Coraid® EtherDrive® SR/SRX

Administration Guide

CONTENTS

Introduction

Thank you for purchasing the **Coraid® EtherDrive® SR/SRX Storage Appliance**. The EtherDrive SR/SRX products are block storage RAID appliances with hot-swappable hard disk drives. Disks can be used individually or in RAID sets and are presented to initiators as logical storage devices accessible using the ATA-over-Ethernet (AoE) protocol.
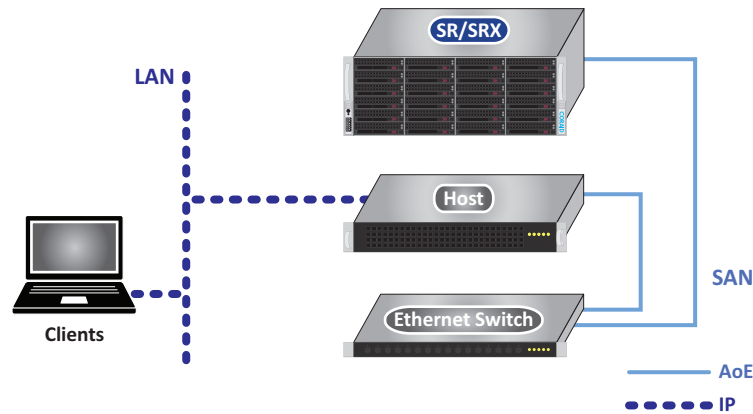
Figure 1:   EtherDrive SR/SRX connected to an AoE SAN

This document explains how to install and setup the SR/SRX and describes the commands you use to manage it.

Reference documentation

For additional information about storage software and concepts, visit the Coraid web site at www.coraid.com.

Package Contents

Each SR/SRX package contains the following:

- EtherDrive SR/SRX storage appliance
- Power cables (2), one for each power supply
- Rack mount hardware (rails, screws, and square-to-round hole converter brackets).
- Screws to mount hard disks into drive carriers (if necessary).

The SR/SRX is shipped with all the necessary software already installed.

Note: Disks purchased from Coraid are installed in drive carriers and shipped in a separate package.

Requirements

The following section describes system requirements for the SR/SRX. For additional specifications and safety information, see Hardware Specifications and Precautions.

Operating software

The native operating system on SR/SRX and all Coraid storage appliances is CorOS (Coraid Operating System) which is based on Plan 9 from Bell Labs.

The SR/SRX is part of a storage area network (SAN) that typically includes several Coraid SR/SRX storage appliances. For optimal stability, ensure that all appliances in the SAN are running compatible versions of the CorOS software. For the latest version of CorOS software, contact the Coraid Technical Assistance Center.

Hardware and network connectivity

- Power—Coraid storage appliances feature redundant power supplies. The appliance requires two grounded outlets, each on a separate UPS (uninterruptible power supply) circuit furnishing 110V or 240V, 60Hz power. For detailed specifications, see Hardware Specifications and Precautions.

- Ethernet SAN ports—SAN port configurations vary depending on the SR/SRX model. All SR and SRX models include two 1 Gb Ethernet RJ-45 ports. SRX appliances also include additional Ethernet SAN interfaces (see Figure 3).
  Network administrators should evaluate their network architecture before using onboard ether0 and ether1 1GbE ports for SAN traffic on an SRX that uses 10GbE SAN ports. Depending on the network configuration, mixing port speeds within an SRX can degrade performance. If the SRX uses ether0 or ether1 for CEC management (default configuration), it is recommended that CEC activity be separated from SAN traffic if the SRX features 10GbE SAN ports.

- Ethernet cables—Use high-quality cables and label each cable at both ends.
  RJ-45 Gb Ethernet SAN ports require Category 6 cables (not Cat. 5 or 5e).

- Network switch—the switch must support flow control (IEEE 802.3x) and jumbo frames with an MTU size of 9K. Most mid-range Ethernet switches support these standards.

- Keyboard—Includes support for PS/2 and USB keyboards.

- VGA—monitor port for console support.

- RS-232 serial port—alternative console connection support. Requires a null modem cable. Default parameters on the serial port are 9600 bits/second, no parity, and 1 stop bit.

- EtherDrive Host Bus Adapter (HBA)— Must be installed in a host connected to the same Ethernet SAN where the SR/SRX appliances are installed. An HBA translates disk requests to AoE requests and transmits them to the SAN.

Terminology and Conventions

The information in this guide assumes familiarity with common data storage and networking concepts and familiarity with data center operations. Terms specific to this product or to Coraid, Inc. are defined in this guide. Users unfamiliar with standard networking and storage terminology are encouraged to find definitions for unfamiliar terms using Web resources and reference documents.

The following terms and conventions are used throughout this documentation and have the following meaning:

Term	Description
SR/SRX	A generic product name used throughout this document to refer to any of the Coraid SR or SRX storage appliances described in Overview of Front and Back Panel.
SRX shelf 7>	A generic prompt used throughout this document in command usage examples to indicate a particular SR or SRX shelf.
Disk	Refers to a physical hard disk drive installed in an SR/SRX appliance.
shelf.slot	Refers to a specific number assigned to a physical disk (slot) in a specific shelf. AoE targets accessible on the SAN are presented to initiators in the form **shelf.lun**.
	Except where noted, command usage examples throughout this guide use the following **shelf.slot** address conventions:
	• 7.0 through 7.2—refers to disks initialized as single-disk JBODs.
	• 7.3 through 7.6—refers to disks initialized to a raid5 and named LUN 8.
	• 7.7 through 7.12—refers to disks initialized to a raid10 and named LUN 9.
	• 7.13 through 7.14—refers to disks assigned to the spare pool.
	• 7.15—refers to an unassigned disk.
Command line examples	To manage the length of command line and workflow examples in this document, most command line examples that list the disks in the SR/SRX depict no more than 8 disks. Your SRX appliances have more disks.
Logical Unit Number (LUN)	A group of uniquely numbered blocks of storage comprising a logical storage device attached to a storage appliance by Ethernet SAN.
Client/host	"Client" and "host" are used interchangeably to refer to the computer accessing the storage over the Ethernet SAN.
Initiator	"Initiator" refers specifically to the host system AoE driver used to perform I/O to the SR/SRX target LUNs.
Target	"Target" refers to the SR/SRX LUNs accessed by the client system. Targets are presented to initiators in the form **shelf.lun**.

Overview of Front and Back Panel

Familiarize yourself with the front and back of the appliance before you install it.

Front panels

4U storage appliances

EtherDrive SR4200/SRX4200

36 disks (3.5" SAS / SSD / SATA)
24 disks in front; 12 disks in back

EtherDrive SRX3200

24 disks (3.5" SAS / SSD / SATA)

EtherDrive SR2421

24 disks (3.5" SATA)

3U storage appliances

EtherDrive SRX2800

16 disks (3.5" SAS / SSD / SATA)

EtherDrive SR1621

16 disks (3.5" SATA)
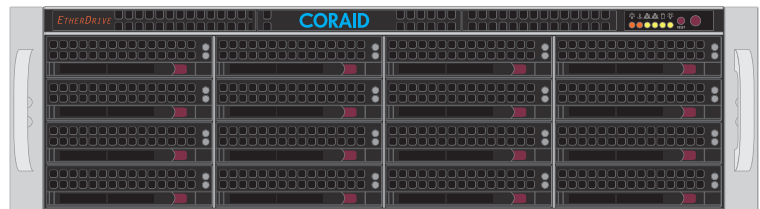
2U storage appliances

EtherDrive SRX3500

24 disks (2.5" SAS / SSD / SATA)

EtherDrive SR821

8 disks (3.5" SATA)
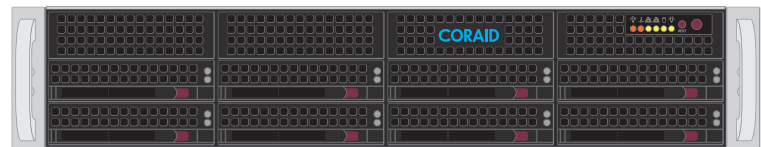
Figure 2:   SR/SRX front panels

See also:

- Front panel buttons and indicators

- Back panel ports

Front panel buttons and indicators

Front panel buttons and indicators are summarized in the table below.

Indicator/button	Function
	Solid red indicates a power failure in the power supply.
	• Flashing—indicates a fan failure. • Solid, not flashing—indicates an overheat condition. May be caused by cables obstructing the airflow in the system or an ambient room temperature that is too warm.
	Flashing indicates network activity on the SAN (AoE) if a network cable is connected to an SR/SRX SAN port shown in Figure 3.
	Flashing indicates SATA DOM (internal SATA boot module) activity.
	Normally lit when the system's power supply unit is receiving power. • Solid green—on • LED off—power supply is plugged in and turned off, or the system is off but in an abnormal state.
RESET	Reboots the system. The Reset button should be used only as a last resort. When the system is rebooted, a consistency check is run.
	The power button applies or removes power from the power supply. Using this button to turn off power removes the main power but keeps standby power supplied to the system. Therefore, you must unplug the appliance if it needs servicing.

Back panel ports

The following table shows the ports available on SR and SRX appliances.
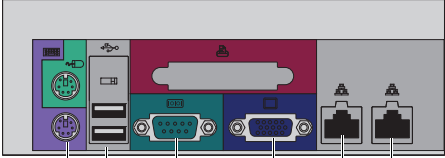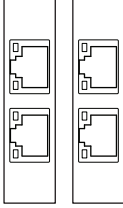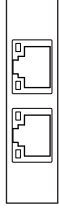
| Standard SR/SRX ports	Additional Ethernet SAN port options available on SRXs			
	C2	**G**	**R2**	**S2**
PS/2 USB RS-232 Serial port VGA ether0 ether1	10GbE CX4 twin axial copper (x2)	1GbE RJ-45 (x4) (Cat. 6 required)	10GbE RJ-45 (x2) (Cat. 6 required)	10GbE SFP+ fiber optic (x2)
• PS/2 (keyboard) • Two USB ports (supports keyboard) • RS-232 Serial (null modem) • VGA (monitor) • Two onboard 1GbE RJ-45 Ethernet SAN ports (ether0 and ether1). See the caution on the right about use with 10GbE ports.	**Note:** The SRX-only SAN port options above are in addition to the two onboard 1GbE RJ-45 ports (ether0 and ether1) common to all SRs and SRXs (see left). ⚠ Network administrators should evaluate their network architecture before using onboard ether0 and ether1 1GbE ports for SAN traffic on an SRX that uses 10GbE SAN ports. Depending on the network configuration, mixing port speeds within an SRX can degrade performance. If the SRX uses ether0 or ether1 for CEC management (default configuration), it is recommended that CEC activity be separated from SAN traffic if the SRX features 10GbE SAN ports (C, R2, and S2 models).			

Figure 3:   SR/SRX back panel ports

Installing the SR/SRX

Installation steps include:

- Unpacking the SR/SRX

- Attaching rails and installing the SR/SRX in the rack (optional)

- Connecting power cables to the SR/SRX and power outlets

- Installing drive carriers (containing disks) into the chassis

- Connecting data cables to the SAN

The following procedure assumes that the AoE SAN is up and running.

To install the SR/SRX in the AoE SAN

1. **Remove the contents from the shipping packages.**

2. **Attach the rails to the SR/SRX chassis and a standard rack and then install the SR/SRX in the rack as described in Installing the SR/SRX in an Equipment Rack.**

3. **Connect the power cables to the back of the SR/SRX and to separate UPS outlets.**

4. **If applicable, install disks into drive carriers. (See To install a disk in a drive carrier.)**

5. **Install the drive carriers containing disks into the chassis.**

   With the drive carrier handle in the open position, insert each drive carrier into an empty slot until it is fully seated in the chassis. Close the handle to lock the drive carrier into place.

6. **Connect one end of the appropriate interface cables to the SR/SRX SAN ports and the other end to one or more Ethernet SAN switches. (See SR/SRX back panel ports.)**

   Network administrators should evaluate their network architecture before using onboard ether0 and ether1 1GbE ports for SAN traffic on an SRX that uses 10GbE SAN ports. Depending on the network configuration, mixing port speeds within an SRX can degrade performance. If the SRX uses ether0 or ether1 for CEC management (default configuration), it is recommended that CEC activity be separated from SAN traffic if the SRX features 10GbE SAN ports.

   The Ethernet SAN switch must support flow control (IEEE 802.3x) and jumbo frames with an MTU size of 9K. Most mid-range Ethernet switches support these standards.

7. **Access the SR/SRX console using one of the following methods:**

   - Using a null modem cable, connect a serial terminal or a computer running an application such as minicom to the SR/SRX RS-232 port. The default parameters on the serial port are 9600 bps, no parity, and 1 stop bit.

   - Connect a VGA monitor and a keyboard to the corresponding ports on the SR/SRX.

8. **Power on the SR/SRX using the button on the front of the appliance.**

9. **Proceed to the section Setting up the SR/SRX.**

To install a disk in a drive carrier

1. Remove the screws and then remove the dummy drive from the drive carrier.

Dummy drive

Drive carrier

Screw (1 of 2)
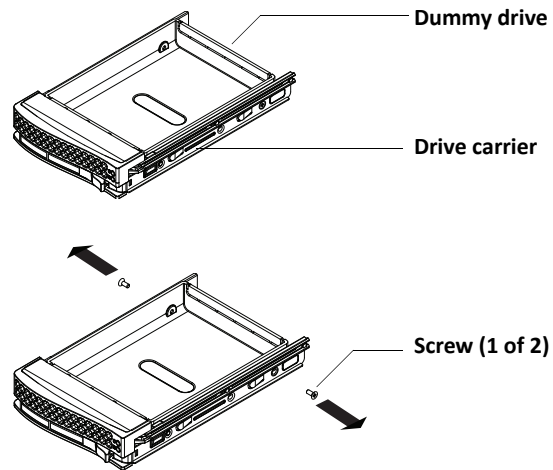
2. Install the disk in the drive carrier with the screws provided.

Disk

Screw (1 of 6)
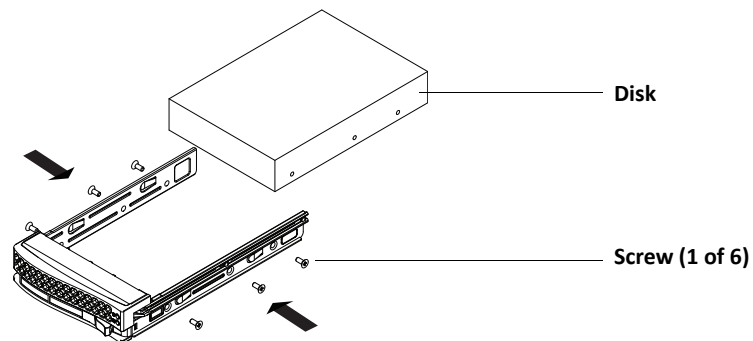
Setting up the SR/SRX

Setup steps include:

- Accessing the SR/SRX command line interface
- Assigning the SR/SRX a unique shelf address so that it can be identified on the SAN
- Configuring additional shelf parameters

To set up the SR/SRX

1. **Make sure the SR/SRX is powered on, and then access it using one of the following methods:**

   - Serial Terminal (RS-232 null modem cable)
   - Monitor and keyboard

   The default prompt should display immediately: **SRX shelf unset>**.

   Note: When you probe the SAN from a CEC client, an uninitialized SR/SRX appears as **-1**. Type **-1** at the **[#qp]** prompt to change the prompt to **SRX unset>**.

   Press Enter a few times if the prompt does not display right away. You will replace the term **unset** with the shelf address that you will assign when you issue the **shelf** command.

2. **Type shelf and assign a number for the SR/SRX shelf address.**

   Choose a shelf address for the SR/SRX that is not already in use by another SR/SRX. Duplicating shelf addresses could lead to data loss and corruption.

   The shelf address must be a number between 0 and 65534 inclusive and unique among all AoE storage devices attached to the SAN.

   For example, to set **7** as the shelf address:

   ```
   SRX shelf unset>
   SRX shelf unset> shelf -?
   usage: shelf shelfno
   SRX shelf unset> shelf 7
   SRX shelf 7>
   ```

3. **Configure additional shelf parameters as described in the SR/SRX Command Reference:**

   - Syslog source and destination IP addresses (see syslog)
   - SR/SRX appliance password (see passwd)
   - Coraid Ethernet Console (CEC) port configuration (see cecon and cecoff)
   - Drive monitoring with Self Monitoring, Analysis, and Reporting Technology (SMART) capability (see smartenable)

   Note: Coraid strongly recommends that you create a password before using the SR/SRX on the Ethernet SAN.

Shutting Down the SR/SRX

To cleanly reboot or shut down an SR/SRX, always use either the **reboot** or **halt** command. Both options flush out dirty buffers and mark all RAIDs as cleanly shut down.

Issue **halt** when you intend to completely remove power from the appliance (such as prior to moving or servicing the appliance).

Issue **reboot** to power-cycle an SR/SRX after a CorOS update or to clear temporary conditions when directed to do so by the Coraid Technical Assistance Center.

If **halt** or **reboot** are not used to shut down an SR/SRX, the appliance initializes parity on RAID 5 and RAID 6 LUNs (if any) the next time the SR/SRX is turned on, which may be undesirable for the following reasons:

• Initialization can take 15-20 hours or longer (depending on the size of disks in the LUN).

• I/O performance is degraded during initialization.

• Because a LUN has no redundancy during initialization it is placed offline if it encounters an I/O error during this period.

To ensure that parity is correct, at startup the SR/SRX validates all RAID 5 and RAID 6 LUNs that are not marked as clean.

To shutdown or reboot the SR/SRX

1. **Quiesce any applications that are using the LUNs on the appliance.**

2. **Issue one of the following commands:**

   • The **reboot** command cleanly shuts down all LUNs and their component RAIDs and then reboots the SR/SRX.

   • The **halt** command cleanly shuts down all LUNs and their component RAIDs, stops the SR/SRX service, and displays the message,
   System halted. Hit enter to reboot:

   To power-off the halted SR/SRX instead of rebooting, press and hold down the power button on the front panel for up to 8 seconds.

Creating LUNs

After you have set up the SR/SRX, you are ready to create LUNs and present them to initiators using the following workflow:

Function:	Command:
Display a list of the disks installed on the SRX	`disks`

Create a LUN initialized as a RAID set
-or-
Create a LUN initialized as a JBOD
	`make`
	-or-
	`jbod`

Verify the LUN you created	`list -l`
Assign a descriptive label to the LUN (optional)	`label`
Allocate disks to a spare pool (optional)	`spare`
Place the LUN online so that it is available to initiators	`online`

The SR/SRX presents LUNs to initiators using the assigned shelf address (`shelf.lun`). Each LUN contains one RAID or JBOD. From the host system on the Ethernet SAN the SR/SRX looks like a shelf of LUNs.

Placing a LUN online without an initiator mask broadcasts the LUN to all servers on the Ethernet SAN. Newly-created LUNs are offline by default to allow you to configure a MAC mask to manage its visibility to initiators. There is one exception to this rule: LUNs created with the `jbod` command are placed online automatically when they are created.

Issuing the `make` and `jbod` commands

You issue the `make` command to create SR/SRX LUN(s) initialized as a specified RAID type. For a list of valid RAID types, see `make`.

You issue the `jbod` (Just a Bunch of Disks) command to present individual SR/SRX disks as single-disk LUNs. A JBOD created using the `jbod` command is placed online automatically. The `jbod` command automatically names the LUN the same number as the disk slot number you specify with the `shelf.slot` argument. To create a JBOD with a number other than the specified slot, issue the `make` command, specify `jbod` as the RAID type, and specify a unique LUN number. For details, see `jbod`.

Understanding EtherDrive RAID notation

When one or more LUNs have been configured on the SR/SRX, the output of the `disks`, `list -l`, and `iostats` commands displays LUN RAID component devices as a three-part term comprised of `lun.part.drive`. For example, the three-part term `8.0.1` describes the first RAID component (`0`) and the second logical drive (`1`) of `LUN 8`. The correspondence between the logical components in a RAID and the physical disks backing them is shown in the output of the `list -l` command as follows:

```
            SRX shelf 7> list -l
             8 6001.197GB online
              8.0   6001.197GB raid5 normal
                8.0.0  normal   2000.399GB 7.3
lun.part. drive ──▶  8.0.1  normal   2000.399GB 7.4  ◀──shelf 7, slot (disk) 4
                8.0.2  normal   2000.399GB 7.5
                8.0.3  normal   2000.399GB 7.6
             SRX shelf 7>
```

lun	part	drive
8.	**0.**	**1**
Logical Unit Number presented to initiators.	RAID component within a LUN. When multiple RAID sets are combined to comprise a single LUN, this number identifies the component RAID sets within the LUN. In today's SR/SRX, this number is always `0`.	Logical drive component within a RAID. Note the correspondence between the logical drives in a RAID set and the physical disks backing them (`7.3` through `7.6` in this example).

When one or more LUNs are present, the same three-part term populates the `ROLE` column in the output of the `disks` command as follows:

Note: The following example lists only eight disks. Your SR/SRX appliance may have more disks.

```
SRX shelf 7> disks
DISK          SIZE      ROLE                   MODEL  FIRMWARE          MODE
7.0    2000.398GB            WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.1    2000.398GB            WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.2    2000.398GB            WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.3    2000.398GB    8.0.0   WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.4    2000.398GB    8.0.1   WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.5    2000.398GB    8.0.2   WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.6    2000.398GB    8.0.3   WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
7.7    2000.398GB            WDC WD2003FYYS-02W0B0  01.01D01   sata 3.0Gb/s
```

The same three-part term populates the `DISK` column in the output of the `iostats` command (when one or more LUNs are present).

To create a LUN and make it available to initiators

1. **Access the SR/SRX in one of the following ways:**

   - A direct connection to the SR/SRX via the serial port or VGA and keyboard ports.

   - Over the network via a host with CEC installed (see Coraid Ethernet Console (CEC)).

   - Over the network via an EtherDrive SAN Manager appliance (if present).

2. **At the SR/SRX prompt, type `disks` to view a list of the disks in the SR/SRX appliance.**

   Note: The following example lists only eight disks. Your SR/SRX appliance may have more disks.

```
SRX shelf 7> disks
DISK         SIZE     ROLE                      MODEL   FIRMWARE           MODE
7.0     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.1     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.2     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.3     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.4     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.5     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.6     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
7.7     2000.398GB            WDC WD2003FYYS-02W0B0   01.01D01    sata 3.0Gb/s
```

   Note: If no disks are listed, make sure the drive carriers contain disks and are fully inserted in the chassis, SR/SRX SAN ports are properly connected to the Ethernet SAN network, jumbo frames are enabled on the network switch, and then type `disks` again.

3. **To create a LUN(s), do one of the following:**

   - **Create one or more RAID sets (or manually create JBOD(s))** — Type `make` followed by the LUN name (a number), RAID type, and the disk(s) you want to initialize to the LUN.

     Note: RAID performance is suboptimal while parity on the LUN is initializing. Attempting to use a LUN while parity is initializing can cause I/O errors and may place the LUN offline. For optimal performance, wait until parity has finished initializing on the LUN before using it.

     For example, to create LUN 8 as a RAID5 using disks 3, 4, 5, and 6:

```
SRX shelf 7> make -?
usage: make lun raidtype [ shelf.slot ... ]
SRX shelf 7> make 8 raid5 7.3-6
```

     – `lun` — Specify a number between 0 and 254, inclusive. The number must be unique within the shelf.

     – `raidtype`— Specify a RAID type. (For a detailed description of valid RAID types, see the `make` command.)

     – `[ shelf.slot ... ]`—Specify the shelf and slot number(s) of the disk(s) to be used as the RAID components. To create a LUN consisting of multiple consecutive or nonconsecutive disks, you can use a dash (-) to specify a range. For details, see Range expansion.

   - **To make and online JBOD(s) with a single command** — issue the `jbod` command.

4. **Type `list -l` to view detailed information about the LUN you created. Information is displayed in three levels. For example:**

```
SRX shelf 7> list -l
```
Level 1 `8 6001.197GB offline`
Level 2 `8.0   6001.197GB raid5 initing 9.90%`
Level 3 `    8.0.0 normal    2000.399GB 7.3`
`        8.0.1 normal    2000.399GB 7.4`
`        8.0.2 normal    2000.399GB 7.5`
`        8.0.3 normal    2000.399GB 7.6`

Level 1 displays the LUN, available storage capacity, and state (and optionally, a descriptive label, not shown in this example. See the label command.).

Level 2 displays the LUN, available storage capacity, RAID type, state, and during parity initialization, percentage of completion.

Level 3 displays the drive components of the RAID, one per line (see Understanding EtherDrive RAID notation). Each line also displays the drive's RAID component address, state, size, and physical shelf.slot (disk) location.

5. **(Optional) Use the label command to create a descriptive label for the LUN.**

6. **(Optional) Use the spare command to allocate disks to a spare pool.**

    If a disk fails in a RAID 1, RAID 5, RAID 6, or RAID 10 LUN, disks in the spare pool are recruited as replacements automatically. Alternatively, you can manually replace failed disks in these RAID types by issuing the **`replace`** command. A spare pool serves only the shelf in which the designated spare disks reside.

7. **Type `online [ lun ... ]` to present the LUN to initiators.**

    For example:

```
SRX shelf 7> online 8
SRX shelf 7> list
 8 6001.197GB online
```

    Note: JBOD(s) created with the **`jbod`** command are placed online automatically.

    LUNs that you place online are accessible to local hosts or clients in the form **`shelf.lun`**.

    Note: Placing a LUN online without an initiator mask broadcasts the LUN to all servers on the Ethernet SAN. To limit visibility of a LUN, use the **`mask`** command.

8. **To configure LUNs further, see Managing LUNs.**

9. **To view LUNs on the EtherDrive SAN from your host computer and present them to clients as locally attached disks, install a Coraid EtherDrive HBA in the host. For details, see the appropriate Coraid EtherDrive HBA documentation.**

Managing LUNs

After you have created LUNs, you can change their configuration using available commands. Some usage examples are provided in the table below. For additional details about each command, see the SR/SRX Command Reference.

To:	Use commands:
Assign or clear a label to or from a LUN.	• **label name lun ...** To assign a label to the specified LUN. • **unlabel lun ...** To remove a label from the specified LUN.
Add or remove a MAC mask to or from a LUN.	• **mask** To view a list of LUNs and their MAC masks. • **offline [lun ...]** To place a LUN offline prior to setting the MAC mask (if the LUN exists and is online). • **mask [+mac ...] [-mac ...]** To add or subtract MAC addresses for a specified LUN. • **online [lun ...]** To allow network access to LUNs.
Change the I/O mode of a LUN (**sequential** or **random**). **Note:** RAID 5 and RAID 6 LUNs are **sequential** by default and cannot be changed.	• **iomode** To view the current I/O mode of LUNs. • **setiomode mode lun ...** To change the I/O mode of a LUN.
Associate or clear a LUN with a vlan.	• **vlan** To view a list of all current vlan associations. • **vlan [lun]** To view vlan associations for the specified LUN. • **vlan [lun] [vlan id]** To associate the specified LUN with the specified vlan. • **vlan [-c] [lun]** To clear the vlan associated vlan id for the specified LUN.
Offline a LUN so that it is no longer available on the Ethernet SAN.	• **offline [lun ...]** To place a LUN offline.
Remove a LUN.	• **offline [lun ...]** To place the LUN offline before removing it. • **remove lun ...** To remove the LUN. All drives used in the component RAID are released for reuse.

Updating the CorOS

Overview

Keep in mind the following before you update the CorOS software on an SR/SRX:

- **Legacy SR appliances** — Do not install CorOS version SR-5.1.1 on legacy EtherDrive series SR420, SR421, and SR1520 appliances. Doing so will cause those appliances to become inoperable. (You are prevented from installing CorOS version SR-6.0.0 or later on these legacy appliances.) EtherDrive series SR420, SR421, and SR1520 should run CorOS version 20090929.

- **Updating the CorOS in an ESX(i) environment** — Because the update LUN is temporary and disappears when the SR/SRX reboots, the ESX(i) server may behave unpredictably when it sees the update LUN initially but fails to see it following the reboot. To prevent the ESX(i) server from seeing the update LUN in the first place, use the `mask` command to mask the update LUN before placing it online so that it is visible only to the host computer from which you are copying the `tarc` update file. If you must update the SR/SRX from an ESX(i) initiator, be sure to reboot the ESX(i) server after performing the update.

- **Updating the CorOS when the SAN includes mirrored VSX PV pairs**—Before updating the CorOS on an SR/SRX, you must issue the `maintenancemode` command on VSX appliances managing mirrored PV pairs. Maintenance mode increases the VSX timeout interval to approximately 3 minutes so that mirrored PVs managed by VSXs are not broken when the SR/SRX automatically reboots during the CorOS update. Failure to enter maintenance mode causes VSXs to interpret an SR/SRX auto reboot as an I/O connection failure and then break mirrored pairs. Make sure to disable maintenance mode on VSXs after the SR/SRX CorOS update is finished. For details, see the *Coraid EtherDrive VSX Administration Guide*.

Installation

The following is a summary. For a detailed procedure, see To update CorOS on the SR/SRX.

The `tarc` update file contains a kernel update and a root filesystem update. Command updates are performed as a process of updating the flash root filesystem.

- Obtain the `tarc` update file and copy it to the host system.

- Make a RAM-based update LUN on the SR/SRX using the `make` command.

- Copy the appropriate `tarc` update file from the host system to the SR/SRX update LUN. For a Windows or a Linux host, do one of the following:

  - **Windows host**, use the Coraid HBA Host View Tool (see the Windows HBA documentation).

  - **Linux host**, use the `coraid-update` utility or `dd` (see step 3 below).

- Issue the `update` command on the SR/SRX to process the `tarc` update file.

To update CorOS on the SR/SRX

⚠️ Do not ignore any error messages that may display during the update process.

Before updating the CorOS, it is recommended that you restrict access to LUNs or quiesce the application(s) interacting with the LUNs. To ensure that the update is completed without data loss, no writes should be performed to the LUN during the update.

1. **Obtain the tarc update file and copy it to the host system.**

   The update file is available from the Coraid Technical Assistance Center.

2. **At the SR/SRX command prompt, create a RAM-based update LUN on the SR/SRX and place it online.**

```
SRX shelf 7> make 15 update
SRX shelf 7> online 15
SRX shelf 7> update -l
15
SRX shelf 7> list -l
15    0.041GB online
  15.0      0.041GB raw normal
   15.0.0  normal        0.041GB update
SRX shelf 7>
```

3. **From the host, copy the `tarc` update file to the RAM-based update LUN you created in step 2.**

⚠️ **Note:** Make sure to copy the **`tarc`** update file to the update LUN only. The update LUN is a small (approximately 40MB) RAM-based LUN. As there may be other small LUNs on your SAN in addition to the update LUN, make sure you know the shelf and LUN ID of the update LUN before you attempt to copy the update file to it. Copying the **`tarc`** update file to any LUNs backed by disk storage will cause data loss.

- For instructions on how to copy the update file from a **Windows host** using the Coraid HBA HostView Tool, see the documentation included with the Windows HBA.

- To copy the update file from a **Linux host**, use the following example as a guide (The example assumes kernel 2.6.):

```
% modprobe aoe
% aoe-stat
    e7.15         0.040GB  eth4,eth5 8704  up
% # Verify the md5sum with that reported by the SR support page
% md5sum SR-5.1.6-00020.tarc
b1936c99efe79a41204eb0f4a58192db
% coraid-update SR-5.1.6-00020.tarc /dev/etherd/e7.15
% # Or alternately, if your system lacks coraid-update
% dd if=SR-5.1.6-00020.tarc of=/dev/etherd/e7.15
5260+0 records in
5260+0 records out
%
```

Recent versions of aoetools on Linux (bundled with the software initiator available on the Coraid website) include the **coraid-update** utility. The utility validates the destination target and the **tarc** update file. Coraid recommends that you use this utility to avoid simple mistakes when using **dd** to copy the file to the update LUN. To update from a client system that lacks the **coraid-update**, use **dd**; simply write the **tarc** update file to the raw block device represented by the update LUN.

4. **At the SR/SRX command prompt, install the tarc update file.**

```
SRX shelf 7> update
Updating CorOS will reboot unit.
Continue? (y/n) y
Updating kernel ... done.
Updating root fs ... done.
Update successful.
Hard rebooting system. Please stand by ...
```

5. **Verify the update by issuing the release command.**

Coraid Ethernet Console (CEC)

CEC is a utility that allows a host computer to establish a console connection to the SR/SRX appliance using standard Ethernet frames. Once connected via CEC, you can execute commands as though you are connected to the local console. Type the **help** command at the prompt to display a list of available SR/SRX commands.

By factory default, current SR/SRXs provide the CEC connection through onboard RJ-45 ports ether0 and ether1 (see Back panel ports). You can display and manage the SR/SRX CEC port configuration using the commands **cecon** and **cecoff**. CEC configuration persists across reboot.

When you probe the SAN from a CEC client, an uninitialized SR/SRX appears as **-1.** Type **-1** at the **[#qp]** prompt to change the prompt to **SRX unset>**, then set a shelf address by issuing the **shelf** command.

All SR and SRX appliances sold since release 20060717 ship with CEC enabled by default. To obtain CEC functionality on appliances running earlier versions of CorOS, you must enable CEC manually.

CEC does not include any security or encryption mechanisms. Also, depending on your network configuration, be aware that enabling CEC and failing to logout may leave your system insecure. As with AoE, the appliance is only as secure as your network.

Downloading CEC

You can obtain the latest version of CEC through the *Related Software* section of the SR/SRX support page at http://support.coraid.com/support/sr/. The UNIX CEC package includes a manpage explaining CEC and its usage (**man cec**).

Installing CEC

You can install CEC on a host computer running Microsoft Windows or a BSD-UNIX operating system such as Linux or Solaris. See the Windows and Linux CEC installation instructions below.

To install CEC on a Windows host

1. **Ensure the following:**

   - You have downloaded the latest WindowsCECSetup.exe file.

   - The host is connected to the SAN via an Ethernet interface that is not a port on a Coraid HBA. (Windows CEC probes for Coraid appliances using the host's NICs and cannot utilize the ports of a Coraid HBA.)

   - The following is installed on the host computer:

     – WinPcap (version 4.1.2 or higher) available from http://www.winpcap.org

     – Microsoft .NET Framework 4.0 update (a reboot may be required)

2. **From the Windows host, double-click the file WindowsCECSetup.exe.**

3. **Follow the on screen prompts to complete the installation.**

To install CEC on a Linux host

- **Use the following example as a guide to install the Linux CEC client.**

   Note: The Linux CEC client will compile and run on Linux, Solaris, and any BSD variants which support bpf. The following example assumes that you have a C compiler and **make** utility installed.

```
user@workstation1:~$ tar -xzf cec-11.tgz
user@workstation1:~/cec-11$ cd cec-11
user@workstation1:~/cec-11$ make
cc -Wall -g -c cec.c
cc -Wall -g -c linux.c
cc -Wall -g -c utils.c
cc -o cec cec.o linux.o utils.o
user@workstation1:~/cec-11$ su
Password:
root@workstation1:/home/user/cec-11# make install
mkdir -p /usr/sbin
cp cec /usr/sbin
+ mkdir -p /usr/share/man/man8
+cp cec.8 /usr/share/man/man8/cec.8
```

Using CEC

The procedures in this section describe how to use CEC from a Windows or a Linux host.

### *To use CEC from a Windows host*

1. **From the Windows host, launch Windows CEC.**

   Start Menu > All Programs > Coraid > Windows CEC.

   Windows CEC automatically probes for Coraid appliances on the SAN.

2. **Select a shelf in the Shelf Probe window, and then click Connect.**
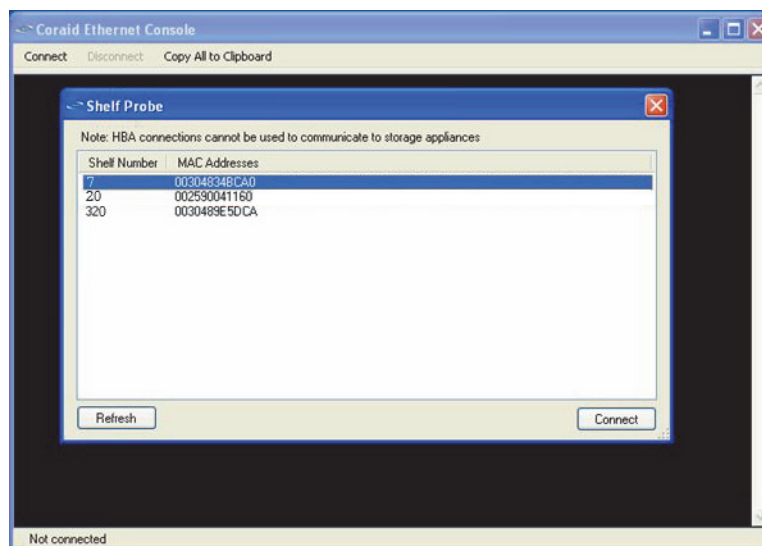
3. **Press Enter a few times until the prompt displays.**
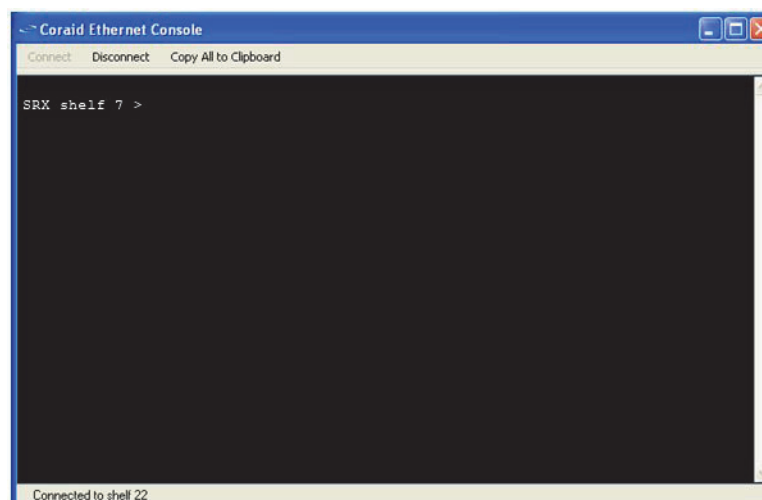
4. **To exit the CEC terminal, click Disconnect.**

To use CEC from a Linux host

1. **Familiarize yourself with `cec` usage:**

   `cec [-s shelf] [-m mac] interface`

Command argument	Description
`[-s shelf]`	Specifies the shelf you want connect to.
`[-m mac]`	Specifies the MAC address of an SR/SRX Ethernet port that is configured to accept CEC communications (see `cecon`).
`interface`	Specifies a network interface on the host that is connected to the SAN.

2. **Launch CEC from a Linux host connected to the SAN or a workstation logged into the Linux host.**

3. **Log-in as root or root-equivalent and connect to an SR/SRX.**

   - To display a list of SR/SRXs available on the host's network interface eth0 and connect to a shelf (shelf 7 in the following example):

   ```
   [root@workstation1 cec-11]# ./cec eth0
   Probing for shelves ... done.
   SHELF | EA
   7       003048348CA0
   20      002590041160
   320     0030489E5DCA
   [#qp]: 7
   connecting ... done.
   Escape is Ctrl-\
   SRX shelf 7>
   ```

   - To search for a specific shelf and connect to it (shelf 7 in the following example), use the - s argument:

   ```
   [root@workstation1 cec-11]# ./cec -s 7 eth0
   Probing for shelves ... shelf 7 found.
   connecting ... done.
   Escape is Ctrl-\
   SRX shelf 7>
   ```

4. **To exit the CEC terminal, press Ctrl - \.**

SMART support

SMART (Self Monitoring, Analysis, and Reporting Technology) support reports the internal SMART status of a specified disk. On an enabled disk, SMART continually monitors various internal counters and determines when a threshold has been exceeded for which disk replacement is considered necessary. To display the SMART status of a disk, issue the `disks -s` command.

Additionally, the SR/SRX itself retrieves this information once per hour and if it determines that a threshold has been exceeded, the SR/SRX sends a syslog message to the syslog server. The SR/SRX will continue to send a syslog message every 6 hours for the first 24 hours, then every 24 hours thereafter, until the user disables SMART on the disk by issuing the `smartdisable` command. Some disks are shipped with SMART disabled by default, so you may need to enable SMART using the `smartenable` command.

RAIDShield Protection

With the exception of JBODs and RAID0, each RAID is protected by a mechanism called the RAIDShield. When a disk in a well-functioning (i.e., not degraded or failed) RAID exhibits a block read error, RAIDShield calculates the block contents in question from the remaining disks in the array. RAIDShield then writes the block contents to the failed disk and rereads it to permit the failed disk to internally remap its bad sector(s). Whether or not this is successful, the user is notified of the attempt via a syslog message. As disks become larger the likelihood of sector read errors increases.

Note: RAIDShield corrections do not necessarily indicate that a disk needs to be replaced.

A special case occurs if RAIDShield attempts to recover from a failure on a disk in a raid5 or raid6rs when the parity is not yet initialized. This can occur when the RAID is first created, but is more likely to occur when the appliance goes down without cleanly releasing the RAID. In the latter case, the parity for the row containing the failure is likely to be correct and can be relied upon to reconstruct the block. Because this cannot be guaranteed, however, RAIDShield takes the LUN offline to protect the user from possible data corruption. In order to bring the LUN back online the user must acknowledge the possible error by running the `online` command twice. As expected, syslog messages are generated at every step.

RAIDShield uses a background scrubber process to continually read RAID arrays, detecting and correcting read failures via the same mechanism described above. The RAIDShield scrubber operates in a loop, reading a predetermined amount of data and sleeping for one second. The amount of data read depends on the level of activity of the RAID array and is calculated to avoid conflicting with user-access I/O. The scrubber's access pattern causes the disk access LEDs on scrubbed disks to flash every second.

The scrubber does not run if the array is initing, degraded, or failed. Due to the scrubber process, disks in redundant arrays are rarely idle. As disk access does not contribute to shortened disk life, this should not be a concern.

RAIDShield also notifies users about latent failures of spare disks. Once per minute RAIDShield reads all spare disks from the beginning to verify that they are accessible. If this check fails, a syslog message is sent to notify the user of the possible faulty spare disk. Spares are not scrubbed like other RAID elements. When spares are allocated, every block is written, permitting the disk to remap any bad sectors.

SR/SRX Command Reference

You can access the SR/SRX command line interface in the following ways:

- Connect directly to the SR/SRX via the serial port or VGA and keyboard ports.

- Over the network via a host with CEC installed (see Coraid Ethernet Console (CEC)).

- Over the network via an EtherDrive SAN Manager appliance (if present).

These commands are for SR/SRX management, not for management of other appliances on the SAN. For information on specific commands used to manage other appliances, see the documentation accessible from the Coraid web site www.coraid.com.

For a workflow example of the **jbod** command, see Workflow examples.

The following table lists the commands in alphabetical order for quick lookup. Click on a command to access more information.

cecoff	**iostats**	**reboot**	**slotled**
cecon	**jbod**	**release**	**smartdisable**
disks	**label**	**remove**	**smartenable**
eject	**list**	**replace**	**sos**
exit	**make**	**resetdisk**	**spare**
fail	**mask**	**restore**	**spareled**
fans	**model**	**rmspare**	**sync**
halt	**offline**	**serial**	**syslog**
help	**online**	**setiomode**	**temp**
ifstat	**passwd**	**shelf**	**unlabel**
iomode	**power**	**sigcheck**	**update**
			uptime
			vlan
			when

Usage

Type any command followed by **-?** to print usage information. For example:

```
SRX shelf 7> ifstat -?
usage: ifstat [ -a ] [ interface ... ]
SRX shelf 7>
```

Also see the help command.

Command usage includes the following conventions:

- The term **SRX** in command prompt examples indicates SR <u>and</u> SRX appliances.

- The **-a** flag displays all possible information for a command. (Currently applicable only for the **ifstat** command.)

- A bracket **[ ]** surrounding an item indicates an optional item. If no bracket surrounds the input string, the item is mandatory. The arguments make the command more specific; many commands issued without an argument print current status or a general response.

- The ellipsis **[...]** indicates that more than one value may be entered as a range of sequential values. A dash (**-**) separates the ends of the sequence. See Range expansion for examples.

Some commands require confirmation before the command is executed. Depending on the convention used in the prompt, type **yes** or **no** (full word) or **y** or **n** (initial only) to complete or cancel the command.

Note: Entering the **#** character in a command string is interpreted as the beginning of a comment and should be avoided.

Range expansion

The ellipsis **[...]** in command usage indicates a range option (series ranging). A single range is entered with a dash (**-**) separating the first and last item in the sequence. For example, the range for shelf.slot **7.0-4** is interpreted as **7.0 7.1 7.2 7.3 7.4**. The range for LUNs **0-8** is interpreted as **0 1 2 3 4 5 6 7 8**.

You can also specify nonconsecutive ranges. For example, the range for shelf.slot **7.0-3 7.6-7 7.9** is interpreted as **7.0 7.1 7.2 7.3 7.6 7.7. 7.9**. The range for LUNs **0-3 6 8-10** is interpreted as **0 1 2 3 6 8 9 10**.

Commands

■ help

Displays a list of all SR/SRX commands in alphabetical order. For usage about a particular command, enter **help** and then the command.

■ sos

The **sos** command displays diagnostic information that you can send to the Coraid Technical Assistance Center. The output contains the SR/SRX release, model, disk controller revision, disk information (model/serial number/firmware), and LUN/RAID configuration. For the quickest solution to your problem, include the **sos** output with your initial contact to the Coraid Technical Assistance Center.

The **sos** command only displays information regarding configuration and status of the SR/SRX appliance. It does NOT include any information about the data stored on the SR/SRX.

Usage:

```
SRX shelf 7> sos -?
usage: sos
SRX shelf 7>
```

■ passwd

The **passwd** command sets the administrator login password. By default the SR/SRX is shipped without a password. The password you set cannot be longer than 27 characters. For example:

```
SRX shelf 7> passwd
new password: ********
Again for sanity: ********
Password successfully set.
SRX shelf 7>
```

If you lose the password of an SR/SRX appliance, you can begin the process of resetting it by entering the reserved keyword **ivelostit** at the *console* login and starting a challenge/response dialogue. Contact the Coraid Technical Assistance Center for the response required by the challenge. When the challenge/response is successfully completed, the password is cleared.

Recovery example:

```
password:
Please supply Coraid support with the following challenge to
receive response.
challenge: 69246
response:
SRX shelf 7>
```

■ **release**

The **release** command displays the current version of the CorOS.

Example:

```
SRX shelf 7> release
SR-6.0.0-R6 - Wed Sep 14 14:52:11 EDT 2011
SRX shelf 7>
```

■ **model**

The **model** command displays the SR/SRX appliance series. When issued from an SRX, **model** also displays the NIC interface-type designator. Interface types include:

- **C2**   Two 10GbE CX4 interfaces

- **G**   Four 1GbE RJ-45 interfaces

- **R2**   Two 10GbE RJ-45 interfaces

- **S2**   Two 10GbE SFP+ interfaces

Example:

```
SRX shelf 7> model
SRX4200-C2
SRX shelf 7>
```

■ **serial**

The **serial** command displays the serial number of the SR/SRX appliance. The serial number is set by Coraid and is sometimes used by the Coraid Technical Assistance Center.

Example:

```
SRX shelf 7> serial
SRX4200G8A000000000130
SRX shelf 7>
```

■ **shelf**

The **shelf** command assigns the SR/SRX the shelf address that you specify. Choose a number between 0 and 65534 inclusive that is unique among all AoE storage devices attached to the network. The SR/SRX base shelf address must not conflict with other shelf addresses on the SAN. Before you set the SR/SRX base shelf address, **unset** appears in the SR/SRX prompt. After you set the shelf address, **unset** is replaced by the shelf address that you specify.

Note: When you probe the SAN from a CEC client, an uninitialized SR/SRX appears as **-1**. Type **-1** at the **[#qp]** prompt to change the prompt to **SRX unset>**, then issue the **shelf** command.

Usage:

```
SRX shelf unset> shelf -?
usage: shelf [shelfno]
SRX shelf unset> shelf 7
SRX shelf 7>
```

Command argument	Description
[shelfno]	Type a number used to identify the SR/SRX.

Note: If you attempt to change the SR/SRX base shelf address of a shelf containing LUNs, you are prompted to place the LUNs offline before changing the shelf address.

For example:

```
SRX shelf 7> shelf 25
8 2000.431GB online
Cannot change shelf address with online LUNs
SRX shelf 7>
SRX shelf 7> offline 8
SRX shelf 7> shelf 25
Changing the shelf address will migrate all defined LUNs to the
new shelf address. LUNs used by other appliances may not
function correctly after re-addressing. Are you sure you want
to perform this action? y/n? [N]
```

The SR/SRX also sends a message about the shelf address change to the syslog server.

■ **syslog**

The **syslog** command configures the local interface port and source and destination server IP addresses for syslog UDP messages. All syslog messages generated by the SR/SRX are sent through the specified interface port to the configured IP address at UDP port 514. Issuing **syslog** without arguments displays the current syslog configuration.

Usage:

```
SRX shelf 7> syslog -?
usage: syslog [ -cp ] [ -s severity ] message
SRX shelf 7>
```

Command argument	Description
[-cp]	Allows you to configure the following: • Destination IP address of the desired host. Messages always display to the console. • Source IP address. If unset, 205.185.197.30 is used. The source IP address you specify must be an unused IP address on the same subnet as your SAN. Facility used is **local0 (16)**. • Local SR/SRX interface port (**ether[0-9]**) through which to send syslog messages. The default port is **ether0**. These settings only need to be configured once; future calls to syslog use the stored information.
[-s severity]	A number that specifies the level of severity of a particular syslog message. By default, the severity is **informational (6)**.
message	The syslog message.

For example:

```
SRX shelf 7> syslog -c

Configuring syslog.  Enter IP addresses in dotted notation.

Local interface is in the format ether[0-9].

IPv4 destination address []: 10.10.10.125

IPv4 source address []: 10.10.10.7

Configuration successful.

SRX shelf 7>
```

■ **ifstat**

The `ifstat` command displays the status of SR/SRX local Ethernet interface ports. The interface port, MAC address, and link speed are displayed. Without an argument, `ifstat` lists all local Ethernet interface ports. For example:

```
SRX shelf 7> ifstat -?
usage: ifstat [ -a ] [ interface ... ]
SRX shelf 7> ifstat

NAME           ADDR        LINK (Mbps)
ether0   00257008a81a       0/ 1000
ether1   00257008a81b       0/ 1000
ether2   0025700364a8   10000/ 10000
ether3   0025700364a9   10000/ 10000
SRX shelf 7>
```

Command argument	Description
`[ -a ]`	Displays additional statistics about the interface(s).
`[ interface ... ]`	Displays the MAC address and link speed for the specified port only. For example, `ifstat ether1` displays only information for port ether1.

■ **uptime**

The `uptime` command displays the length of time (in days, hours, minutes, and seconds) that the SR/SRX has been powered on.

■ **cecon**

The **cecon** command enables CEC on the specified SR/SRX network interface port. Without an argument, **cecon** displays all the local interfaces ports that are configured to accept CEC communications. Current SR/SRXs are configured by default to provide the CEC connection through onboard ports ether0 and ether1.

Usage:

```
SRX shelf 7> cecon -?
usage: cecon [ interface ]
```

Command argument	Description
[interface]	Specify a SR/SRX network interface port. By factory default, CEC is enabled on ports ether0 and ether1.

Example:

```
SRX shelf 7> cecon ether1
SRX shelf 7> cecon
/net/ether1
SRX shelf 7>
```

■ **cecoff**

The **cecoff** command disables CEC on the specified SR/SRX network interface port.

Usage:

```
SRX shelf 7> cecoff -?
usage: cecoff interface
```

Command argument	Description
interface	Specify an SR/SRX network interface port.

Example:

```
SRX shelf 7> cecon
/net/ether1
SRX shelf 7> cecoff ether1
SRX shelf 7> cecon
SRX shelf 7>
```

■ **exit**

The **exit** command terminates an active SR/SRX CLI session.

◼ reboot

The **reboot** command cleanly shuts down all LUNs and their component RAIDs and then reboots the SR/SRX.

See Shutting Down the SR/SRX.

◼ halt

The **halt** command stops the SR/SRX service and halts the SR/SRX. Once halted, the user must press the power or reset button on the SR/SRX front panel in order to restart the system.

See Shutting Down the SR/SRX.

Use the **reboot** or **halt** command to cleanly shut down the SR/SRX. Both commands flush out dirty buffers, mark all RAIDs as cleanly shut down, and bring the system to a halt. **reboot** then reboots the system, while **halt** awaits user input to reboot. To ensure that parity is correct, at startup the SR/SRX validates all raid5 and raid6rs RAIDs that are not marked as clean.

◼ sigcheck

The **sigcheck** command lists and sets a signature on the SR/SRX boot flash. A signature is unique to the SR/SRX boot flash for which it is generated.

As of release 20071031, all flash boot modules must be signed in order for disk-backed LUNs to be brought online. More recent appliances are pre-signed, but users running older CorOS need to update and contact the Coraid Technical Assistance Center with the output of **sigcheck -l** to obtain a valid signature.

Usage:

```
SRX shelf 7> sigcheck -?
usage: sigcheck [ -ls signature ]
```

Command argument	Description
[-l]	Displays the signature details. You can provide the output of **sigcheck -l** to the Coraid Technical Assistance Center to obtain a flash signature.
[-s]	Accepts a signature parameter and directs **sigcheck** to validate the signature. If the signature is valid, **sigcheck** stores the signature on the SR/SRX boot flash for future use.
[signature]	Specify a signature parameter.

■ **disks**

The **disks** command displays the following information about the disks in the SR/SRX.

Heading	Description
DISK	Disk in the form of **shelf.slot**
SIZE	Total capacity of the disk in Gigabytes.
ROLE	A disk can fulfill any one of the following roles: • A component of a LUN expressed as a three-part term indicating the correspondence between a physical disk(s) in an appliance and its role (if any) as a logical drive(s) within a RAID set. For details about the three-part term, see Understanding EtherDrive RAID notation. • **spare**, if the disk is configured to be a spare. • Nothing, if the disk is not a component of a LUN and not a spare.
MODEL	Disk manufacturer and model.
FIRMWARE	Firmware version.
MODE	Displays the connection mode. Modes are determined by auto-negotiation and are not controllable.

Usage:

```
SRX shelf 7> disks -?
usage: disks [ -pcs ] [ shelf.slot ]
SRX shelf 7>
```

Command argument	Description
[-p]	Displays information about the disks in the appliance.
[-c]	Displays the configuration strings associated with all disks in the appliance. Disk status can be one of the following: • **normal**—The disk is in a healthy state. • **clean**—The disk is in a healthy state; the last update event was a shelf restart or a LUN ejection. • **failed**—The disk failed and is being replaced by another disk. • **defunct**—The disk failed and its role in the LUN is now fulfilled by a replacement disk. • **replaced**—The disk is in the process of replacing a failed disk.
[-s]	Reports the SMART status. Valid SMART states are **normal**, **threshold exceeded**, **disabled**, and **unknown**. The **unknown** state is displayed when communication with a disk fails.
[shelf.slot]	Shelf and slot number of the disk you want information about.

(*Continued on next page*)

Note: The following example lists only eight disks. Your SR/SRX appliance may have more disks.

```
SRX shelf 7> disks
DISK        SIZE      ROLE                     MODEL  FIRMWARE           MODE
7.0    2000.398GB    0.0.0   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.1    2000.398GB    1.0.0   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.2    2000.398GB    2.0.0   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.3    2000.398GB    8.0.0   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.4    2000.398GB    8.0.1   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.5    2000.398GB    8.0.2   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.6    2000.398GB    8.0.3   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
7.7    2000.398GB    9.0.0   WDC WD2003FYYS-02W0B0  01.01D01    sata 3.0Gb/s
```

If disk information cannot be obtained, disk state is displayed. Disk states include **up**, **missing**, **initing**, or **connectfail**. The **connectfail** state indicates that the SR/SRX has given up trying to initialize a disk. The **connectfail** state is entered only when a disk is functioning unpredictably and the SR/SRX has stopped communicating with the disk in order to conserve system resources. To manually reset the disk and retry initialization, you must use the **resetdisk** command.

■ **smartenable**

The **smartenable** command enables the SMART command features on a disk. The SMART status (Self Monitoring, Analysis, and Reporting Technology) of disks is displayed when the **disks -s** command is issued. Enablement is maintained by the disk and persists across power cycles. For more information, see SMART support.

Usage:

```
SRX shelf 7> smartenable -?
usage: smartenable shelf.slot ...
SRX shelf 7>
```

Command argument	Description
shelf.slot ...	Enter the shelf address and slot number of the disk whose SMART features you want to enable.

■ **smartdisable**

The **smartdisable** command disables the SMART command features on a disk. This is primarily useful when an administrator no longer wants to be notified about a disk that has exceeded an error threshold. Coraid recommends always enabling SMART on disks in the SR/SRX.

Usage:

```
SRX shelf 7> smartdisable -?
usage: smartdisable shelf.slot ...
SRX shelf 7>
```

Command argument	Description
shelf.slot ...	Enter the shelf address and slot number of the disk whose SMART features you want to disable.

■ **resetdisk**

The **resetdisk** command manually resets the connection to one or more disk slots. It is only useful when a disk has entered the **connectfail** state.

Usage:

```
SRX shelf 7> resetdisk -?
usage: resetdisk shelf.slot ...
SRX shelf 7>
```

Command argument	Description
shelf.slot ...	Enter the shelf address and slot number of the disk whose connection you want to reset.

■ **iostats**

The **iostats** command displays throughput and latency information for configured LUNs and the disks backing them. Without arguments **iostats** displays the following statistics for all LUNs on the shelf:

Heading	Description
LUN	The LUN presented to initiators.
DISK	Three-part term indicating the correspondence between a physical disk(s) in an appliance and its role (if any) as a logical drive(s) within a RAID set. For details about the three-part term, see Understanding EtherDrive RAID notation.
READ	The calculated average amount of data (in MB/s) read from a RAID drive component within the specified time period.
WRITE	The calculated average amount of data (in MB/s) written to a RAID drive component within the specified time period.
AVG **MAX**	Displays latency statistics (in milliseconds) for individual I/O commands issued to the LUN/drive. By default, statistics displayed are an average over the last 4 seconds.

Usage:

```
SRX shelf 7> iostats -?
usage: iostats [ -dl ] [ -s secs ] [ lun ... ]
SRX shelf 7>
```

Command argument	Description
[-d]	Displays only RAID drive component statistics.
[-l]	Displays only LUN statistics.
[-s secs]	Specifies the prior time period (from 1 to 32 seconds) over which to calculate the average (the default is 4 seconds).
[lun ...]	Displays statistics only for the specified LUN.

Example:

```
SRX shelf 7> iostats
LUN    DISK        READ   AVG   MAX     WRITE   AVG   MAX
8                0.000MB  0ms   0ms    0.000MB  0ms   0ms
       8.0.0     3.407MB  0ms  14ms    0.008MB  0ms   0ms
       8.0.1     3.407MB  0ms   5ms    0.000MB  0ms   0ms
       8.0.2     3.407MB  0ms   8ms    0.000MB  0ms   0ms
       8.0.3     3.407MB  0ms   6ms    0.000MB  0ms   0ms
       8.0.4     3.407MB  0ms   4ms    0.000MB  0ms   0ms
```

■ **list**

The **list** command displays the LUNs currently presented to initiators by the SR/SRX. If a **slot** is not specified, all current LUNs on the shelf are displayed.

Usage:

```
SRX shelf 7> list -?
usage: list [ -l ] [ lun ... ]
SRX shelf 7>
```

Command argument	Description
[-l]	Displays detailed information about the LUN's components.
[lun ...]	Specify the LUN you want to evaluate.

Example:

```
SRX shelf 7> list -l
```

Level 1 `8 6001.197GB online`
Level 2   `8.0   6001.197GB raid5 normal`
Level 3
```
        8.0.0 normal    2000.399GB 7.3
        8.0.1 normal    2000.399GB 7.4
        8.0.2 normal    2000.399GB 7.5
        8.0.3 normal    2000.399GB 7.6
```

Level 1 displays the LUN, size, state, and optionally, a descriptive label within single quotes (not shown in this example). The state of a LUN is either online or offline, indicating whether it is or is not accepting requests.

Level 2 displays the LUN, RAID size, RAID type, state, and during parity initialization, percentage of completion. The state of the RAID is one of the following:

State	Description
initing	RAID is initializing parity.
recovering	RAID is rebuilding a replaced component.
degraded	RAID is operating with failed or missing components.
failed	RAID has sustained too many component failures and is unusable.
normal	RAID is operating normally.

(*Continued on next page*)

Level 3 displays the drive components of the RAID (see Understanding EtherDrive RAID notation), one per line. Each line displays the drive's RAID component address, state, size, and physical `shelf.slot` location. The state of the drive component is one of the following:

State	Description
`failed`	Drive has failed.
`replaced`	Drive is being used as a replacement for a failed drive.
`missing`	Drive is placeholder for a missing drive. This is possible if all components are not available at startup time.
`normal`	Drive is operating normally.

■ make

The **make** command creates a LUN. Each LUN contains one RAID. From the host system on the Ethernet SAN the SR/SRX looks like a shelf of LUNs. Placing a LUN online without an initiator mask broadcasts the LUN to all servers on the SAN. Newly-created LUNs are offline by default to allow you to configure a MAC mask to manage its visibility to initiators. There is one exception to this rule: LUNs created with the **jbod** command are placed online automatically. (For details, see the **jbod** command.)

The SR/SRX configures LUN RAID component devices using the three-part naming scheme described in Understanding EtherDrive RAID notation. For example, the term **8.0.1** describes the second drive component (**1**) of **LUN 8**.

Usage:

```
SRX shelf 7> make -?
usage: make lun raidtype [ shelf.slot ... ]
SRX shelf 7>
```

Command argument	Description
lun	Specify a number between 0 and 254 inclusive. The number must be unique within the shelf.
raidtype	The **raidtype** may be any one of the following: • **jbod**—A single-disk LUN. Default I/O mode is sequential. • **raid0**—Block-level data striping with no parity or mirroring. Default I/O mode is sequential. • **raid1**—Disk mirroring with no parity or striping. Default I/O mode is random. • **raid5**—Block-level data striping with distributed parity. Default I/O mode is sequential. • **raid6rs**—Block-level data striping with double distributed parity using Reed-Solomon syndromes. Default I/O mode is sequential. • **raid10**—A stripe of mirrors RAID. Default I/O mode is random. The drive list must contain an even number of elements. The list is split at the center into two equal ordered sets. Mirrors are constructed across the pairs of drives in the same position in each set. Once the mirrors are chosen, a stripe is placed across all mirrored elements. See the example below. • **raw**—A raw block-for-block presentation of a single underlying disk. Since no portion of the disk is used for RAID configuration storage, the LUN does not persist across reboot. • **update**—A raw-based device for appliance update; a pseudo-type for a raw device over a RAM-based disk. No component drives should be specified when declaring the update LUN. An update LUN does not persist across reboot. For an explanation of the software update procedure, see Updating the CorOS.
[shelf.slot ...]	Type the shelf and slot number(s) of the disks to be used as the component of the RAID.

(*Continued on next page*)

In the **raid10** example below, the mirrored elements of LUN 9 are {7.7, 7.10}, {7.8, 7.11}, and {7.9, 7.12}.

Example:

```
SRX shelf 7> make 9 raid10 7.7-12
SRX shelf 7> list
  9 6001.197GB offline
SRX shelf 7> online 9
SRX shelf 7> list -l
 9 6001.197GB online
  9.0   6001.197GB raid10 normal
    9.0.0  normal   2000.399GB 7.7
    9.0.1  normal   2000.399GB 7.8
    9.0.2  normal   2000.399GB 7.9
    9.0.3  normal   2000.399GB 7.10
    9.0.4  normal   2000.399GB 7.11
    9.0.5  normal   2000.399GB 7.12
SRX shelf 7>
```

■ iomode

The **iomode** command displays the current access pattern optimization setting for LUNs in a shelf. (For the default I/O mode of supported LUN types, see the **make** command.) You can change the I/O mode of JBOD, RAID 0, RAID 1, and RAID 10 LUNs to **sequential** or **random** by issuing the **setiomode** command. Issuing **iomode** without arguments displays the I/O mode of all LUNs on the shelf.

Usage:

```
SRX shelf 7> iomode -?
usage: iomode [ lun ]
SRX shelf 7>
```

■ **setiomode**

The **setiomode** command sets the access pattern optimization setting of the specified LUN to **sequential** or **random**. For the default I/O mode of supported LUN types, see the **make** command.

Note: RAID 5 and RAID 6 are configured to **sequential** mode by default and their I/O mode cannot be changed.

Usage:

```
SRX shelf 7> setiomode -?
usage: setiomode mode lun ...
SRX shelf 7>
```

Command argument	Description
mode	• **sequential**— Optimizes the LUN access pattern for sequential I/O. This is the default I/O mode for the following LUN types: – JBOD – RAID 0 – RAID 5 (cannot be changed) – RAID 6 (cannot be changed) • **random** — Optimizes the LUN access pattern for random I/O. This is the default I/O mode for the following LUN types: – RAID 1 – RAID 10
lun	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to set the I/O mode of more than one LUN at a time.

Example:

```
SRX shelf 7> iomode
LUN         MODE
8     sequential
9     random
SRX shelf 7>

SRX shelf 7> setiomode sequential 9
SRX shelf 7> iomode
LUN         MODE
8     sequential
9     sequential
SRX shelf 7>
```

■ when

The **when** command lists RAID devices in the initing or recovering state and displays their percentage complete, I/O rate, and estimated time to completion.

Usage:

```
SRX shelf 7> when -?
usage: when
SRX shelf 7>
```

Time is formatted as hours:minutes:seconds. For example:

```
SRX shelf 7> when
0.0    1.29%  235073 KBps  0:46:06 left
SRX shelf 7>
```

■ online

The **online** command places one or more LUNs online, making them accessible to initiators on the Ethernet SAN. When issued without an argument, **online** lists all LUNs currently online.

Placing a LUN online without an initiator mask broadcasts the LUN to all servers on the SAN. Newly-created LUNs are offline by default to allow you to configure a MAC mask to manage its visibility to initiators. There is one exception to this rule: LUNs created with the **jbod** command are placed online automatically. (For details, see the **jbod** command.)

Usage:

```
SRX shelf 7> online -?
usage: online [ lun ... ]
SRX shelf 7>
```

Command argument	Description
[lun ...]	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to place more than one LUN online at a time.

■ **offline**

The **offline** command places one or more LUNs into the offline state. While offline, LUNs are not accessible on the Ethernet SAN. When issued without an argument, **offline** lists all LUNs currently offline.

Usage:

```
SRX shelf 7> offline -?
usage: offline lun [...]
SRX shelf 7>
```

Command argument	Description
lun [...]	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to place more than one LUN offline at a time.

Note: All LUNs must be placed offline before you attempt to change the shelf address.

■ **mask**

The **mask** command manages client access to online LUNs. Without arguments, **mask** displays all LUNs and their mask lists. Given only LUN arguments, **mask** displays the MAC mask list for all specified LUNs.

Usage:

```
SRX shelf 7> mask -?
usage: mask lun ... [ +mac ... ] [ -mac ... ]
SRX shelf 7>
```

Command argument	Description
lun ...	Specify the name of the LUN or a series of LUNs for which you want to set/remove a MAC mask or whose MAC mask list(s) you want to evaluate.
[+mac ...]	Prefix the MAC address with a plus (+) to add a MAC mask.
[-mac ...]	Prefix the MAC address with a minus (-) to remove a MAC mask.

■ **spare**

The **spare** command displays and manages the disk(s) in the spare pool. If a disk fails in a RAID 1, RAID 5, RAID 6, or RAID 10 LUN, the SR/SRX attempts to recruit a disk from the spare pool to replace it. If the given spare disk is already in use, an error occurs.

Disks are recruited from the spare pool according to a best-fit algorithm. When a disk fails in any of the RAID types listed above, the spare pool is checked for the smallest disk able to satisfy the RAID's need. For example, if the spare pool contains 3TB and 2TGB disks and a failure occurs on a RAID needing a 1TB disk, a 2TB disk is recruited as the replacement.

A spare pool serves only the shelf in which it was created. Without arguments, **spare** displays all disks in the spare pool.

Usage:

```
SRX shelf 7> spare -?
usage: spare [ shelf.slot ... ]
SRX shelf 7>
```

Command argument	Description
`[ shelf.slot ... ]`	Specify the disk(s) you want to assign to the spare pool. You can assign multiple disks to the pool simultaneously using a dash (-) to indicate a range (see the example below).

Example:

```
SRX shelf 7> spare 7.13-14
SRX shelf 7> spare
7.13 2000.399GB
7.14 2000.399GB
SRX shelf 7>
```

■ **rmspare**

The **rmspare** command removes disks from the spare pool.

Usage:

```
SRX shelf 7> rmspare -?
usage: rmspare shelf.slot ...
SRX shelf 7>
```

Command argument	Description
shelf.slot ...	Specify the disk(s) you want to remove from the spare pool. You can remove multiple disks from the pool simultaneously using a dash (-) to indicate a range (see the example below).

Example:

```
SRX shelf 7> spare
7.13 2000.399GB
7.14 2000.399GB
SRX shelf 7> rmspare 7.13
SRX shelf 7> spare
7.14 2000.399GB
SRX shelf 7>
```

■ **spareled**

The **spareled** command enables or disables the blinking activity of the red LED on disks assigned to the spare pool. The activity is disabled by default.

Usage:

```
SRX shelf 7> spareled -?
usage: spareled [enable|disable]
SRX shelf 7>
```

■ **fail**

The `fail` command changes the state of a RAID component to `failed`. It is a convenient way to test how an SRX behaves in a failure condition.

Usage:

```
SRX shelf 7> fail -?
usage: fail lun.part.drive
SRX shelf 7>
```

Command argument	Description
`lun.part.drive`	Specify the RAID component you want to put into a failed state.

Example:

```
SRX shelf 7> list -l
 8 6001.197GB online
   8.0   6001.197GB raid5 normal
     8.0.0 normal    2000.399GB 7.3
     8.0.1 normal    2000.399GB 7.4
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6
SRX shelf 7> fail 8.0.1
SRX shelf 7> list -l
 8 6001.197GB online
   8.0   6001.197GB raid5 degraded
     8.0.0 normal    2000.399GB 7.3
     8.0.1 failed    2000.399GB 7.4
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6

SRX shelf 7>
```

■ **remove**

The **remove** command removes one or more LUNs. Issuing the **remove** command clears the RAID configuration on the LUN's component drives and releases for reuse all drives used in the component RAID. A LUN must be placed offline before it can be removed (see **offline**).

All data on a LUN is lost when it is removed.

Usage:

```
SRX shelf 7> remove -?
usage: remove lun ...
SRX shelf 7>
```

Command argument	Description
lun ...	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to remove more than one LUN at a time.

Example:

```
SRX shelf 7> list -l
 8 6001.197GB online
   8.0   6001.197GB raid5 normal
     8.0.0 normal    2000.399GB 7.3
     8.0.1 normal    2000.399GB 7.4
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6

SRX shelf 7> offline 8
SRX shelf 7> remove 8
Are you sure you want to perform this action? y/n? [N]
Removing lun(s): 8
SRX shelf 7>
```

■ replace

The **replace** command replaces a **failed** component in RAID 1, RAID 5, RAID 6, and RAID 10 LUNs with a spare disk. After the **failed** disk has been replaced, the RAID is reconstructed. The replacement disk you specify must be listed when you issue the **disks** command, not in a **failed** state, and not in use as a spare or RAID component, with one exception: it is permissible to replace a RAID component with itself to force recovery of the existing component drive.

Usage:

```
SRX shelf 7> replace -?
usage: replace lun.part.drive shelf.slot
SRX shelf 7>
```

Command argument	Description
`lun.part.drive`	Specify the RAID component you want to replace.
`shelf.slot`	Specify the replacement disk.

Example:

```
SRX shelf 7> list -l
 8 6001.197GB offline
   8.0   6001.197GB raid5 degraded
     8.0.0 normal    2000.399GB 7.3
     8.0.1 failed    2000.399GB 7.4
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6

SRX shelf 7> replace 8.0.1 7.15
SRX shelf 7> list -l
 8 6001.197GB offline
   8.0   6001.197GB raid5 recovering, degraded
     8.0.0 normal    2000.399GB 7.3
     8.0.1 replaced  2000.399GB 7.15 0.03%
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6

SRX shelf 7>
```

■ **eject**

The **eject** command ejects one or more LUNs. It is similar to the **remove** command, except **eject** does not clear the RAID configuration on the component drives of the LUN. The **eject** command is useful when you want to move a LUN from one shelf to another without shutting down the SR/SRX. A LUN must be placed offline before it can be ejected (see **offline**).

Usage:

```
SRX shelf 7> eject -?
usage: eject lun ...
SRX shelf 7>
```

Command argument	Description
lun [...]	Specify the LUN you want to eject. You can eject multiple LUNs simultaneously using a dash (-) to indicate a range (see the example below).

Example:

```
SRX shelf 7> list -l
 8 6001.197GB online
   8.0   6001.197GB raid5 normal
     8.0.0 normal    2000.399GB 7.3
     8.0.1 normal    2000.399GB 7.4
     8.0.2 normal    2000.399GB 7.5
     8.0.3 normal    2000.399GB 7.6

SRX shelf 7> offline 8
SRX shelf 7> eject 8
Are you sure you want to perform this action? y/n? [N]
Ejecting lun(s): 8
SRX shelf 7>
```

■ **restore**

The **restore** command reads the configuration from all disks in the SR/SRX and assembles LUNs and spares. When issued without arguments, the **restore** command ignores any disks that do not belong to the configured shelf address of the SR/SRX (such as disks removed from another SR/SRX appliance and installed in the SR/SRX). You must use arguments to restore LUNs that once resided on another appliance (see below). The **restore** command runs without arguments when the appliance is booting.

Usage:

```
SRX shelf 7> restore -?
usage: restore [ -l ] [ oldshelfno [ oldlun [ newlun ] ] ]
SRX shelf 7>
```

Command argument	Description
[-l]	Displays the actions that **restore** will perform and exits without performing any of them. Issuing **-l** may display undocumented formats and flags that are for internal use only and not relevant to end users.
[oldshelf]	Imports LUNs and spares that once resided on another shelf.
[oldlun]	Imports only a specified LUN. The resulting LUN will be identical to **oldlun**.
[newlun]	If the action of **oldlun** is undesirable, use the **newlun** argument to specify a new LUN.

Example:

```
SRX shelf 7> list -l
SRX shelf 7> restore -l
Reading config information from drives ... done.
make -r 8 raid5 7.3:c 7.4:c 7.5:c 7.6:c
online 8
SRX shelf 7>
```

Old and new LUN meta-data formats — To improve performance, the LUN meta-data format was changed in CorOS version SR-6.0.0. Installing a LUN created on an appliance running an earlier CorOS version into an appliance running SR-6.0.0 or later generates the following warning:

```
warning: old LUN format detected. Updating to a newer format
will destroy existing data. Please contact support if you are
attempting to recover a failed LUN. This operation cannot be
reversed. Would you like to update the LUN format? y/n? [N]
```

There is no performance penalty for choosing not to update the LUN to the new format. But if you want to update the LUN to the new format *and* preserve data, you must first copy the data off the old-format LUN, create a new LUN, and then copy the data to the new LUN.

■ **update**

The **update** command processes the **tarc** update file on the update LUN to update the CorOS on the SR/SRX. The SR/SRX automatically reboots the SR/SRX after the update is complete. For a detailed explanation of the software update procedure, see Updating the CorOS.

Do not install CorOS version SR-5.1.1 on legacy EtherDrive series SR420, SR421, and SR1520 appliances. Doing so will cause those appliances to become inoperable. (You are prevented from installing CorOS version SR-6.0.0 or later on these legacy appliances.) EtherDrive series SR420, SR421, and SR1520 should run CorOS version 20090929.

Usage:

```
SRX shelf 7> update -?
usage: update [ -l ]
SRX shelf 7>
```

Command argument	Description
`[ -l ]`	Displays the LUN being used as the update target and exits without performing any action.

■ **jbod**

The **jbod** command initializes a LUN over a single disk, assigns it the same number as the slot number you specify with the **shelf.slot** argument, and places the LUN online. To create a JBOD with a number other than the slot number, manually create the JBOD using the **make** command and specify a different number.

The following two sets of commands have an identical result:

```
SRX shelf 7> jbod 7.0
```

and

```
SRX shelf 7> make 0 jbod 7.0
SRX shelf 7> online 0
```

Usage:

```
SRX shelf 7> jbod -?
usage: jbod shelf.slot ...
SRX shelf 7>
```

Command argument	Description
`shelf.slot ...`	Specify the shelf and disk slot number you want to associate with the single -disk LUN you will create with the **jbod** command. You can create multiple JBODs simultaneously using a dash (-) to indicate a range.

Note: Using the **make** command to create a multi-disk JBOD is not supported. For example, the following is not a valid command:

```
SRX shelf 7> make 0 jbod 7.0-2
```

■ **label**

The **label** command assigns a descriptive text label to an existing LUN. You can display the label by issuing the **list** command. The length of the label may not exceed 16 characters.

A label that contains spaces must be enclosed in quotes (').

Usage:

```
SRX shelf 7> label -?
usage: label name lun ...
SRX shelf 7>
```

Command argument	Description
name	Type a descriptive label for the LUN.
lun	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to apply the same label to multiple LUNs at once.

Example:

```
SRX shelf 7> list
 8 6001.197GB online
SRX shelf 7> label 'Sales Dept' 8
SRX shelf 7> list
 8 6001.197GB online 'Sales Dept'
SRX shelf 7>
```

■ **unlabel**

The **unlabel** command removes the label (if any) from a LUN. To set a label, issue the **label** command.

Usage:

```
SRX shelf 7> unlabel -?
usage: unlabel lun ...
SRX shelf 7>
```

Command argument	Description
lun	Specify a LUN or a series of sequentially numbered LUNs as a range indicated by a dash (-). This allows you to remove a particular label from more than one LUN at a time.

■ **vlan**

The **vlan** command associates a **lun** with an IEEE 802.1Q **vlan id**. The association limits the LUN to communication with a single **vlan id**. Multiple LUNs may be associated with a single **vlan id**. A valid **vlan id** is a number inclusively between 1 and 4094. Without arguments **vlan** displays a table of all LUN and VLAN associations.

Usage:

```
SRX shelf 7> vlan -?
usage: vlan [ -c ] [ lun ] [ vlan id ]
SRX shelf 7>
```

Command argument	Description
[-c]	Typing **-c** and then an existing **lun** clears the **vlan id** from the specified **lun**.
[lun]	Type a number to specify the **lun** you want to evaluate, associate, or dissociate. Issuing **vlan** with a single **lun** displays a table with a single entry indicating a LUN-VLAN association.
[vlan id]	Type a number inclusively between 1 and 4094.

Example:

```
SRX shelf 7> vlan
LUN     VLAN
8
9
SRX shelf 7> vlan 8 100
SRX shelf 7> vlan 9 200
SRX shelf 7> vlan 8
LUN     VLAN
8       100
SRX shelf 7> vlan
LUN     VLAN
8       100
9       200
SRX shelf 7> vlan -c 9
SRX shelf 7> vlan
LUN     VLAN
8       100
9
SRX shelf 7>
```

■ **slotled**

The **slotled** command interacts with the red LED indicators at each disk slot. Without arguments, **slotled** displays the state of the specified disk. Specifying the slot argument in combination with any other argument produces specific LED behavior (see the table below). Physically ejecting or inserting a disk resets its LED state. The audible alarm is active if any LED is in the **fault** state. The SR/SRX automatically sets each disk's LED state in accordance with the RAID configuration.

Usage:

```
SRX shelf 7> slotled -?
usage: slotled slot [ locate | fault | rebuild | reset | spare ]
SRX shelf 7>
```

Command arguments	Description	LED behavior
slot	Type a number to specify a disk slot.	N/A
[locate]	Type to produce the associated LED behavior.	LED blinks rapidly (4Hz).
[fault]	Type to produce the associated LED behavior.	LED light remains on (solid) and an audible alarm sounds.
[rebuild]	Type to produce the associated LED behavior.	LED blinks slowly (1Hz).
[reset]	Type to produce the associated LED behavior.	LED is off. Physically ejecting or inserting a disk has the same effect as the **reset** command.
[spare]	Type to produce the associated LED behavior.	LED blinks rapidly twice, pauses, and then repeats.

Example:

```
SRX shelf 7> slotled 0
reset
SRX shelf 7> slotled 0 locate
SRX shelf 7> slotled 0
locate
SRX shelf 7> slotled 0 reset
SRX shelf 7> slotled 0
reset
SRX shelf 7>
```

■ **fans**

The **fans** command reports the RPM of each fan on the motherboard. A warning displays if one or more fans are missing.

Usage:

```
SRX shelf 7> fans -?
usage: fans
SRX shelf 7>
```

Example:

```
SRX shelf 7> fans
FAN#      RPM
fan0      4440
fan1      4218
fan2      4218
fan3      4218
fan4      4218
fan5      4218
fan6      4218
SRX shelf 7>
```

■ **power**

The **power** command displays the status, temperature, and fan RPM for all power supplies in the appliance. If a particular power supply is not found, it is reported as missing.

Note: Issuing the **power** command from some SR/SRX appliances may return the message **No power supply is reporting failure**.

Usage:

```
SRX shelf 7> power -?
usage: power
SRX shelf 7>
```

Example:

```
SRX shelf 7> power
PSU#      STATUS   TEMP    FAN1RPM
ps0           up   41C      12251
ps1           up   43C        824
SRX shelf 7>
```

■ **temp**

The **temp** command displays the temperature of the power supplies and CPU. On some SR/SRX models the ambient system temperature is also displayed.

Note: System and power supply temperatures may not be available when the **temp** command is issued from some EtherDrive SR821 appliances. Power supply temperature may not be available when the **temp** command is issued from some SRX4200 appliances.

Usage:

```
SRX shelf 7> temp -?
usage: temp
SRX shelf 7>
```

Example:

```
SRX shelf 7> temp
LOCATION    TEMP
cpu         48C
sys         35C
ps0         35C
ps1         35C
SRX shelf 7>
```

■ **sync**

The **sync** command flushes the SR/SRX memory cache to disk. This command is intended for use by the Coraid Technical Assistance Center.

Usage:

```
SRX shelf 7> sync -?
usage: sync
SRX shelf 7>
```

Workflow examples

The following example configures all disks in an SR/SRX appliance as JBODs.

Note: The following example lists only eight disks. An actual SRX appliance may have more disks.

```
SRX shelf 7> jbod 7.0-7
SRX shelf 7> list -l
 0 2000.399GB online
  0.0   2000.399GB jbod normal
    0.0.0 normal    2000.399GB 7.0
 1 2000.399GB online
  1.0   2000.399GB jbod normal
    1.0.0 normal    2000.399GB 7.1
 2 2000.399GB online
  2.0   2000.399GB jbod normal
    2.0.0 normal    2000.399GB 7.2
 3 2000.399GB online
  3.0   2000.399GB jbod normal
    3.0.0 normal    2000.399GB 7.3
 4 2000.399GB online
  4.0   2000.399GB jbod normal
    4.0.0 normal    2000.399GB 7.4
 5 2000.399GB online
  5.0   2000.399GB jbod normal
    5.0.0 normal    2000.399GB 7.5
 6 2000.399GB online
  6.0   2000.399GB jbod normal
    6.0.0 normal    2000.399GB 7.6
 7 2000.399GB online
  7.0   2000.399GB jbod normal
    7.0.0 normal    2000.399GB 7.7
SRX shelf 7>
```

Installing the SR/SRX in an Equipment Rack

There are a variety of rack units on the market, so the rack assembly procedure that came with your unit may differ slightly from the instructions in this section. If necessary, refer to both instructions.

Note: SR/SRX appliances can weigh more than 50 lbs. To avoid injury, always use two people to install an SR/SRX appliance in a rack.

Components of the rail assemblies

The shipping box includes left and right rail pairs. Each pair consists of an inner and an outer segment which you must separate prior to assembly.

- **Inner rails**—The inner rails attach to the left and right sides of the chassis and are secured on each side by a locking mechanism and a single screw. Left and right inner rails are identified by initials stamped into the metal (LH and RH, respectively).

- **Outer rails**—The tool-less outer rails attach to the equipment rack without screws.

Note: Use the inner and outer rail sections that shipped with the SR/SRX. Mixing rail sections from different sets can cause the SR/SRX to be unstable in the rack.

Outer rail   **Inner rail**

Left

Inner rail

Outer rail

Right

Front of chassis   RH   **Rear of chassis**

RIght inner rail

Attaches to front of rack   **Attaches to rear of rack**

Right outer rail

Installation sticker
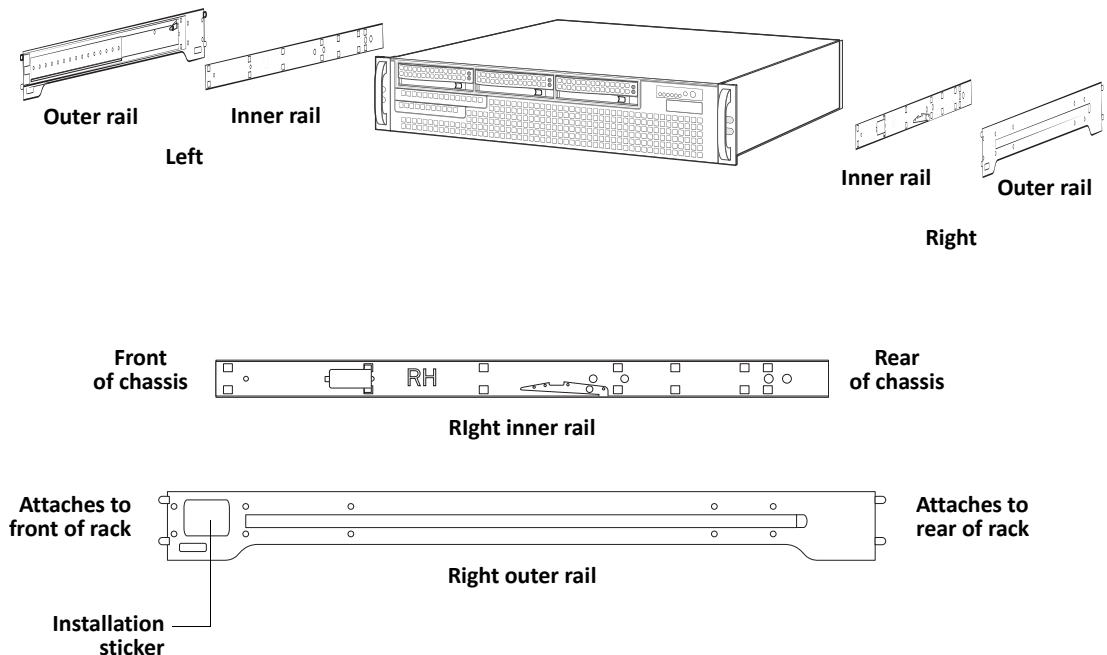
Figure 4:   Rack rail components

Attaching the rails to the chassis and the rack

To attach the inner rails to the chassis

1. **Separate the inner and outer rail segments.**

   Fully extend the rails, and then press down on the latch on the inner rail to separate the pair.


   Extend the rail segments

   Press down on the latch

   Separate the rail segments
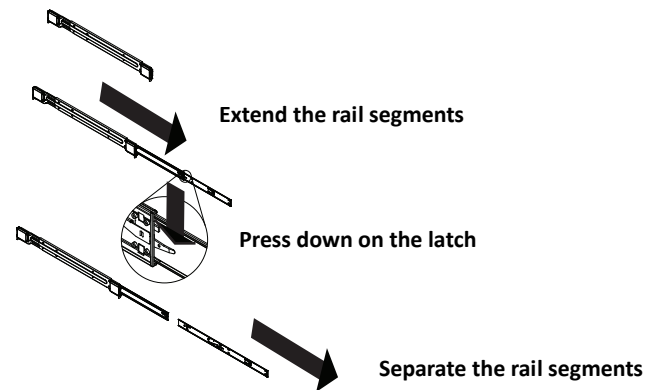
   Figure 5:   Separating the rail segments

2. **Identify the left and right inner rails by locating the LH and RH stamped into the metal.**

3. **Align the hooks on one side of the chassis with the corresponding holes in the appropriate inner rail, place the rail against the chassis and slide it toward the front of the chassis until it locks in place.**

4. **Secure the rail with the screw.**
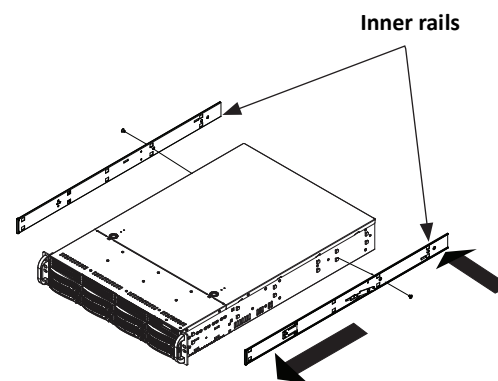
   Inner rails

   Figure 6:   Attaching the inner rails

5. **Repeat the previous step to secure the other inner rail to the other side of the chassis.**

   Proceed to To attach the outer rails to the rack.

To attach the outer rails to the rack

1. **Adjust the outer rail as necessary to fit the rack.**

   Press upward on the locking-tab to release the ball-bearing shuttle portion of the outer rail.

2. **Determine exactly where in the rack you will install the ends of each outer rail.**

   The rails attach to the rack via spring-loaded pegs and metal hooks at both ends of the rail. (See the installation label on each outer rail.)

3. **Insert the hooks and spring-loaded tabs on both ends of the outer rail into the target holes in the rack.**

4. **If necessary, secure the ends of the rails with screws.**
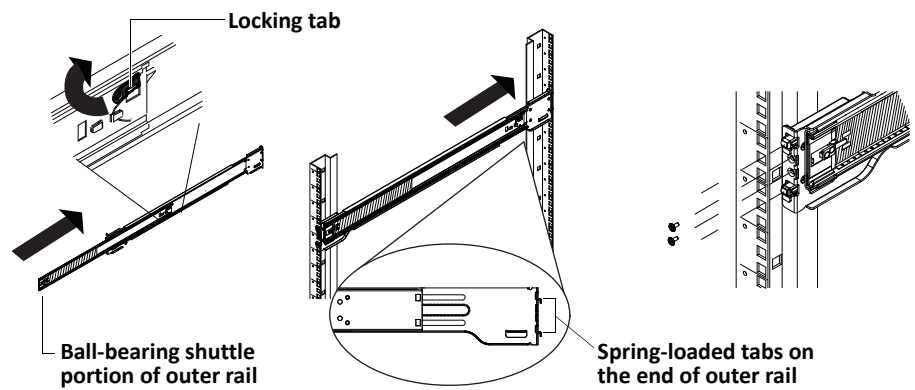
Figure 7:   Attaching an outer rail to the rack

Installing the chassis in the rack

Ball-bearing shuttle
portion of outer rail
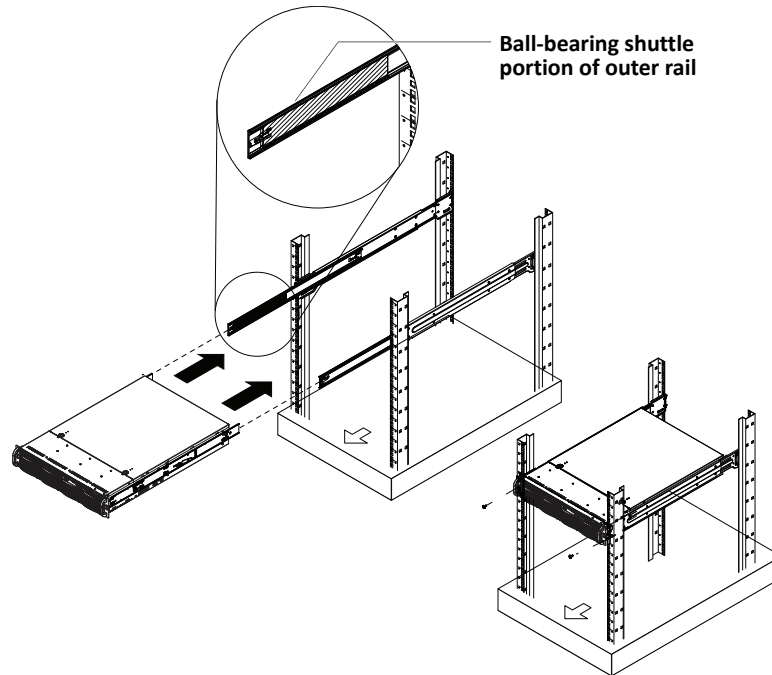
Figure 8: Sliding the chassis into the rack

To install the chassis into the rack

Note: With disks installed, an SR/SRX appliance may weigh more than 50 lbs. To avoid injury, always use two people to install a heavy SR/SRX appliance in a rack.

1. **Make sure that the inner rails are securely attached on the chassis and the outer rails are securely installed in the rack.**

2. **Extend the ball-bearing shuttle portions of both outer rails to their front locking positions.**

3. **Align the inner rails (on the chassis) with the outer rails (on the rack) and install the SR/SRX in the rack.**

   - Slide the inner rails into the outer rails, keeping even pressure on both sides.

   - When it becomes necessary to do so, press to unlock the locking-tabs on the outer rails and fully install the appliance into the rack.

4. **(Optional) Insert and tighten the screws that hold the front of the appliance to the rack.**

Hardware Specifications and Precautions

Physical and environmental specifications

Form Factor	2U—SRX3500 / SR821
	3U—SRX2800 / SR1621
	4U—SRX4200 / SRX3200 / SR2421
Dimensions	SRX3500—3.5" high x 17.2" wide x 24.8" deep (89mm x 437mm x 630mm)
	SR821—3.5" high x 17.2" wide x 25.5" deep (89mm x 437mm x 648mm)
	SRX2800 / SR1621—5.2" high x 17.2" wide x 25.5" deep (132mm x 437mm x 648mm)
	SRX3200 / SR2421—7" high x 17.2" wide x 26" deep (178mm x 437mm x 660mm)
	SRX4200—7" high x 17.2" wide x 27.5" deep (178mm x 437mm x 699mm)
Weight	SRX3500—53 lbs (24 kg)
	SR821—52 lbs (23.6kg)
	SRX2800 / SR1621—72 lbs (32.7kg)
	SRX3200 / SR2421—75 lbs (34.7kg)
	SRX4200—80 lbs (36.3kg)
Operating Environment	Operating Temperature Range 10-35°C (50-95°F) Non-Operating Temperature Range -40 to +70°C (-40 to 158°F) Humidity Range 8-90% non-condensing Non-Operating Humidity Range 5-95% non-condensing
Fans	SRX3500—3x 80mm 6300 RPM PWM fans
	SR821—3x 80x38mm 4-pin PWM fans
	SRX2800 / SR1621—3x 80mm Hot-swap PWM fans; 2x 80mm rear-exhaust fans
	SRX3200 / SR2421—3x 5000 RPM Hot-swap PWM cooling fans 2x 5000 RPM Hot-swap Rear Exhaust PWM cooling fans
	SRX4200—7x 80mm Hot-Swap cooling fans

Physical and environmental specifications

Regulatory (Power Supply/Safety/EMC)	USA - UL listed, FCC Canada - CUL listed Germany - TUV Certified EN 60950/IEC 60950-Compliant CB report CCC Certification
Power	SRX3500 900W (1+1) Redundant AC-DC power supply with PFC AC Voltage 100-240V, 60-50 Hz, 11 - 4.5 Amp +5V 50 Amp, +5V standby 4 Amp +12V 75 Amp, -12V 0.6 Amp, +3.3V 30 Amp SR821 720W (1+1) Redundant AC-DC high-efficiency power supply with PMBus AC Voltage 100-240V, 50-60 Hz, 4 - 9 Amp +5V 45 Amp, +5V standby 3 Amp +12V 59 Amp, -12V 0.6 Amp, +3.3V 24 Amp SRX2800 / SR1621 800W (1+1) Redundant AC-DC high-efficiency power supply with PFC AC Voltage 100-240V, 50-60 Hz, 10- 4 Amp +5V 30 Amp, +5V standby 4 Amp +12V 66 Amp, -12V 0.6 Amp, +3.3V 24 Amp SRX3200 / SR2421 900W (1+1) Redundant AC-DC power supply with PFC AC Voltage 100-240V, 60-50 Hz, 11 - 4.5 Amp +5V 50 Amp, +5V standby 4 Amp +12V 75 Amp, -12V 0.6 Amp, +3.3V 30 Amp SRX4200 1400W (1+1) high-efficiency power supply with PMBus AC input: • 1100W: 100-140V, 50-60 Hz, 9.5 - 13.5 Amp • 1400W: 180-240V, 50-60 Hz, 7.0 - 9.5 Amp DC output +5V standby: 4 Amp DC output +12V: 92 Amp @ 100-140V / 116 Amp @ 180-240V With distributor: +5V 30 Amp, -12V 0.6 Amp, +3.3V 24 Amp
Front panel buttons	Buttons: Power On/Off, System Reset, LEDs: Power supply failure, System overheat, 2x Network activity, Hard drive activity, power supply

Physical and environmental specifications

Back panel ports

All SR and SRX appliances provide the following ports:

- PS/2 (supports keyboard)
- Two USB (supports keyboard)
- One RS-232 Serial (null modem)
- One VGA (monitor)
- Two 1Gb Ethernet RJ-45 ports on the motherboard (ether0 and ether1).

SRX appliances are also available with the following interface options:

- C2 configuration—Two 10 Gb Ethernet (CX4)
- G configuration—Four 1 Gb Ethernet (RJ-45)
- R2 configuration—Two 10 Gb Ethernet (RJ-45)
- S2 configuration—Two 10 Gb Ethernet (SFP+)

Precautions

Inspect the box

You should inspect the box the chassis was shipped in and note if it was damaged in any way. If the chassis itself shows damage, file a damage claim with the carrier who delivered your system.

Decide on a suitable location for the rack unit that will hold that chassis. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated.

You will also need it placed near at least one grounded power outlet. The SR/SRX chassis includes one power supply.

Electrical precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the SR/SRX from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.

- Do not work alone when working with high-voltage components.

- Power should always be disconnected from the system when removing or installing main system components, such as the motherboard, memory modules (not necessary for hot swappable disks). When disconnecting power, you should first power down the system with the operating system and then unplug the power cords from all the power supply modules in the system.

- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.

- Do not use mats designed to decrease electrostatic discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.

- The power supply power cord must include a grounding plug and must be plugged into grounded electrical outlets.

General safety precautions

- Keep the area around the chassis clean and free of clutter.

- When loaded with hard disk drives, the SR/SRX appliance weighs over 50 lbs. To avoid injury, always use two people to lift the appliance.

- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.

- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.

- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.

- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

Coraid Policy Statements, Warranty and EULA

Technical support

Do you have more questions? See the Coraid Support web site:

http://www.coraid.com/support/

Contact the Coraid Technical Assistance Center at:

support@coraid.com

To help the Technical Assistance Center diagnose your problem, send diagnostic output along with a description of your problem. To obtain diagnostic output, issue the `sos` command.

Warranty and return policy

CAUTION: If the product includes hard disk drives, do not ship the product with hard disk drives installed! Doing so may damage the product and void the warranty!

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Coraid's sole obligation shall be to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund at Coraid's sole discretion. Such repair or replacement will be rendered by Coraid at Coraid's Service Center. The replacement Hardware need not be new nor have an identical make, model or part. Coraid may in its sole discretion replace the defective Hardware (or any part thereof) with any reconditioned product that Coraid reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. Repaired or replacement Hardware will be warranted for the remainder of the original Warranty Period from the date of original Product purchase from Coraid or its authorized reseller.

Submitting a claim

The customer shall obtain a Return Material Authorization ("RMA") number from Coraid service center and return the Product to Coraid. The customer must submit with the Product as part of the claim a written description of the hardware defect or Software nonconformance in sufficient detail to allow Coraid to confirm the same.

After an RMA number has been issued by Coraid, the defective Product must be packaged securely in suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The customer is responsible for all return shipping charges to Coraid, and Coraid will not be held responsible for any packages that are lost in transit to Coraid.

Return Product ship to address is: Coraid Inc. 2393 Pendley Rd, Suite 200, Cumming, Georgia 30041

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Additional Safety Information

WARNING: Read the installation instructions before connecting the system to the power source.

ATTENTION: Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

WARNUNG: Vor dem Anschließen des Systems an die Stromquelle die Installationsanweisungen lesen.

Lithium battery notice for service personnel

This product contains a lithium battery. Although the battery is not field-serviceable, observe the following warning:

CAUTION: Danger of explosion if battery is replaced with incorrect type. Replace only with the same type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

ATTENTION: II y a danger d'explosion s'il a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un type equivalent recommande par le constructeur. Mettre au rebut les batteries usagees conformement aux instructions du fabricant.

WARNUNG: Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Dual power supply notice

WARNING: This unit has more than one power supply connection; all connections must be removed to remove all power from the unit.

WARNUNG: Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

ATTENTION: Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

WARNING: This product relies on the building's installation for shortcircuit (over current) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15 A U.S. (240 VAC, 10 A international) is used on the phase conductors (all current carrying conductors).

ATTENTION: Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).

WARNUNG: Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird.

Laser warning

WARNING: Class 1 Laser product.

ATTENTION: Produit laser de classe 1

WARNUNG: Laserprodukt der Klasse 1

EtherDrive equipment is intended for installation in restricted access areas.

Mounting the unit

WARNING: To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. These guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

ATTENTION: Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel.

- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.

- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.

- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

WARNUNG: Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem

Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.

- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.

- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

Regulatory certifications

United States FCC statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada compliance statement (Industry Canada)

This Class [A] digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe [A] respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Safety standards

- UL 60950-1: 2007
- CAN/CSA C22.2 No. 60950-1-07
- EN60950-1: 2006 +A11: 2009
- Emissions Standards: FCC Part 15B Class A
- EN 55022: 2006 plus A1:2007
- EN 61000-3-2: 2006
- EN 61000-3-3: 2008
- EN 55024: 1998 plus A1:2001 & A2:2003
- Australian/New Zealand Standard AS/NZS CISPR 22: 2009

European Union (CE) Statement

This product is in conformity with the essential requirements of the following EU directives:

- 2004/108/EC--- Electromagnetic Compatibility Directive (EMC)
- 2006/95/EC---- Low Voltage Directive (LVD)