled • 11-15: Reserved, shall be zero • 16: IsConnectionManagerSupported • 17: IsSNMPTunnelingSupported • 18: Reserved, shall be zero • 19: IsDeviceManagementSupported • 20: IsVendorClassSupported • 21-31: Reserved, shall be zero
DiagCode	Port diagnostic code.
MKeyLeasePeriod	Timer value used to indicate how long the M_Key protection bits are to be remain non-zero after a SubnSet(PortInfo) fails a M Key check. The value of the timer indicates the number of seconds for the lease period.
LocalPortNum	Local port number.
LinkWidthEnabled	Enabled link width (1x, 4x, or 12x).
LinkWidthSupported	Supported link width.
LinkWidthActive	Currently active link width.
LinkSpeedSupported	Supported link speed (in Gbps).
State	State of the port: • noStateChagne • down • initialize • armed • active

Table 8-33 Ports (1) Tab Field Descriptions (continued)

Field	Description
PortPhys	State of the physical port: • noStateChange(0), • sleep • polling • disabled • portConfigurationTraining • linkup • linkErrorRecovery • reserved • linkDownDef
LinkDownDef	Port physical state “link down.”
MKeyProtectBits	Determines MADheader behavior.
LMC	LID mask for multipath support.
LSActive	Current active link speed.
LSActiveEnabled	Enabled link speed.
NeighborMTU	Active maximum MTU enabled on this port for transmission.
MasterSMSL	The administrative SL of the master SM that is managing this port.

Ports (2)

To view extended SMA port details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Ports (2)** tab. Table 8-34 lists and describes the fields in this tab.

Table 8-34 Ports (2) Tab Field Descriptions

Field	Description
NodeGuid	64-bit GUID of the node that contains this port.
IbPort	The local port number of this port (relative to a particular node).

Table 8-34 Ports (2) Tab Field Descriptions (continued)

Field	Description
VLCap	Virtual lanes supported on this port.
VLHighLimit	Limit of high priority component of VL arbitration table.
VLArbitrationHighCap	VL/Weight pairs supported on this port in the smVLArbTable for high priority.
VLArbitrationLowCap	VL/Weight pairs supported on this port in the smVLArbTable for low priority.
MTUCap	Maximum MTU supported by this port.
VLStallCount	Specifies the number of sequential packets dropped that causes the port to enter the VLStalled state.
HOQLife	Time a packet can live at the head of a VL queue.
OpVLs	Virtual Lanes operational on this port.
PkeyEnfIn	Indicates support of optional partition enforcement on packets received from this port.
PkeyEnfOut	Indicates support of optional partition enforcement on packets transmitted from this port.
FilterRawPktIn	Indicates support of optional raw packet enforcement on raw packets received from this port.
FilterRawPktOut	Indicates support of optional raw packet enforcement on raw packets transmitted from this port.
MKeyViolations	Number of SMP packets that have been received on the port that have had invalid M_Key, since power on or reset.
PKeyViolations	Number of packets that have been received on the port that have had invalid P_Key, since power on or reset.
QKeyViolations	Number of packets that have been received on the port that have had invalid Q_Key, since power on or reset
GuidCap	Number of GUID entries supported in the GUIDInfo attribute for this port.
SubnetTimeout	Maximum expected **subnet** propagation delay.
RespTimeValue	Expected maximum time between the port reception of a SMP and the transmission of the associated response.
LocalPhysErr	Threshold value. When the count of marginal link errors exceeds this threshold, the local link integrity error is detected.
OverrunErr	Overrun threshold value. When the count of buffer overruns exceeds the threshold, an excessive buffer overrun error occurs.

Mcast

To view SMA multicast details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Mcast** tab. Table 8-35 lists and describes the fields in this tab.

Table 8-35 Mcast Tab Field Descriptions

Field	Description
NodeGuid	Global unique ID of the node.
TableBlockIndex	Index into the multicast block table, this index starts from 1 rather than 0.
TableBlock	List of 32 PortMask Block Elements. 16 bits starting at position 16*p of the port mask associated with the particular LID. An incoming packet with this LID is forwarded to all ports for which the bit in the port mask is set to 1. Note that an invalid LID is indicated with an all zero PortMask.

Linear Forwarding

To view SMA linear forwarding table details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **Linear Forwarding** tab. Table 8-36 lists and describes the fields in this tab.

Table 8-36 Linear Forwarding Tab Field Descriptions

Field	Description
NodeGuid	Global unique ID of the node.
BlockIndex	Index into the linear forwarding table, this index starts from 1 rather than 0.
Block	Linear forwarding table block.

PKey

To view SMA partition details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **PKey** tab. Table 8-37 lists and describes the fields in this tab.

Table 8-37 PKey Tab Field Descriptions

Field	Description
NodeGuid	Global unique ID of the node.
IbPort	Port number.
Index	PKEY table index.
TableVector	GUID assigned by the SM on the **subnet**.

SLVL Map

To view SMA SLVL details, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**Topology** View. The **Specify Topspin Devices** dialog box opens.

Step 2 (Optional) Click the checkbox, in the **Enabled** column, of any additional IB devices that you want to add to the Topology View display.

Step 3 Click the **OK** button. The **InfiniBand Topology** window appears.

Step 4 Double-click a server switch icon. The **Internal InfiniBand Topology** window opens.

Step 5 Click the **SMAs** button. The Subnet Manager **Agents** window opens.

Step 6 Click the **SLVL Map** tab. Table 8-38 lists and describes the fields in this tab.

Table 8-38 SLVL Map Tab Field Descriptions

Field	Description
NodeGuid	Global unique ID of the node.
InIbPort	Ingress port number.
OutIbPort	Egress port number.
Sl#toVI	SL# to VL mapping.

Viewing Device Management

Note Device Management (DM) features are only available on I/O chassis (Cisco SFS 3001, Cisco SFS 3012).

With Device Management, you can

- View IOUs.
- View IOCs.
- View IOC Services.

Viewing IOUs

To view the I/O Units (IOUs) on your device, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**DM**. The **Device Manager** window opens.

Step 2 Click the **IOU** tab. IOU details appear. Table 8-39 lists and describes the fields in this display.

Table 8-39 IOU Display Field Descriptions

Field	Description
Change ID	Cumulative number of changes to the controller list since the device last booted.
Max Controllers	Maximum number of controllers that your device can support.
Diag Device ID	All device IDs appear as **1**.
Option ROM	Indicates the presence or absence of Option ROM.
Controllers	Lists each slot on your device that can potentially contain a controller and identifies whether or not a controller resides in that slot.

Viewing IOCs

To view the I/O controllers (IOCs) on your device, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**DM**. The **Device Manager** window opens.

Step 2 Click the **IOC** tab. A table of IOC details appears. Table 8-40 lists and describes the fields in this display.

Table 8-40 IOCs Display Field Descriptions

Field	Description
GUID	GUID of the controller.
Vendor ID	Organization Unique Identifier (OUI) of the vendor.
Device ID	Vendor-assigned device identifier.
Device Version	Vendor-assigned device version.
Subsystem Vendor ID	Vendor-assigned subsystem vendor identifier
Subsystem ID	Vendor-assigned subsystem identifier.
IOClass	I/O class that the IOC supports.
IOSubclass	Subclass of the I/O class protocol of the IOC.
Protocol	Standard protocol definition that the IOC supports.
Protocol Version	Protocol version that the IOC supports.
Send Msg Queue Depth	Maximum number of messages that the send message queue supports.
RDMA Read Queue Depth	Maximum depth of the per-channel RDMA Read Queue.
Send Msg Size	Maximum size, in bytes, of send messages.
RDMA transfer size	Maximum size, in bytes, of outbound RDMA transfers that the IOC initiates.
Controller Op Cap	Integer value (from 8 cumulative bits) between 1 and 255 that represents the operation type(s) that the IOC supports. • bit 0: ST; Send Messages To IOCs • bit 1: SF; Send Messages From IOCs • bit 2: RT; RDMA Read Requests To IOCs • bit 3: RF; RDMA Read Requests From IOCs • bit 4: WT; RDMA Write Requests To IOCs • bit 5: WF; RDMA Write Requests From IOCs • bit 6: AT; Atomic Operations To IOCs • bit 7: AF; Atomic Operations From IOCs
Service Entries	Number of services that the IOC provides.

Viewing IOC Services

To view the IOC services on your device, perform the following steps:

Step 1 Click the **InfiniBand** menu and choose**DM**. The **Device Manager** window opens.

Step 2 Click the **IOC Services** tab. A table of IOC Services details appears. <Link>Table 8-41 lists and describes the fields in this table.

Table 8-41 IOC Services Table Field Descriptions

Field	Description
IOC GUID	GUID of the node that provides the service.
Service Name	ASCII identifier of the service.
Service ID	Numeric identifier that nodes use to call the service.