



User Guide
ISE Storage Blade

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Preface

This user guide is intended to be a comprehensive summary of user-level operations on the ISE Storage System, including the Fibre Channel ISE and iSCSI ISE, which are collectively referred to as the ISE unless model discrimination is required. A Hybrid ISE platform is one that combines a Hybrid DataPac with a standard DataPac. This user guide is designed for use by administrators who are responsible for initial system setup and storage managers who are responsible for configuring, monitoring, and maintaining the ISE in a production environment. This document includes a number of appendices that help with setup and troubleshooting.

Conventions

The following conventions are used in this document:

Element	Convention
Button	Arial, 9 pt, Bold
Command Line Interface input/output	Courier New, 10 pt, Bold
Emphasize a word or phrase	<u>Underline</u>
Event notifications or other message	Times New Roman, 10 pt, Bold
Key	COURIER NEW, 11 PT, CAPS
Literals	Times New Roman, 10 pt, Bold
Titles	<i>Italic</i>
Window option	Arial, 9 pt, Bold
Variable, represents text that must be entered	<Courier New, 10 pt, Bold, Italic>

Table 1: Document Conventions

Related Documents

The following documents are available for download from the X-IO Support Center Web site,

The following documents provide additional information about the ISE:

- *ISE ISE User Guide 2.x.x Release Notes*, provides most recent documentation updates
- *ISE ISE User Guide 3.x.x Release Notes*, provides most recent documentation updates
- *ISE ISE User Guide Quick Start Guide*
- *ISE Mirroring User Guide*

- *ISE Block Storage Controller User Guide*
- *ISE Manager Suite User Guide*
- *ISE Analyzer User Guide*

Introduction

The ISE is a high-density, fully redundant, rack-mountable storage device that integrates enterprise-class drives with advanced array controllers and environmental support components to provide an extremely reliable self-contained storage unit that outperforms more traditional storage sub-systems.

As a fully redundant unit, the ISE consists of pairs of active components; each member of the pair can function in the absence of the other member, maintaining operation in the event of failure of an active component. If a component fails, the system supplies information designed to assist in completing corrective actions. The ISE can continue to operate with multiple component failures while making intelligent decisions to provide the highest level of data protection and integrity.

Advanced Features

The ISE provides the following advanced features:

- a. **Managed Reliability:** The ISE contains processes that improve system reliability through intelligent error management. These processes include:
 - A hierarchy of table-driven recovery actions that repair drive errors ranging from simple errors to those requiring more advanced error handling. This feature provides no-touch drive maintenance and virtually eliminates removal of entire drives from service.
 - In-place drive remanufacture that predicts, diagnoses, and repairs drive degeneration and failures using algorithms and commands previously available only to the drive manufacturer.
 - A closed-loop feedback system between the installation and the manufacturer that collects and analyzes a variety of system operating metrics. This feature greatly reduces failures by remotely predicting and diagnosing potential problems and providing proactive system servicing.
 - Hybrid DataPacs, combining solid state drives and hard drives.
- b. **High-performance data I/O:** The system architecture leverages the power of a single processor with multiple cores, Fibre Channel or 40GbE data paths, and SSDs (Hybrid ISE) to deliver outstanding data I/O performance.
- c. **iSCSI Data Access and Security:** Data paths use 40 Gb Ethernet ports to deliver data at high speed while supporting Challenge-Handshake Authentication Protocol (CHAP) to deliver a higher degree of authentication and data security.
- d. **Dual controllers:** Both controllers actively participate in data I/O, simultaneously accessing all drives in the system. This configuration provides maximum performance as well as reliability.
- e. **Outstanding data integrity protection:** The system implements the following data integrity features:
 - ISE RAID 1 (similar to industry RAID 10) provides data integrity protection using algorithms that deliver efficient function with minimal overhead.
 - Data Integrity Field (DIF) implementation provides additional data integrity protection.
- f. **Automatic failover/fallback:** The system performs automatic transfer of volume access from an out-of-service controller to the partner in conjunction with appropriate multi-path drivers at the host level.

- g. **Run-time controller and drive firmware upgrades:** The system provides the ability to upgrade the internal controller firmware, drive firmware, and servo code with new versions without service interruption. Should a controller experience an unrecoverable error during the firmware upgrade process, controller firmware is returned to the previously installed version.
- h. **Background parity scan:** Provides enhanced data integrity by employing an embedded function to automatically check all data for RAID parity consistency and flag inconsistent data with a media error.
- i. **Storage Management, Provisioning:** The ISE Manager Suite provides storage management and provisioning services for all networked ISEs.
- j. **LUN Expansion:** As volume space needs increase, individual LUNs can be expanded.
- k. **ActiveWatch:** Provides full telemetry.
- l. **Quality of Service (QoS):** Control of performance expectations, useful when running different applications on the same ISE. An optional feature available in ISE firmware 3.1.0 and later.

Components

The ISE consists of six major components as shown in the following figure (Figure 1) plus an active bezel.

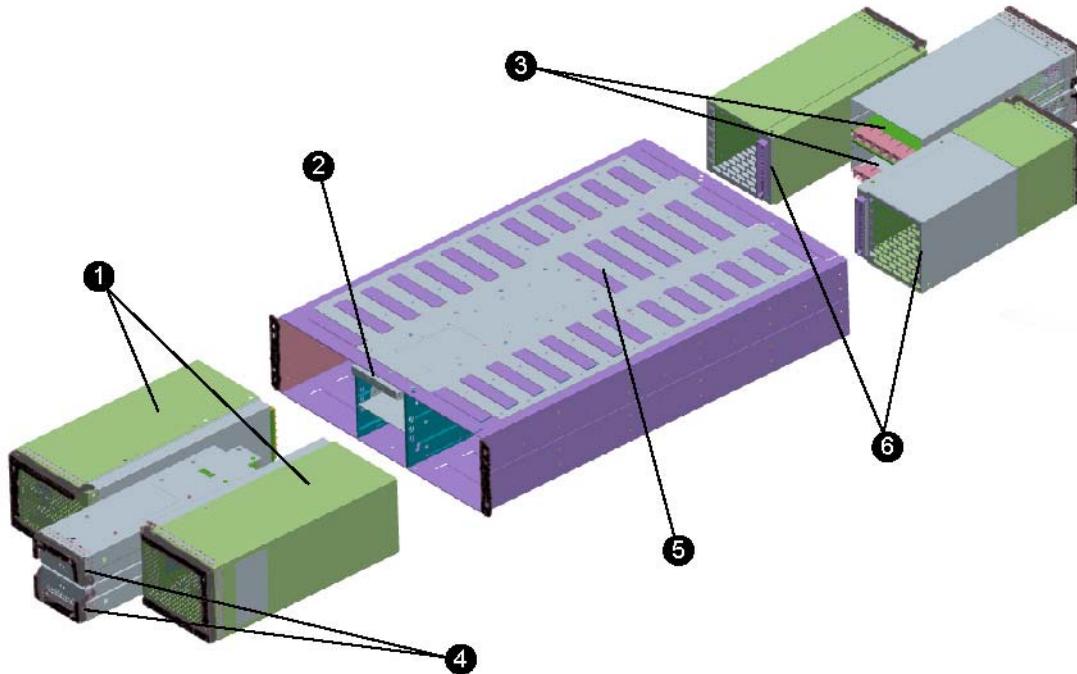


Figure 1. ISE Major Components

These major components are:

1. Two DataPacs, containing multiple drives in sealed assemblies
2. One System status module
3. Two Managed Reliability Controllers (MRCs), providing control and value-added features
4. Two emergency power units, made up of supercapacitors, capable of providing power to write-back cache
5. One chassis, custom-designed to house the active components of the ISE
6. Two power supply units with blowers, providing a redundant power source

Of the above listed components, all but numbers 2 and 5 are Field Replaceable Units (FRU). Additionally, the Fibre Channel ISE contains one to eight more FRUs, they are the Small Form-Factor Pluggable (SFP) Fibre Channel connectors described below.

Fibre Channel ISE

The Fibre Channel ISE has eight Small Form-Factor Pluggable⁺ (SFP⁺) Fibre Channel connectors (four per MRC), providing maximum throughput with eight Gigabit host port connectivity. These Fibre Channel host ports connect hosts to a Storage Area Network through Fibre Channel switches. Using multiple Fibre Channel switches for host connections achieves fault tolerance at the storage-to-network interface. See “Fibre Channel ISE—Ports View” on page 20.

Extremely high drive operability is provided by the ISE Managed Reliability feature, which corrects many drive failures without operator intervention. A data migration utility is available through X-IO Global Services if an entire DataPac requires replacing. Capacity for hot sparing is automatically provided within the DataPac and managed by the MRCs.

iSCSI ISE

The iSCSI ISE has two QSFP [Quad (4-channel) Small Form-factor Pluggable] interface ports per MRC; these ports are labeled **Data A** and **Data B**, providing maximum throughput with forty Gigabit host port connectivity. These 40 GbE data ports connect hosts to a Storage Area Network through iSCSI switches. Using dual iSCSI switches for host connections achieves fault tolerance at the storage-to-network interface. See “iSCSI ISE—Ports View” on page 21 to view the MRC port layout.

ISE Management Ports

The ISE has two Ethernet management ports, one on each MRC, and can operate in either Dynamic Host Configuration Protocol (DHCP) mode or static IP mode. DHCP mode is enabled by default at the factory.

Easy-to-use management interfaces provide configuration and control of the ISE:

- ISE Manager Suite—an advanced user interface facilitating the management of all ISE systems within an Ethernet network as documented in the *ISE Manager Suite User Guide*
 - Command Line Interface (CLI)—accessible from a remote console anywhere on the network
- See “Characters—Web-Mgt and CLI” on page 29 for a detailed description of these interfaces.

TMRA

The TMRA (Temperature-Maximum Recommended Ambient) is 40° C.

La Temperatura-máxima recomendada ambiente (TMRA) es de 40 grados C.

Die T_{mra} (empfohlene maximale Umgebungstemperatur für den Betrieb) liegt bei 40° C.

A TMRA (temperatura ambiente máxima de funcionamento recomendada) é de 40° C.

Максимально допустимая температура окружающей среды составляет 40°C.

建議的最高環境溫度（TMRA）為攝氏 40 度

General Hazards

Elevated Operating Ambient Temperature

When installed in a closed or multi-unit rack assembly, the operating ambient temperature within the rack may exceed the room ambient temperature. Consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum recommended ambient temperature (TMRA).

Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading

Mounting of the equipment in a rack should be such that the rack and supporting floor structure weight capacities are not compromised.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing the concern.

Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Power Supplies

All ISE Storage System models have redundant power supplies. Both AC power cords must be removed before servicing any ISE Storage System. All ISE Storage System models must be serviced only by an Authorized Service Technician.

MRC Coin Cell Battery

There is a risk of explosion if the battery is replaced with an incorrect type. Dispose of used batteries according to the manufacturer's instructions

一般危害

操作環境溫度升高

當安裝在封閉或多單元的機架內時，機架內的操作環境溫度可能會超過室內環境溫度。應考慮將設備安裝在與製造商建議的最高環境溫度（TMRA）相容的環境中。

空氣流通減少

設備應安裝在機架內，使得安全操作設備所需的空氣流通量不會受到不良影響。

機械負荷

設備應安裝在機架內，使得機架和支承地面結構的承重能力不會受到不良影響。

電路超載

應考慮設備與供電電路的連接和電路超載可能對過流保護和電源線產生的影響。解決這個問題時，應適當考慮設備銘牌上的額定值。

可靠的接地

應保持機架安裝設備的可靠接地功能。除注意與分支電路的直接連接外（例如使用電源板），還應特別注意電源連接。

電源

所有 ISE 存儲系統的型號都有冗餘電源。在維修任何 ISE 存儲系統之前，必須切斷兩根交流電源線。所有 ISE 存儲系統的型號僅限由經授權維修技術人員維修。

Safety and Emissions

All ISE Storage System models have been verified to the following safety certifications:

- UL60950-1
- CSA C22.2 No. 60950-1
- EC Directive 2006/95/EC
- EN 60950-1
- IEC 60950-1

All ISE Storage System models have been verified to the following emissions/immunity certifications:

- FCC CFR 47 - Part 15

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.

- CSA C108.8-M1983
- CISPR 22
- EC Directive 89/336/EEC
- EN61000-3-2
- EN61000-3-3
- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5
- EN61000-4-6
- EN61000-4-8
- EN61000-4-11
- EN 50081-1
- EN 55022
- CSA C108.8-M1983
- CISPR 22
- EN 50082-1
- EN 55024

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe A est conforme à la norme NMB-003 du Canada.

	DECLARATION OF CONFORMITY	
<p>Responsible Company: Xiotech Corporation Responsible Company Address: 9950 Federal Drive Suite 100 Colorado Springs, Colorado 80921 U.S.A.</p>		
<p>Equipment Description: Rack Mounted Storage Shelf Equipment Model Designation: ISE 12xx ISE14xx</p>		
<p>Application of Council Directive: 73/23/EEC on the harmonization of the laws related to Member States relating to electrical equipment designed for use within certain voltage limits, as amended by: Council Directive 93/68/EEC and Council Directive 89/336/EEC on the approximation of the laws related to Member States relating to electromagnetic compatibility, as amended by: Council Directive 93/68/EEC.</p>		
Referenced Safety Standards:	Referenced EMC Standards:	
EN 60950:	EN61000-6-3: 2001 EN61000-6-1: 2001 EN61000-6-4: EN 55022 Class A EN 61000-3-2 EN 61000-3-3 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-4-8 EN 61000-4-11 ENV 50204	
<p>I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).</p>		
Signature:		
Printed Name: <u>Gary Hamilton</u>		
Title: <u>Sr. Director Hardware Engineering</u>		

Figure 2. Declaration of Conformity

Rack Loading

An ISE Storage System can weigh from 100 lbs. to 130 lbs.; care must be taken to mount the ISE Storage System on a rack certified to support the models being installed as well as the attached hardware load.

Environmental Specifications

Environmental specifications for the ISE Storage System are presented in this section.

Dimensions

The ISE Storage System dimensions are shown in the figure below.

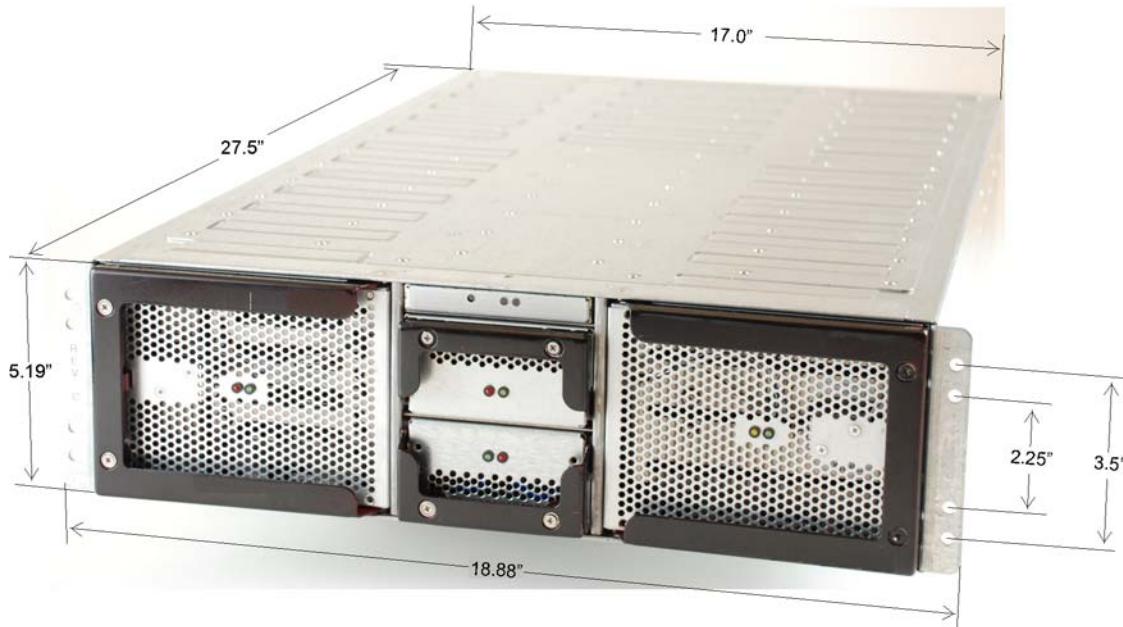


Figure 3. Front View with Dimensions (without Bezel)

For reference, the ISE, with bezel installed, is shown in the figure below.



Figure 4. Bezel

Note. The bezel is an integral component and should remain installed. The two LEDs and the "X" provide status indications.

Site Requirements

The following tables present crucial environmental requirements for the ISE Storage System.

Environment	Requirement
Operating temperature	10–35 degrees C
Operating humidity	20–80% (Non-condensing)
Operating altitude	-1,000.6562–10,000 feet (-305–3,048 meters)
Heat dissipation	2,050 btu per hour
Loading weight	Minimum
DataPac (varies by model)	~13–24 pounds (~5.9–10.9 kg)
Model 2400, 3400, 3401 without DataPacs	~72.3 pounds (~32.9 kg)
Model 2400, 3400, 3401 with DataPacs (2)	~97.9–120 pounds (~44.5–54.5 kg)
Power	Requirement
Input voltage	100–240 Volts AC
Input frequency	50–60 Hertz
Maximum load	10–8 Amps
Connectivity	Requirement
Host interface	Eight port 8Gb FC

Table 2: ISE Site Requirements

Installation

The ISE Storage System is a 3U, rack-optimized unit for installation into a server rack using the supplied custom rails and conforming to the specifications defined in this section. Before installation, it is a good practice to review the support matrix at <https://xone.xiotech.com/support/supportmatrix> for the latest information on supported configurations.

The ISE consists of five different components referred to as Field Replaceable Units (FRUs) plus a bezel. The unit is shipped with the MRC, power supply, and supercapacitor FRUs pre-installed. The DataPacs are packaged individually.

Overview

The ISE Storage System comprises five different major components, shown below, plus a bezel (not shown).

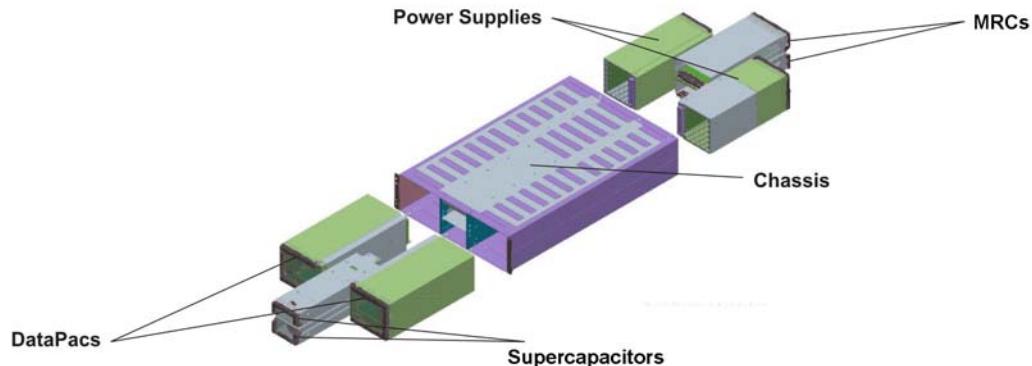


Figure 5. Assembly Overview

In addition to the five different major components (eleven in all), there is one minor component, the bezel. This bezel is an integral component of the ISE. All ISE Storage System components must be installed during normal operation and removed only during maintenance operations.

Rack ISE Chassis

The ISE chassis should be installed using the supplied rail kit into a rack before inserting the DataPacs as described here.

Install Rail Kit

Before an ISE Storage System can be installed in a rack, the custom rails must be installed. The custom rail kit mounts easily into both round-holed and square-holed racks.

Round-Holed Rack Mounting

To install the adjustable rail kit into a round-holed rack, do the following:

1. Remove the rail kit with anchoring screws from its packaging.
2. Install both rails, as labeled, into the server rack by placing the front rail bracket over the three mounting holes and inserting at least one rack screw, anchoring the rail front to the rack (Figure 7).
3. Extend the rear slider until the rear mount aligns on the rack's back mounting face, securing it with two of the supplied rack screws (Figure 7).
4. Secure the rail, at the front, with three of the rack screws supplied in the rail kit.

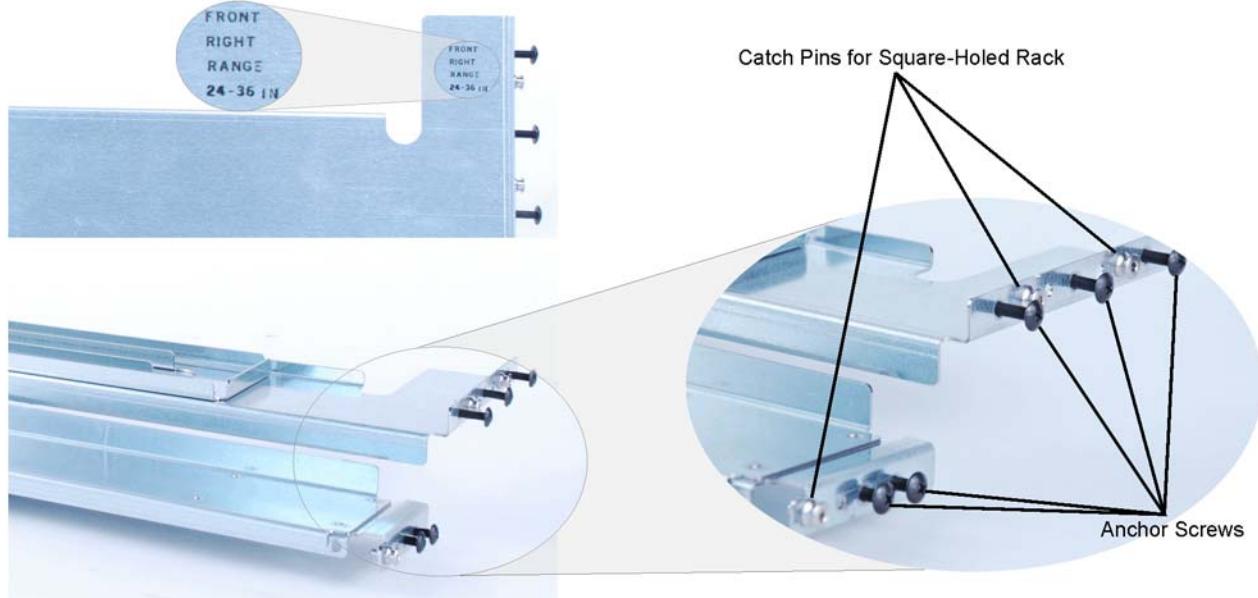


Figure 6. Adjustable Rail Kit

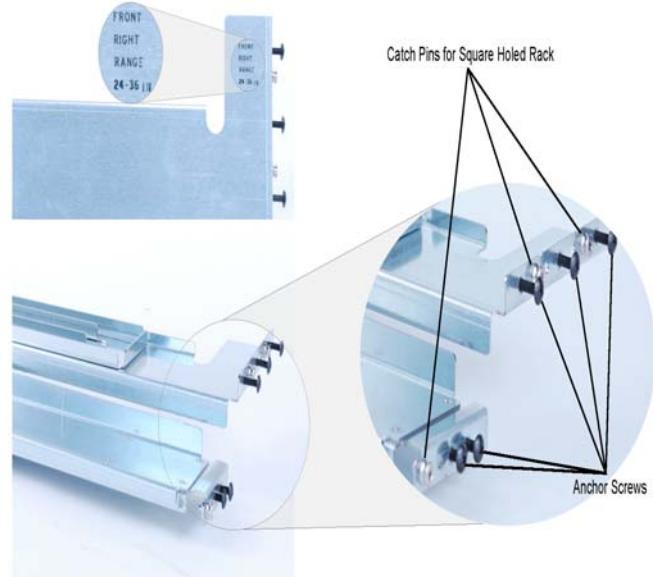
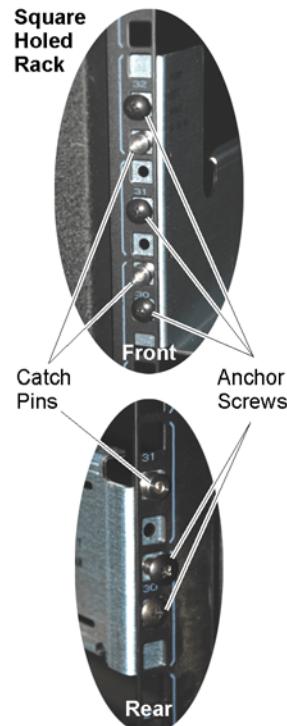


Figure 7. Installed Rail Kits

Square-Holed Rack Mounting

To install the adjustable rail kit into a square-holed rack, do the following:

1. Remove the rail kit with anchoring screws from its packaging (Figure 6 on page 12).
2. Install both rails, as labeled, into the server rack by inserting the rail mounting catch pins into the front square-holed rack mountings from behind—see figure to right.
3. Extend the rear slider until the rear catch pin engages with the rear rack mount—see figure to right.
4. Secure the rail, at the rear, with two of the rack screws supplied in the rail kit.
5. Secure the rail, at the front, with three of the rack screws supplied in the rail kit.



Install ISE Chassis

The ISE chassis can be installed into a rack as it is in the shipping box before inserting the DataPacs as shown. The chassis as it is shipped weighs about seventy-three pounds and it is recommended that two people co-lift the chassis from the collapsed shipping carton and slide it into the rack.

1. Remove the static shield bag from the chassis and slide the chassis (as shipped) into the server rack on the custom rails from the front, oriented with the system display on the top.
2. Secure the chassis to the rack with the four mounting screws included in the hardware packet.

Note. The ISE can weigh up to 120 pounds with all components installed.

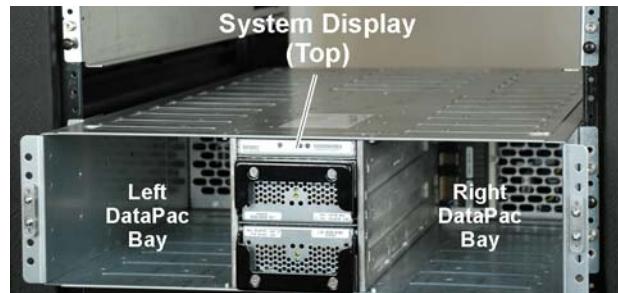


Figure 8. Inserting ISE Chassis

Front View

The ISE is shown from the front with the latches and captive screws pointed out.

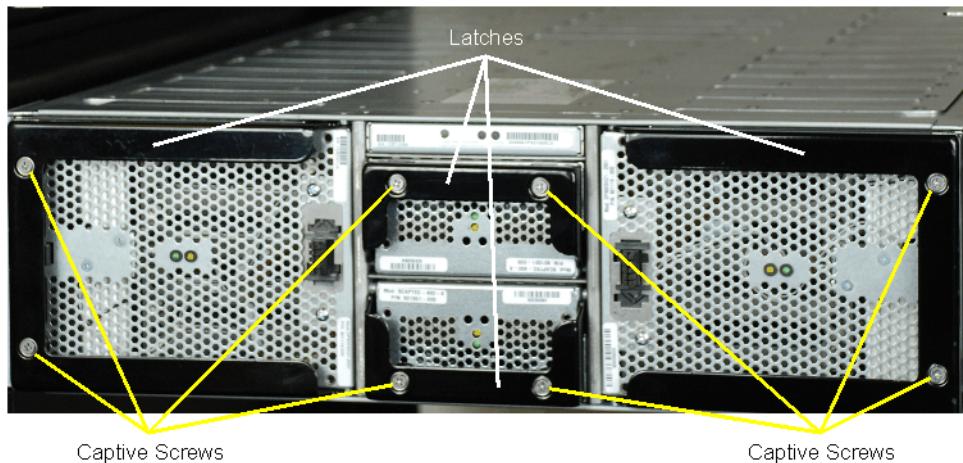


Figure 9. ISE Front View

Rear View

The ISE is shown from the rear with the latches and captive screws pointed out.

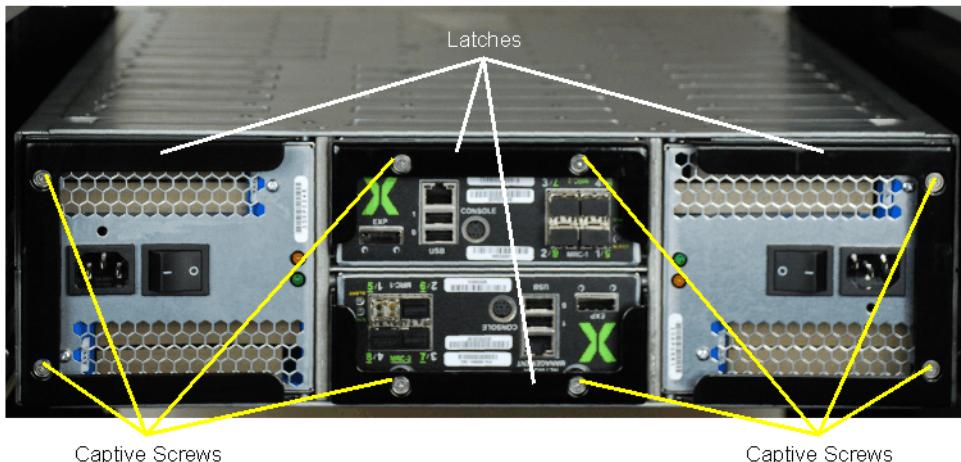


Figure 10. Fibre Channel ISE Rear View

The iSCSI ISE is shown from the rear pointing out the MRC ports in the below figure.

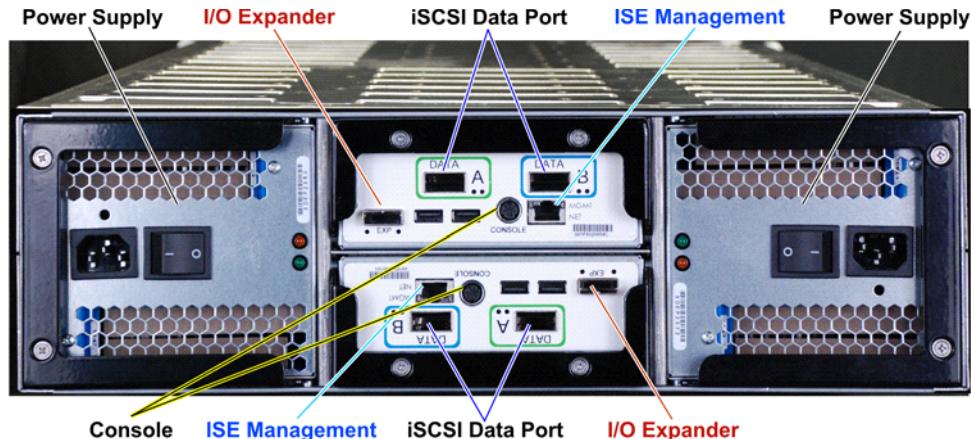


Figure 11. iSCSI ISE Rear View

Install DataPacs

The ISE Storage System ships with two DataPacs or one DataPac and one DataPac Filler. Both must be installed to guarantee proper operation.

CAUTION—Handling DataPacs

DataPac units are delicate and should always be handled with care. This is extremely important during the unpacking of DataPacs and subsequent handling leading to DataPac insertion into the chassis. The latch handle located on each DataPac unit is not intended for use as a carrying handle. Careless handling can damage the unit.

Proper and improper handling of a DataPac is demonstrated below.



Figure 12. DataPac Handling Proper and Improper

Unpack a DataPac and insert it gently into the front of the chassis with the latch fully extended and oriented as shown in Figure 13 below. When the DataPac is firmly in place, secure the DataPac by closing the latch handle and tightening the two captive screws (Figure 9 on page 14) until snug—do not overtighten—to secure the DataPac (Figure 13). Repeat this step for the other DataPac.

Notes:

- [1] All DataPac latch handle captive screws must be firmly tightened prior to initial ISE Storage System power on to prevent the inadvertent pulling of a DataPac and resultant data loss.
- [2] DataPacs should never be removed from an initialized ISE Storage System unless it is powered off or a DataPac remove command has been issued.
- [3] If the DataPac captive screws are not tightened, the DataPac status indicates **Insecure DataPacs**.

Single DataPac Installation

For single DataPac installations, a DataPac Filler must be installed along with the DataPac.

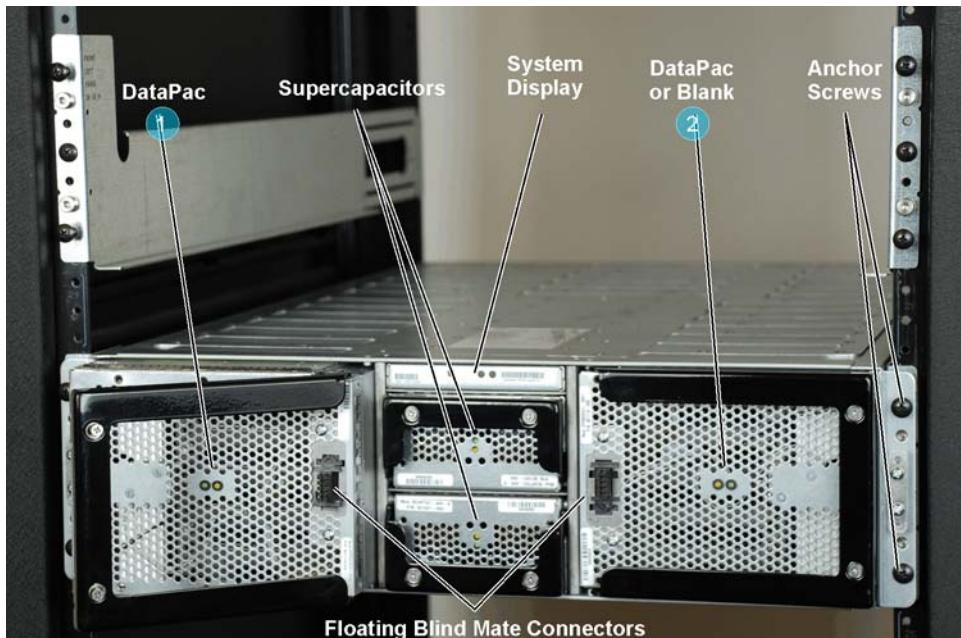


Figure 13. ISE Chassis Front View—DataPac and Supercapacitor Insertion

Install Supercapacitors

The supercapacitors come pre-installed in the ISE chassis. In the event there is a need to install a supercapacitor unit, insert the supercapacitor into the chassis gently from the front, oriented as shown in Figure 13 and with the latch fully extended. When the supercapacitor is firmly in place, return the latch to its closed position and tighten the two captive screws (Figure 9 on page 14) until snug—do not overtighten.

WARNING: Earlier version Supercapacitors (PN: 801001-000 and 801001-001) cannot be installed in iSCSI ISE Storage Systems while the current version Supercapacitors (PN: 801001-002 and 801301-000) can be installed in both current Fibre Channel ISE Storage Systems and iSCSI ISE Storage Systems.

Install Power Supplies

The ISE comes with the power supplies pre-installed. In the event there is a need to install a power supply unit, insert the power supply into the chassis gently from the rear, oriented as shown in Figure 14 and with the latch fully extended. When the power supply is firmly in place, return the latch to its closed position and tighten the two captive screws (Figure 10 on page 14) until snug—do not overtighten.

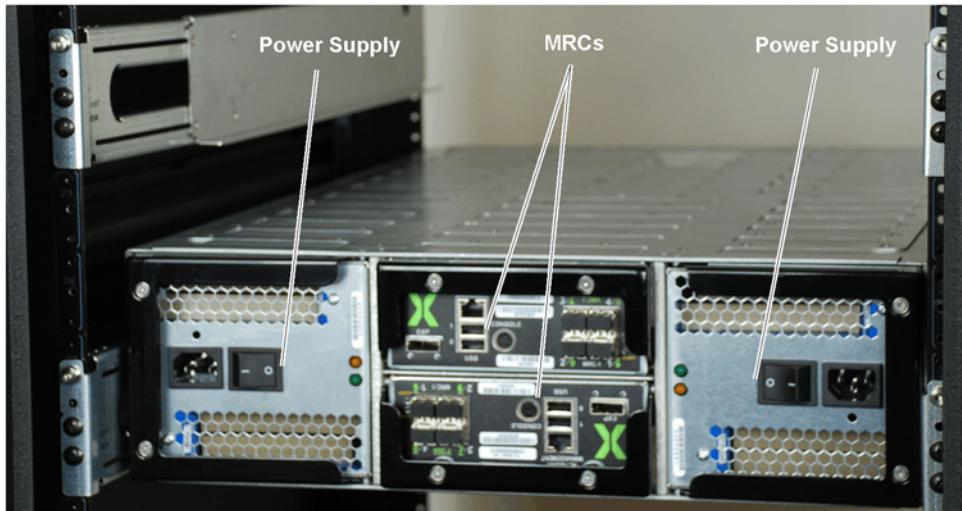


Figure 14. Rear View—Power Supply, MRC Insertion

Install MRCs

The MRCs come pre-installed in the ISE chassis. In the event there is a need to install an MRC, insert the unit gently into the chassis from the rear, oriented as shown in Figure 14 and with the latch handle fully open, pushing firmly until the MRC seats. With the MRC firmly in place, secure the unit by closing the latch handle and tightening the two captive screws (Figure 10 on page 14) until snug—do not overtighten. Repeat this step for the other MRC.

Install Bezel

The ISE bezel, shown below, is an integral component that snaps onto the chassis at each end with snap pins (see Figure 16 on page 18).

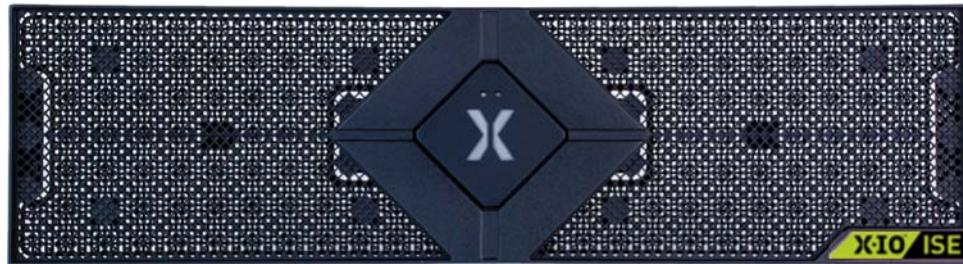


Figure 15. Bezel

To install the bezel, align the bezel as shown in figure 16 such that the snap pins seat into the anchors on the chassis. With the snap pins seated, firmly press the bezel onto the chassis. The floating blind mate connectors (See Figure 16 on page 18) automatically align and mate, connecting the bezel circuitry to the ISE circuitry.

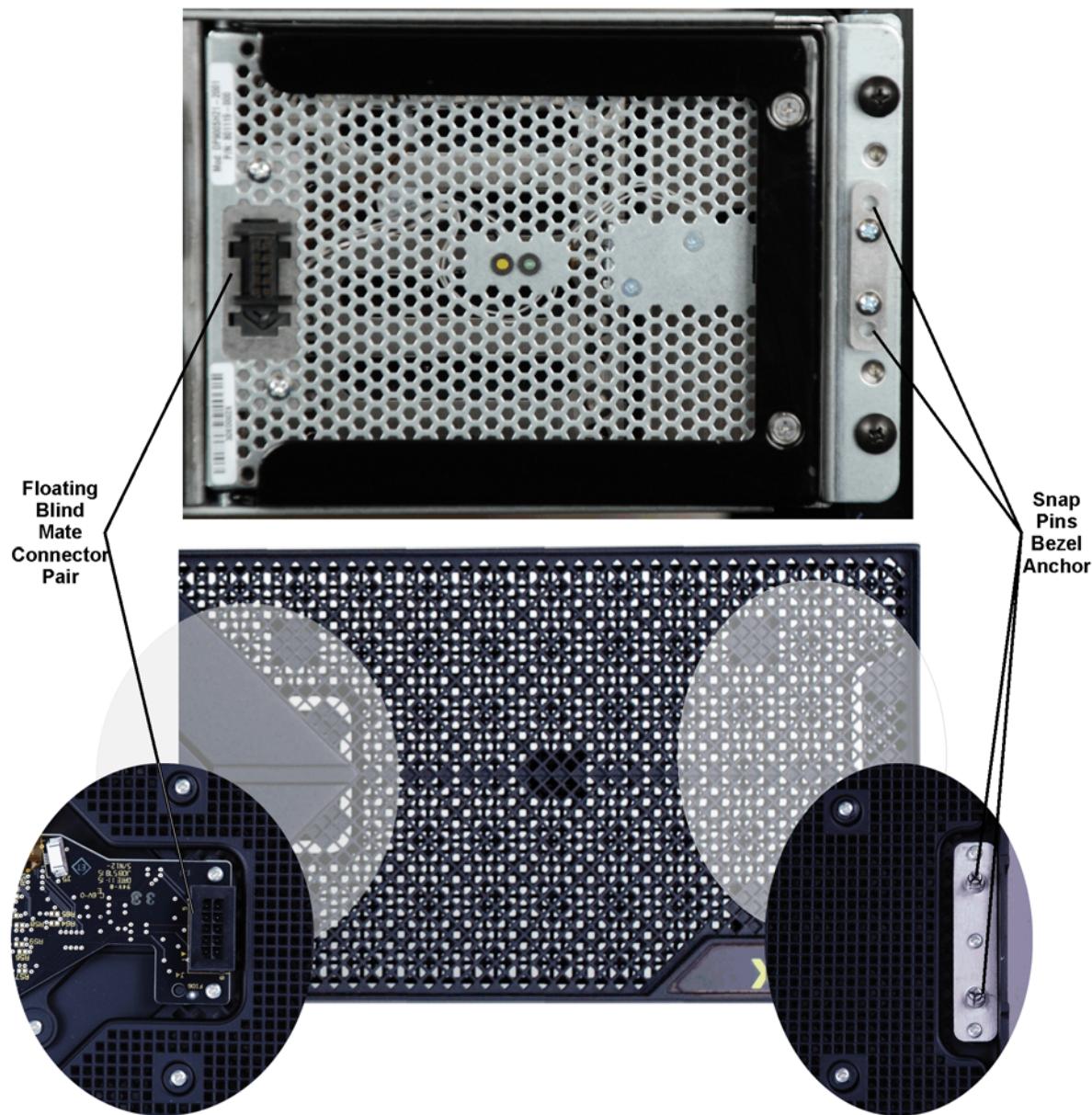


Figure 16. Snap Bezel Into Place

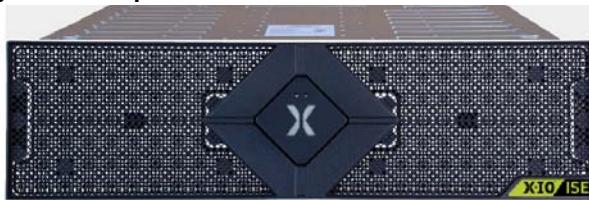


Figure 17. Bezel Installed

Recommended Cabling

Cabling an ISE involves attaching the power cords, Ethernet cables, service console cable (one), and Fibre Channel cables to the associated connectors on the ISE. The important issue with cabling is to run the cables with enough slack to permit the hot-replacement of any component without interruption in ISE data services.

FRU Locations

The following figure identifies the ISE components (FRUs) by their location number. That is, when referring to DataPac one (1), the specified DataPac is located to the left when viewing the ISE from the front. In Figure 18, this DataPac is identified with the number 1 on the front view. Note that in the front view the Supercapacitors are identified with numbers 1 and 2.

When viewing the ISE from the back, the location numbering is in reverse order. That is, when referring to power supply one (1), the specified power supply is located to the right. In Figure 18, this power supply is identified with the number 1 on the back view. Note that in the rear view the MRCs are identified with numbers 1 and 2.



Figure 18. FRU Locations Numbered

Connectivity

Fibre Channel ISE connectivity includes the following different ports (Figure 19).

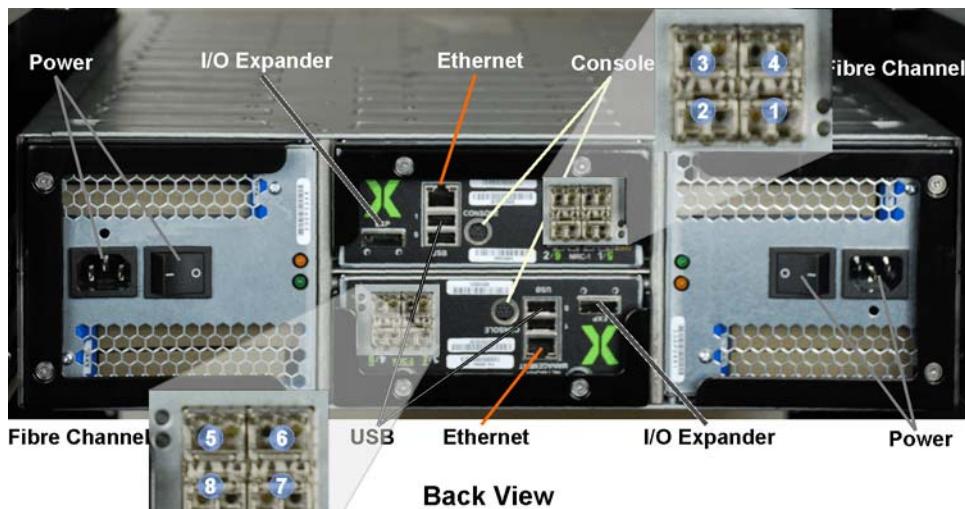


Figure 19. Fibre Channel ISE—Ports View

Fibre Channel ISE

- MiniDIN—for connecting a service console (PCCABLES.COM, P/N 70810)
- Ethernet—for Wake-On-LAN (10/100/1000 Mbps)
- Fibre Channel—for volume data accessed by the host (4/8 Gbps)
- I/O Expander—SAS, wide port reserved for future use
- USB—reserved for service

Note. All management commands are communicated through the Ethernet interface.

SFP Installation

When additional SFP (Small-Form-Factor Pluggable) Fibre Channel connector modules are purchased, installation is required. Install SFP modules using the following procedure:

1. Remove the protective plug from a port on an ISE MRC—three ports are available on each MRC.
2. Gently insert the replacement SFP fully into the chassis. If a solid resistance is encountered, remove the SFP, turn it over, and re-insert it.
3. When the SFP is fully inserted, engage the bail if needed to secure it in the MRC. When properly seated, the SFP is flush with the MRC latch handle.
4. Insert a Fibre Channel cable gently into the SFP while gently pinching the cable connector.

iSCSI ISE connectivity includes the following different ports (Figure 19).

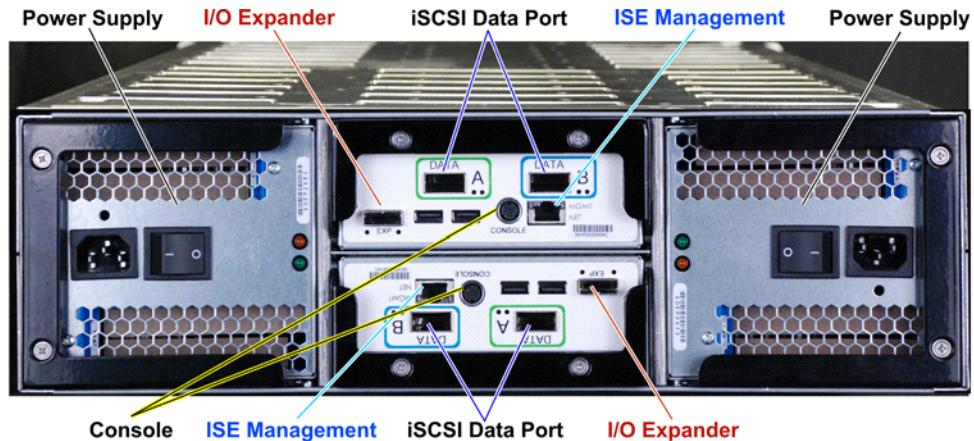


Figure 20. iSCSI ISE—Ports View

iSCSI ISE

- MiniDIN—for connecting a service console (PCCABLES.COM, P/N 70810)

Ethernet—for Wake-On-LAN (10/100/1000 Mbps)

- Data Ports—for volume data accessed by the host (two 10/40 Gbps Ethernet ports)
- I/O Expander—SAS, wide port reserved for future use
- USB—reserved for service (two ports)

Note. All management commands are communicated through the Ethernet Management interface.

Service Console

The very first time an ISE is powered on, a service console is required to determine or change the IP addresses. The service console can be a laptop or other computer that provides serial port connectivity. Connect the computer to one of the console (serial) ports on one of the ISE MRCs with the supplied serial cable.

Note. A single cable can be plugged into either service console port.

With a service console connected, follow the procedure below to establish a service console connection:

1. Open a terminal emulation application on the service console.
2. Set the terminal emulation application properties for the appropriate COM port as shown in Table 3.

Setting	Value
Bits per second (Baud rate)	115200
Data bits	8
Parity bit	none
Stop bit	1
Flow control	none
Any other settings	default

Table 3: COM Port Settings

3. Press **ENTER** on the service console (or use whatever method is provided by the application in use) to initiate a terminal console session and receive a login prompt from the ISE (Figure 22 on page 26).

ISE Management

ISE management is provided in three different modes through the 10/100/1Gb Ethernet ports or one of the console ports, as follows:

- ISE Manager Suite—all ISE systems
- ISE Command Line Interface (CLI)—all ISE systems

ISE Manager Suite

ISE Manager Suite provides storage management and provisioning services for all ISE Storage System systems. This approaches ISE management from a global perspective. See the *ISE Manager Suite User Guide* for details.

Command Line Interface

The ISE Command Line Interface (CLI) is embedded in all ISE systems and is accessed through the console connection on one of the MRCs (see “Command Line Interface” on page 34) and through SSH on the Ethernet management ports.

Fibre Channel Management Console

The Fibre Channel ISE MRC RJ-45 port is a Gigabit Ethernet connection for ISE management. This port is used by all ISE management interfaces to connect to the ISE.

iSCSI ISE Management Console

The iSCSI ISE MRC RJ-45 port is a Gigabit Ethernet connection for ISE management. This port is used by ISE Manager Suite and CLI interfaces to connect to the ISE.

ISE Host Data Traffic

ISE host, high-speed data traffic uses the Fibre Channel or 40 Gb Ethernet ports.

Fibre Channel Host Connection

The Fibre Channel ISE can connect to a host directly or through a Fibre Channel switch (see the online compatibility matrix at <https://xone.xiotech.com/support/supportmatrix>). To facilitate Fibre Channel connectivity, the ISE interfaces are designed to conform to the following specifications and standards:

- Fibre Channel Framing and Signaling (FC-FS) Revision 1.90,
- Fibre Channel Link Services (FC-LS) Revision 1.0 to SCSI Primary Commands (SPC-3) Revision 22a,
- SCSI 3 Block Commands (SBC) Revision 8C and
- SCSI Architecture Model 3 (SAM-3) Revision 13 of the SCSI specifications.

Zoning Requirements

For a best practices discussion of the Fibre Channel ISE zoning requirements, refer to the Support Matrix at <http://support.X-IO.com/supportmatrix>.

iSCSI Host Connection

The iSCSI ISE Managed Reliability Controllers have three Ethernet ports. The Ethernet ports labeled **Data A** and **Data B** are I/O data ports that accept 40GbE QSFP cables. These QSFP ports are referred to as the I/O network interfaces and provide redundant access through two independent networks. Two sub-nets are required for the iSCSI MRC to provide redundancy. One sub-net connects both **Data A** interfaces, and the other connects both **Data B** interfaces. Figure 21 shows the physical cabling connections for an iSCSI ISE configuration.

The iSCSI ISE interfaces are designed to conform to the following specifications and standards:

- Internet Small Computer Systems, revision RFC 3720, April 2004
- SCSI 3 Block Commands (SBC) Revision 8C and
- SCSI Architecture Model 3 (SAM-3) Revision 13 of the SCSI specifications.

The configure command can be used to assign static IP addresses to each interface as follows.

Data A network for both MRCs

```
configure --ionet --network=A --ipaddress1=<mrc1_data-a_ip> --
          ipaddress2=<mrc2_data-a_ip> --netmask=<data-a_netmask>
          --gateway=<data-a_gateway>
```

Data B network for both MRCs

```
configure --ionet --network=B --ipaddress1=<mrc1_data-b_ip> --
          ipaddress2=<mrc2_data-b_ip> --netmask=<data-b_netmask>
          --gateway=<data-b_gateway>
```

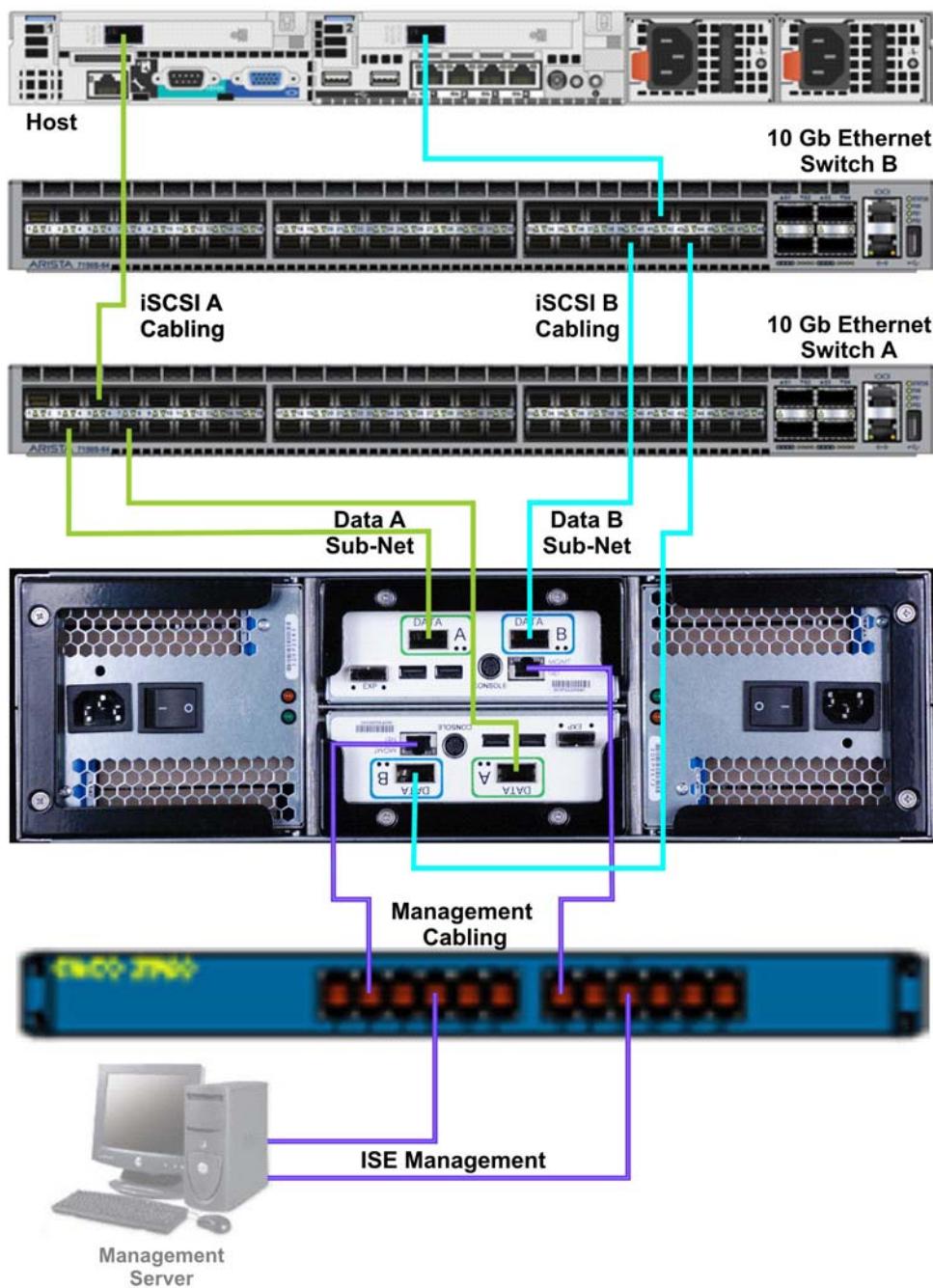


Figure 21. iSCSI ISE Cabling

First-Time Power On

When powering on the ISE for the first time, follow the steps outlined below.

Pre-power On Check

Before powering on, check the following:

1. Components—all components are completely inserted and secured
2. Latch handles—all latch handles are locked and secured with the captive screws
3. Service console port—at least one service console port is cabled to a service laptop or PC
4. Ethernet ports—both Ethernet ports are connected, secure, and routed for hot component replacement
5. Fibre Channel ports—at least one Fibre Channel port on each MRC is connected, secure, and routed to allow hot component replacement (see see “Fibre Channel Host Connection” on page 22 for port details)
6. iSCSI ports—both QSFP ports on each MRC are connected on two different sub-nets, secure, and routed to permit hot component replacement (see “iSCSI Host Connection” on page 23).

Power On Procedure

With a service console connected, turn on both power supply switches and confirm that:

- All fans are running
- All green component LEDs are lit (may take a few minutes)

If there are any of the below listed amber LEDs lit contact X-IO Global Services for the appropriate action.

- Supercapacitor
- Power Supply
- SFP
- MRC
- DataPac
- Chassis

Once the ISE system is running with no amber LEDs lit, both IP addresses can be determined and configured.

ISE Initialization

ISE initialization must be done before the ISE is usable and takes five to ten minutes. With a terminal console session established through either service console port (see “Service Console” on page 21), at the ISE login prompt (Figure 22 on page 26):

1. Log in with the following user credentials:

User name: administrator

Password: administrator

On a non-initialized ISE, the console displays the following message:

This ISE requires initialization. Would you like to initialize it?

Select, <y> or <ESC>:

2. Press **Esc** to skip the initialization process (initialization will be done later); the **skipping initialization** message is displayed followed by the **CLI** prompt, and the service console is ready to accept commands (Figure 22).

Determine Management IP Addresses

To determine whether the ISE is using DHCP or a default IP address for the management ports, enter the `show network` command. The network settings are displayed as shown in figure 22.

The screenshot shows a Windows HyperTerminal window titled "II - HyperTerminal". The terminal session starts with a login prompt: "login as: administrator" followed by "administrator@bb2099's password:". The user enters "y" to initialize the ISE. The process continues with "Initializing ISE (Sparing = 20%) ... Done" and "administrator:> reformat ise". The user then types "y" to confirm reformatting. Finally, the command "administrator:> show network_" is entered, which triggers a configuration menu. A mouse cursor is visible pointing at the "Network Settings" option in the menu. The menu also includes "Common Settings" and several configuration options like "DHCP : Enabled" and "Wake On LAN : Enabled". The terminal window has standard Windows-style buttons at the top and a toolbar at the bottom with options like "Connected 0:06:01", "Auto detect", "115200 8-N-1", and "Print echo".

Figure 22. Show Network Command—Management Ports

The screenshot shows a Windows HyperTerminal window titled "II - HyperTerminal". The terminal session displays the output of the "show network" command. It starts with "Port 1" configuration, listing "Status : Connected", "MAC Address : 00:0C:50:88:03:9C", "IP Address : 10.20.56.156 - ise", "IP Netmask : 255.255.240.0", and "IP Gateway : 10.20.48.1". Below a horizontal line, it shows "Port 2" configuration with similar details: "Status : Connected", "MAC Address : 00:0C:50:88:03:97", "IP Address : 10.20.56.151 - ise", "IP Netmask : 255.255.240.0", and "IP Gateway : 10.20.48.1". At the bottom, the prompt "administrator:>_" is visible. The terminal window has standard Windows-style buttons at the top and a toolbar at the bottom with options like "Connected 0:06:01", "Auto detect", "115200 8-N-1", and "Print echo".

Figure 23. Show Network Command—Response

Changing Management Ethernet IP to Static (optional)

The ISE Storage System management Ethernet ports default to DHCP addressing. Leaving the management addresses as DHCP and using the MAC addresses associated with the management ports on the MRCs for mappings is the easiest way to initially configure an ISE.

If Static addressing is required, execute the command shown in the following figure (see Figure 24 and the example in Figure 25 on page 27).

```
configure --dhcp=off --ipaddress1=<mrcaddr1> --netmask1=<netmask>
--gateway1=<gateway> --ipaddress2=<mrcaddr2> --netmask2=<netmask>
--gateway2=<gateway>
```

Figure 24. CLI Configure DHCP

An example is shown in Figure 25 on page 27.

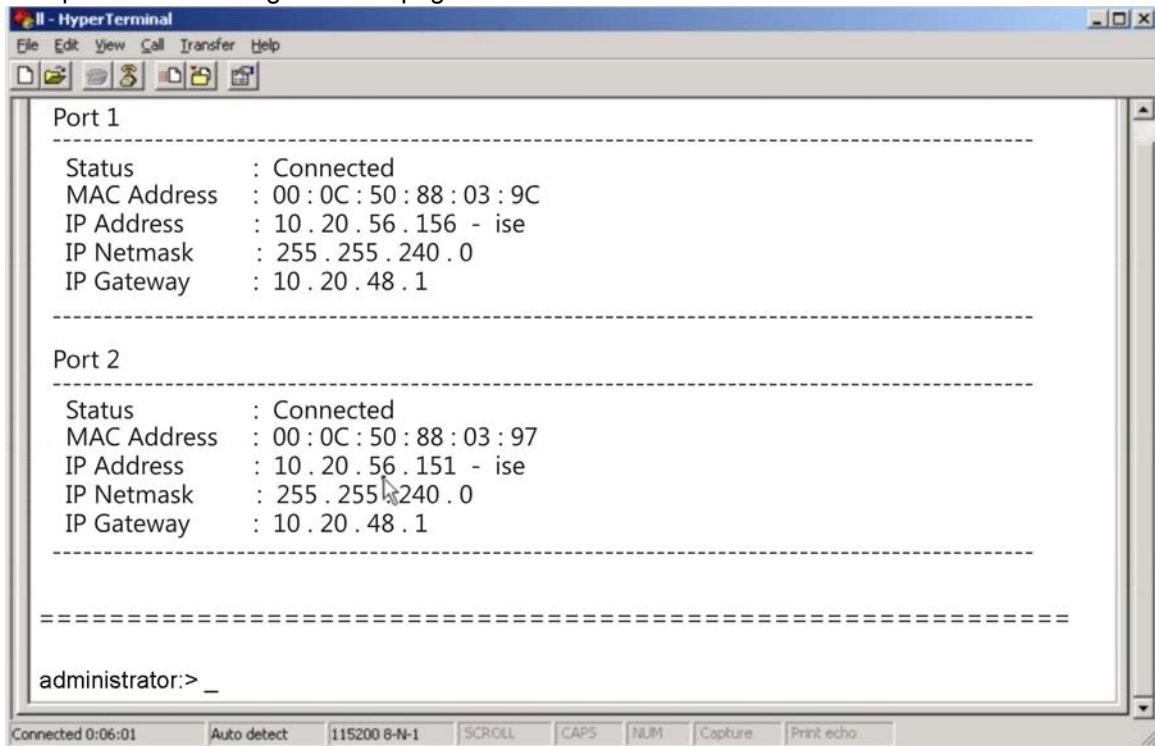


Figure 25. Changing Management Ports—Static IP

Installation Complete

The ISE installation is complete; the service console should be logged out of and a management interface connection opened. The three management interfaces, accessible through the network, are:

- X-IO ISE Manager Suite storage management and provisioning service
- X-IO Command Line Interface, referred to as the CLI

Additional Options

There are a number of additional options available for the ISE. Some of these (see “Related Documents” on page 1) are:

- ActiveWatch—Part of an available X-IO Global Services service
- ISE Analyzer—Appliance and Graphical User Interface for access to real-time and historical status, configuration, and performance data from multiple ISEs
- ISE Mirroring—For Fibre Channel ISE only.
- ISE Multipath Suite

Management Tools

The ISE provides these methods to manage its configuration and operation:

- The X-IO ISE Manager Suite site-wide management tool, available on both Fibre Channel ISE and iSCSI ISE. This document highlights some key uses of ISE Manager Suite. Additional information can be found in the *ISE Manager Suite User Guide* and *Release Notes*.
 - The X-IO Command Line Interface (CLI), available on both Fibre Channel ISE and iSCSI ISE
- This chapter presents the requirements and connection procedures for the ISE models.

Reserved Characters

The ISE Manager Suite accepts special characters in text-entry fields except for those characters listed in the table below.

Character	Name
&	ampersand
"	double quotes
/	forward slash
\	back slash
'	single quote

Table 4: Characters—ISE Manager Suite

In addition to the ISE Manager Suite, the CLI accepts special characters in text-entry fields except for those characters listed in the table below.

Character	Name
%	percent
&	ampersand
<	less than
>	greater than
\	back slash
'	single quote

Table 5: Characters—CLI

ISE Management

The ISE management tool of choice is the ISE Manager Suite. Product documentation and auxiliary software are available for download from X-IO Storage support center at <http://support.X-IO.com>. Registration may be required.

ISE Manager Suite

The ISE Manager Suite **Physical View** is used to view the hardware and configure ISE hardware settings as shown below.

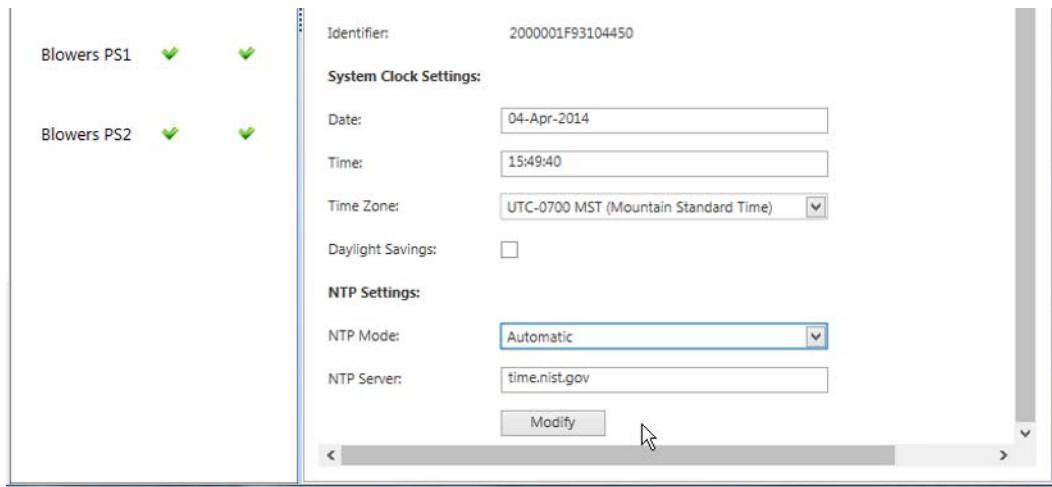


Figure 26. ISE Manager Suite—Physical View

The ISE health status shows the operational states of all the components. The component states presented are:

- ISE Storage System Properties
- MRC
- DataPac
- Power Supply
- Supercapacitor
- Storage Pools
- Hosts
- Firmware
- Network
- SNMP

ISE Manager Suite **Storage View** to manage attached ISE systems and **Server View** to manage volumes and hosts. The *ISE Manager Suite User Guide* should be referred to for a detailed discussion of the ISE Manager Suite **Physical View**, **Storage View**, and **Server View**.

Login

To log in to the ISE Manager Suite:

1. Enter the name or IP address for an ISE system.
2. On the login screen enter the user name (**administrator**).
3. Enter the password (default **made4you**).
4. Click **Login**.

Configuration Guide

ISE Storage System configuration options with ISE Manager Suite:

Configuration Option	ISE Manager Suite Action
Create Host	SAN Groups >> san_group >> Physical View >> Create Host Client
Daylight Savings	SAN Groups >> san_group >> Physical View >> ISE Storage Properties tab
DHCP Enable or Disable	SAN Groups >> san_group >> Physical View >> Network tab
Firmware Upgrade	SAN Groups >> san_group >> Physical View >> Firmware tab
QoS Mode Enable or Disable (in ISE firmware 3.1.0 and later)	SAN Groups >> san_group >> Physical View >> ISE Storage Properties tab
SNMP Configuration	SAN Groups >> san_group >> Physical View >> SNMP tab
System Clock	SAN Groups >> san_group >> Physical View >> ISE Storage Properties tab
Telemetry	SAN Groups >> san_group >> ActiveWatch View
UPS Mode Enable or Disable	SAN Groups >> san_group >> Physical View >> SuperCap tab
Wake-on-LAN	SAN Groups >> san_group >> Physical View >> Network tab

Table 6: ISE Manager Suite Configuration Guide

For the details of logging in to and out of the ISE Manager Suite, refer to the *ISE Manager Suite User Guide*.

Command Line Interface

The ISE contains an embedded Command Line Interface (CLI) that responds to commands entered at the CLI prompt on a remote console or invoked through a script. Standard command line protocol (such as terminating a command by pressing **ENTER**) applies.

Multiple users may be connected to the ISE simultaneously. This section describes the requirements and connection procedure of the CLI. To aid in script development, Appendix B presents the Help file from the Command Line Interface, listing the commands and options available.

Remote Console Requirements

The remote console used to control the ISE may be any terminal connection application that has Secure Shell connection capability (protocol version 2) through port 22.

Secure Shell connection capability is a secure form of telnet. The ISE will not respond to a regular telnet connection request.

Connecting

This section describes the steps to connect to the ISE through the remote console.

1. To connect to the target ISE, use any terminal connection application on the remote console and configure it for SSH service on port 22.

2. Type the IP address or the host name of one of the MRCs in the ISE into the application's connection field and connect.

The application requests SSH access credentials.

3. Enter the access credentials as follows:

User name: administrator

Password: <password>

The user password for the first-time login, built into the ISE during its manufacture, is **administrator**. During the first-time login, the system prompts for entry of a new password. If the password **administrator** is rejected, check with the network administrator to obtain the current valid user password.

4. Connect to the ISE by entering its name or IP address and the prompt appears.

CLI commands can now be entered to control the ISE as described throughout this document.

5. Enter **help** at the prompt to display a list of available commands.

6. To exit from the CLI, type **exit** or **quit** at the prompt.

Reserved Characters

The CLI permits special characters in text-entry fields with the exception of those characters listed in Table 5 on page 29. An argument in a CLI field may contain spaces if the entire argument entry is enclosed in quotation marks.

Power-up, Shutdown, Restart

This chapter describes the power-up, shutdown, and restart functions of the ISE and details the steps to perform them:

- Power-up (see “Power On State” on page 33)
- Shutdown (see “Shutdown” on page 35)
- Restart (see “Restart” on page 35)

The ISE is connected to two separate and independent AC power sources by two power cords connected to the ISE power supplies. Each power supply unit has a power switch as shown in Figure 27. Connect the ISE power cords to appropriate AC receptacles only after first confirming that the power switches on the ISE are in the **OFF** position.

ISE Power States

The ISE has three power states as follows:

- **Powered On**—ISE is in service
- **Powered Off**—ISE is out of service, can be powered up manually
- **Standby**—ISE is out of service, can be powered on with WOL

Power On State

An ISE in the powered-on state is fully functional with AC power applied to all components and all green LEDs are lit.

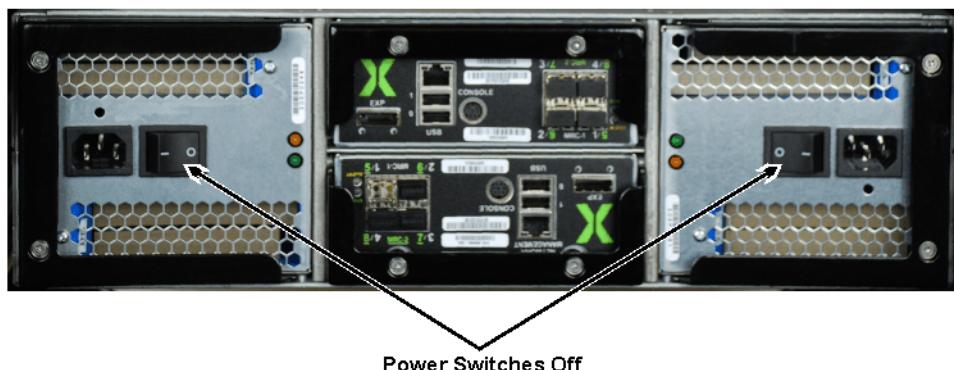


Figure 27. Power Switches

Power Off State

An ISE in the powered off state is totally without AC power. That is, all ISE components are without power and all LEDs are off. To place the ISE in the power-off mode, put both power supply switches into the **Off** position. To power up the ISE from the power-off state, press the power supply rocker switch on both power supplies, putting them into the **ON** position.

Standby State

In the standby state, an ISE has power to the Ethernet ports and to the System Status Module LED (see Table 23 on page 98). In standby mode, the LED is lit amber. When Wake-on-LAN (WOL) is enabled, the Ethernet ports monitor the network for a wake-up command (*magic packet*), sent by certain third-party utilities, to restart the ISE remotely. See “Wake-on-LAN (WOL) Service” on page 51 for details.

To power up the ISE from the standby state:

- If the Wake-on-LAN service is enabled (see “Wake-on-LAN (WOL) Service” on page 49), use a third-party utility to send a magic packet on the network to one of the ISE’s two Ethernet port addresses.
- If the Wake-on-LAN service is disabled, toggle both power switches **Off** and **On**, ensuring that the switches on both supplies are in the **Off** position concurrently for five seconds.

The power off and standby states and the powerup actions are summarized in Table 7.

State	Power Condition	Action	Powerup Action
Power off	No power to all components	Press power switch on both power supplies to OFF . WARNING: DO NOT DO THIS as a means of shutting down the ISE.	Press power switches on both supplies to ON .
Standby	Power is supplied to Ethernet ports and System Status Module LED	Shut down ISE from CLI	If WOL service is enabled, send magic packet on network to one of the ISE’s two Ethernet port addresses OR Press power switches on both supplies to On (if already on, press both switches simultaneously to Off , wait 5 seconds, then press to On).

Table 7: Power Off and Standby States

When the ISE is powered on from the power-off or standby states, it performs a cold boot. Boot types are summarized in the following table (Table 8).

Boot Type	Conditions Inducing Boot Type	Characteristics
Cold boot	Power applied (power off or standby) Remote start by WOL packet from standby state Restart, Reformat, and Remove/Add MRC functions from CLI Some firmware exceptions causing ISE reboot	System performs self-test of subcomponents ISE performs subset of self-test of subcomponents Effects on outstanding host I/O requests: <ul style="list-style-type: none"> • One MRC cold boots, the surviving MRC processes all host requests with no impact on host • Both MRCs cold boot simultaneously, host requests may time out, causing the host to see I/O errors
Hot boot	Failover Some operations (such as Add MRC) Some firmware exceptions causing ISE reboot	Reboot process completes quickly Effect on host I/O requests that are outstanding when the hot boot occurs: requests are completed within the host’s timeout period without impact on the application

Boot Type	Conditions Inducing Boot Type	Characteristics
Warm boot	Firmware upgrade A few firmware exceptions causing system reboot	ISE resets some hardware subcomponents and reloads software and firmware Effects on outstanding host I/O requests: <ul style="list-style-type: none"> • One MRC warm boots, and the surviving MRC processes all host requests with no impact on host • Both MRCs warm boot simultaneously. Requests may be completed within the host timeout period without impact on the application, or requests time out, causing the host to see I/O errors

Table 8: Boot Types

Shutdown

The ISE should be shut down from a running condition in a controlled manner from ISE Manager Suite (**Physical View >> Shutdown**) or the CLI. This shutdown procedure places the ISE in standby mode as shown in Table 7 (page 34) and described in “Power On State” on page 33. After a controlled shutdown completes, the AC power can be removed by flipping the power switches to the **OFF** position.

Note. The ISE should not be shut down from a running state by turning off the power.

Controlled Shutdown

To execute a controlled shutdown from the CLI, follow the procedure detailed in “Shutdown” on page 120. This controlled shutdown causes the ISE to perform the following actions:

- Complete all in-progress I/O commands from all hosts.
- Flush all cache data; this data flush requires patience, as it can take from a few seconds to several minutes.
- Prepare internal processes for a graceful shutdown.
- Shut down both MRCs and leave off (in standby mode).
- Retain all configuration settings and terminate management connectivity with the ISE.

When power is applied to a powered-off ISE or a WOL signal is sent to an ISE in a standby state, the ISE performs a cold boot. Boot types are summarized in Table 8 on page 35.

Restart

An ISE can be restarted while running using ISE Manager Suite (**Physical View >> Restart**) or the CLI. The ISE restart performs the following:

- Completes all in-progress I/O commands from all hosts
- Flushes all data from cache
- Prepares internal processes for a graceful shutdown
- Shuts down both MRCs
- Automatically restarts both MRCs

Initialization and all configuration settings are retained. Connection to the ISE through the ISE Manager Suite or the CLI is terminated. When the restart is complete, the ISE is again accessible.

To restart the ISE from the ISE Manager Suite or CLI, follow the procedure detailed in “Restart” on page 119. When an ISE is restarted, it performs a cold boot. Boot types are summarized in Table 8 on page 35.

The ISE power states differ for a **Shutdown** (see “Shutdown” on page 35) and a **Restart** as described in the following table (Table 9).

Action	Power State	Means of Activation
Restart	Power on (power is on to all components)	Automatically restarts
Shutdown	Standby (power is off to all components except system LED and Ethernet ports to intercept WOL magic packet)	Use third-party utility to send appropriate WOL magic packet (if enabled) or toggle power switches (ensure both are off simultaneously for five seconds)

Table 9: **Restart and Shutdown Power States**

Initialize and Configure

This chapter details the procedures to initialize the ISE, customize the system settings, and configure the hosts, storage, and other customizing elements. The steps to initialize and configure an ISE using ISE Manager Suite and the CLI for all ISEs are presented here.

Note. For users already familiar with the ISE who need only a review of initialization and configuration procedures, see the *ISE Quick Start Guide*.

Creating the initial configuration is detailed in the following sections of this chapter:

- Initializing the ISE (see “Initializing ISE” on page 37)
- Setting System Parameters (see “System Parameters” on page 40)
- Setting SNMP Parameters (see “SNMP Setup” on page 45)
- Creating Storage Volumes (see “Configuring Storage” on page 46)
- Creating Hosts (see “Configuring Hosts” on page 51)
- Mapping Volumes and Hosts (see “Mapping Volumes and Hosts” on page 52)

Initializing ISE

The ISE ships from the factory in an uninitialized state. Initializing the system causes metadata to be written on the DataPacs so that volumes can be created. Initialization reserves twenty percent of overall storage capacity for dedicated sparing.

ISE Manager Suite

Launch ISE Manager Suite, create a SAN Group, and add the ISE to the SAN Group.

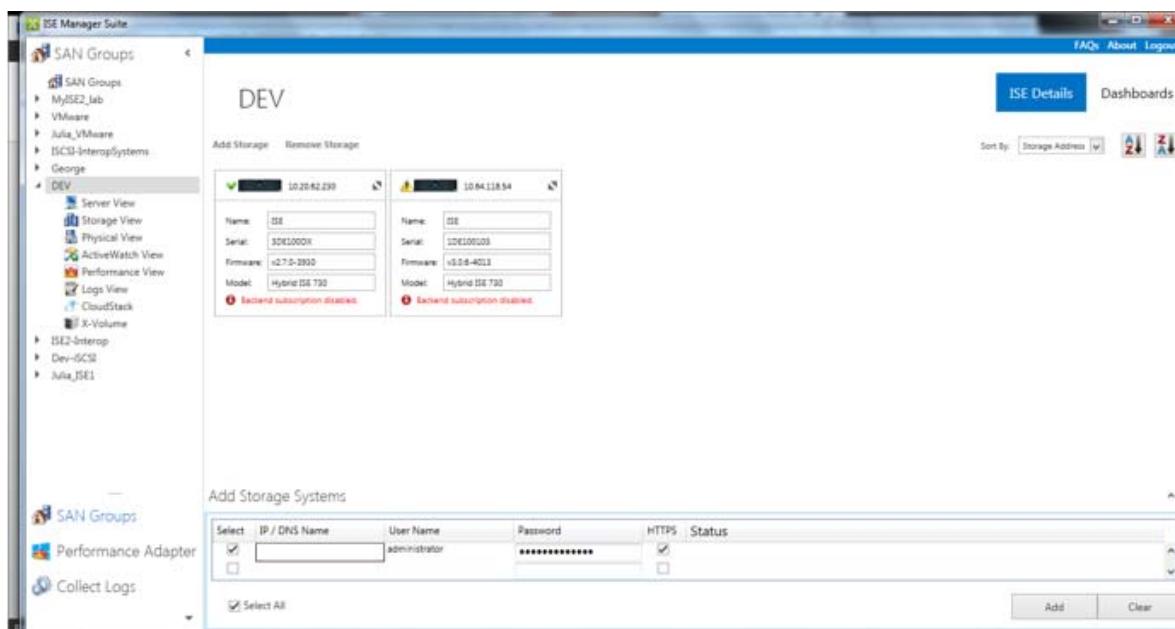


Figure 28. Add Storage Systems

Then, select the Physical View. Those ISEs being monitored are shown near the top of the details pane in the form of ISE images. Select an ISE and the status summary is displayed in the details pane. The current Status is shown at the top of the ISE Storage Properties tabbed page. Refer to the *ISE Manager Suite User Guide* for complete details.

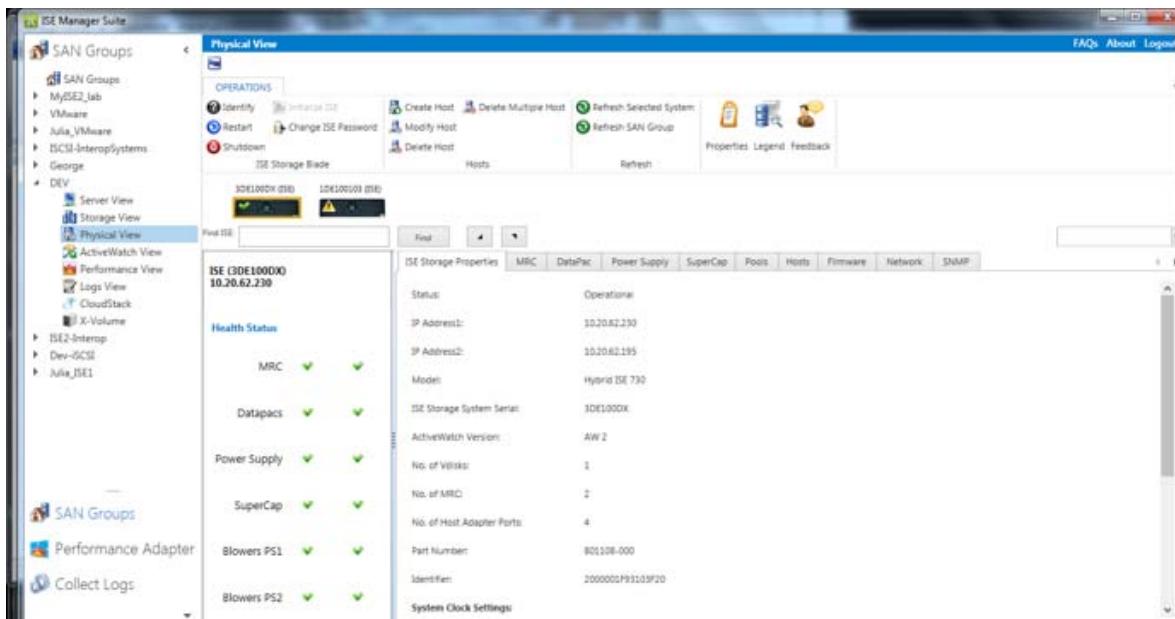


Figure 29. ISE Manager Suite—Status Summary

Clicking any of the ISE component tabs loads the details for that selected ISE component (see *ISE Manager Suite User Guide*).

Initialize and Configure

The ISE initialization and configuration functions available through the ISE Manager Suite are:

1. ISE firmware upgrade
2. Network settings
3. System clock settings

Command Line Interface (CLI)

Connect to the ISE using the remote console (see “Command Line Interface” on page 34 for details). At first-time login to the un-initialized ISE, the **ISE requires initialization** dialog is presented in the remote console window.

To skip the initialization process, press the **ESC** key. The **skipping initialization** message appears.

Initialize ISE and Storage Pools

To initialize the ISE and storage pools from the initialization prompt:

Press **y** and then press **Enter**. The following message is displayed while initialization is occurring:

```
Initializing ISE (Sparing = 20%)
```

When initialization is complete, the word **Done** is displayed after the three dots in the **Initializing** message, and the console returns to the prompt.

iSCSI Network Settings

There are three Ethernet ports on each iSCSI MRC, one RJ-45 management port and two iSCSI Data ports (**Data A** and **Data B**). These all default to DHCP.

Set Up iSCSI IP Addresses

To change the iSCSI Data ports (**Data A** and **Data B**) to static use the **configure -ionet** CLI command as shown below. The configure command is used to assign static IP addresses to each MRC iSCSI interface port as follows.

```
configure --ionet --network=A --dhcp=disable
configure --ionet --network=A --ipaddress1=<mrc1_data-A_ip>
configure --ionet --network=A --ipaddress2=<mrc2_data-A_ip>
configure --ionet --network=A --netmask=<data-A_netmask>

configure --ionet --network=B --dhcp=disable
configure --ionet --network=B --ipaddress1=<mrc1_data-B_ip>
configure --ionet --network=B --ipaddress2=<mrc2_data-B_ip>
configure --ionet --network=B --netmask=<data-B_netmask>
```

The above commands can be combined into two commands, one command for network **A** and another for network **B**.

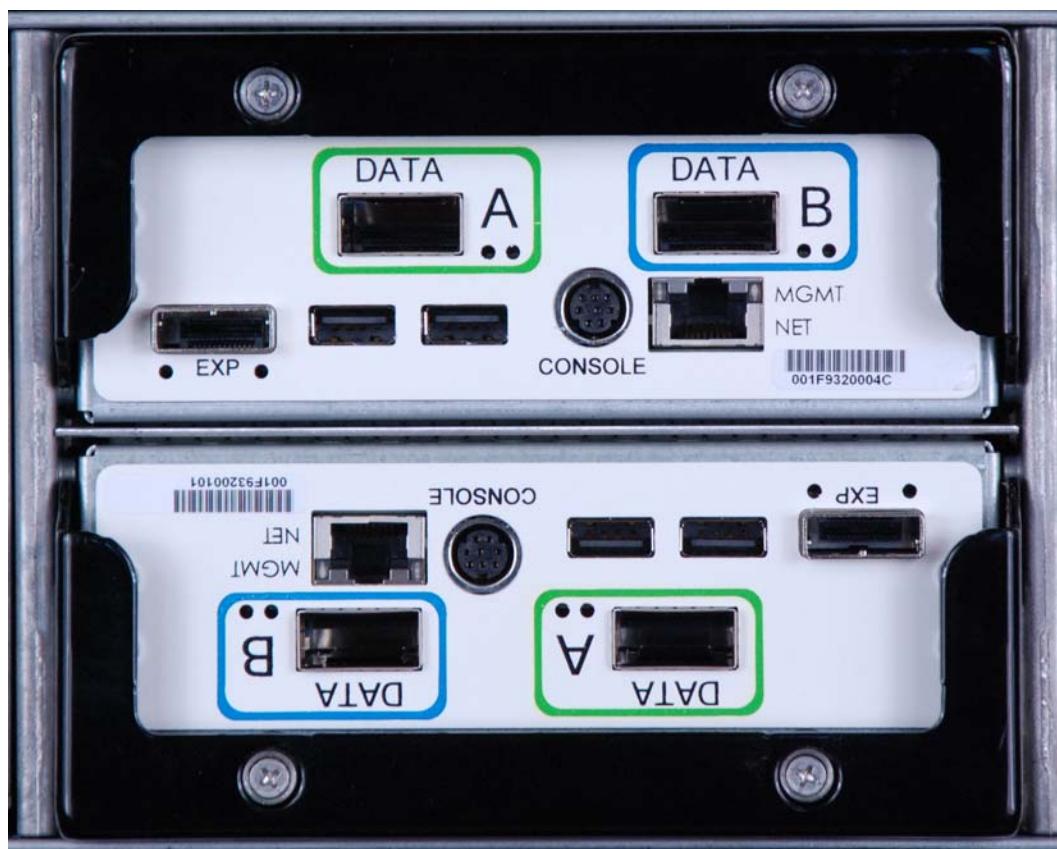


Figure 30. iSCSI MRC Pair—Ports A and B

The ISE is initialized with one pool distributed across two DataPacs. To initialize the ISE and the storage pools after skipping the initialization prompt, use the `initialize` command with no parameters.

View the sparing percentage in effect on a system that has already been initialized by using either of the following commands:

- Type `initialize`. The console displays the following message:
Already initialized. Nothing to do. (Sparing = 20%).
- Type `show datapac`. The resulting console output includes the spare level in effect.

System Parameters

The configurable ISE system parameters—factory settings—should be reviewed and changed as needed. Discussed here are:

- Using the ISE Manager Suite interface, detailed in the *ISE Manager Suite User Guide*
- Using the Command Line Interface as detailed in “Command Line Interface (CLI)” on page 39
- The ISE system parameters are explained in “ISE System Parameters Detailed” on page 41

ISE Manager Suite

To configure the system parameters of the ISE with ISE Manager Suite, navigate to the Physical View after adding the ISE to a SAN Group. Refer to the *ISE Manager Suite User Guide* for additional details.

Command Line Interface (CLI)

The system parameters may be changed at any time on all ISE models with the CLI. All parameter changes become effective immediately upon entry (see Step 2 below).

To set system parameters, connect to the ISE using the remote console (see “Command Line Interface” on page 34 for details). Then perform the following steps:

1. From the prompt, set or change the system parameters using the syntax shown in Table 10 on page 41. For example, to set the System Name, enter `configure --name=<ise_systemname>`, where `<ise_systemname>` is the name to be associated with the ISE. Text strings with embedded blanks must be enclosed in quotes.
 2. Press ENTER.
- The console window displays the updated parameter list.
3. Continue to set parameters until all desired changes are complete (use the up arrow key to retrieve previous entries).

Parameters Displayed Through the <code>show ise</code> Command		
Parameter	Command to Set ¹	Additional Description
System Name	<code>configure --name=<System_Name></code>	“System Name” on page 42
Address	<code>configure --address=<Address></code>	“Address” on page 42
Location	<code>configure --location=<Location></code>	“Location” on page 42
Contact Name	<code>configure --contact=<Contact_Name></code>	“Contact Name” on page 42
Contact Phone	<code>configure --phone=<Contact_Phone></code>	“Contact Phone” on page 42
Contact Email	<code>configure --email=<Contact_Email></code>	“Contact Email” on page 43
Fibre Channel Port Speed	<code>configure --fcspeed=<Auto/2/4/8></code>	“Fibre Channel Port Speed” on page 44
Date, Time, Time Zone, and auto-adjust for Daylight time	<code>configure --date=<DD-MMM-YYYY></code> <code>configure --time=<HH:MM:SS></code> <code>configure --timezone=<Zone></code> ² Also see: <code>help timezone</code>	“System Clock Settings” on page 43
QoS Mode	<code>configure --qosmode=<Enable Disable></code>	“QoS Mode” on page 45
Parameters Displayed Through the <code>show network</code> Command		
DHCP setting	<code>configure --dhcp=<Enable/Disable></code>	“Network Settings” on page 43
Port 1 IP Address, IP Mask, IP Gateway, Connection Status	<code>configure --ipaddress1=<x.x.x.x></code> <code>configure --netmask1=<x.x.x.x></code> <code>configure --gateway1=<x.x.x.x></code>	“Network Settings” on page 43
Port 2 IP Address, IP Mask, IP Gateway, Connection Status	<code>configure --ipaddress2=<x.x.x.x></code> <code>configure --netmask2=<x.x.x.x></code> <code>configure --gateway2=<x.x.x.x></code>	“Network Settings” on page 43
Wake-on-LAN setting	<code>configure --wol=<Enable/Disable></code>	“Wake-on-LAN (WOL) Service” on page 43

Table 10: CLI—System Parameters

¹ Entries may contain special characters except those listed in “Reserved Characters” on page 34. If an entry is to include spaces, enclose the entire entry in quotation marks.

² Append the `--dst` option to this command to specify automatic adjustment to Daylight Savings Time.

ISE System Parameters Detailed

This section describes the various system parameters of the ISE that can be customized.

System Name

The system name is an optional user-defined name for an ISE. A name is any alphanumeric string of up to thirty-two characters. Embedded blanks and special characters (excepting “Reserved Characters” on page 34) are permitted.

CLI: To display the System Name from the CLI, use the `show ise` command. The System Name is changed with the `configure --name=<ise_system_name>` command (“CLI—System Parameters”). If the name is to contain embedded blanks, enclose the character string in quotation marks as shown in the following example:

```
configure --name=<"ISE System Name">
```

Address

The Address is an optional user-defined address for an ISE, defining a physical address, building, or any address string. The address is any alphanumeric string of up to sixty characters. Embedded blanks and special characters (excepting “Reserved Characters” on page 29) are permitted.

CLI: To display the Address from the CLI, use the `show ise` command. To set the Address from the CLI, use the `configure --address=<ise_address>` command (see Figure 10 on page 41). If the address is to contain embedded blanks, enclose the character string in quotation marks as shown in the following example:

```
configure --address=<"ISE Address">
```

Location

The Location is an optional user-defined location for an ISE, such as a data center, room number, rack number, rack position, or any other type of locator. The location is any alphanumeric string of up to sixty characters. Embedded blanks and special characters (excepting “Reserved Characters” on page 29) are permitted.

CLI: To display the Location from the CLI, use the `show ise` command. To set the Location from the CLI, use the `configure --location=<ise_location>` command (see Figure 10 on page 41). If the location is to contain embedded blanks, enclose the character string in quotation marks as shown in the following example:

```
configure --location=<"ISE location">
```

Contact Name

The Contact Name is an optional user-defined name for a person associated with this ISE, such as a storage manager, network administrator, or other associated person. The contact name is any alphanumeric string of up to sixty alphanumeric characters. Embedded blanks and special characters (excepting “Reserved Characters” on page 29) are permitted.

CLI: To display the Contact Name from the CLI, use the `show ise` command. To set the Contact Name from the CLI, use the `configure --contact=<contact_name>` command (see Figure 10 on page 41). If the contact name is to contain embedded blanks, enclose the character string in quotation marks as shown in the following example:

```
configure --contact=<"contact name">
```

Contact Phone

The Contact Phone is an optional user-supplied phone number for the contact person (see “Contact Name” on page 42). The contact phone is any alphanumeric string of up to sixteen characters. Embedded blanks and special characters (excepting “Reserved Characters” on page 29) are permitted.

CLI: To display the Contact Phone from the CLI, use the `show ise` command. To set the Contact Phone from the CLI, use the `configure --phone=<contact_phone>` command (see Figure 10 on page 41). If the contact phone is to contain embedded blanks, enclose the character string in quotation marks as shown in the following example:

```
configure --phone=<"contact phone">
```

Contact Email

The Contact Email is an optional user-defined e-mail address for the contact person (see “Contact Name” on page 42). The Contact Email field accepts any valid e-mail address of up to sixty alphanumeric characters.

CLI: To display the Contact Email from the CLI, use the `show ise` command. To set the Contact e-mail from the CLI, use the `configure --mail=<contact_email>` command (see Figure 10 on page 41) as shown in the following example:

```
configure --mail=<"contact_address@emailsrvr.net">
```

Network Settings

The ISE Network Settings include two Ethernet ports (**1** and **2**), the Media Access Control (MAC) address, link status (connected or unknown), and Dynamic Host Configuration Protocol (DHCP) mode (enabled or disabled). Connections to the CLI are made through the Ethernet ports.

When DHCP mode is enabled, the network DHCP server assigns an IP address, mask, and gateway to each of the Ethernet ports. These addresses are displayed by the CLI as the **Port 1** and **Port 2** addresses and cannot be set when DHCP mode is enabled. The ISE enables DHCP Mode by default.

When DHCP mode is disabled, the IP address, mask, and gateway for **Port 1** and **Port 2** must be supplied at system setup time and manually changed to reflect any network changes that have an impact.

CLI: To display the network settings from the CLI, use the `show network` command. To set the IP address, netmask, and gateway from the CLI, use the syntax shown in “CLI—System Parameters” on page 41. To set the DHCP Mode from the CLI, use the `configure --dhcp=<Enable/Disable>` command (see Figure 10 on page 41).

Wake-on-LAN (WOL) Service

The setting of the Wake-on-LAN (WOL) Service controls the means by which the ISE is activated after being placed into standby mode by the system shutdown as follows:

- If WOL is enabled, the Ethernet ports monitor the network for a magic packet sent to the ISE by certain third-party utilities to restart it remotely. The ISE enables WOL by default.
- If WOL is disabled, the Ethernet ports do not monitor the network for a magic packet. To restart the ISE, toggle the rocker switches of both power supplies **OFF** and **ON**, ensuring that the switches on both supplies are in the off position concurrently for a minimum of five seconds.

See “Power-up, Shutdown, Restart” on page 35 for more information about system powerup, shutdown, and restart.

CLI: To display the WOL setting from the CLI, use the `show network` command. To set the WOL Mode from the CLI, use the `configure --wol=<Enable/Disable>` command (see Figure 10 on page 41).

System Clock Settings

During ISE manufacture, the system clock is set to Coordinated Universal Time (UTC). If desired, the CLI, as described in this section, can be used to manually set the system clock as needed to meet site requirements. When the system clock is set on one MRC, the system clock of the companion MRC is automatically and immediately synchronized.

To approximately synchronize the ISE to a local server manually, enter a synchronization time and wait for the server's clock to cycle to that synchronization time before pressing **ENTER** while in the CLI.

ISE Manager Suite: To set or change the system clock using the ISE Manager Suite, select **Physical View >> ise_name >> Physical View >> ISE Storage Properties**. (See the *ISE Manager Suite User Guide*.)

CLI: To set this parameter from the CLI, use the **configure** command with the options shown in “CLI—System Parameters” on page 41.

The following formats apply to both the CLI:

- a. Date: *dd-mmm-yyyy*, where *mmm* is the 3-letter representation of a month (for example, Nov for November). Enter the month in uppercase or lowercase or a combination of both; it is displayed in lowercase with an initial capital.
- b. Time: *hh:mm:ss* using a 24-hour clock.
- c. Time Zone:
 - In the CLI, type **help timezone** to see the time zone options.
- d. Daylight: Enable this option to cause the ISE to automatically adjust the time for the change to and from Daylight Savings Time. The Daylight option is enabled by default.

System Clock Attribute	CLI Command	
Date	configure --date=<dd-mm-yyyy>	
Time	configure --time=<hh:mm:ss>	
Timezone	configure --timezone=<zoneoption>	Use help timezone to view options
Automatic Daylight Time	configure --timezone=<zoneoption> configure --timezone=<zoneoption> --dst	To disable To enable

Table 11: Setting System Clock Attributes—CLI Commands

Fibre Channel Port Speed

The Fibre Channel host port speed can be set to one of the following settings:

- **Fibre Channel ISE:** Speeds of 4 and 8 Gbs are supported on the individual ports when specified, otherwise all ports are the same. Fibre Channel activity occurs at the selected speed (see support matrix at www.X-IO.com).
- **Auto:** Using the protocol defined in the T11 Auto-Negotiation standard, the ISE auto-negotiates with the Fibre Channel switch to determine and set the highest port speed that both devices support.
- Auto-negotiation is enabled by default at the factory.

CLI: To control this parameter using the CLI, use the **configure --fcspeed=<Auto/1/2/4>** command (see “CLI—System Parameters” on page 41).

UPS Mode

While the ISE has no data connection for UPS hardware, the ISE should be powered through an uninterruptible power supply (UPS) to maintain power to cache memory in the event of a power outage. By default, the ISE disables UPS Mode. If the ISE is protected by a UPS, enable UPS mode by setting the **UPS Mode** system parameter to **Enable**.

Note. The UPS mode cannot be changed on Hybrid ISE systems.

ISE Manager Suite: To enable or disable the UPS Mode through the ISE Manager Suite, select **Physical View >> ISE_Name >> Supercaps**, then click the **UPS Mode Selected** check box.

CLI: To enable or disable UPS Mode using the CLI, use the `configure --upsmode=<Enable/Disable>` command (see “Command Line Interface (CLI)” on page 39).

QoS Mode

Optional Quality of Service settings in the ISE firmware 3.1.0 and later. Disabling this QoS mode is a means of globally disabling the feature and temporarily overriding any QoS volume settings. This is temporarily disabling QoS to evaluate performance differences. By default, the QoS mode is enabled, meaning the ISE is QoS-ready and each volume is QoS-enabled, with storage-regulated values by default.

ISE Manager Suite: To disable or re-enable QoS mode through ISE Manager Suite, select **Physical View >> ISE_Name >> Properties**, then click **QoS Mode**.

CLI: To disable or re-enabled QoS mode through CLI, use `configure -- qosmode=<Enable | Disable>`.

SNMP Setup

The ISE has a number of configurable SNMP settings as well as fixed factory settings. SNMP V1 and V2 are supported by the ISE, and the SNMP protocol data units (PDUs) are implemented. In addition, the ISE includes an algorithm to prevent denial of service attacks.

SNMP PDU	ISE Support Status	Notes
GetRequest	Yes	ISE monitors port 161
GetNextRequest	Yes	ISE monitors port 161
Response	No	—
SetRequest	No	ISE is set through the CLI
GetBulkRequest	Yes	ISE monitors port 161
InformRequest	No	—
TrapV2	Yes	ISE sends on port 162
Report	No	—

Table 12: SNMP PDUs Implementation

Configuring SNMP

SNMP contact information, MIB root OID, Event subscriptions, and SNMP trap destination IP address are the configurable SNMP settings. The SNMP Contact parameters are detailed below in “SNMP Contact Settings” through “SNMP Trap Destination Setup” on page 46.

Monitoring the ISE using SNMP Object Identifiers is described in “System Monitoring with SNMP” on page 115.

SNMP Contact Settings

The information entered in the four SNMP Contact settings is included in the Management Information Base (MIB) file for the ISE and in SNMP GetRequest and Trap notification packets. The SNMP Contact information settings are:

- Community string
- Contact information
- Organization

- Description

MIB Root OID Setting

The ISE Root OID Name and Number are also displayed.

When any change to the four Contact Information parameters is saved by clicking **SUBMIT** or **SAVE CHANGES**, the system automatically regenerates the MIB file to include the new information.

Event Subscriptions

Event subscriptions provide the means to designate which events are to be forwarded to the SNMP Client Application. Upon an event, the system checks this list to determine whether to send the event as an SNMP trap to the SNMP Trap Destination list (see “SNMP Trap Destination Setup” on page 46). SNMP traps are datagrams and do not have guaranteed delivery. Traps are sent only once and are not saved locally.

Trap service is provided by one of the two MRCs; if the trap-serving MRC experiences an exception causing a reboot, the surviving MRC resumes trap service using only the traps and destinations defined for itself. Traps defined only for an out-of-service MRC are not sent by the surviving MRC. Should trap service need to be restarted on the surviving MRC, some traps may be lost during the transition.

SNMP Trap Destination Setup

The SNMP trap destination setup allows specification of site-specific IP addresses to which the selected SNMP events (see “Event Subscriptions”) are sent. Events can be sent to different IP addresses from each port if desired. Duplicate IP addresses are not permitted in the address lists and cannot be added.

CLI: SNMP Trap Settings

In the CLI, only Trap Subscriptions and Destinations can be modified.

To subscribe to and unsubscribe from SNMP trap notifications, use the **trap_subscription** command as follows.

```
trap_subscription network={1|2} {add|remove} events="n,m,o,p"
```

where 1 or 2 identifies the MRC that will originate the trap and where n,m,o,... are the event numbers.

To add or remove an SNMP trap notification destination, use the **trap_destination** command as follows.

```
trap_destination network={1|2} {add|remove} address="n,m,o,p"
```

where n,m,o,... are IP addresses.

MIB File

The Management Information Base (MIB) file for the ISE can be viewed or downloaded to be compiled into an SNMP device-monitoring tool using the on-screen instructions. The ISE automatically regenerates the MIB file when changes to any logical object in the system are made, ensuring that the MIB file is always current. Monitoring the ISE using SNMP Object Identifiers is described in “System Monitoring with SNMP” on page 115.

Configuring Storage

This section provides an overview of ISE storage and its configuration using the CLI. “Creating Volumes” on page 49 and “Command Line Interface” on page 49 detail the procedures to create volumes using the CLI. See the *ISE Manager Suite User Guide* for assistance in configuring storage with ISE Manager Suite on ISEs.

Storage Pools and Volumes

In the ISE, storage capacity is organized into entities called storage pools. A storage pool consists of all available storage in one ISE DataPac, or all available storage in both DataPacs. The overall capacity of each pool is determined by the type of DataPac and the percentage of capacity reserved for sparing during initialization of the storage pools (see “Initializing ISE” on page 37).

Each storage pool can be segmented into multiple volumes. Volumes within a storage pool can be of any RAID type supported by the ISE and can have a maximum capacity of 2 TB each with mirroring and 8 TB each without mirroring. Sparing and RAID operations occur within the boundaries of the storage pool. Volumes are created in the ISE on a pool-by-pool basis, and the cache policy (write-back or write-through) and RAID type are specified on a volume. QoS IOPs settings are available in ISE firmware 3.1.0 and later.

For details on handling pools and LUNs using the ISE Manager Suite interface refer to the *ISE Manager Suite User Guide*.

From the CLI, obtain storage pool information using the `show pool` command.

```
bb41//asa:cosp:colo.seagate.com - PUTTY
Thin Threshold : 75 %

Pool 2 (DataPac-2)
-----
Status      : Operational (None)
Details     : 0x00000000
UUID        : 6001F931001F0000169B000010000000
Type        : Hybrid
# of Volumes : 4
Free Capacity
  Raid 0 : 6297 GB
  Raid 1 : 3148 GB
  Raid 5 : 5038 GB
  Flash Capacity : 1405 GB
  Flash Quota   : 505 GB (35%)
  Flash Free Capacity
    Raid 0 : 393 GB
    Raid 1 : 196 GB
    Raid 5 : 314 GB

  Pool Capacity      : 6425 GB
  Allocated Space    : 127 GB (2 %)
  Free Space         : 6297 GB (98 %)
  Usage by RAID level, used/provisioned
    Raid 0 : 0/0    GB (0 /0 %)
    Raid 1 : 127/400 GB (2 /6 %)
    Raid 5 : 0/0    GB (0 /0 %)

  Allocated Space    : 112 GB
  Free Space          : 393 GB
  Flash Usage by RAID level, used/provisioned
    Raid 0 : 0/0    GB (0 /0 %)
    Raid 1 : 89/200  GB (18 /40 %)
    Raid 5 : 22/250  GB (4 /50 %)

Thin Threshold : 75 %

root:> [green arrow]
```

Figure 31. `show pool` command

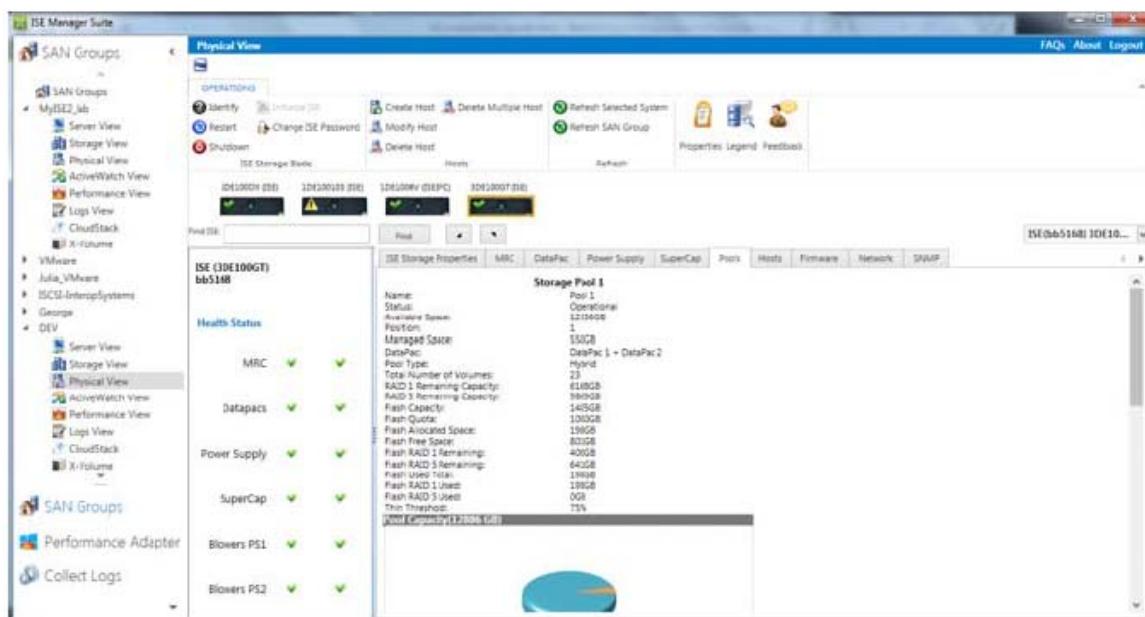


Figure 32. ISE Manager Suite Pool Tab

Creating Volumes

This section details the steps to create volumes using the CLI.

ISE Manager Suite

To create volumes using the ISE Manager Suite, select a SAN group then select **Storage View >> Create** (in ISE Storage System Banner) (see the *ISE Manager Suite User Guide*).

Command Line Interface

To create volumes using the Command Line Interface (CLI), follow the steps below.

Note. Cache mode, volume-host mapping, LUN number, and volume size can be modified after the volume is created.

To view the remaining capacity for volumes of each RAID type within each pool, type **show pool**. Then locate the Free Capacity section of the resulting console display.

To create a volume using the CLI, use the **create volume** command with the options shown in Table 13. If a name is not specified, the CLI auto-generates a name in the format **Volumenn**, where **nn** is an incrementing number starting from **01**. Any auto-generated names that already exist are skipped over.

Command	Options	Comment
create --volume=<name> or create --volume	--size=<size in GB>	Volume size in GB
	--raid1	RAID 1 volume (default)
	--pool1	Volume from Pool 1 (default)
	--pool2	Volume from Pool 2
	--write-back or --wb	Write-back cache policy (default)
	--write-through or --wt	Write-through cache policy
	--comment=<comment text>	Optional comment
	--cadp	
	--flash	
	--hdd	
	--iopsmin=<value>	Up to 500,000 IOPS
	--iopsmax=<value>	
	--iopsburst=<value>	
	--thin	HDD and Flash
Example:		
create --volume=Payroll --size=100 --raid1 --pool2 --wb --comment="Pay Roll"		

Table 13: Create Volume Command—CLI

The example command in Table 13 creates a RAID1 volume named Payroll of 100GB from storage pool 2 with write-back caching and the comment Pay Roll.

The volume name may be up to thirty-two alphanumeric characters long (but may not begin with a numeric character). The comment may be up to sixty alphanumeric characters long. Special characters are accepted except those listed in “Command Line Interface (CLI)” on page 39. Text strings with embedded blanks must be enclosed in quotes as shown in the above example.

The ISE creates the volume and displays a confirmation like that shown in the figure below.

```
Volume 'Payroll' (RAID= 1, Size= 100 GB, Pool= 2, Cache= Write-Back)
Creation started successfully.
```

Figure 33. Volume Created Confirmation—CLI

Media Affinity is available on volumes created with ISE FW 2.8.0 and later. Media can be changed on an existing volumes with ISE FW 3.3 and later. See “Modify Volume–Host Mappings” on page 64 for details.

CADP is the default when creating volumes on a 700.

HDD is the default when creating volumes on 200 series ISEs.

Flash is an option only on 700 series ISEs.

- By default, the available capacity to create Pinned to Flash volumes is 0 GB. The Pool Flash Quota must be adjusted to allocate capacity for volume creation.

Caution:

- Allocating Pool Flash Quota decreases the amount of available Flash capacity for CADP volumes.
- Pinned to Flash volumes are recommended for industry-standard Flash operations. Write-intensive applications are not recommended, per industry standards. This restriction includes the use of Pinned to Flash volumes in the X-IO X-volumes due to their write-intensive nature.

Pool Flash Quota modification is supported in the modify pool command.

Modify pool

```
This command is used to modify the quota for Pinned to Flash volumes on a hybrid pool.
```

```
Usage: modify --pool=<pool_id> [options] options include:
```

- **--flashquota=<new quota GB>**

ISE Manager will have EDIT POOL in the Storage System banner view or as an option when selecting Create Volume with Storage Pool selection Manual.

QoS settings are available in ISE firmware 3.1.0 and later.

Setting the IOPS limits effectively sets a priority for volumes. If these goals or limits are not met, the ISE automatically adjusts the service levels in order to make sure that necessary QoS levels for your highest priority applications are nearly always maintained.

Min Goal IOPS can be considered a means of “reserving” performance for given LUNs and will throttle back other LUN performance to achieve this goal. Throttling delays the I/O request, which adds latency to the I/O to slow down the host. The Min can be guaranteed only if the host is generating the I/O to reach that minimum, so care should be taken to set a realistic Min value.

Max Limit IOPS is used in conjunction with Min Goal as a level to initially throttle to when not achieving the Min Goal for other volumes. Max Limit per volume can be considered a soft threshold for IOPS. As long as volumes are achieving their Min Goal, then IOPS can go higher and reach the Burst Limit (hard threshold) for an indefinite period of time.

Burst Limit IOPS “caps” the IOPS as a hard threshold or ceiling. IOPS can never exceed the Burst Limit. If a user is using QoS for the use case of provisioning IOPS, this generally will set Burst Limit the same as Max Limit.

Thinly Provisioned volumes are supported in 3.1.0 and later. They can be created as HDD pinned or pinned to Flash. The Flash Quota needs to be greater than zero but does not require adjustment to the full capacity.

Configuring Authentication (iSCSI ISE)

The iSCSI ISE supports CHAP as an option. To configure CHAP use the `configure --iscsi` CLI command (see `iSCSI authentication` in “This Appendix lists the ISE Command Line (CLI) commands and options.” on page 145). The authentication rules are:

- If either `--auth=in` or `--auth=out` are specified authentication is enabled in that direction
- If either `--auth=in` or `--auth=out` are specified in conjunction with `--auth=disabled` the respective authentication is disabled in that direction
- A username and password must be supplied only if authentication is enabled in either direction
- Different passwords must be used for CHAP IN and CHAP OUT according to iSCSI specifications

Configuring Hosts

Fibre Channel ISE

In the ISE, Host Bus Adapter (HBA) port World Wide IDs (WWIDs) are organized into entities called hosts. A host consists of one or more HBAs under a single name, by which all the HBAs in the host are referenced. Hosts may contain HBA ports from different host computer systems. Hosts allow convenient mapping of storage volumes to the HBAs by providing recognizable named entities containing multiple HBAs.

A list of the HBAs by WWID that comprise a given host can be viewed by expanding the host tree element in the navigation pane of many of the Management Information panels.

iSCSI ISE

When creating hosts on an iSCSI ISE, the `create --host` command can specify one or more IQN names or IP addresses.

Creating Hosts

Creating hosts using the CLI is detailed in “Command Line Interface (CLI)” on page 51.

Note. When creating hosts on an ISE not connected to the target hosts, use the CLI interface (page 51).

ISE Manager Suite

To create hosts through ISE Manager Suite, select a SAN group then select **Server View** and select the appropriate options (see the *ISE Manager Suite User Guide*). Hosts can also be created through selecting **Physical View | Hosts**.

Command Line Interface (CLI)

To create a host using the CLI, use the `create host` command with the options shown in Table 14. To see a list of assigned and unassigned HBA port WWIDs, enter the `show hba` command. If a name is not specified, the CLI auto-generates a name in the format `Hostnn`, where `nn` is an incrementing number starting from `01`. Any auto-generated names that already exist are skipped over.

iSCSI ISE

For an iSCSI ISE, the `create -host` command can specify one or more IQN names or IP addresses.

Command	Options	Comment
create --host=<name> or create --host	--windows	For host using Windows operating system. This option is the default.
	--linux	For host using Linux operating system.
	--comment=<comment text>	Optional comment.
	<list of HBA WWNs that compose this host>	Separate multiple HBA WWIDs with spaces.
iSCSI ISE		
create --host=<name>	iqn or ip address list	For host create on an iSCSI ISE
Example:		
<code>create --host=GEN01 --windows 10000000D94D0123 10000000A87D0902 --comment= "Test Host 1"</code>		

Table 14: Create Host Command

The example command in Table 14 creates a host named `GEN01` with a Windows operating system and containing HBA port WWIDs `10000000D94D0123` and `10000000A87D0902` and comment `Test Host 1`.

The host name may be up to thirty-two alphanumeric characters long but may not begin with a numeric character. The comment may be up to sixty alphanumeric characters long. Special characters are accepted except those listed in “Reserved Characters” on page 29. Text strings with embedded blanks must be enclosed in quotes as shown in the example.

The ISE creates the host and displays a confirmation similar to that shown in the figure (34) below.

<code>GEN01 (Windows)</code>

Comment : Test_Host_1
HBAs : 10000000D94D0123, 10000000A87D0902
Volumes : <no volumes presented to this host>

<code>Host created</code>

Figure 34. Host Created Confirmation

Volumes and hosts are mapped with the CLI using the `present` command. See “Command Line Interface (CLI)” on page 53 for details.

Mapping Volumes and Hosts

This section details mapping volumes and hosts using the CLI. When presenting a volume to a host, a mapping between that host and that volume is created. Each time a mapping is made, the ISE assigns an incrementing LUN number (starting with 0) for the volumes seen by that host. For example, if `volume04` is the first volume mapped to `Host01`, the mapping LUN number assigned to this host is `LUN0`. `volume04` could also be the second volume mapped to `Host02`, where it would be assigned to `Host02` as `LUN1`. An assigned LUN number can be changed for a given volume on a given host as needed to meet the site host/LUN configuration requirements.

Note. Some operating systems or Boot from SAN environments require `LUN0` or a valid response from `LUN0` to discover presented LUNs. Verify the requirements by referring to the best practices for your operating system.

ISE Manager Suite

To map hosts and volumes through ISE Manager Suite select **Unmapped Host Initiators** on the **Server View page** and follow the on screen instructions (see the *ISE Manager Suite User Guide*).

Command Line Interface (CLI)

To map volumes and hosts through the CLI, use the `present` command with the options shown in Table 15.

Command	Options	Comment
<code>present --volume=<name></code>	<code><host name></code>	Hosts to be mapped to this volume. Separate multiple hosts with spaces.
	<code>:<LUN number></code>	Optional entry to specify the LUN on which this host is to see this volume. Place this option immediately after the host name.
<code>present --host=<name></code>	<code><volume name></code>	Volumes to be mapped to this host. Separate multiple volumes with spaces.
	<code>:<LUN number></code>	Optional entry to specify the LUN on which this volume is to be presented to this host. Place this option immediately after the volume name.
Examples:		
<code>present --volume=Volume7 Host00:8 Host01:5</code>		maps Volume7 to Host00 as LUN8 and to Host 01 as LUN5.
<code>present --host=Host00 Volume07:8 Volume02:4</code>		maps Host00 to Volume7 on LUN8 and to Volume2 on LUN4.

Table 15: Present Command

For example, the command below presents **Volume03** to hosts **Prod01** and **Prod02** without specifying the LUN.

```
present --volume=Volume03 Prod01 Prod02
```

The ISE creates the mapping and displays a confirmation similar to that shown in the figure (35) below.

Presenting 'Volume03' to 'Prod01': OK
Presenting 'Volume03' to 'Prod02': OK

Figure 35. Volume Host Mapping

After the initial volume-host mapping scheme has been created, it can be modified or deleted at any time using the CLI commands detailed in “Modify Volume–Host Mappings” on page 80.

ISE Management

This chapter details the various aspects of managing an ISE configuration:

- System and SNMP settings (“Modify System, SNMP” on page 55)
- ISE Analyzer (“ISE Analyzer Software Service” on page 56 and “Subscription Function” on page 56)
- Volumes and Hosts (“Volume and Host Configuration” on page 61)
- Volume–Host mapping (“Modify Volume–Host Mappings” on page 64)
- LUNs (“View, Modify LUNs” on page 68)
- Expand and Contract LUNs (“View, Modify LUNs” on page 68)
- Volume Cache policy (“Re-size LUNs” on page 70)
- Volume Delete (“Deleting Volumes” on page 72)
- Host Delete (“Deleting Hosts” on page 72)
- ISE Systems Dashboard (“ISE Systems Dashboard” on page 73)

Modify System, SNMP

ISE Manager Suite: To modify the System parameters using **Physical View | SNMP**. Additional information is in the *ISE Manager Suite User Guide*.

CLI: To modify the System parameters using the CLI, follow the procedures detailed in “Command Line Interface (CLI)” on page 46. All changes become effective immediately after `ENTER` is pressed.

ISE Analyzer Software Service

The optional **ISE Analyzer Software Service** executes on an appliance, providing a single point for viewing real-time status, configuration, and performance data from multiple ISEs. The **ISE Analyzer Software Service** consists of a dedicated server running a Web-based application that collects and displays the following types of data:

- General Updates: This data contains extensive information about the ISE, including the state of FRUs, performance data, volume status, and configuration
- Telemetry data: This data contains SMART logs, CEL files, and system logs
- Alerts: Notifications of specific events site-selected to track and notify a monitoring destination

The **ISE Analyzer Software Service** works in conjunction with ActiveWatch by monitoring ActiveWatch data in real time. ActiveWatch delivers diagnostic information to X-IO Global Services. Where daily performance data collected from that automatically sent to X-IO Global Services through secure web service calls. When issues are detected, alerts are sent to X-IO to expedite issue resolution.

An **ISE Analyzer Software Service** can be installed locally and used to access ActiveWatch data, or the **ISE Analyzer Software Service** managed by X-IO Global Services can be used.

Subscription Function

The ISE includes the **Subscription** function that is used to adjust the IP address of the **ISE Analyzer Software Service** managed by X-IO Global Services. **Subscription** is also used to provide an IP address for a locally installed **ISE Analyzer Software Service** to which General Update files, Telemetry files, and alerts can be sent. The following destinations can be defined:

- **ISE Analyzer Software Service**, managed by X-IO, is built into the ISE as the default destination and with the subscription function disabled. Subscription to this destination can be enabled or disabled using the Command Line Interface (CLI).
- **Local ISE Analyzer**: Up to three addresses are supported through the CLI.

Each subscription entry has three components:

- **IP address**: The IP address of the destination, expressed in IPv4-standard format (*nnn.nnn.nnn.nnn:ppp*) or DNS name.
- **Interval**: The number of minutes between one data transmission and the next. The default interval is 1440 minutes (24 hours); the interval range is from 15 to 1440 minutes. Alerts are sent as they occur regardless of the interval set for data transmission.
- **Enabled/disabled state**: Each subscription entry can be individually enabled or disabled for transmission. General Updates, Telemetry data, and alerts are sent to all enabled addresses.

Management Interfaces

The following interfaces can be used in relation to the **ISE Analyzer Software Service**:

- ISE Manager Suite can be used to manage subscriptions. Refer to the *ISE Manager Suite User Guide* for more information.
- ISE Analyzer Web interface is used to configure, manage subscriptions, and view ActiveWatch data. Refer to the *ISE Analyzer User Guide* for more information.

Command Line Interface

The Command Line Interface (CLI) can be used to manage subscriptions. When using the CLI, enter the command **help subscribe** for help with subscription commands.

Enable Subscriptions

The **ISE Analyzer Software Service** ships with a default destination address and the subscription function disabled. To use the **ISE Analyzer Software Service**, subscription must be enabled. This destination uses a secure SSL connection.

When enabling a subscription to the **ISE Analyzer Software Service**, it may be necessary to configure the site firewall to allow outbound HTTPS communication (port 443 using TCP). To precisely specify the destination, define the target address as 207.250.72.215—this restricts other HTTPS traffic.

Notes:

- [1] The interval for Telemetry and General Update subscriptions can be specified, but Alert subscriptions cannot be specified.
- [2] When creating or changing Telemetry update subscriptions, it is recommended that the interval be left at 1440. If a smaller interval is specified, the ISE can run out of resources and log the following event in the SMGT event log:

General Telemetry request for <host> has failed with status code = 4 - No resources

ISE Manager Suite

To manage ActiveWatch subscriptions using the ISE Manager Suite, under a SAN group select **ActiveWatch View >> ise_name**, then modify the subscription type. (See the *ISE Manager Suite User Guide*.)

Command Line Interface

From the CLI, enter the following command at the prompt:

```
subscribe add -ipaddress=207.250.72.215 -type=gupdate -interval=720 -enabled=true
```

The range for the **-interval** option is 15 to 1440 minutes. For Telemetry it is recommended that the interval be allowed to default to 1440.

Enable Local Subscriptions

Use the CLI to define a subscription to a locally installed **ISE Analyzer Software Service** by entering the following command at the prompt:

```
subscribe add -ipaddress=nnn.nnn.nnn.nnn:ppp [-enabled=true|false] -type=type  
[-interval=xx]
```

where **nnn.nnn.nnn.nnn:ppp** is the IP address and port of the local **ISE Analyzer Software Service** expressed in IPv4-standard format and the **type** is **alert**, **gupdate**, OR **telemetry**.

The range for the **-interval** option is 15 to 1440 minutes. For Telemetry it is recommended that the interval be allowed to default to 1440.

For example, the following command creates a subscription with an IP address destination of 10.20.30.40 and an interval of 8 hours (720 minutes).

```
subscribe add -ipaddress=10.20.30.40 -interval=720
```

View Subscriptions

Active subscriptions can be viewed with the ISE Manager Suite and the CLI.

ISE Manager Suite

To view ActiveWatch subscriptions using the ISE Manager Suite, under a SAN group select **ActiveWatch View >> ise_name**, then select the subscription type. (See the *ISE Manager Suite User Guide*.)

Command Line Interface

From the CLI, enter the following command at the prompt to view a subscription to a locally installed ISE Analyzer Software Service:

```
subscribe show
```

The existing subscriptions are displayed similar to the following example:

```
ipaddress=10.20.30.40, type=telemetry enabled=true, interval=1440
```

Modify Subscription

The interval for Telemetry and General Update subscriptions can be modified. Alert subscriptions do not have an interval.

Note. When creating or changing Telemetry update subscriptions, it is recommended that the interval be left at 1440. If a smaller interval is specified, the ISE can run out of resources and log the following event in the SMGT event log:

General Telemetry request for <host> has failed with status code = 4 - No resources

ISE Manager Suite

To modify ActiveWatch subscriptions using the ISE Manager Suite, under a SAN group select **ActiveWatch View** >> **ise_name**, then select the subscription type. (See the *ISE Manager Suite User Guide*.)

Command Line Interface

To modify a subscription with the CLI, use the **subscribe add** command with new settings for **enabled** or **interval**. The subscription is modified with the settings included on the command line. In the following example, the interval of a subscription to IP address 10.20.30.40 is changed from 1440 minutes to 720 minutes.

```
subscribe show
10.20.30.40:443, type=telemetry, enable=true, interval=1440, Last Sent= 14-Sep-2010
09:17:26
10.20.30.40:443, type=general update, enable=true, interval=1440, Last Sent= 14-Sep-
2010 09:17:26
10.20.30.40:443, type=alert, enable=true
subscribe add -ipaddress=10.20.30.40 -type=gupdate, -interval=720
subscribe show
10.20.30.40:443, type=telemetry, enable=true, interval=1440, Last Sent= 14-Sep-2010
09:17:26
10.20.30.40:443, type=general update, enable=true, interval=720, Last Sent= 14-Sep-2010
09:17:26
10.20.30.40:443, type=alert, enable=true
```

Disable Subscriptions

Once a subscription to **ISE Analyzer Software Service** has been enabled, it can be disabled using the CLI as described below.

ISE Manager Suite

To disable ActiveWatch subscriptions using the ISE Manager Suite, under a SAN group select **ActiveWatch View >> ise_name**, then select the subscription type. (See the *ISE Manager Suite User Guide*.)

Command Line Interface

From the CLI, enter the following command at the prompt:

```
subscribe add -ipaddress=nnn.nnn.nnn.nnn -type=type -enabled=false
```

where **nnn.nnn.nnn.nnn** is the IP address of the **ISE Analyzer Software Service** expressed in IPv4-standard format and the **type** is **alert**, **gupdate**, or **telemetry**. The range for the **-interval** option is 15 to 1440 minutes. For example, to disable the general update subscription to 207.250.72.215:443, enter

```
subscribe add -ipaddress=207.250.72.215:443 -type=gupdate -enabled=false
```

Delete Subscriptions

To delete a subscription, enter the following command at the prompt:

```
subscribe delete -ipaddress=nnn.nnn.nnn.nnn:ppp -type=type
```

where **nnn.nnn.nnn.nnn** is the IP address of the **ISE Analyzer Software Service** expressed in IPv4-standard format and the **type** is **alert**, **gupdate**, or **telemetry**.

For example, to delete the general update subscription to 10.20.30.40:443, enter

```
subscribe show
10.20.30.40:443, type=telemetry, enable=true, interval=1440, Last Sent= 14-Sep-2010 09:17:26
10.20.30.40:443, type=general update, enable=false, interval=720, Last Sent= 14-Sep-2010 09:17:26
10.20.30.40:443, type=alert, enable=true
subscribe delete -ipaddress=10.20.30.40:443 type=telemetry
```

```
subscribe show
10.20.30.40:443, type=general update, enable=false, interval=720, Last Sent= 14-
Sep-2010 09:17:26
10.20.30.40:443, type=alert, enable=true
```

Send General Update File

An immediate transmission of the General Update file to the **ISE Analyzer Software Service** managed by X-IO Global Services or the locally installed **ISE Analyzer Software Service** can be directly initiated through the CLI. The General Update file contains extensive information about the ISE, including state of FRUs, performance data, volume status and configuration, and more. The transmission uses a secure SSL operation. This function is available in the CLI only.

CLI

To initiate immediate transmission of the General Update file, enter the following command at the CLI prompt:

```
gupdate send [-ipaddress=nnn.nnn.nnn.nnn]
```

where **nnn.nnn.nnn.nnn** is the IP address of the local **ISE Analyzer Software Service** expressed in IPv4-standard format.

The **-ipaddress** option may be omitted if the desired destination is the default IP address (the **ISE Analyzer Software Service** managed by X-IO Global Services). If a different address is desired, define it with the **ipaddress** option. For example:

```
gupdate send sends General Update file to the default address.
```

```
gupdate send -ipaddress=10.20.30.40 sends General Update file to 10.20.30.40.
```

Send Telemetry Data File

An immediate transmission of a Telemetry data file to the **ISE Analyzer Software Service** managed by X-IO Global Services or the locally installed **ISE Analyzer Software Service** can be directly initiated through the CLI. Telemetry data files contain SMART logs, CEL file, system logs, and more. The transmission uses a secure SSL operation. This function is available through the CLI only.

CLI

To initiate immediate transmission of the Telemetry data file, enter the following command at the CLI prompt.

```
telemetry send [-ipaddress=nnn.nnn.nnn.nnn]
```

where **nnn.nnn.nnn.nnn** is the IP address of an **ISE Analyzer Software Service** expressed in IPv4-standard format. The **-ipaddress** option can be omitted if the intention is to send telemetry to all **ISE Analyzer Software Service** subscriptions. If a specific **ISE Analyzer Software Service** is desired, select it with the **-ipaddress** option. For example:

```
telemetry send sends the Telemetry file to all ISE Analyzer Software Service subscriptions.
```

```
telemetry send -ipaddress=10.20.30.40 sends the Telemetry file to 10.20.30.40.
```

Note. Do not use the **telemetry send -file** unless instructed to by X-IO Global Services.

Volume and Host Configuration

ISE Manager Suite

To view ISE volume configuration by pools using the ISE Manager Suite, under a SAN group select **Server View**. Storage pools are listed under the servers. (See the *ISE Manager Suite User Guide*.)

ISE Manager Suite—View Host Configuration

To view ISE host configuration using the ISE Manager Suite, under a SAN group select **Server View**. (See the *ISE Manager Suite User Guide*.)

ISE Manager Suite—Modify Host Configuration

To modify the ISE host configuration using the ISE Manager Suite, under a SAN group select **Server View**. (See the *ISE Manager Suite User Guide*.)

CLI—View, Modify Volume Configuration

View existing volumes from the CLI using the `show volume` command.

Note. The Local ID (LDID) number provides the means to map the relevant events in the Event Log to the name given the volume during volume creation. The LDID number for each volume is displayed below the volume status as shown in the following example.

```
r/ssl_trasn: (pool 2, 10 GB, Raid 1, write-through cache)
-----
Status   : Operational (None)
Details  : 0x00000000
LDID    : 28
GUID    : 6001F9300063000006A0000200000000
HVID    : 6001F9300063000006A0000200000000
Created  : Sat Nov  8 00:12:12 2014
Has
Snapshots: No
VMirror  : This VDisk is not participating in a VMirror
Affinity  : Pinned to Flash (FlashPercent : 100.00)
Hosts    : W2k8_r7s5 (LUN:40)
```

Figure 36. Show Volume Example

Change the volume name, cache policy, and optional comment through the CLI using the `modify` command with the options shown in Table 16 below.

Command	Options	Comment
<code>modify --volume=<name></code>	--name=<new name>	Change the volume name
	--write-back or --wb	Change cache policy to write-back
	--write-through or --wt	Change cache policy to write-through
	--comment=<comment text>	Change the optional comment
	--expand	GB size to increase
	--shrink	GB size to decrease
	--iopsmin	
	--iopsmax	
	--iopsburst	
	--qosmode	enable (default) or disable
Example:		
<code>modify --volume=Payroll --name=Transaction --wt --comment="transaction volume"</code>		

Table 16: Modify Volumes

CLI—View, Modify Host Configuration

View existing hosts through the CLI using the `show hosts` command and existing HBA port WWIDs using the `show hba` command. View any mappings by entering `show hosts` or `show volumes`.

Change the host name, its operating system, the member HBA port WWIDs, and its optional comment from the CLI using the `modify` command with the options shown in Figure 17.

To remove HBA port WWIDs from the host, all mappings to that host must be removed. To do so, use the `unpresent` command as described in “Modify Volume–Host Mappings” on page 64. After the host modifications are complete, restore or create the requisite mappings using the `present` command as described in the same section.

Command	Options	Comment
<code>Modify --host=<name></code>	<code>--name=<new name></code>	Change the host name
	<code>--windows</code>	Change host operating system to Windows
	<code>--linux</code>	Change host operating system to Linux
	<code>--add=<WNN></code>	Add HBA WWID to host. Separate multiple WWIDs with spaces.
	<code>--remove=<WNN></code>	Remove HBA WWID from host. Separate multiple WWIDs with spaces.
	<code>--comment=<comment text></code>	Change the optional comment
Example:		
<pre>modify --host=GEN01 --name=Prod6 --remove 10000000D94D0123 --comment= "Rack1 Slot6"</pre>		

Table 17: Modify Hosts

Modify Volume–Host Mappings

The volume-host mapping scheme can be modified at any time after initial configuration. The ISE Manager Suite and the CLI can be used as follows:

- Modify volumes and hosts with the ISE Manager Suite (see *ISE Manager Suite User Guide*).
- Modify the volume-host mapping with the CLI (see “CLI—Modify Volume, Host Mapping” on page 65).

ISE Manager Suite

To modify the volume–host mappings using the ISE Manager Suite, under a SAN group select **Storage View**. (See the *ISE Manager Suite User Guide*.)

Encryption

ISE firmware 3.2 and later supports user-enabled encryption at rest on supported ISE G3s. Encryption is enabled by entering a user-selected passkey and can be enabled any time as long as the data has not existed prior to ISE firmware 3.2.

The encryption commands are supported only if encryption has been enabled by the user.

Note. Encryption-capable DataPacs do not have to be user-enabled. They can be used without user encryption.

ISE Manager Suite

Physical View | Operations Banner

CLI

```
encryption --enable [unlock disable change]
```

Thin Provisioning

Thin Provisioning is a method of over-subscribing or over-provisioning the amount of space on a storage array. One of the advantages of thin provisioning is on-demand allocation. This allows the storage administrator to present an ISE volume to an Operating System without having to fully allocate the space on the storage array for a given ISE volume. By using ISE Thin Provisioned volumes, the array can be used in a more space efficient manner. Only when new writes are requested are the new blocks actually allocated to the Thin Provisioned ISE volume. Blocks that are re-written do not require new blocks to be allocated. ISE Thin Provisioning is implemented on a per pool basis.

Thin provisioned pinned to flash and pinned to HDD are supported in ISE firmware 3.2 and later. Thin CADP is supported in ISE firmware 3.3 and later.

Note. Thin-provisioned volumes cannot be mirrored.

ISE Manager Suite

In the *Create Volume—Properties* dialog, select the **Thin Provisioning** check box.

CLI

When creating a volume, issue the `--thin` command.

Note. The default Thin threshold is 75% of the pool storage. Use the `modify --pool` command to change the threshold value.

Converting Volumes from Thick to Thin

ISE firmware 3.3 and later supports converting thick volumes to thin volumes. Volumes that are participating in ISE mirrors cannot be converted to thin volumes.

Note. Some operating systems and applications may not automatically adjust to the volume attribute change. Please refer to your vendor-specific documentation for specific guidelines on how to rediscover a volume that has been converted to a thin volume.

ISE Manager Suite

In Volume Properties (right-click on a volume in Storage View), check the Thin Provisioned option.

CLI

The `modify volume` command with the `--thin` qualifier will convert an existing thick volume to a thin volume.

Delete Volume–Host Mapping

ISE Manager Suite

To delete ISE volume–host mappings using the ISE Manager Suite, under a SAN group select **Storage View**. (See the *ISE Manager Suite User Guide*.)

CLI—Modify Volume, Host Mapping

The steps involved in modifying host mappings are presented in “Mapping Volumes and Hosts” on page 62. Deleting a mapping removes visibility from the host to the volume. The volume–host mapping scheme can be modified at any time through the CLI by first deleting the current mapping using the `unpresent` command with the options shown in Table 18. Then create a new mapping using the `present` command with the options shown in Table 19.

Command	Options	Comment
<code>unpresent --volume=<name></code>	<code><host name></code>	Host or list of hosts (separated by blanks) to be unmapped from this volume.
	<code>--all</code>	Following volume name unmaps all hosts from a volume.
<code>unpresent --host=<name></code>	<code><volume name></code>	Volume or list of volumes (separated by blanks) to be unmapped from this host.
	<code>--all</code>	Following host name unmaps all volumes from a host.
Examples:		
<code>unpresent --volume=Volume7 Host00 Host01</code>		Unmaps Volume7 from Host00 and Host 01.
<code>unpresent --host=Host00 Volume07 Volume02</code>		Unmaps Host00 from Volume7 and Volume2.
<code>unpresent --host=Host00 --all</code>		Unmaps Host 00 from all volumes.

Table 18: Unpresent Command—CLI

Command	Options	Comment
<code>present --volume=<name></code>	<code><host name></code>	Hosts to be mapped to this volume. Separate multiple hosts with spaces.
	<code>:<LUN number></code>	Optional entry to specify the LUN on which this host is to see this volume. Place this option immediately after the host name.
<code>present --host=<name></code>	<code><volume name></code>	Volumes to be mapped to this host. Separate multiple volumes with spaces.
	<code>:<LUN number></code>	Optional entry to specify the LUN on which this volume is to be presented to this host. Place this option immediately after the volume name.
Examples:		
<code>present --volume=Volume7 Host00:8 Host01:5 present --host=Host00 Volume07:8 Volume02:4</code>		Maps Volume7 to Host00 as LUN8 and to Host 01 as LUN5. Maps Host00 to Volume7 on LUN8 and to Volume2 on LUN4.

Table 19: Present Command

For example, assume Volume03 is mapped to hosts Prod01 and Prod02 and it needs to be mapped to hosts Prod01 and Prod07 instead. The following sequence of commands changes the mapping as needed.

```
unpresent --volume=Volume03 Prod02
```

The mapping of Volume03 to host Prod02 is deleted and the mapping of Volume03 to host Prod01 remains unaffected. The following message appears on the console when the unmapping completes:

Unpresenting 'Volume03' from 'Prod02':OK

The following `present` command creates the new mapping:

```
present --volume=Volume03 Prod07
```

Volume03 is mapped to host Prod07 and the following message appears on the console upon completion:

Presenting 'Volume03' to 'Prod07': OK

A subsequent `show volume` confirms that Volume03 is now mapped to hosts Prod01 and Prod07.

Modify Pool

Modifying a pool is necessary when insufficient flash quota is available for Pinned to Flash volumes on a hybrid pool.

ISE Manager Suite—Modify Pool

To modify a pool using the ISE Manager Suite, select the desired storage pool from the Storage View, then click Edit Pool. (See the *ISE Manager Suite User Guide*.)

Pool Flash Quota modification is made in Edit Pool under Storage View Volume Operations by clicking on the selected Pool.

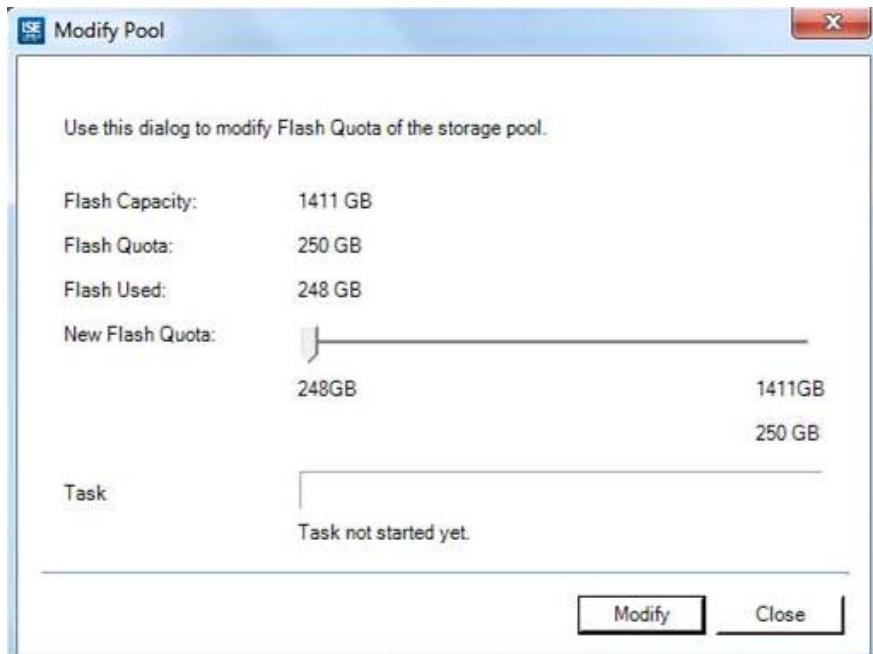


Figure 37. Modify Pool

As the Flash Quota is increased, the ISE will encounter background activity to allocate the flash capacity. The amount of time it takes to complete the allocation Task depends on the CADP volume data that needs to be migrated back to HDD to satisfy the request. The Task progress bar indicate when capacity is available and the user can proceed to create a Pinned to Flash volume.

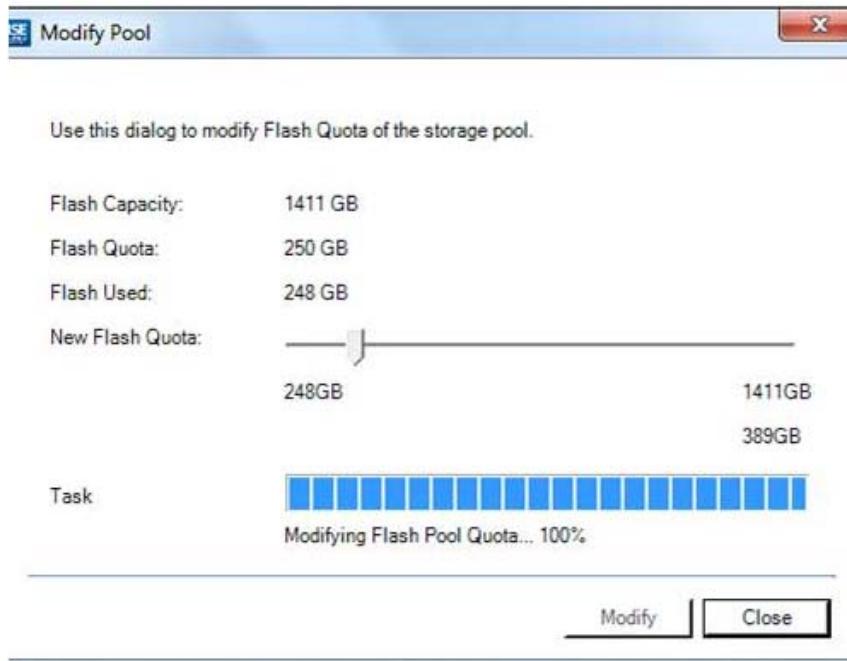


Figure 38. Modifying Flash Pool Quota

CLI—Modify Pool

To modify a pool using the CLI, issue the command `modify --pool=<pool_id> [options] options include:`

```
--flashquota=<new quota GB>
--thinthreshold=<percentage>
```

Note. The default is 75%.

The Flash Quota defaults to 0GB. As it is increased, the ISE will encounter background activity to allocate the flash capacity. The amount of time it takes to complete the allocation depends on the CADP volume data that needs to be migrated back to HDD to satisfy the request. This will start a background process to migrate any necessary data. The Volume Create command will continue to fail until capacity has been fully allocated to meet the create volume request. A Show Pool request can be issued to monitor the new flash quota.

The Thin Threshold percentage is the capacity allocated before an alert is generated. Allocated capacity is the written capacity of the volume.

```
Pool 2 (DataPac-2)
-----
Status      : Operational (None)
UUID        : 6001F930006300000693000100000000
Type        : Hybrid
# of Volumes : 11
Pool Capacity   : 8678 GB
Allocated Space : 521 GB (6 %)
Free Space     : 8157 GB (94 %)
Free Capacity
  Raid 1 : 4078 GB
  Raid 5 : 6526 GB
Usage by RAID level
  Raid 1 : 272 GB (3 %)
  Raid 5 : 248 GB (3 %)

Flash Capacity : 1443 GB
Flash Quota   : 500 GB [34%]
Allocated Space : 140 GB
Free Space     : 359 GB
Flash Free Capacity
  Raid 1 : 179 GB
  Raid 5 : 287 GB
Flash Usage by RAID level
  Raid 1 : 40 GB (8 %)
  Raid 5 : 100 GB (20 %)
```

Figure 39. PuTTY

View, Modify LUNs

LUNs are created during host-volume mapping. Each time a mapping is made, the ISE assigns an incrementing LUN number (starting with 0) to the volumes seen by that host. For example, in the configuration, `r2_meta1` is the first volume mapped to `cc1r2_p1_ini`, so it is **LUN0** to this host.

In the CLI, LUN assignments are displayed on the console from the `show host` and `show volume` commands.

The LUN number for a given volume on a given host can be changed as needed to meet host-LUN configuration requirements. The following subsections detail changing the LUN using the CLI (“CLI—View, Modify LUNs” on page 70).

ISE Manager Suite—View, Modify LUNs

To view and modify LUNs using the ISE Manager Suite, under a SAN group select **Storage View**. (See the *ISE Manager Suite User Guide*.)

CLI—View, Modify LUNs

To view the LUN assignments from the CLI, enter the `show host` or `show volume` commands.

To change the LUN assignments using the CLI, use the `present` command described in “Modify Volume–Host Mappings” on page 64, adding the `:<lun>` option after each host name. For example, the following command changes the LUN through which Volume03 is mapped to host Prod02 to LUN7 from whatever LUN was previously used:

```
present --volume=Volume03 Prod02:7
```

Mappings do not have to be removed before changing a LUN.

Re-size LUNs

The ISE supports LUN re-sizing, expansion, and shrink in place without first copying data to another volume.

LUN re-sizing in the ISE is done in multiples of 1GB by adding to or subtracting from the currently highest numbered logical block address. During LUN re-sizing, independent of the LUN re-size amount, host I/O to the volume is momentarily paused (no more than ten seconds).

A re-sizing process cannot be aborted once initiated, cannot be undone, and the original presentation persists. Presentation changes must be done manually after the LUN is re-sized. The re-size process is unaffected by controller failovers and reboots. The ISE generates an SNMP trap (if enabled) for LUN re-size processes upon completion and in the event of a failure (such as insufficient space or target LUN being inoperative).

LUN Expansion

When the expansion process begins, the ISE reserves enough space to complete the expansion.

LUN Shrink

The operating system volume shrink must be completed before a LUN shrink is attempted. Not all operating systems, file systems, and databases support volume shrink. Refer to the operating system documentation for recommended procedures prior to volume shrink.

Note. Improper use of LUN shrink results in data loss.

ISE Manager Suite—Re-size LUNs

To re-size LUNs using the ISE Manager Suite, under a SAN group select **Storage View**. (See the *ISE Manager Suite User Guide*.)

CLI—Resize LUNs

Follow the steps below to resize LUNs using the Command Line Interface.

1. At the prompt, enter `modify --volume=volume1 --expand=x`, where `volume1` is the volume to be re-sized and `x` is the new size in GB. Alternatively, enter `modify --volume=volume1 --size=x`.
2. Press **Enter** to execute the expansion or shrink.

LUN re-sizing is completed and the volume details are shown, reflecting the new volume size.

Modify Volume Affinity

With ISE firmware 3.3 or later, the volume media affinity type can be changed on an existing volume. The eligible types are CADP, Pinned to Flash, and Pinned to HDD. The affinity type can be changed only if the ISE DataPacs support the new type. For example, an ISE 240 is all-HDD DataPacs, so a volume media affinity cannot be changed to Pinned to Flash or CADP.

ISE Manager Suite—Volume Media Affinity Change

To change the volume media affinity type, under **Storage View**, select **Properties** on the volume.

CLI-Volume Media Affinity change

To change the volume media affinity type through the Command Line Interface:

1. At the prompt, type **modify --volume=volume1 --affinity**, where **volume1** is the volume to be modified and affinity is the new affinity type of CADP, HDD, or Flash.
2. Press **Enter** to execute the media affinity change.

Deleting Volumes

When a volume is no longer needed, its capacity can be returned to the storage pool by deleting the volume.

To delete a volume using the CLI, type `delete --volume=<name>`. If the volume to be deleted is mapped to any hosts, the mapping must be removed before deleting the volume. To do so, use the `unpresent` command as described in “CLI—Modify Volume, Host Mapping” on page 65. Then delete the volume.

Deleting Hosts

A host that is no longer needed can be deleted to free the HBA ports that were contained in it. These HBA ports can then be added to existing hosts or used in new ones as needed.

ISE Manager Suite

To delete hosts using the ISE Manager Suite, under a SAN group select **Server View**. (See the *ISE Manager Suite User Guide*.)

ISE Systems Dashboard

The ISE Systems dashboard provides the means to view and manage multiple ISEs from a single application.

ISE Manager Suite

An ISE Manager Suite session presents an overall view of all networked ISE storage that is available from any managed ISE. Click on user SAN Group and dashboard options will be listed in the top banner. Additional details are provided in the *ISE Manager Suite User Guide*.

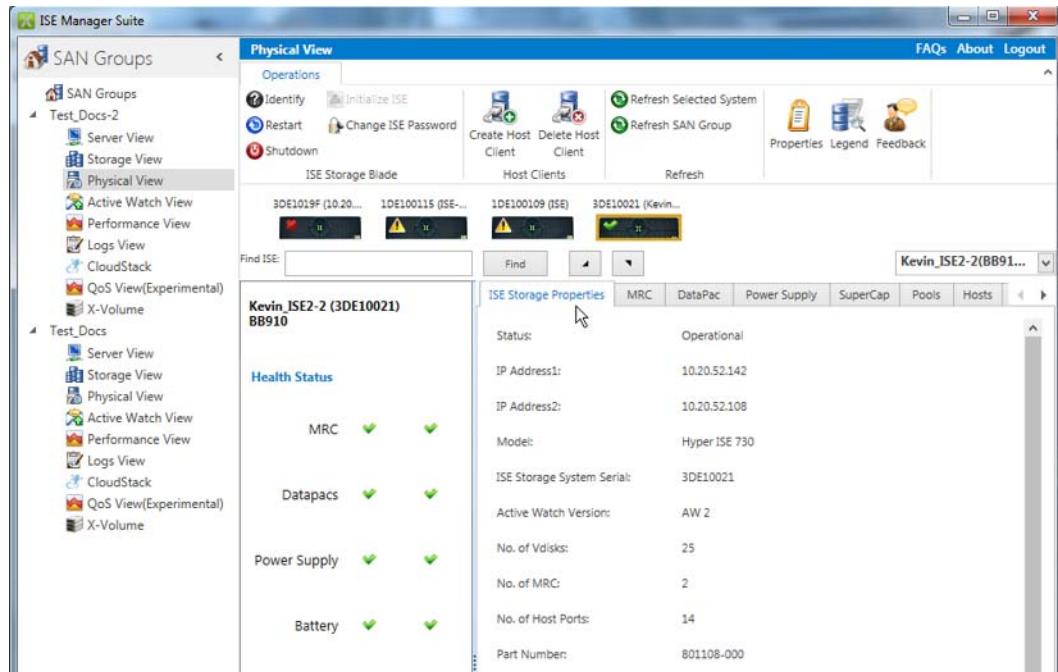


Figure 40. ISE Systems Dashboard—Summary

ISE Systems Setup

The Systems setup page is used to manage the site list of ISE systems by DNS names (or IP addresses) that are monitored.

ISE Manager Suite

To view and modify the ISE systems using the ISE Manager Suite, under a SAN group select **Physical View**. (See the *ISE Manager Suite User Guide*.)

ISE Monitoring

This chapter describes the various features available to monitor the ISE. The following is a summary of these monitoring features:

- LEDs (“Front LEDs” on page 75)
- System status (“System Status LED States” on page 76)
- Monitoring all site ISE systems (“ISE Manager Suite SAN Group Summary” on page 78)
- Environment (“Environment Status” on page 80 and “CLI” on page 80)
- ISE SNMP monitoring (“System Monitoring with SNMP” on page 84)
- Performance (“Performance Monitoring” on page 84)
- Events (“Event Logs” on page 85)
- ActiveWatch (refer to the *ActiveWatch Client Installation and Configuration Guide*, 160178-000)

Front LEDs

The LEDs give an overall indication of the state of the ISE components.

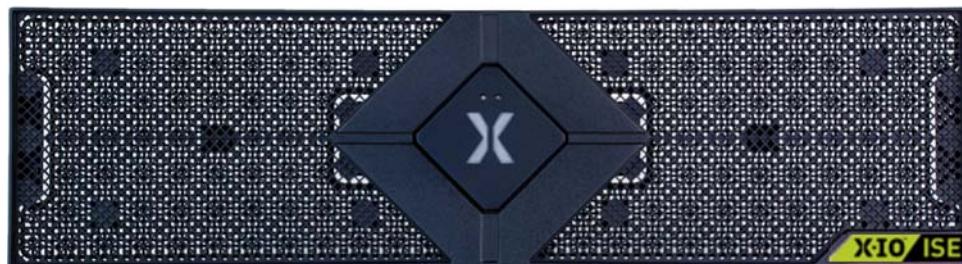


Figure 41. ISE Front Bezel Installed

The ISE state is indicated by the large X centered on the bezel. The states are:

- Slow pulse green—default mode when powering up. In ISE firmware 3.2.x, this can also include the normal state if the bezel is installed after powerup or identify.
- Solid green—ISE is running normally
- Solid amber—ISE is encountering a problem. Note that this includes host cables not being installed.
- Solid blue—Identify ISE function activated (as of firmware version 2.4.0)

With the bezel removed, the exposed LEDs indicate the overall state of the ISE with the three clustered LEDs (blow-up 1 below) that are located on the System Status Module. The System Status module is the small horizontal panel in the center of the chassis above the supercapacitor units (see Figure 42). The definitions for the various states of these LEDs are listed in Table 20.



Figure 42. System Status Module—LEDs

In the figure above, the blow-ups labeled 2 show the LEDs that indicate the state of the supercaps. The state of the DataPacs is indicated by the LED pairs labeled number 3.

Condition	Power On/Standby Dual-color LED	Green LED in Status LED Pair	Amber LED in Status LED Pair
No power applied	OFF	OFF	OFF
Standby (see “Power On State” on page 35)	AMBER	OFF	OFF
Normal operation	GREEN	ON	OFF
ISE locate	GREEN	Flashing	Flashing
One or more component in failed state	GREEN	OFF	ON

Table 20: System Status LED States

The state of the individual ISE FRUs is indicated by pairs of LEDs on each FRU. Each DataPac, supercapacitor or battery unit, and power supply has one green and one amber LED. The green and amber LED pairs on each MRC operate as follows.

Back LEDs

The ISE backside LEDs are intended for use in conjunction with the ISE management interfaces. The LEDs give an indication of the state of the power supplies and the MRCs.

1. LED pair nearest the Ethernet ports (1), just above the I/O Extender input, shows the state of the MRCs.
2. LED pair nearest the set of Small Form-Factor Pluggable (SFP) Fibre Channel connectors (2) indicates:
 - Lit green LED indicates host connection is present
 - Un-lit amber LED indicates normal operation
3. LED pair located on the power supplies (3) shows the state of the power supplies.

The Ethernet ports on each MRC have the standard green and amber network activity LEDs.



Figure 43. ISE Back View—LEDs

The various LED states for the MRCs, the supercapacitor units, and the power supplies are described in Table 21. The LEDs on the DataPacs convey additional information on DataPac activity as shown in Table 22.

Condition	Green	Amber
No power applied	OFF	OFF
Normal operation with no failure conditions	ON	OFF
Component failed and/or can be removed	OFF	ON

Table 21: MRC, supercapacitor, Power Supply LEDs

Condition	Green	Amber
No power applied and normal state with no DataPac activity occurring	OFF	OFF
Normal state with drive activity occurring	Flashing	OFF
Component failed and/or can be removed	OFF or flashing	ON

Table 22: DataPac LEDs

ISE System Monitoring

The following section describes monitoring ISE systems from ISE Manager Suite.

ISE Manager Suite SAN Group Summary

Connect to ISE Manager Suite to view a summary of any SAN group within the site network. To display an ISE system list, select **SAN Groups** and click on a SAN group tab. The list appears (shown below). This system list is also accessible by clicking the SAN group link in the left navigation pane. Clicking Physical View exposes the summary for the first ISE in the list. Refer to the *ISE Manager Suite User Guide* for use details.

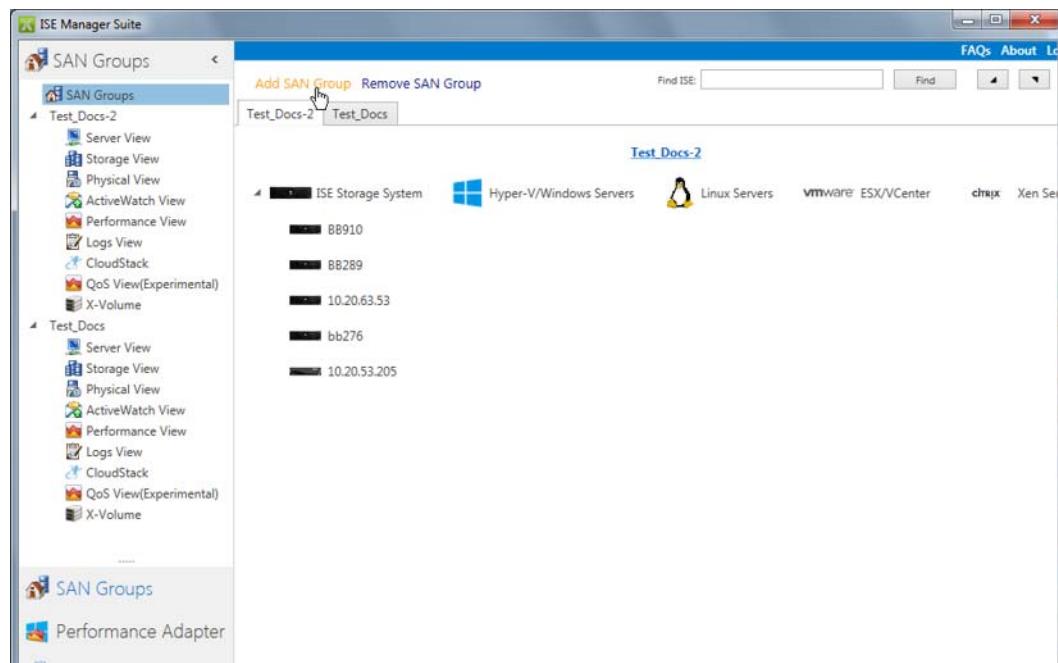


Figure 44. ISE Manager Suite—SAN Group Summary

The ISE Manager Suite System Summary display includes the items listed in the following table.

Status Summary Items	Description
ISE Identification	ISE DNS name and IP addresses assigned to the Ethernet ports on the MRCs, where address one is that of MRC one and address two is that of MRC two.
Up Time	Time since the last start or re-start of the ISE
Identifier	WWID of the ISE
Serial Number	Unique number identifying this ISE, stored in the System Status Module
Model	Model number for this ISE
Temperature Gauge	Ambient temperature of the ISE
ISE: Operational (None)	ISE status (details): 1) Operational (None), 2) Warning (Component Degraded), 3) Warning (None)
MRC 1, MRC 2	Hot link to Physical View >> MRC tab
DATAPAC 1, DATAPAC 2	Hot link to Physical View >> DataPac tab
POWER SUPPLY 1, POWER SUPPLY 2	Hot link to Physical View >> Power Supply tab
BATTERY 1, BATTERY 2	Physical View >> Battery tab
STORAGE POOL 1, STORAGE POOL 2	Physical View >> Storage Pool tab
VOLUMES	Hot link to Physical View >> Volumes tab

Table 23: Status Summary Description

Command Line Interface Views

From the CLI, use the **show** command to display the various components of the ISE. Table 45 shows the use of the **show** command and the components that can be displayed.

Command	Options	Comment
show	ise	Overview of the ISE identity and configuration
	network	
	mrc	
	powersupply	Component details including their internal environment as detailed in “CLI” on page 80
	supercap	
	datapac	
	volumes	Definitions, mappings, overall storage capacity and usage, and other configuration details
	hosts	
	pool	
	hba	List of ISEs visible by WWID
	events	Management events occurring since system initialization (to a maximum of approximately 2,000 events). See “Event Logs” on page 100 for a full description of these events.
	task	Information on any running tasks
	performance	Performance data as detailed in “Performance Monitoring” on page 84
	all	All of the above information
Example:		
show network		

Figure 45. Show Command—CLI

Environment Status

The following section describes monitoring the environmental status of ISE systems.

ISE Manager Suite

To view ISE component details using the ISE Manager Suite, under a SAN group select **Physical View >> ise_name** then step through the component tabs. (See the *ISE Manager Suite User Guide*.)

CLI

The ISE provides details about its components and information on its internal environment by means of several commands through the ISE CLI as described in the following subsections.

Temperature Indicators

Component temperature is viewed with the `show <component>` command; for example:

```
Temperature : 29 C (Warning: 50 C, Critical: 60 C)
```

The current ambient temperature reading of the component is shown after the colon (:). The warning and critical threshold temperatures are displayed in parentheses after the current reading. When the ambient temperature exceeds either of these thresholds, warning or critical events occur and a warning or critical status message appears in the console displays. If the ambient temperature at the component crosses the critical threshold, the amber LED on that component is illuminated.

If the ISE is configured to subscribe to warning or critical overtemperature events as SNMP traps, notifications are sent to the designated destinations ("SNMP Setup" on page 51) as shown in Table 24.

Event	SNMP Trap
Temperature exceeds warning threshold	FRU - Warning Temperature Threshold
Temperature exceeds critical threshold	FRU - Critical Temperature Threshold
Temperature returns to operational range	FRU - Temperature Back to Normal

Table 24: Temperature Events—CLI

Warning and critical thresholds are set by the manufacturer and cannot be modified.

MRC Detailed

Enter the `show mrc` command in the CLI. The following information is displayed for each MRC (see Figure 26 for a sample display from one MRC).

Field	Comment
Status	Overall state of the MRC, normally Operational ; other possible states include Warning , Critical , and Non-Operational .
Detailed Status	Shown in parentheses after Status, normal is None ; abnormal states are detailed here.
Hardware, Firmware Version	N/A
Position	Physical bay location in the chassis; see Figure 100 on page 133.
Serial Number, Part Number	N/A
MRC Ambient Temperature	MRC temperature plus warning and critical temperature thresholds (see "Temperature Indicators" on page 80 for display details and SNMP trap information).
Fibre Channel Port	Status, type (N Port), WWID, and port speed.

Table 25: MRC Environment—CLI

```
MRC-1
=====
Status          : Operational (None)
Hardware Ver.   Position      : 1
Firmware Ver.   : V1.0 (Developer1.3) Serial Number : 2BCC01NP
                  Part Number   : 9BR004-982

FC Port Information
Status      : Operational
Type       : N Port
WWN        : 20000014C3673710
FC speed   : 4 Gb/S (Requested: Auto)
```

Table 26: Sample: Show MRC Console Print**DataPac Detailed**

Enter the `show datapac` command in the CLI. The following information is displayed for each DataPac.

```
oem:> show datapac
DataPac Information
=====
DataPac-1 (Pool 1)
-----
Status          : Operational (None)
Detailed Status : 0x00000000
Position        : 1                               Hardware Ver  : hwr
Redundancy Health : 125% (DataPac self-healing is in progress.)
Capacity        : 8678 GB                         Type         : Unknown
Model           :                               Part Number  : part1
Firmware Version : 100 (4202)                   Cache Generation: 1
Temperature     : 31 C (Warning: 50 C, Critical: 60 C)
-----

DataPac-2 (Pool 2)
-----
Status          : Operational (None)
Detailed Status : 0x00000000
Position        : 2                               Hardware Ver  : A
Redundancy Health : 125% (DataPac self-healing is in progress.)
Capacity        : 8678 GB                         Type         : Unknown
Model           : DP1000FC3-1                 Part Number  : part1
```

```

Firmware Version : 100 (4202) Cache Generation: 1
Temperature       : 31 C (Warning: 50 C, Critical: 60 C)
=====
=====
```

Table 27: Sample: Show DataPac Console Print

Field	Comment
Status	Overall DataPac state, normal is Operational and other possible states are: Warning , Critical , and Non-Operational
Detailed Status	Normally None . Abnormal states are detailed here
Redundancy Health	Functional, relative DataPac storage remaining
Serial Number	DataPac serial number
Model	Model number of DataPac
Part Number	DataPac part number
Firmware Version	DataPac firmware version
Type	DataPac classification as Performance, Balanced, or Capacity
Capacity	DataPac capacity stated in total Gigabytes (GB)
Position	Physical bay location in the chassis; see Figure 100 on page 133
Pool Identifier	Values appearing in parentheses after the DataPac number and are 0 or 1
Temperature	DataPac temperature plus warning and critical temperature thresholds (see "Temperature Indicators" on page 80 for display details and SNMP trap information)

Power Supply Detailed

Enter the **show powersupply** or **show ps** command in the CLI. The following information (Table 28) is displayed for each power supply and a sample display for a single power supply is shown in Figure 46.

Field	Comment
Status	Overall power supply state, normally Operational , other possible states are: Warning , Critical , and Non-Operational
Detailed Status	Shown in parentheses after Status; normal is None , abnormal states are detailed here
Serial Number	Serial number of the power supply
Model	Model of the power supply
Part Number	Part number of the power supply
Blower Status, Speed	Each power supply contains two blowers, all of which operate independently under system control. Speeds are grouped into ten RPM ranges, from 1 (slowest) to 10 (fastest).
Position	Physical bay location in the chassis; see Figure 100 on page 133
Temperature	DataPac temperature plus warning and critical temperature thresholds (see "Temperature Indicators" on page 80 for display details and SNMP trap information)

Table 28: Power Supply Environment—CLI

Power Supply-1	
<hr/>	
Status	: Operational (None)
Blower (1) Status	: Operational
Speed Setting	: 1 (2243 RPM)
Blower (2) Status	: Operational
Speed Setting	: 1 (2236 RPM)
Temperature	: 31 C (Warning: 50 C, Critical: 60 C)
<hr/>	

Figure 46. Sample: Show Power Supply Display

Supercapacitor Detailed

The ISE Storage Systems contain two supercapacitor units (see Figure 1 on page 4) to maintain cache memory in the event of a power outage.

To view detailed information about the supercapacitor units and their environment, enter the **show battery** command in the CLI. The following information is displayed for each supercapacitor unit (see Figure 47 for a sample display from one supercapacitor unit).

Note. Entering the **show battery** command in the CLI returns the same information as entering **show supercap**.

The supercapacitor information fields are described in the following table (Table 29):

Field	Comment
Status	Overall state of the SuperCap unit. This field usually reports Operational . Other possible states include Warning , Critical , or Non-Operational .
Detailed Status	Any unusual state this SuperCap unit may be in. This field usually reports None .
Serial Number, Model, Part Number	Component serial number, model, and part number
Hardware Version	—
Position	Physical bay location in the chassis, see Figure 100 on page 133
Temperature	Current temperature of supercapacitor unit

Table 29: Supercapacitor Environment Display

SuperCap-2	
<hr/>	
Status	: Operational (None)
Details	: 0x00000000
Position	: 2
Serial	: SN123456
Model	: 9DB211-999
HW Version	: A
Part Number	: P-N
Manufacture Date	: Tue Apr 20 00:00:00 2010
Voltage	: 10292 mV
Type	: Super Capacitor
<hr/>	

Figure 47. Sample: Show Battery Display

System Monitoring with SNMP

The ISE provides an SNMP MIB (see “System Monitoring with SNMP” on page 84) containing the Object Identifiers (OIDs) of ISE variables. These variables can be monitored using SNMP Get Request PDUs (see “SNMP Setup” on page 51). The following example shows the MIB entry for ISE temperature, where **N** is a company’s assigned private enterprise OID.

```
iseTemperature OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "ISE Temperature"
    ::= { ise 32 } -- 1.3.6.1.4.1.N.6.1.1.1.2.32
```

Figure 48. Sample MIB Entry

An SNMP Get Request with the OID in this example returns an integer representing the current temperature of the ISE.

Performance Monitoring

The ISE includes an internal performance monitor intended to provide approximate statistics; for precise performance monitoring, it is advisable to use external performance monitoring tools.

System performance is available through the CLI with the **show performance** command. To refresh the statistics in the display, repeat the command.

The statistics are divided into three sections to provide performance characteristics from different points of view as follows:

- **System Information:** Statistics by category are provided for the overall ISE and each MRC.
- **Volume Information:** Statistics by category are provided on a volume-by-volume basis.
- **Host Information:** Statistics by category are provided for each host.

Monitoring ISE

The **Performance Information** view shows a one-second snapshot of the performance statistics. To ensure accurate observations, visit or refresh the **Performance Information** view repeatedly and at different times during the workload periods of interest.

It is advisable to monitor the performance of each ISE periodically and maintain a record to establish a workload-specific baseline and history for each ISE. These data form useful points of comparison during any performance problem analysis.

To obtain optimal performance from the ISE, two goals must be met:

- Maintain a workload below the rated limits of the ISE.
- Balance the workload across both storage pools in a given ISE and across all storage pools in the installation.

ISE Manager—Performance Monitoring

Click on **Performance View** to monitor performance, which updates automatically. For a static view, click on the **SAN Group dashboard ISE Details In Table View** and select the **Performance Details** tab. To obtain more in-depth analytics, use the **Performance Analyzer** option in the left navigation pane. Refer to the *ISE Manager User Guide* for more details.

Event Logs

The ISE maintains logs of management events. These management events are described in more detail in "Management Events" below. Management events can be viewed from the CLI as detailed below. The management event logs retain all events from ISE initialization to a maximum of approximately 2,000 events. If the maximum number of events is reached, the log drops the oldest events as it adds the new events.

See "SNMP Setup" on page 51.

Management Events

Management events describe occurrences that typically result from actions performed by an operator in managing the ISE. The management event log includes the following fields:

- a. **Date and Time:** As recorded by the ISE system clock.
- b. **Severity:** An assessment of the impact of this event on system performance or user data. The severity can be one of the following assessments:
 - **Normal:** No impact to system performance or user data.
 - **Warning:** Possible impact to system performance or user data. Action needs to be taken to prevent impact.
 - **Critical:** Impact to system performance or user data is imminent or has already occurred. Immediate action is vital.
- c. **Service:** The management service that reported this event. This information may be of interest to authorized service personnel during detailed problem investigation.
- d. **Description:** Text explanation of the event.

Clear Event Log

To display the events through the command line interface or clear the events, issue the commands below.

- To display events through the CLI, issue the command `--show events`
- To clear events through the CLI, issue the command `show events --clear=management`.

ISE Manager—Event Display

Click **Logs View** to display the management logs and events. Also, note that e-mail alerts can be enabled for additional monitoring through the Telemetry/Email Notification option. Refer to the *ISE Manager User Guide* for more details.

Log Files

In the event authorized service personnel need to conduct detailed problem investigation, log files maintained by the ISE may need to be obtained.

ISE logs, Cortex logs, and ISE Manager logs can be obtained through ISE Manager and clicking **Collect Logs** in the lower left navigation pane.

ISE Maintenance

The ISE provides a number of maintenance features, including:

- Restart ISE (“Restart” on page 87)
- Shut down ISE (“Shutdown” on page 88)
- Upgrade firmware (“ISE Firmware Upgrades” on page 88)
- Remove Managed Reliability Controller (“Removing a Managed Reliability Controller” on page 91)
- Add Managed Reliability Controller (“Remove Command—CLI” on page 92)
- Locate ISE FRU (physically) (“Physically Locating ISE” on page 93)
- Reformat ISE (“Reformat an ISE” on page 95)
- Change password (“Change the Password” on page 95)
- Transfer DataPac (“Transferring DataPacs” on page 95)

Restart

Restarting the ISE involves the following actions:

- Completion of all in-progress I/O commands from all hosts
- Flushing of all data from cache
- Preparation of internal processes for a graceful shutdown
- Shutting down of both MRCs
- Restarting of both MRCs

During an ISE shutdown, all initialization and all configuration settings are retained. An ISE shutdown terminates any CLI session. When the restart completes, the ISE again accepts a connection from a remote console.

An ISE restart differs from a shutdown (see “Shutdown” on page 88) as shown in Table 30.

Operation	Power State	Start-up
Restart	Power remains on to all components	Automatically restarts
Shutdown	Power is turned off to all components except System Status Module LED and Ethernet ports to intercept WOL magic packet	Wake-On-LAN or Toggle power switches (ensure both are off concurrently for five seconds)

Table 30: Restart and Shutdown Differences

ISE Manager Suite

To restart an ISE using the ISE Manager Suite, under a SAN group, select **Physical View >> ise_name** then click **Restart**. (See the *ISE Manager Suite User Guide*.)

Restart—CLI

To restart the ISE from the CLI:

1. At the prompt, enter **restart**.
2. Enter **y** or **n** in response to the verification message **System restart requested. Are you sure?**.

Shutdown

Shutting down the ISE involves the following actions:

- Completion of all in-progress I/O commands from all hosts.
- Flushing of all data from cache.
- Preparation of internal processes for a graceful shutdown.
- Shutting down of both MRCs.

All configuration settings are retained and CLI connections are terminated. An ISE shutdown differs from a restart (see “Restart” on page 87) only in the aspects shown in Table 30 on page 87.

To start the ISE after shutdown, use one of two methods:

1. **Wake-On-LAN:** If WOL is enabled, the ISE powers on and starts up when it receives the appropriate magic packet. See “Wake-on-LAN (WOL) Service” on page 49 for more information on the WOL service.
2. **Power cycling:** Toggle the power switches on the ISE to the OFF position concurrently for five seconds and then on (see “Power On State” on page 35).

When restart is complete, the ISE accepts connections from a remote console.

ISE Manager Suite

To shut down an ISE using the ISE Manager Suite, under a SAN group select **Physical View >> ise_name**, then click **Shutdown**. (See the *ISE Manager Suite User Guide*.)

CLI

To shut the ISE down from the CLI:

1. Enter **shutdown**.
2. Enter **y** or **n** in response to the confirmation message **System shutdown requested. Are you sure?**.

ISE Firmware Upgrades

Upgrading the ISE firmware is an uptime event. The ISE must be in an operational state before performing a firmware upgrade. The ISE state can be confirmed by displaying the system status and the status of each component. If the system or any component is in a state other than **Operational**, the problem must be corrected before performing the firmware upgrade. Refer to the Support Matrix at <http://www.X-IO.com/supportmatrix> for the latest information on supported configurations to ensure that the correct file is retrieved.

Once a firmware upgrade is begun, no other upgrade of either MRC or DataPac firmware may be performed until the current upgrade is complete or terminated. A **Remove** or **Add** procedure may not be performed until the firmware upgrade completes. Do not make configuration changes while a firmware upgrade is occurring.

Upgrading ISE firmware is a three-step process:

1. **Upload Firmware Files:** The new firmware files are transferred from a network location to the ISE resident memory.
2. **Upgrade MRC Firmware:** The system installs the new firmware image on the MRCs.
3. **Upgrade DataPac Firmware:** The system installs the new firmware image on the DataPacs.

MRC Firmware Upgrade

When an MRC firmware upgrade is performed, the new firmware is automatically propagated to both MRCs. After a firmware upgrade, the ISE automatically begins using the newly installed firmware. All configuration settings, volume configurations, and other system information are preserved through the upgrade process.

Event notifications are sent during the MRC upgrade process. If Event Subscription is on, MRC upgrade events refer to the processes on both MRCs; that is, a single event covers upgrade activity on both MRCs. Several event notifications, identifying various stages of the upgrade, are available for subscription; see “Event Logs” on page 116.

Note. The upgrade filename format is **ISE-3_y_z_0_build.ue3**, where **3_y_x** represents the version (for example: **3_0_0** for version 3.0.0).

During the MRC firmware upgrade, the ISE Manager Suite or CLI can be used to monitor the progress or view other ISE management pages. Any attempt to start another firmware upgrade on the same ISE is rejected because another upgrade cannot be started on the same ISE.

ISE Manager Suite

To upgrade ISE firmware using the ISE Manager Suite, under a SAN group select **Physical View >> ise_name**, then click the **Firmware** tab. (See the *ISE Manager Suite User Guide*.)

Upgrade Firmware—CLI

The steps of an MRC firmware upgrade are described in “MRC Firmware Upgrade” on page 89. To upgrade MRC firmware using the CLI, use the following three-step procedure.

Before performing an MRC firmware upgrade with the CLI, ensure that the system is in a healthy state. Use the **show mrc** command to determine the firmware version currently loaded on the MRCs. Use the **show ise** command to check the status of all FRUs. In a routine firmware upgrade, all components in the system should be operational. Use the **upgrade --status** command to ensure that no other upgrade is in progress.

Step-1. Upload Firmware Upgrade File

- a. Locate the MRC upgrade file (.zip) on the X-IO download Web site and download it to a location on the ISE attached network.
- b. Unzip the MRC upgrade file (.zip).
- c. Upload the **ISE-x_y_x_0_build.ue3** file, where **x_y_x** represents the version (for example: **3_0_0** for version 3.0.0), with a suitable service from the unzipped folder on the network to the ISE local memory.
For example:

```
sftp <user_name>@<mrc_host_name_either_mrc>
```

or, for PuTTY on Windows users:

- ```
psftp <user_name>@<mrc_host_name_either_mrc>
```
- d. Answer any security questions and, when prompted, enter the appropriate user password for this ISE. Typically, the administrator credentials (“administrator” for both username and password) are used for this process.
  - e. Enter the following command to specify where in the directory the firmware file is to be deposited.  
`cd /upgrade/controller`
  - f. Enter the following command to deposit the file:  
`put <ISE-x_y_z_0_build.ue3>`

## Step-2. Install Firmware Upgrade

During the firmware upgrade install, the **MRC Status** (`show mrc display`) indicates **Warning <MRC FW Update In Progress>** for each MRC.

- a. Using a remote console, connect to the MRC that received the uploaded file.
- b. Enter `upgrade --status` to check the upgrade status of the MRC.
  - If an MRC upgrade has never been performed, the status reads **Ready for upgrade**.
  - If an MRC upgrade has been attempted or performed, the status displays information about the most recent upgrade attempt or completion.
- c. Enter `upgrade --mrc=<x_y_z_0_build.ue3>` to transfer the file from ISE local memory to an interim bootable location. The CLI displays the message **Firmware upgrade in progress...** and the upgrade status.

**Note.** If a power failure occurs during this step, the system restores the pre-upgrade firmware to both MRCs, terminates the upgrade process, and clears the uploaded file from ISE memory when power is restored. Reconnecting to the ISE through a remote console and entering the `upgrade --status` command displays the **Status** field, showing **Upgrade interrupted, backing out**. This process can require several minutes. The progress percentage may reset to zero as various parts of the process occur. When the Status field in the `upgrade --status` display reads **Upgrade failed** with an Error Code of **Interrupted**, the restoration process is complete.

- d. Monitor the progress of the upgrade by repeatedly typing `upgrade --status`. The display shows the percentage of completion as various parts of the process occur (the status may remain at 0% for several minutes before beginning to increment). This process can require several minutes.

## Cancelling an Upgrade

If it becomes necessary to cancel an upgrade once it has begun, do the following:

- a. Enter `upgrade --cancel`. The system restores the pre-upgrade firmware to both MRCs and terminates the upgrade process.
- b. Enter `upgrade --status` to monitor the progress as the pre-upgrade firmware is restored. This process can require several minutes. The progress percentage may linger at 100% and reset to zero as various parts of the process occur.
  - The upgrade is cleared from the ISE’s local memory.
  - When the upgrade status display shows the status **Upgrade canceled**, the restoration process is complete.

## Removing a Managed Reliability Controller

The ISE provides the **Remove MRC** command to bring all MRC operations to a halt before physically removing it. Halting an MRC causes it to complete outstanding host commands, flush cache, and signal the companion MRC to process all host requests to volumes in both DataPacs. To preserve access to the resident volumes, a multi-pathing tool must be running on at least one server attached to the ISE that is to have an MRC removed.

The ISE supports physical removal of an MRC after a shutdown and power off.

The following procedures describe how to force an MRC into a quiescent state and prepare it for removal from the system using the CLI. Once an MRC is removed through a management interface it should not remain in the ISE.X-IO Global Services

**Note.** To physically remove an MRC from the system, contact X-IO or assistance.

### ISE Manager Suite

To remove an MRC using the ISE Manager Suite, under a SAN group select **Physical View >> ise\_name**, then click the **MRC** tab. (See the *ISE Manager Suite User Guide*.) This will shut down the MRC and prepare it to be physically removed from the chassis. Before removing the MRC, verify that the fibre channel lights on the MRC host ports are OFF. This will ensure that the proper MRC is removed.

### Remove MRC—CLI

CLI commands for removing components are shown in Table 31 on page 92. To force an MRC into a quiescent state and prepare it for removal from the system using the CLI, follow these steps:

1. Enter **remove --status** to display the status of the MRC and note the number of the MRC to be removed. Table 30 (above) describes the various FRU states for adding and removing FRUs.
2. Enter **remove --mrc1** or **remove --mrc2** depending on the MRC being removed.

**Note.** In some conditions, such as Maintenance Mode, the system may reject the removal command and display an informational message explaining the rejection. To override the rejection, re-issue the **--force** option in the command line.

The console displays the following message:

```
MRC <n> removal in progress...type 'remove --status' to monitor current status.
```

3. Monitor the progress by typing the **remove --status** command at intervals. The Remove process can take several minutes to complete. When the removal is complete, the response to the **remove --status** command shows that the MRC is ready to be physically removed. The **show mrc** command also displays the status of the MRC.

**Note.** If the remote console session is connected to the MRC being removed, the connection may be terminated by the Remove MRC function. If so, reconnect to the MRC in a few minutes when the Remove MRC function has completed.

Once the MRC remove command is complete, the MRC is ready to be physically removed. Verify that the fibre channel lights on the MRC host ports are OFF. This will ensure that the correct MRC is removed.

If the second MRC is to be removed, do not use the **remove --mrc** command. Shut down the system using the **shutdown** command. Then physically remove the second MRC from the chassis and contact X-IO Global Services.

| Command                                                                      | Options    | Comment                                                                                     |
|------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------|
| remove                                                                       | --status   | Shows removal status of both DataPacs and MRCs.                                             |
|                                                                              | --mrc1     | Prepares MRC1 or 2 for removal from the system.                                             |
|                                                                              | --mrc2     |                                                                                             |
|                                                                              | --force    | Use with --mrc1 or --mrc2 options to override rejection of the <code>remove</code> command. |
|                                                                              | --datapac1 | Prepares DataPac 1 or 2 for removal from the system.                                        |
|                                                                              | --datapac2 |                                                                                             |
|                                                                              | --erase    | Use with --datapac1 or --datapac2 options to securely erase the DataPac before removal.     |
| <b>Examples:</b>                                                             |            |                                                                                             |
| <code>remove --mrc1 --force</code><br><code>remove --datapac2 --erase</code> |            |                                                                                             |

Table 31: Remove Command—CLI

## Adding a Managed Reliability Controller

When a new MRC is installed into the ISE, it must be added to the configuration before the system can begin using it. The new MRC is automatically configured with the parameters effective on the remaining MRC. The following sections detail the procedure to add an MRC to the system configuration using the CLI. The **Add** and **Remove** procedure is blocked by the ISE system while an Add, Remove, or MRC Firmware Upgrade procedure is in progress.

**Note.** Contact X-IO Global Services for assistance with physically adding an MRC.

### ISE Manager Suite

Click on **Physical View** in the MRC tab.

### CLI

CLI commands for adding components are shown in Figure 32 on page 93. To add an MRC using the CLI, follow these steps:

1. Enter `add --status` to display the status of the MRC and note the number of the MRC to be added.
2. Enter `add --mrc1` or `add --mrc2` depending on which MRC is being added.

The console displays the following message:

```
Adding MRC <n> in progress...type 'add --status' to monitor current status.
```

3. Monitor the progress by typing the `add --status` command at intervals.

The Add process can take several minutes to complete. When the MRC configuration is 100% complete, the response to the `add --status` command shows that the MRC is **online**. The `show mrc` command also displays the status of the MRC.

**Note.** If the remote console session is connected to the MRC being added, the connection may be terminated with the Add MRC function. If so, reconnect to the MRC when the Add MRC function

completes.

| Command                      | Options    | Comment                                     |
|------------------------------|------------|---------------------------------------------|
| add                          | --status   | Shows add status of both DataPacs and MRCs. |
|                              | --mrc1     |                                             |
|                              | --mrc2     | Adds MRC1 or 2 to the system.               |
|                              | --datapac1 |                                             |
|                              | --datapac2 | Adds DataPac1 or 2 to the system.           |
| <b>Examples:</b>             |            |                                             |
| add --mrc1<br>add --datapac2 |            |                                             |

Table 32: Add Command

## Physically Locating ISE

To physically locate an ISE or one of its components, use the Identify feature along with Figure 49 on page 94. This feature causes the LED pairs on the selected component to flash. Any component, including the ISE chassis, can be selected either singly or in combination on an ISE for identification.

### ISE Manager Suite

In Physical View, click **Identify** in the Operations banner.

### Locate Component—CLI

To identify ISE Storage System units from the CLI, use the **identify** command with the options shown below.

| Command  | Options        | Comment                                  |
|----------|----------------|------------------------------------------|
| identify | --ise=<on/off> | Flashes LEDs on the System Status Module |

Table 33: ISE Identify Command

## FRU Identification

The ISE FRU physical location is shown below.



Figure 49. ISE Component Identification and Location

### Front View

1. The numeral 1 points to the number one DataPac and number one supercapacitor.
2. The numeral 2 points to the number two DataPac and number two supercapacitor.

### Rear View

1. The numeral 1 points to the number one power supply and number one MRC.
2. The numeral 2 points to the number two power supply and number two MRC.

## Reformat an ISE

When an ISE is no longer being used in its current configuration and requires a complete re-configuration, it can be returned to the factory default settings shown in Table 32 with the *reformat* operation. Contact X-IO Global Services for assistance with reformatting. The current user settings of network, management service, and SNMP options are retained as shown.

### Notes:

- [1] **Reformatting an ISE removes all data.** Use this operation **ONLY** with X-IO Service approval.
- [2] Always unplug the ISE from the fabric before beginning an ISE reformat.
- [3] After the ISE is reformatted, data on the ISE is no longer accessible.

### Reformat—ISE Manager Suite

In Physical View, click **Reformat ISE** in the Operations banner

### Reformat—CLI

To return any ISE to a pre-initialized state and remove all stored data through the CLI, issue the following command:

```
reformat ise
```

## Change the Password

The **administrator** password can be changed from **administrator** (set by manufacturer) to a password of up to a maximum of sixty-four alphanumeric characters. For excluded special characters when entering passwords using the CLI, see “Characters—Web-Mgt and CLI” on page 29. The password is case-sensitive.

### Password—ISE Manager Suite

In Physical View, click **Change Change Password ISE** in the Operations banner

### Password—CLI

To set the administrator password using the CLI, log into the ISE administrator account and use the **configure --password=<new\_password>** command.

**Note.** When changing the password using the CLI, the console displays the password characters as they are entered. Exercise care in typing and reviewing the password, as the CLI does not provide a password verification step.

The CLI console displays the message **Changing password for administrator** followed by a list of configurable parameters.

## Transferring DataPacs

When transferring DataPacs between like model ISEs, the following steps must be taken:

1. The receiving ISE must be in a shipped from manufacturing state (not yet initialized).

**Note.** When the receiving ISE is a spare that has been initialized, the ISE must be reformatted and left uninitialized. The **REFORMAT ISE** warns not to proceed as data will be lost. That is, any data on this ISE will be destroyed by the reformat. Only proceed if this is acceptable.

2. Determine the Fibre Channel speed setting on the transferring ISE and recorded it for later as this setting is not retained during the DataPac transfer process.
3. Shut down both ISE units.
4. Pull any Fibre Channel cables from the receiving ISE.
5. Pull the DataPacs being transferred—DataPac pairs always remain paired.
6. Power on the receiving ISE and let it boot up.
7. Verify that the receiving ISE is in the operational state.
8. Change Fibre Channel speed setting on the receiving ISE to that recorded in Step 2.
9. Re-attach the disconnected receiving ISE Fibre Channel cables to the fabric.
10. Verify that the host can now see all presented LUNs.

# FRU Replacement

---

The ISE consists of a chassis containing a number of components called FRUs as described in the “Components” on page 4. Figure 1 on page 4 shows the location of each FRU. This chapter details the procedures to replace the following ISE FRUs:

- Small Form-Factor Pluggable Fibre Channel connectors (SFP) (below)
- Power supply (page 98)
- Supercapacitor (page 98)
- Other FRUs (“Other Components” on page 99)

**Note.** Cables to unaffected FRUs should not be removed when replacing any FRU.

## Seating FRUs

When a supercapacitor, power supply, MRC, DataPac, or SFP is correctly seated, the system generates event code 116 (FRUInsertRem). Absence of this event indicates that the FRU did not properly seat. Event code 116 generates SNMP trap **FRU - Removal or Insertion Detected**.

## SFP

Each MRC has four Small-Form-Factor Pluggable Fibre Channel (SFP) connectors. If any SFP in an MRC fails, it can be replaced with a vendor-specified replacement SFP using the following procedure:

1. Remove the Fibre Channel cable from the SFP by grasping and gently pinching the cable connector while gently pulling. Care should be taken not to pinch the connector as the tab cover may pop below the tabs on the head of the connector.
2. Release the bail holding the SFP in the chassis.
3. Gently pull the SFP from the chassis.
4. Remove the protective plug from the replacement SFP and lift the bail if needed.
5. Gently insert the replacement SFP fully into the chassis.
6. Engage the bail if needed to secure the SFP in the chassis.
7. Insert the Fibre Channel cable gently into the SFP while gently pinching the cable connector.
8. Check for system detection of the SFP insertion as described in “Seating FRUs” on page 97.

Once the SFP is seated, the MRC establishes communication with the switch through the SFP and I/O operations resume.

## Power Supply

Prior to changing a power supply, check the power supply cables at the power supply connector and the AC receptacle to be sure they are properly and securely seated. Then use the techniques in Step 1 below to verify that the power supply needs to be replaced. If replacement is required, then steps 2 through 16 below should be used in replacing the failing power supply.

**Note.** The cooling design of the ISE requires that all FRUs be present. Operating the ISE without all FRUs in the bays has a detrimental effect on system cooling. The ISE should not be operated with the power supply uninstalled for longer than necessary while installing the new unit.

1. Ensure that the FRU to be replaced has a status of **Critical** or **Non-Operational** as follows:
  - From the CLI, enter `show ps`.
  - In ISE Manager Suite, select the Power Supply tab while in Physical View
2. Identify the unit to be replaced by locating the power supply with its amber LED **ON** and green LED **OFF**.
3. Press the switch on the power supply to the **OFF** position.
4. Remove the power cord from the power supply.
5. Using a Phillips screwdriver, loosen the two captive screws securing the latch handle.
6. Open the latch handle fully to unseat the power supply.
7. Pull the power supply out of the chassis by its latch handle.
8. Check the replacement power supply to be sure that the switch is in the **OFF** position.
9. Loosen the two captive screws on the latch handle of the replacement power supply, if necessary, and open the latch handle.
10. Insert the replacement power supply fully into the chassis, closing its latch handle to seat and secure it.
11. Gently tighten the latch handle captive screws (not to exceed 3 inch-pounds), taking care not to over-tighten them.
12. Plug the power cord into the power supply.
13. Press the switch on the power supply to the **ON** position.
14. Verify that the green LED is **ON** and the amber LED is **OFF**.
15. Check for system detection of the power supply insertion as described in “Seating FRUs” on page 97.
16. Ensure that the status of the new power supply is operational as follows:
  - From the CLI, enter `show ps`.

## ISE Supercapacitor Unit

Typically, only a failed supercapacitor unit (amber LED on) should be replaced. A supercapacitor can be replaced while the system is actively performing data I/O. Prior to changing a supercapacitor, check the state of both supercapacitors. Use the techniques in Step 1 below to verify a supercapacitor replacement is required. Then follow Step 2 through Step 11 (below) to replace any failing supercapacitor unit.

**Note.** The cooling design of the ISE requires that all FRUs be present in each FRU bay. Operating the ISE without all FRUs in the bays has a detrimental effect on system cooling. Do not operate the ISE with the supercapacitor unit uninstalled for longer than necessary to install the new supercapacitor unit.

**Note.** The supercapacitor unit contains no lithium ion batteries.

**WARNING:** Earlier version Supercapacitors (PN: 801001-000 and 801001-001 used in the ISE-2) cannot be installed in ISE Storage Systems with G3 (ISE3400, ISE 3401). Supercapacitors (PN:

801001-002 and 801301-000) are supported only. They are backwards compatible with the ISE2 (ISE2400).

Follow the steps below to replace a supercapacitor unit:

1. Supercapacitors operate together to provide backup power for cache. Before beginning supercapacitor replacement, verify the status of both supercapacitors in the system. When in doubt, contact X-IO Global Services for consultation. Supercapacitor status is displayed by the following functions:
  - From the CLI, enter `show supercap`.

**Note.** Entering `show battery` in the CLI returns the same information as entering `show supercap`.

2. Locate the unit to be replaced. A failed unit has its amber LED **ON** and the green LED **OFF** (indicating that the supercapacitor is ready to be removed).
3. Using a Phillips screwdriver, loosen the two captive screws securing the latch handle.
4. Open the latch handle fully to unseat the supercapacitor unit.
5. Pull the supercapacitor unit out of the chassis by its latch handle.

**Note.** An internal green LED remains lit after the supercapacitor unit is pulled. This is normal and no cause for concern.

6. Loosen the two captive screws securing the latch handle of the replacement supercapacitor unit, if necessary, and open the latch handle.
7. Insert the replacement supercapacitor unit fully into the chassis and close its latch handle to seat it.
8. Tighten the latch handle captive screws to snug only, being careful not to overtighten them.
9. Check the LEDs on the new supercapacitor unit, ensuring the green LED is **ON** and the amber LED is **OFF**.
10. Check for system detection of the supercapacitor insertion as described in “Seating FRUs” on page 97.
11. Ensure that the new supercapacitor unit is operational with a charge of 10V or above as follows:
  - From the CLI, enter `show supercap`.

## Other Components

Contact X-IO Global Services for assistance with replacing any other components.



# Appendix A: Troubleshooting

---

This section discusses recovering from unexpected conditions.

## Unexpected Conditions Recovery

This section describes recovery techniques for unexpected conditions.

### ISE Not Visible to Host—Fibre Channel

Fibre Channel connectivity problems may manifest themselves as the inability of a host to see an ISE. Ensure that all network components (switches, HBAs, operating system versions, drivers, and so forth) are:

- At supported hardware and software versions; see <https://www.X-IO.com/supportmatrix>.
- Connected—cables, switches, and other Fibre Channel connections have continuity throughout the Storage Area Network.
- Supported—check switch zoning to verify expected and supported configuration; best practices for ISE zoning are listed in the ISE Support Matrix at <https://www.X-IO.com/supportmatrix>.
- Configured—review volume-host mapping to verify that the expected volumes are being presented to the host.

Use utilities and applications provided with the operating system, Fibre Channel switches, and host bus adapters to gain broader insight into the connections and configurations of the site Storage Area Network.

### ISE Not visible to Host—iSCSI

If iSCSI ISE volumes are not showing up in the VMware Devices list the problem is likely a cabling or networking issue. Ensure that:

- The subnets (VLANs) cable configuration is correct
- IP networking addressing is correct on the MRC iSCSI ports and the VMware host(s)
- The VMware iSCSI initiators are set up correctly
- Challenge-Handshake Authentication Protocol (CHAP) is configured correctly (if in use)

## Amber LEDs

Check for an amber LED on all of the components and follow the corrective action recommended in Table 34.

| Component             | Corrective Action                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>SuperCap</b>       | Contact service for replacement component and then follow the procedure in "ISE Super-capacitor Unit" on page 140 |
| <b>Power Supply</b>   | Contact service for replacement component and then follow the procedure in "Power Supply" on page 140             |
| <b>SFP</b>            | Contact service for replacement component and then follow the procedure in "SFP" on page 139                      |
| <b>MRC</b>            | Contact service                                                                                                   |
| <b>DataPac</b>        | Contact service                                                                                                   |
| <b>System Display</b> | Contact service                                                                                                   |

Table 34: Amber LEDs Corrective Actions

## Appendix B: CLI Commands

---

This Appendix lists the ISE Command Line (CLI) commands and options.

--- Command Line Interpreter Command Set Summary ---

|                            |                                              |
|----------------------------|----------------------------------------------|
| initialize <options>       | - Initialize the ISE                         |
| reformat ise               | - Return ISE to pre-initialized state        |
| configure <option>         | - Configure ISE parameters                   |
| reformat ise               | - Return ISE to pre-initialized state        |
| <br>                       |                                              |
| show <component>           | - Display information                        |
| help <subject>             | - Display help                               |
| version                    | - Display SCLI version information           |
| <br>                       |                                              |
| create <options>           | - Create a host or volume                    |
| delete <options>           | - Remove a host or volume                    |
| modify <options>           | - Modify a host or volume                    |
| present <options>          | - Present a volume to a host                 |
| unpresent <options>        | - Unpresent a volume from a host             |
| <br>                       |                                              |
| setsnmp <options>          | - Configure SNMP                             |
| setsnmpoid <options>       | - Configure SNMP MIB OID variables           |
| trap_subscription <option> | - Subscribe/Unsubscribe SNMP Trap Events     |
| trap_destination <options> | - Add/Remove Trap destination addresses      |
| <br>                       |                                              |
| gupdate <options>          | - Send a General Update to a target          |
| subscribe <options>        | - Manage ActiveWatch subscriptions           |
| telemetry <options>        | - Send telemetry files to a target           |
| license <options>          | - Display, Add, Delete function license keys |
| <br>                       |                                              |
| dns                        | - Display current or set DNS settings        |
| <br>                       |                                              |
| identify <options>         | - Flash LEDs on the ISE to                   |
| restart                    | - Reboot the ISE                             |
| shutdown                   | - Shut down the ISE                          |
| add                        | - Add a DataPac or MRC                       |
| remove                     | - Remove a DataPac or MRC                    |
| exit/quit                  | - Exit from the CLI                          |

See 'help' for more detailed information on the help system.

## Configure

Set or change user parameters

Usage: configure --<parameter>=<value>

ISE parameters can be any of the following:

- name=<string>
- address=<string>
- location=<string>
- contact=<string>
- phone=<string>
- email=<string>
- upsmode=<Enable|Disable>

Network parameters can be any of the following:

- dhcp=<Enable|Disable>
- wol=<Enable|Disable>
- ipaddress1=x.x.x.x
- netmask1=x.x.x.x
- gateway1=x.x.x.x
- ipaddress2=x.x.x.x
- netmask2=x.x.x.x
- gateway2=x.x.x.x

NTP client parameters:

- ntp=<disable|auto|static>
- server=<string|x.x.x.x>

Ethernet I/O network parameters must be preceded by --ionet command and network ID:

- network=<A|B>

and can include:

- dhcp=<enable|disable>
- ipaddress1=x.x.x.x
- ipaddress2=x.x.x.x
- netmask=x.x.x.x

Time parameters can be any of the following:

- date=DD-MMM-YYYY
- time=HH:MM:SS
- timezone=<Zone>
- dst

iSCSI authentication parameters must be preceded by --iscsi command and can include:

- auth=<in|out|disable>
- username=<username>
- password=<password>

Also see: timezone, setsnmp

## Upgrade

Upgrade firmware on the MRC or DataPac

Usage: upgrade --<parameter>=<value>

MRC upgrade options:

- mrc=<filename>
- commit
- cancel
- force
- check=<filename>

DataPac upgrade options:

- datapac=<filename>
- datapac1=<filename>
- datapac2=<filename>

Also see: *ISE Storage System User Guide* for complete documentation.

## Timezone

Available time zones:

|      |                           |      |                                   |
|------|---------------------------|------|-----------------------------------|
| WET  | - Western Europe Time     | GST  | - Guam Standard Time              |
| CET  | - Central Europe Time     | KST  | - Korea Standard Time             |
| EET  | - Eastern Europe Time     | SBT  | - Solomon Islands Time            |
| MSK  | - Moscow Time             | NZST | - New Zealand Standard Time       |
| AST  | - Arabian Standard Time   | IDLE | - International Date Line East    |
| IST  | - Iran Standard Time      | IDLW | - International Date Line West    |
| GST  | - Gulf Standard Time      | SST  | - Samoa Standard Time             |
| PKT  | - Pakistan Time           | HST  | - Hawaii Standard Time            |
| IST  | - India Standard Time     | AKST | - Alaska Standard Time            |
| BDT  | - Bangladesh Time         | PST  | - Pacific Standard Time           |
| THA  | - Thailand Standard Time  | MST  | - Mountain Standard Time          |
| CCT  | - China Coast Time        | CST  | - Central Standard Time           |
| SGT  | - Singapore Standard Time | EST  | - Eastern Standard Time           |
| HKT  | - Hong Kong Time          | AST  | - Atlantic Standard Time          |
| MYT  | - Malaysia Time           | NFT  | - Newfoundland Time               |
| AWST | - Australian Western Time | BST  | - Brazil Standard Time            |
| ACST | - Australian Central Time | VTZ  | - Greenland Eastern Standard Time |
| AEST | - Australian Eastern Time | AZOT | - Azores Time                     |
| JST  | - Japan Standard Time     |      |                                   |

## SNMP

Configure SNMP MIB variables

setsnmp

Usage: setsnmp  
 community="strng" contact="strng" org="strng" description="string"

setsnmp MIB variables:

```
--community=<strng>
--contact=<strng>
--org=<company_name>
--description=<device_desc>

setsnmpoid
```

**Usage:** setsnmpoid oidnums=<x.y.z> oidnames=<mycompany.storage.devices>

**Examples:** OID numbers and names

```
1.3.6.1.4.1.2366.6.1.1
iso.org.dod.internet.private.enterprise.xiotech.xiotechAdvStorArch.iseProducts.iseStorage
1.3.6.1.4.1.x.y.z
iso.org.dod.internet.private.enterprise.mycompany.storage.devices
```

**Also see:** trap\_subscription, trap\_destination, show subscriptions

## Subscribe to Events

**trap\_subscription** Used to subscribe, unsubscribe SNMP Trap notifications

**Usage:** trap\_subscription network={1|2} {add|remove} events="n,m,o,p"

**trap\_subscription parameters:**

|                          |                                              |
|--------------------------|----------------------------------------------|
| - network={1   2}        | - Identify MRC one or two                    |
| - {add   remove}         | - Add or Remove the event                    |
| - events="<n,m,o,p,...>" | - Event list by number separated with commas |

**Examples:** Trap subscription add and remove

```
trap_subscription network=2 add events="115,116,177,235,236"
trap_subscription network=1 remove events="250,251"
```

**Also see:** show subscriptions.

## Manage Trap Destinations

**trap\_destination** Used to create or delete SNMP Trap destination IP addresses

**Usage:** trap\_destination network={1|2} {add|remove} address="n,m,o,p"

**trap\_destination parameters:**

|                           |                                      |
|---------------------------|--------------------------------------|
| - network={1   2}         | - Identify MRC one or two            |
| - {add   remove}          | - Identify MRC one or two            |
| - network={1   2}         | - Identify MRC one or two            |
| - address="<n,m,o,p,...>" | - Address list separated with commas |

**Examples:** Trap subscription add and remove

```
trap_destination network=2 add address="255.255.255.255"
trap_destination network=1 remove remove="1.1.1.1,1.12.123.234"
```

**Also see:** show subscriptions.

## Subscribe

Configure IP Address for General Update and Telemetry operations

```
Usage: subscribe option option = {show | add | delete}
subscribe show - shows the current subscriptions - IP Addresses where
 General Updates and Telemetry are sent.
subscribe add -ipaddress=<nnn.nnn.nnn.nnn>[<:ppp>]
 -type=[telemetry|gupdate|alert]
 [-enabled=true|false] [-interval=xx] [-start=hh:mm]
 [-usessl=true|false]
 [-enable=true|false is optional. (default: true)]
 [-interval=xx is optional. xx is in minutes. Range: telemetry [45 - 1440],
 general update [3-1440]
 (default: 24 hr=1440 minutes)]
 [-usessl=true|false] Default is true and this is optional.
 [-start=hh:mm] Optional, hh is hour (24hr clock) and mm
 is minute to send subscription
 Note. Start time is only valid for 24 hour intervals. That is, just
 accept the default of 1440 minutes. Range for start time is
 00:01 to 24:00. Alert subscriptions have no intervals or start time.
 [-useproxy=true|false] Optional and default is false
 [-proxyaddr=nnn.nnn.nnn.nnn][:ppp] Optional
 [-proxyusr=username] Optional
 [-proxypass=password] Optional

subscribe delete -ipaddress=<nnn.nnn.nnn.nnn>[<:ppp>]
 -type=[telemetry|gupdate|alert]
```

Examples: Configure for general and telemetry

```
subscribe add -ipaddress=101.102.103.104 -type=gupdate
subscribe add -ipaddress=10.20.30.40 -type=telemetry -interval=720
subscribe add -ipaddress=1.2.3.4:2666 type=gupdate -enabled=false
 interval=60 -usessl=false
subscribe add -ipaddress=10.20.30.40 -type=alert
subscribe add -ipaddress=11.22.33.44 -type=gupdate -useproxy=true
 proxyaddress=111.222.33.44 -proxyusr=myproxy
 proxypass=somepasswd
subscribe delete -ipaddress=10.20.30.40 -type=telemetry
```

To modify a subscription, use the **add** command with new parameters and the subscription will be modified with the new values.

## Telemetry

Request Telemetry files to be sent to the subscribed IP addresses or to a specific IP address.

```
Usage: telemetry send
telemetry send [-ipaddress=nnn.nnn.nnn.nnn:pppp] [-usessl=true|false]
[-file=exception|cel|syslog|linux|crash|exception|etf|ma]
[-ipaddress=nnn.nnn.nnn.nnn:pppp] - Optional target address not in the subscription list
where pppp is the port number, defaults to 443. If
no ipaddress is specified telemetry goes to all active
telemetry subscriptions in the subscription list
[-usessl=true|false]
[-file=cel]
[-file=syslog]
[-file=linux]
[-file=crash]
[-file=exception]
[-file=etf]
[-file=major_exception]
```

- Optional, default is true
- Optional CEL file request, defaults to daily
- Send linux syslog
- Send syslog, optlog, mgmt log
- Send smld Crash Dumps
- Send crash dumps, CEL
- Send ETF Log X 2—Note: Files are 2GB each
- Send Crash Dumps, CEL, ETF Log X 2

\*\* Warning: ETF files are 2GB each!

```
Examples: telemetry send
telemetry send -ipaddress=10.20.30.40
telemetry send -ipaddress=1.2.3.4 -file=exception
```

## License

Request a list of active application licenses or add or delete an active license.

```
Usage: license show | delete key=<key> - Where key is 32 hex characters
license add key=0123456789abcdef0123456789abcdef
 - Adds a valid application license key
license delete key=0123456789abcdef0123456789abcdef
 - Removes the valid application license key
```

## DNS

Show or modify the DNS setting.

```
Usage: dns show - Displays the current DNS settings
 dns set -search=<dom.namesvr.com> -nameserver1=<nnn.nnn.nnn.nnn>
 -nameserver2=<nnn.nnn.nnn.nnn> - Where nnn.nnn.nnn.nnn is valid IP addr
```

WARNING: Changing DNS setting incorrectly could cause a loss of communication with the ISE!

## Create

### Create host

This command creates a host.

```
Usage: create --host[=<name>] [options] <wwn | iqn | ip_addr |>
options include:
--windows (default)
--linux
--comment=<comment_string>
```

### Create volume

This command creates a volume (RAID 1 or 5)

```
Usage: create --volume[=<name>] [options]
options include:
--size=<GB size>
--raid1 (default)
--raid5
--pool1 (default)
--pool2
--write-back(--wb) (default)
--write-through(--wt)
--comment=<comment_string>
```

## Modify

### Modify host

This command modifies an existing host.

WWN, IQN, or IP can only be removed if there are no presentations.

```
Usage: modify --host=<name> [options]
options include:
--name=<new_name>
--comment=<commentstring>
--windows (default)
--linux
--add=<wwn>
--remove=<WWN | iqn | ip_addr list>
```

### Modify volume

This command modifies some existing volume parameters.

Not all volume parameters can be modified.

```
Usage: modify --volume=<name> [options]
options include:
--name=<new name>
--comment=<comment string>
--write-back(--wb) or --write-through(--wt)
--size=<GB_size>
```

```
--expand=<GB_size_increase>
--shrink=<GB_size_decrease>
--iopsmin=<value>
--iopsmax=<value>
--iopsburst=<value>
--thinthreshold=<percentage> (defaults to 75% of pool usage)
--qosmode <enable | disable>
```

In ISE 3.3 firmware and later, the following modify volume commands are also available:

```
--hdd
--cadp
--flash
--thin
```

## Modify pool

This command is used to modify the quote for Pinned to Flash volumes on a hybrid pool.

```
Usage: modify --pool=<pool_id> [options]
options include:
--flashquota=<new quota GB>
--thinthreshold=<percentage>
```

## Delete

### Delete host

This command deletes a host.

```
Usage: delete --host=<name>
```

### Delete volume

This command deletes a volume.

```
Usage: delete --volume=<name>
```

## Exit/Quit

This command closes the CLI.

```
Usage: exit or quit
```

## Help

Displays on-line help.

```
Usage: help <subject>
<subject> can be any of the commands or 'all'.
```

## Initialize

Initializes the ISE and configures any available DataPacs into pools.

```
Usage: initialize [options]
 options include:
 --sparelevel=<10|20>
```

## Present

Adds a presentation.

```
Usage: present --host=<host name> [<vol0>[:<L0>] ...]|--all
 present --volume=<volume name> [<host0>[:<L0>] ...]|--all
```

The present command presents a host to a list of volumes or a volume to a list of hosts.

To present a volume to a list of hosts, use:

```
present --volume=<name> host0 host1
```

To present a host to a list of volumes, use:

```
present --host=<name> vol0 vol1
```

To specify explicit LUN values, add :<LUN> to each name in the list (e.g., host0:1 host1:5 or v0:4 v1:1).

The list can be replaced with '--all' to present a host to all volumes or a volume to all hosts. (e.g., present --host=host1 --all).

## Unpresent

Removes a presentation.

```
Usage: unpresent --host=<host name> [<vol0> ...]|--all
 unpresent --volume=<volume name> [<host0> ...]|--all
```

The unpresent command removes hosts or volumes from a presentation.

To unpresent hosts from a volume, use:

```
unpresent --volume=<name> host0 host1
```

To unpresent volumes from a host, use:

```
unpresent --host=<name> vol0 vol1
```

The list can be replaced with '--all' to unpresent a host from all volumes or a volume from all hosts. (e.g., present --host=host1 --all).

## Identify

Flash on or off the ISE LED.

```
Usage: identify --ise=<on | off>
```

## Show

Displays information about the ISE

Usage: `show <component>`

component can be any of the following:

|               |                                                 |
|---------------|-------------------------------------------------|
| battery       | : Display battery or supercapacitor information |
| ise           | : Display information about the ISE's identity  |
| mrc           | : Display MRC information                       |
| volumes       | : Display information about the volumes         |
| pool          | : Display information about the pools           |
| powersupply   | : Display power supply information              |
| supercap      | : Display supercapacitor information            |
| hosts         | : Display information about the hosts           |
| task          | : Display information about any running tasks   |
| datapac       | : Display DataPac information                   |
| hba           | : Display detected host HBA WWNs                |
| network       | : Display network configuration                 |
| events        | : Display recent events from all logs           |
| snmp          | : Display SNMP configuration                    |
| isns          | : Display iSNS configuration                    |
| subscriptions | : Display SNMP trap subscriptions               |
| all           | : Display all of the above information          |
| performance   | : Display performance data for ISE              |

**Note.** By default, `show perf` shows latencies in ms (milliseconds) and `--usec`' switch displays used (micrsoconds).

## Shutdown

Flushes all data and powers down the ISE.

Usage: `shutdown`

## Restart

Reboots the ISE. Same as shutdown but the system will reboot after the shutdown.

Usage: `restart`

## Reformat Ise

Returns the ISE to its pre-initialized state, provided that no volumes are defined. Reformatting an ISE removes all stored data.

Usage: `reformat ise`

## Version

Displays version information.

**Usage:** `version`

## Add

Adds DataPac or MRC to the system.

**Usage:** `add --y`

Displays the current Add status for DataPacs and MRCs.

**Usage:** `add --datapac1`

Adds DataPac1 to the system.

**Usage:** `add --datapac2`

Adds DataPac2 to the system.

**Usage:** `add --mrc1`

Adds MRC1 to the system.

**Usage:** `add --mrc2`

Adds MRC2 to the system.

## Remove

Removes a DataPac or MRC from the system.

**Usage:** `remove --status`

Displays the current Remove status for DataPacs and MRCs.

**Usage:** `remove --datapac1 [--erase]`

Removes DataPac1 from the system. If the --erase option is specified, the DataPac will be securely erased.

**Usage:** `remove --datapac2 [--erase]`

Removes DataPac2 from the system. If the --erase option is specified, the DataPac will be securely erased.

**Usage:** `remove --mrc1`

Removes MRC1 from the system.

**Usage:** `remove --mrc2`

Removes MRC2 from the system.

## Subscribe

Enables Local ISE Analyzer Subscription.

**Usage:** `subscribe show`

```
10.20.30.40:443, type=telemetry, enable=true, interval=1440,
```

```
Last Sent= 14-Sep-2010 09:17:26
```

```
Usage: subscribe add -ipaddress=10.20.30.40:443 -type=gupdate -interval=720
-enabled=true
```

## Unsubscribe

Disables Local ISE Analyzer Subscription.

```
Usage: subscribe delete -ipaddress=10.20.30.40:443 type=gupdate
```

## Encryption

**Note.** The commands for encryption are allowed only if the user has enabled encryption.

**Note.** To verify encryption settings, issue a `show ise` command. The encryption field display one of the following:

`Supported, the system is capable of having encryption enabled`

`Not supported, the system is not capable of having encryption enabled`

`Enabled, the system is capable of supporting encryption, and the user has enabled it on the system`

```
Usage: encryption [--enable|--disable|--unlock|--changekey] [options]
```

options include:

`--passkey`

`--newpasskey (changekey)`

Passkey will be required for the following operations:

- unlock after power loss
- change the passkey
- disable encryption,
- remove or add a DataPac

**enable:** Turns on encryption. Allows the data to be encrypted with a user-specified passkey on G3 ISE that supports encryption.

**disable:** Turns off encryption. Allows data to be read/written without a user passkey. This can be re-enabled at any time.

**change:** Allows user passkey to be changed.

**unlock:** unlock ISE to continue boot of an ISE after a power cycle

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