SE4200 Installation Guide

Table of Contents

Revision History

This section lists the summary of changes corresponding to each release.

Release	Date	Change Summary
1.0.0	2/2024	New document
1.1.0	12/2024	Added Revision History

SE4200 Installation Guide

This reference document provides important legal disclaimers and notices for SE4200 products.

Disclaimer

Celestica may update product specifications or information without prior notice to enhance reliability, functionality, or design. Although the provided information is believed to be accurate, no responsibility is assumed for its use, or for any infringements of patents or third-party rights.

Preface

Document Scope

This installation guide details the design features of, and provides instructions for the SE4200 storage expansion.

Intended Audiences

- System architects
- Firmware engineers
- System application engineers

Document Conventions

The following table describes various types of notes used within this installation guide.

Type	Generalized Definition
ⓘ NOTE:	Provides supplemental information.
⚠ CAUTION:	Indicates a situation that if not avoided, may result in equipment damage or minor to moderate injury.
ⓟ TIP:	Indicates information that helps you make better use of your system.
⚠ WARNING:	Indicates a hazardous situation that if not avoided, could result in data loss or serious injury.
ⓘ DANGER:	Indicates a hazardous situation that if not avoided, will result in death or serious injury.

SE4200 Overview

This document describes the installation process of the SE4200 storage expansion product.

SE4200 is Celestica's all-flash storage expansion with PCIe 4.0 NVMe SSDs. Optimized for high performance and maximum capacity per enclosure, the SE420 is the ideal storage building block for a broad range of applications and workloads including AI/ML, composable storage, and software-defined storage (SDS).

Optimized for:

- Hyperscale Data Centers
- Object Storage & Scale Out
- Big Data Analytics
- Backup Target
- HPC and AI

Features

- NVMe technology
- 2U height rack mount
- Support for up to 24 U.2 NVMe SSDs
- 16Gbps PCIe Gen4 (16Gb/s per lane)
- Dual port, x2 + x2 PCIe lanes for each SSD
- Enclosure management
- In-band management interface
- Enclosure health monitor
- Enclosure cooling control
- System event log
- On-line firmware updates
- Supports hot-swappable ESMs, PSUs and SSDs

Front Panel Identification

Front Panel Identification

Figure 1. SE4200 **Front Panel**

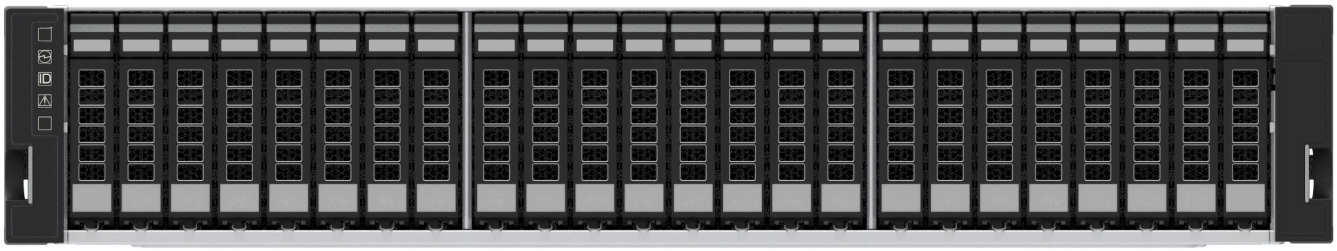
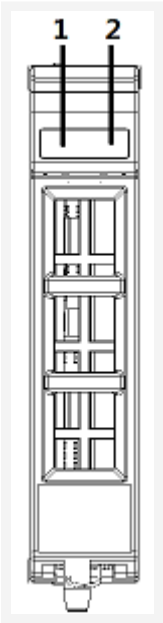


Table 1.Front Panel LED Identification

LED Name	LED Status	Description
Ready LED (Top)	On (Green)	Firmware initialization on one or more canisters is complete
	Off	Firmware is not initialized / ready
Fault LED (Middle)	ON (Amber)	Warning / Fault conditions exist in an enclosure
	Off	Normal operation
Location LED (Bottom)	Blinking @ 4Hz (Blue)	Identifies selected enclosure
	Off	Normal operation

Figure 2. Gen2 2.5" Drive Carrier

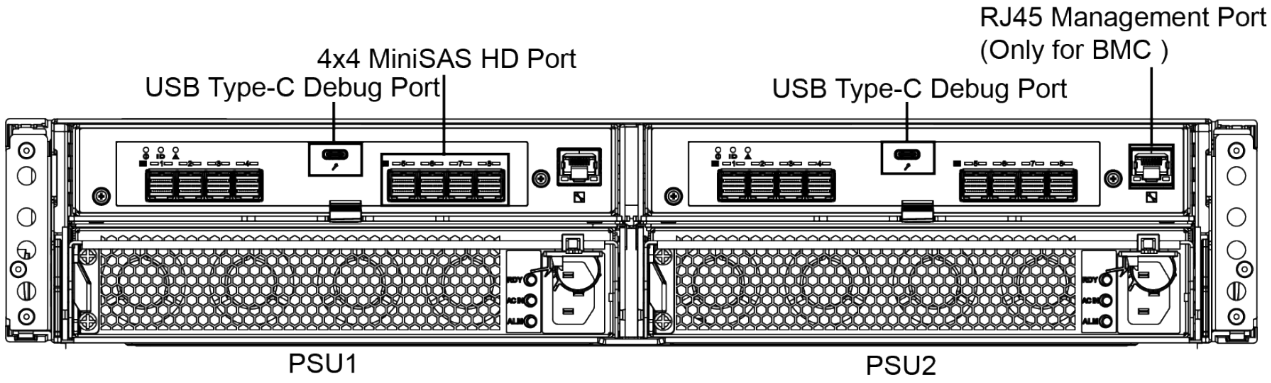


1. Fault LED (Amber)
2. Active LED (Green)

Rear Panel Identification

Rear Panel Identification

Figure 3. SE4200 Rear Panel



Drive Slot Identification

Figure 4. Drive Slot Numbers

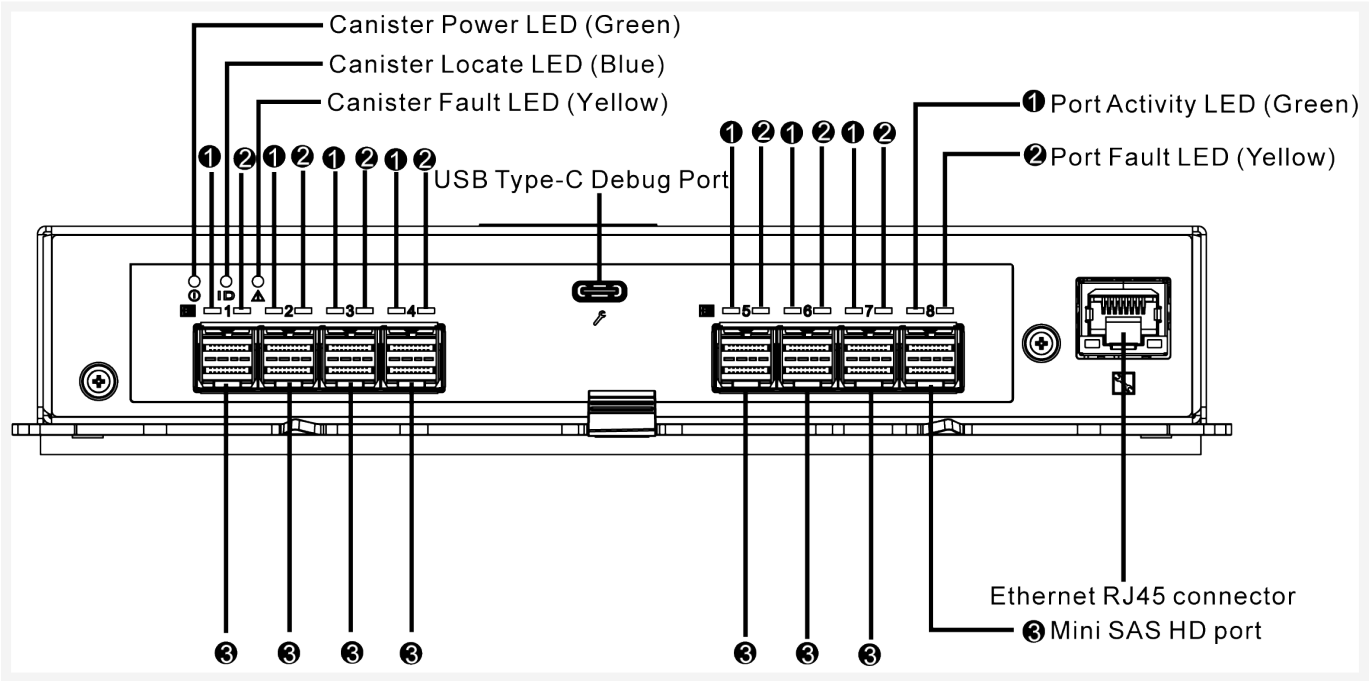
Table 2.Drive Slot LED Descriptions

LED Name	LED Status	Description
Active LED	OFF	This LED is controlled by the SSD itself. Please refer to the SSD spec for the LED definition. A reference behavior can be: OFF: Drive power off ON: Drive ready without IO Blink - During IO transferring
	ON	
	Blink	
Fault LED	ON	Drive fault
	OFF	Normal operation
	Blink @ 4Hz	Locate
	Blink @ 1Hz	Rebuild

Canister Identification

Figure 5. Canister Identification

The SE4200 houses two canisters and two power supplies. The following is a detailed view of a single canister.



Field Replaceable Units (FRUs)

Some components are designed to be removed and replaced without the need to send chassis in for repair.

> ☆ IMPORTANT: Do not try to replace components not listed as field replaceable. Also, do not attempt to disassemble FRUs themselves. FRUs are designed and intended to be used as a whole part and do not contain replaceable parts within.

Power Supply Unit (PSU) Replacement

Figure 6. PSU Removal

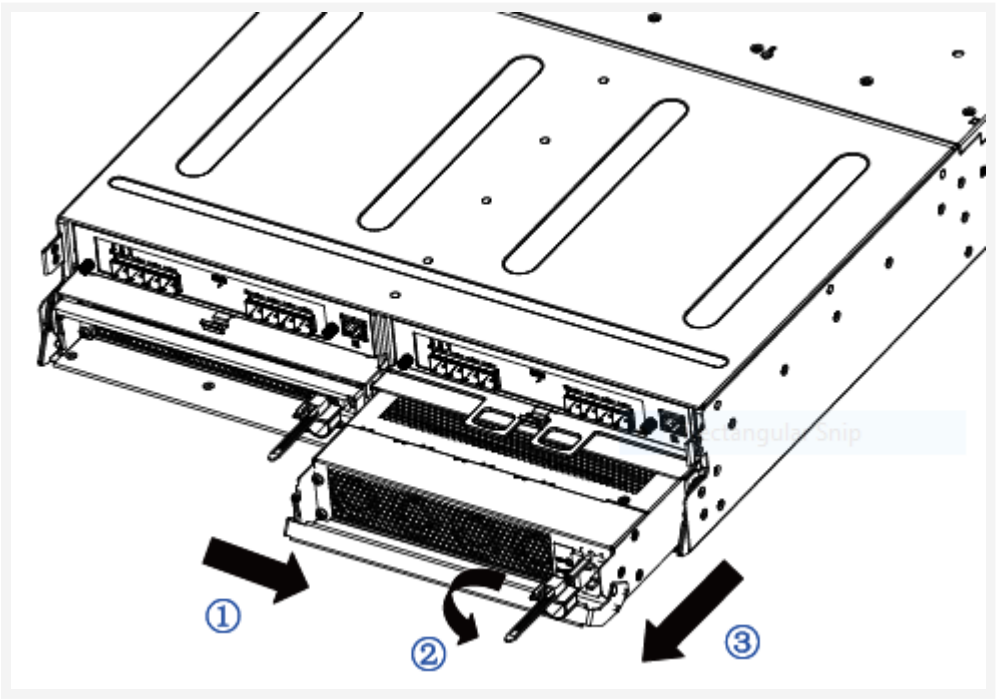
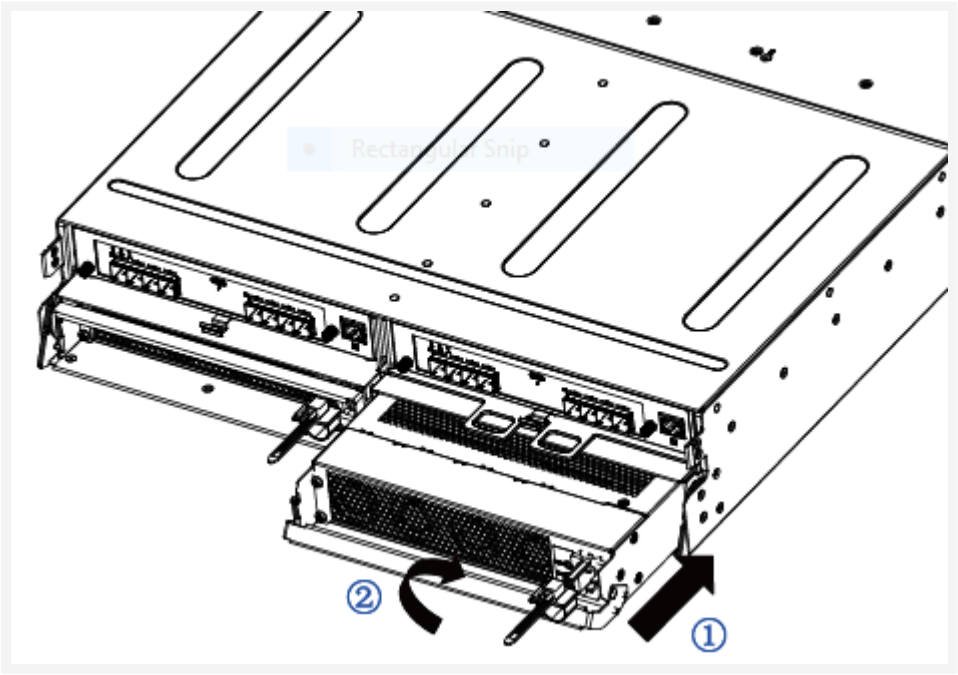


Figure 7. PSU Installation



Canister Replacement

Figure 8. Canister Removal

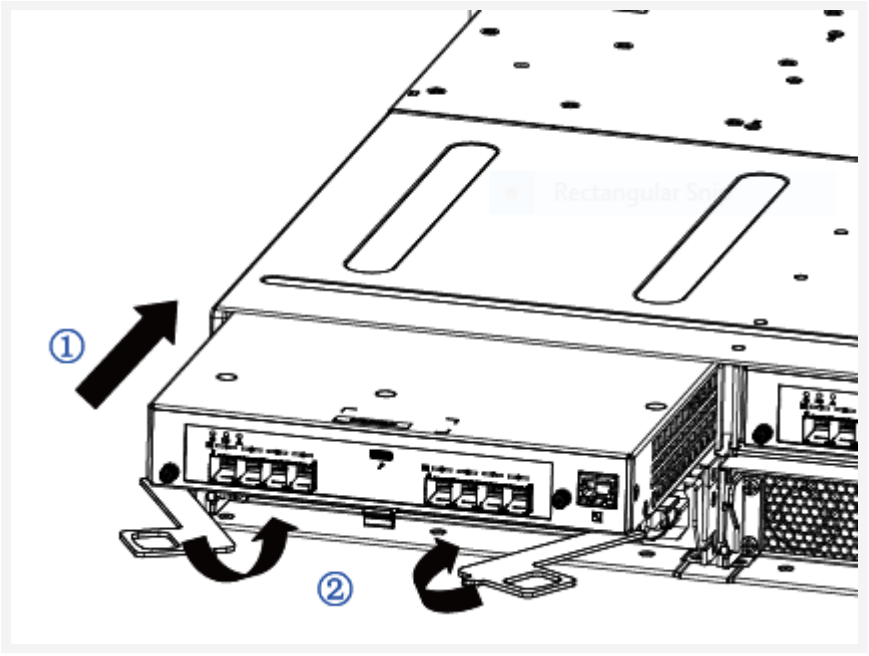
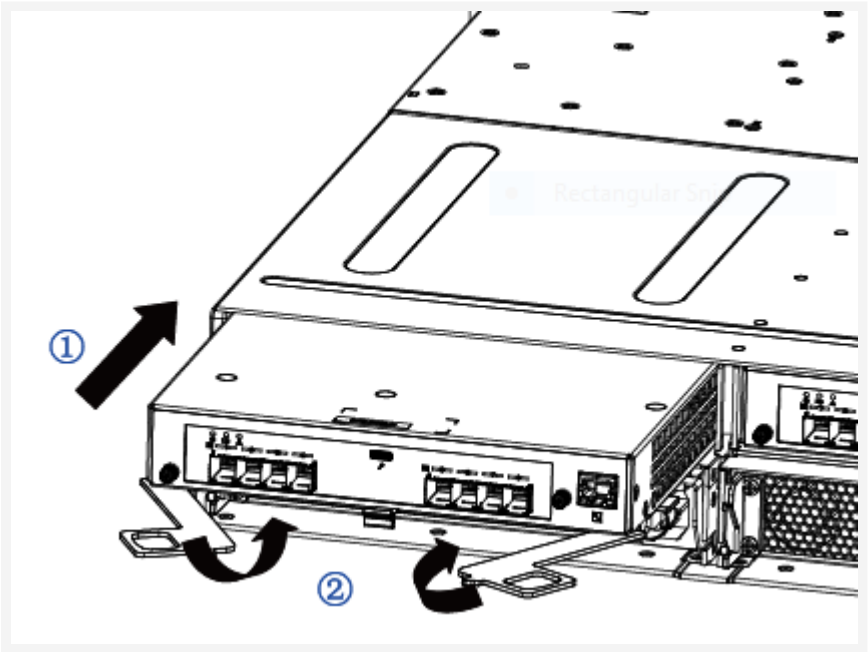


Figure 9. Canister Installation



Solid State Drive (SSD) Replacement

Figure 10. SSD Removal

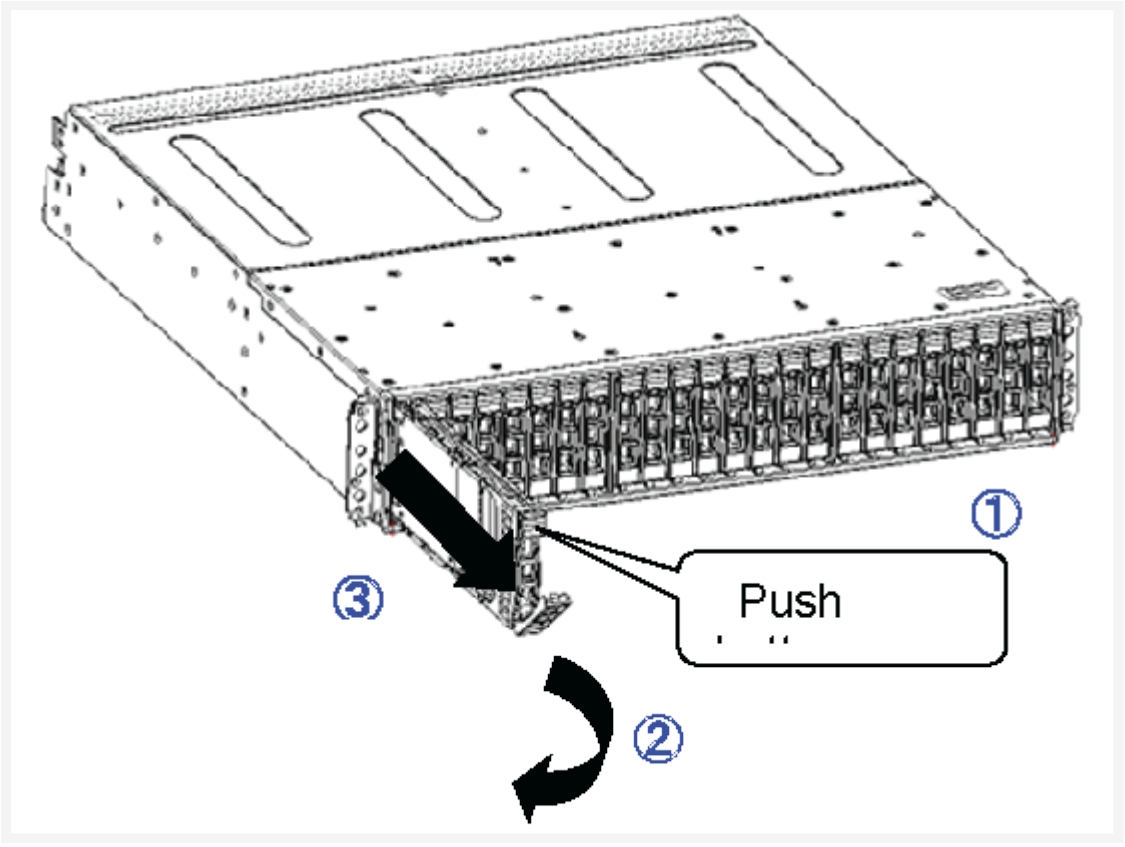
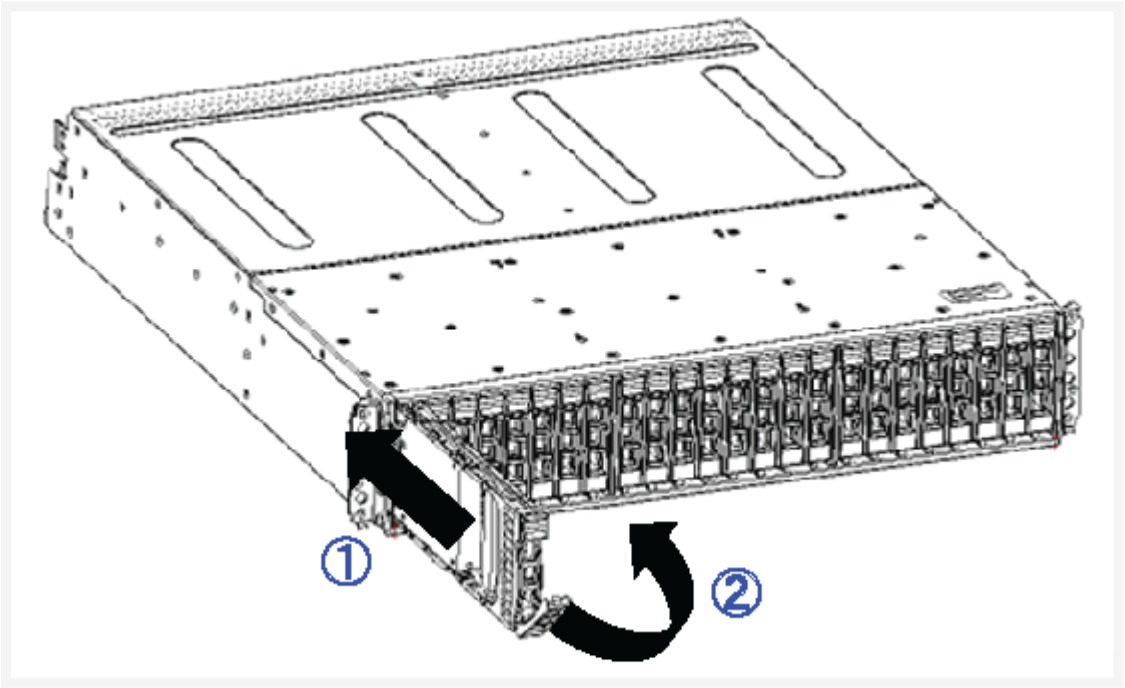


Figure 11. SSD Installation



Complex Programmable Logic Device (CPLD)

The CPLD can be upgraded via the serial port. To do so you must first establish a CLI connection. See: Connecting to Console

CPLD Upgrading

> ⓘ NOTE: The CPLD upgrade process includes two phases: 1. Downloading the CPLD file and 2.Installing the upgrade. The upgrade installation process takes approximately three minutes. After which a power cycle of the canister **must** be performed.

1. Within Tera Term type "cmdsvr_mode 1" and "fdl 4 0 y", then choose "File > Transfer > XMODEM > Send.
2. Select appropriate .bin file to update. Once finished, the screen will display "Buffer Download Complete".
3. Type "cmdsvr_mode 0" and "cpld upgrade" to upgrade the CPLD. This process takes approximately three minutes.
4. The upgrade is complete when "PASS" is displayed on screen.
5. Power cycle the canister/unit to apply CPLD upgrade.
6. Type "fru get" to verify new version of CPLD.
7. Repeat these steps to apply updates to other canisters.

Basic Firmware Commands

Connecting to Console

This section introduces basic commands for system checks and debugging via Celestica's Firmware Console Port Connection Setting.

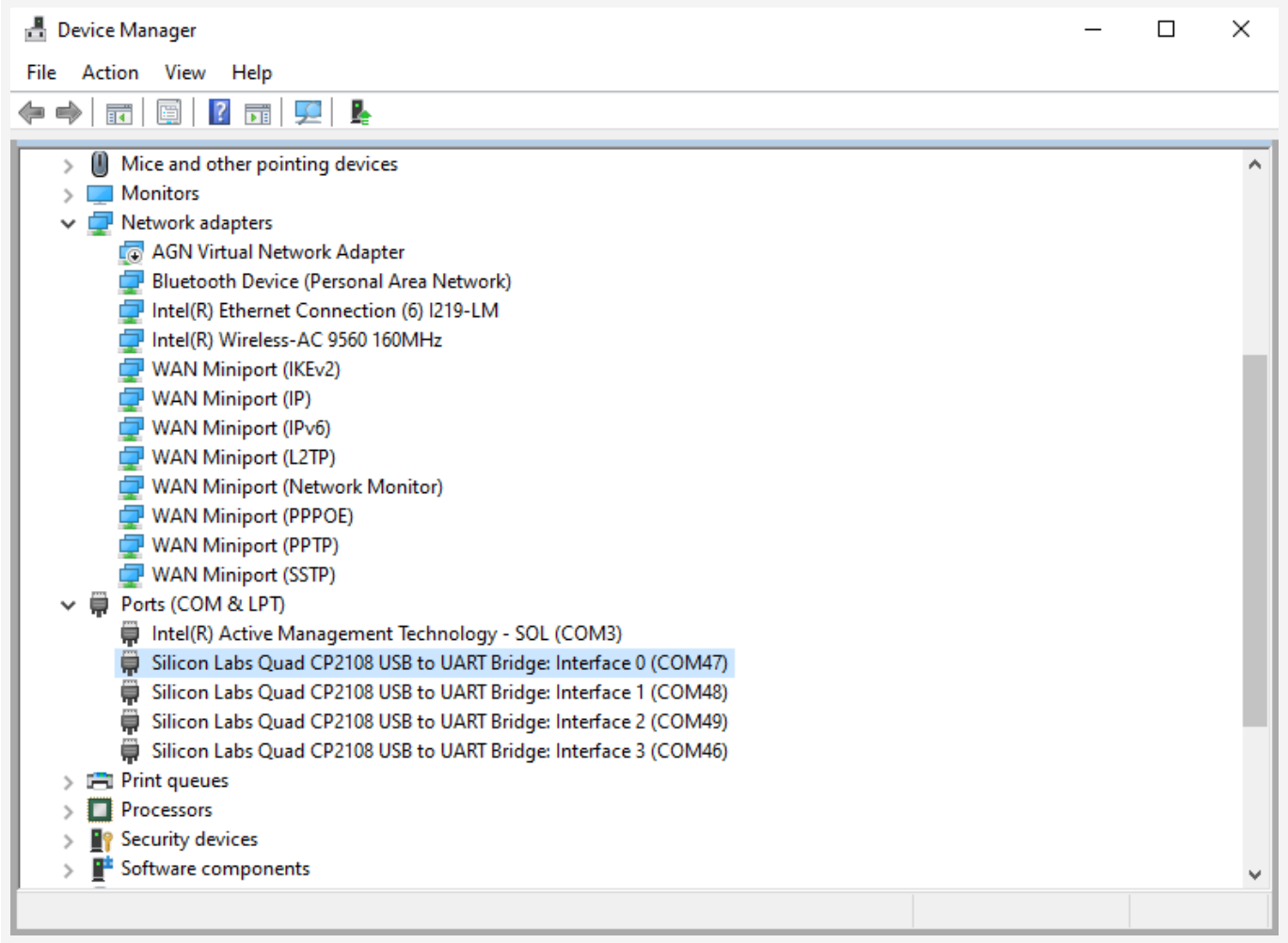
Tera Term is recommended for connecting, but before the first connection install the appropriate TPYEC-UART device driver.

The device driver available for CP2108 is the Virtual COM Port (VCP) driver. The latest drivers are available at https://www.silabs.com/search#q=TPYEC-UART%20Virtual%20COM%20Port%20driver&t=All&sort=relevancy .

When connecting, choose the COM port and set the Baud rate to 115200. Also apply the other values as listed below.

Attribute	Value
Baud Rate	115200
Date	8 bit
Parity	None
Stop	1 bit
Flow Control	None

Figure 12. Windows Device Manager



Interface0: SES UART (Debug, refer to the Nebula G2 SES FW User Guide)

Interface1: BMC UART (Debug, refer to the Nebula Gen2 BMC User Manual)

- Username: sysadmin
- Password: superuser
- Baud rate: 115200

NOTE:

> ⓘ NOTE: This port is only for debug purposes, not a BMC interface for customers

> ⓘ NOTE: This username and password are only for BMC serial port login, neither for Web GUI

> ⓘ NOTE: Interface2: Reserved, not recommended for customers

ⓘ NOTE: Interface3: Reserved, not recommended for customers

ⓘ NOTE: The serial port number is different for different devices on different computers

System Information Commands

Use the following CLI commands to get various information.

Figure 13. About Command

Use command "fru get" to check system information.

Figure 14. FRU Get Command

```
0x00000000:0003>fru get
--- Nebula Enclosure ---
[Product Info]
Product Name: Nebula
Product Manufacturer Name: CELESTICA-CSS
Product Serial Number: F093205LSNE16190
Product Part: Nebula

[Incumbent Canister ID]
ICID = CLS      Nebula
Total 24 bytes:
43 4c 53 20 20 20 20 20 4e 65 62 75 6c 61 20 20   CLS     Nebula
20 20 20 20 20 20 20 20

[Chassis]
Chassis Part Number: R0932-F2000-02
Chassis Serial Number: F093204LSN016190001
Chassis Product Name: Nebula

[DriveBoard]
Drive Board Product Name: Nebula
Drive Board Serial Number: G093201LSN116180002
Drive Board Manufacturer: CELESTICA-CSS
Drive Board Part Number: R0932-G0002-03
Drive Board HW Version:
Drive Board MFG Serial Number:

--- ESM A ---
ESM Name: Nebula
ESM ID: CLS      Nebula
SAS Address: 50-0E-0E-CA-02-24-12-3E
Running Time: 0 day 0 hours 11 minutes 39 seconds

[Board]
Manufacture Name: CELESTICA-CSS
Manufacture Part Number: R0932-G0001-03
Manufacture Serial Number: G093201LSN116180002
[Revision]
FW Revision 0.5.0
Built r52 Jun 16 2016 04:28:33
CFG Revision 0.5.0
MFG HW Revision:
CPLD Revision Code: 0.3.0
--- ESM B ---
ESM Name: Nebula
ESM ID: CLS      Nebula
SAS Address: 50-0E-0E-CA-02-24-12-7E
Presence: Yes
Processor Ready (MIPSRDY): Yes

[Board]
Manufacture Name: CELESTICA-CSS
Manufacture Part Number: R0932-G0001-03
Manufacture Serial Number: G093201LSN116180002
[Revision]
```

Figure 15. FRU Get Command - Continued

```
FW Revision 0.5.0
Built r52 Jun 16 2016 04:28:33
CFG Revision 0.5.0
MFG HW Revision:
CPLD Revision Code: 0.3.0
--- PS A ---
PS Type: 800W
Power Capacity:
PS Manufacturer:  DPS-800EB A
PS Serial Number: S3F
PS Part Number: CCCT140900208
PS Firmware Version: 0111
--- PS B ---
PS Type: -JBOD-PSU
Power Capacity:
PS Manufacturer:  DPS-800EB A
PS Serial Number: 01F
PS Part Number: CCT16076210
PS Firmware Version: 010=
```

Use command "temp get" to view temperature sensor information.

Figure 16. Temp Get Command

```
0x00000000:0002>temp get
Temp ID     Temp Name                                       Reading          Status           Threshold
---------------------------------------------------------------------------------------------------------
T0          Inlet Temperature_ESM A                         28'C             Normal           [-5,0,60,70]
T1          Outlet Temperature_ESM A                        31'C             Normal           [-19,-19,75,80]
T2          Die Temperature_ESM A                           42'C             Normal           [-19,-19,95,100]
T3          Inlet Temperature_ESM B                         29'C             Normal           [-5,0,60,70]
T4          Outlet Temperature_ESM B                        33'C             Normal           [-19,-19,75,80]
T5          Die Temperature_ESM B                           46'C             Normal           [-19,-19,95,100]
T6          Hotspot Temperature_PS A                        38'C             Normal           [-19,-19,110,135]
T7          Ambient Temperature_PS A                        31'C             Normal           [-19,-19,55,67]
T8          Primary Temperature_PS A                        29'C             Normal           [-19,-19,97,105]
T9          Hotspot Temperature_PS B                        32'C             Normal           [-19,-19,110,135]
T10         Ambient Temperature_PS B                        27'C             Normal           [-19,-19,55,67]
T11         Primary Temperature_PS B                        27'C             Normal           [-19,-19,75,105]
0x00000000:0003>
```

Use "power get" to view system component voltages.

Figure 17. Power Get Command

```
0x00000000:0001>power get
PS A: ON
PS B: ON
Power Sensor Info:
Sensor ID   Sensor Name                             Read   Status        Threshold                 Margin
---------------------------------------------------------------------------------------------------------
V0          0.92V_AVD_PCIe_TX_ESM A                 0.92V  Normal        [-10%,-8%,+8%,+10%]       N/A
V1          0.9V Voltage_ESM A                      0.92V  Normal        [-10%,-8%,+8%,+10%]       N/A
V2          0.92V_AVD_PCIe_ESM A                    0.93V  Normal        [-10%,-8%,+8%,+10%]       N/A
V3          1.8V Voltage_ESM A                      1.81V  Normal        [-10%,-8%,+8%,+10%]       N/A
V4          3.3V Voltage_ESM A                      3.37V  Normal        [-10%,-8%,+8%,+10%]       N/A
V5          5V Voltage_ESM A                        5.09V  Normal        [-10%,-8%,+8%,+10%]       N/A
V6          12V Voltage_ESM A                       12.02VNormal         [-10%,-8%,+8%,+10%]       N/A
V7          0.92V_AVD_PCIe_TX_ESM B                 0.92V  Normal        [-10%,-8%,+8%,+10%]       N/A
V8          0.9V Voltage_ESM B                      0.92V  Normal        [-10%,-8%,+8%,+10%]       N/A
V9          0.92V_AVD_PCIe_ESM B                    0.93V  Normal        [-10%,-8%,+8%,+10%]       N/A
V10         1.8V Voltage_ESM B                      1.81V  Normal        [-10%,-8%,+8%,+10%]       N/A
V11         3.3V Voltage_ESM B                      3.35V  Normal        [-10%,-8%,+8%,+10%]       N/A
V12         5V Voltage_ESM B                        5.06V  Normal        [-10%,-8%,+8%,+10%]       N/A
V13         12V Voltage_ESM B                       12.02VNormal         [-10%,-8%,+8%,+10%]       N/A
```

Firmware Upgrade

> ⓘ **NOTE:** Since SE4200 firmware has changed the flash layout of MSCC standard Alpha Candidate release codebase, it does not support updating firmware from previous version or codebase directly to Rev 0.5.0.

Firmware Upgrade

Context

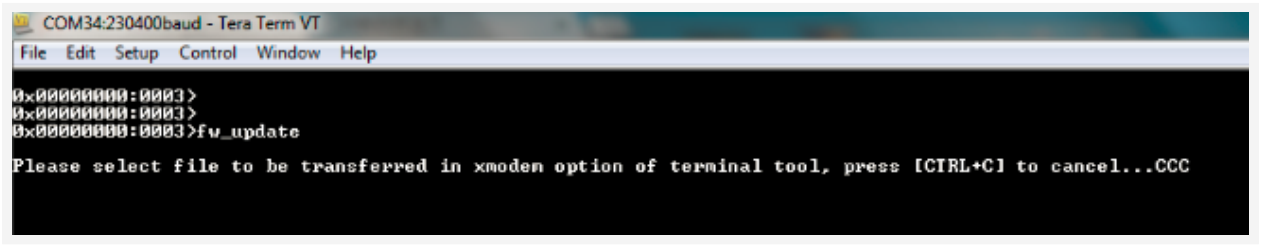
SE4200 supports upgrading the firmware and configuration binary file through UART.

> ⓘ NOTE: Since SE4200 firmware has changed the flash layout of the MSCC standard Alpha Candidate release codebase, it does not support upgrading firmware from previous versions or codebases directly to Rev 0.5.0.

Procedure

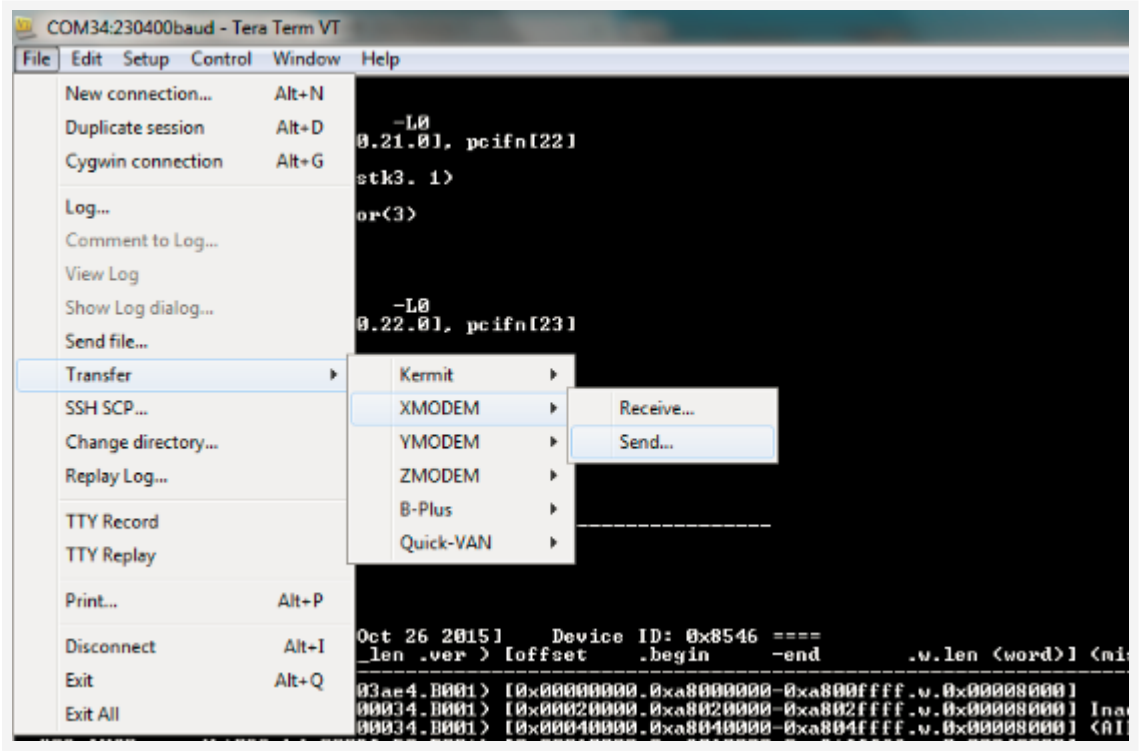
1. From the Tera Term CLI type "fw_update" and press Enter.

   Figure 18. Firmware update command

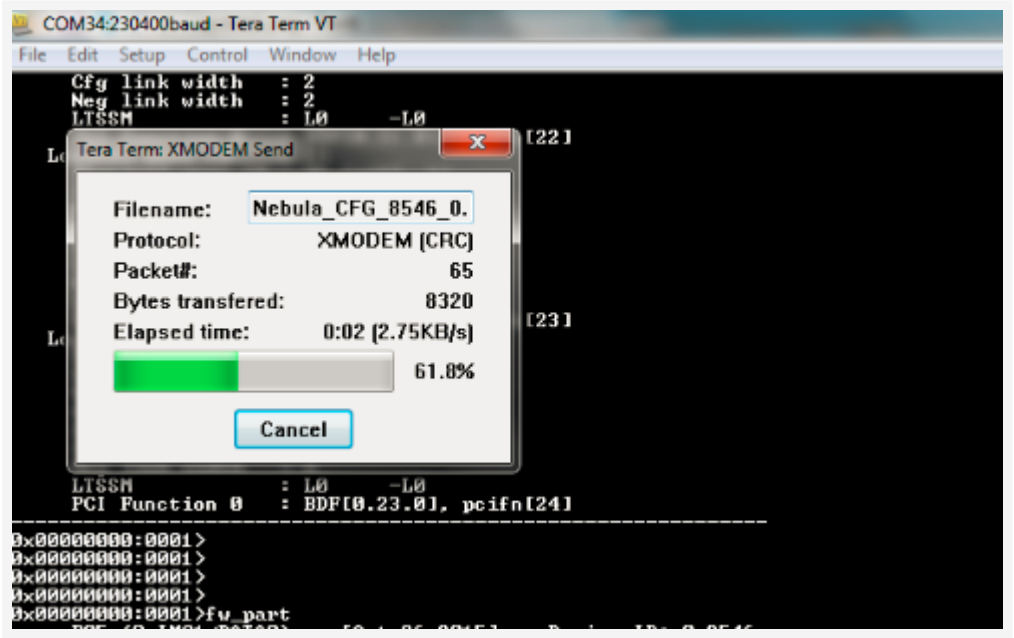
2. Select File > Transfer > XMODEM > Send. Then select firmware or configuration binary file.

Figure 19. Sending firmware file



3 Wait for transfer to complete. Once done, choose Reset or power-cycle the storage expansion device to activate the new firmware and configuration.

Figure 20. File transfer complete and reset.



System Partition Configuration

HBA Partition Configurations

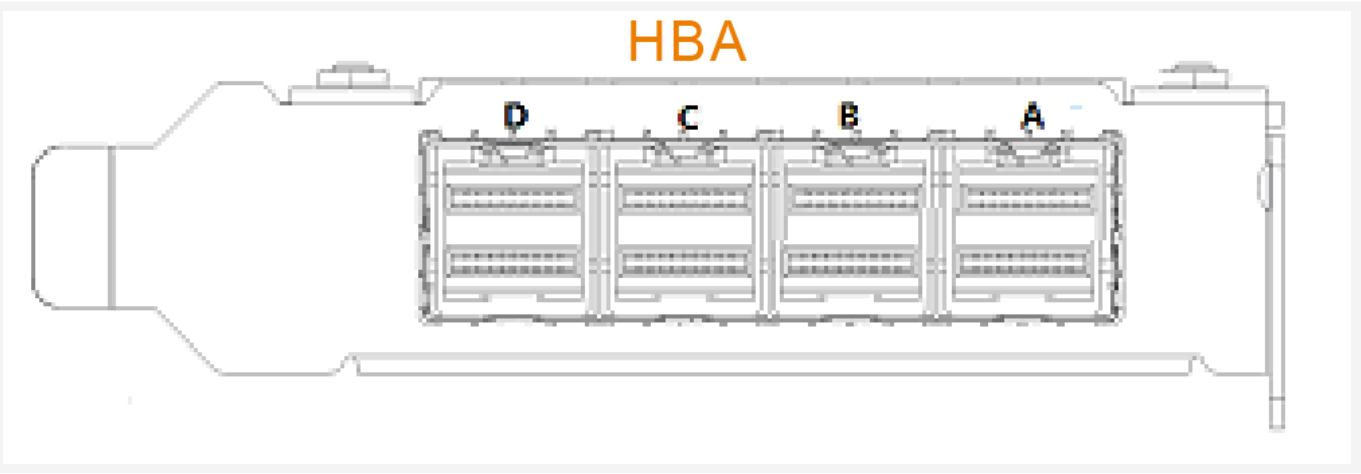
> ⓘ NOTE: The HBA card exists within the storage controller, not the storage expander. It is listed here for configuration purposes.

HBA external ports order definition

There are 4 mini-SAS HD ports on each HBA, port A-D

See below for HBA mini-SAS HD ports order definition

Figure 21. Host Bus Adapter



The HBA can be designed in three configurations.

> ⓘ NOTE: Once connected, the HBA card will detect which configuration to use based whether all cables connect to the same Retimer card or to separate Retimer cards (a.k.a. IOM cards).

Configuration 1

The four external ports are set to two partitions.

Port A (1st four lanes)	PCIe x8	Partition 0: DSP #1
Port B (2nd four lanes)		
Port C (1st four lanes)	PCIe x8	Partition 0: DSP #2
Port D (2nd four lanes)		

Configuration 2

The 4 external ports are set to 1 partition. This is the default HBA partition setting.

Port A (1st four lanes)	PCIe x16	Partition 0: DSP #1
Port B (2nd four lanes)		
Port C (3rd four lanes)		
Port D (4th four lanes)		

Configuration 3

The 4 external ports are set to 4 partitions.

Port A (1st four lanes)	PCIe x4	Partition 0: DSP #1
Port B (1st four lanes)	PCIe x4	Partition 0: DSP #2
Port C (1st four lanes)	PCIe x4	Partition 0: DSP #3
Port D (1st four lanes)	PCIe x4	Partition 0: DSP #4

SE4200 Partition Configurations

The SE4200 storage expansion supports three configurations. They are 1x16, 2x8 and 4X4. Each PCIe switch has x32 PCIe links on Upstream, each Retimer covers one of x16. Each x16 can be bifurcated into three CLS-specific configurations: 1x16, 2x8, and 4x4.

These configurations are statically written into SES firmware.

The mapping table is as follows：

- CFG#1 is 4X4 configuration;
- CFG#2 is 2X8 configuration;
- CFG#3 is 1X16 configuration

Below are the canister PCIe partition configurations:

Figure 22. Canister PCIe partition configurations

Configuration	CON#1	CON#2	CON#3	CON#4	CON#5	CON#6	CON#7	CON#8	Partitions
#1	USP(x4)	USP(x4)	USP(x4)	USP(x4)	USP(x4)	USP(x4)	USP(x4)	USP(x4)	8
#2	USP(x8)		USP(x8)		USP(x8)		USP(x8)		4
#3	USP(x16)				USP(x16)				2

Configuration #1 contains eight partitions. Each partition contains 1x4 USP and 3 SSDs with the default setting.

Configuration #2 contains four partitions. Each partition contains 1x8 USP and 6 SSDs with the default setting.

Configuration #3 contains two partitions. Each partition contains 1x16 USP and 12 SSDs with the default setting.

Default Port and SSD Assignments

Figure 23. Default port and SSD assignments for each configuration

	CFG#1	CFG#2	CFG#3
Port#1	Par#0 (USP)	Par#0 (USP)	Par#0 (USP)
Port#2	Par#1 (USP)		
Port#3	Par#2 (USP)	Par#1 (USP)	
Port#4	Par#3 (USP)		
Port#5	Par#4 (USP)	Par#2 (USP)	Par#1 (USP)
Port#6	Par#5 (USP)		
Port#7	Par#6 (USP)	Par#3 (USP)	
Port#8	Par#7 (USP)		
SSD#0	Par#0	Par#0	Par#0
SSD#1	Par#1	Par#1	Par#1
SSD#2	Par#2	Par#2	Par#0
SSD#3	Par#3	Par#3	Par#1
SSD#4	Par#4	Par#0	Par#0
SSD#5	Par#5	Par#1	Par#1
SSD#6	Par#6	Par#2	Par#0
SSD#7	Par#7	Par#3	Par#1
SSD#8	Par#0	Par#0	Par#0

Retimer Card Configuration

> ⓘ NOTE: The retimer card is also known as the "IOM" I/O MOdule, or "Pass-Thru Card". Up to two of these would be located in each SE4200 canister (4 per SE4200 storage expansion.)

The configuration (default 1x16) changes support by SES command in SES FW release (2.0.0), for 2x8 configuration commands, refer to the following:

Retimer: Update settings and get current configuration

Usage: retimer_cfg <args...>

<args>

- get: Get the working mode of all currently loaded configurations of the retimer
- set_all n: Set all retimer configurations to <0|1|2>(0: 1x16, 1: 2x8, 2: 4x4)
- set c n: Set the <0|1> retimer configuration to <0|1|2> (0: 1x16, 1: 2x8, 2: 4x4)

Figure 24. Changing the retimer card configuration to 2x8

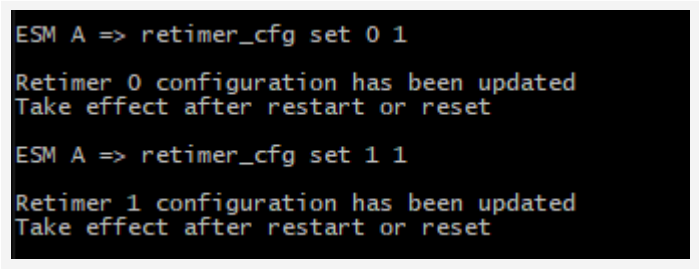
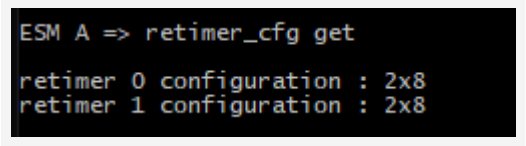


Figure 25. Check the current retimer card configuration



Safety Precautions

Read this section before beginning any procedure. For your safety and the proper maintenance and operation of the SE4200, please follow these precautions when setting up this device.

- Follow all cautions and instructions marked on the equipment.
- Ensure the voltage and frequency of your power source match the voltage and frequency noted on the system's electrical rating label.
- Never insert any objects through openings in the chassis. Dangerous voltages, and/or moving parts may be present. Conductive external objects could produce a short circuit that could damage the system or cause electric shock, resulting in serious personal injury.
- In order to not exceed operational temperature guidelines, do not block or cover the openings of your system. Never place a product near a radiator or heat register. Failure to follow these guidelines may cause overheating and affect the reliability of the device.
- Do not drop the product or subject it to physical shock.
- Keep liquids away from the system.
- When shipping the product, pack it inside the original or equivalent packaging and ship on a pallet.
- Celestica does not assume any responsibility for problems caused by unauthorized repairs or replacement.
- Keep flammable items away from the product.
- Inspect and maintain the site and the system regularly. Failure to do so may reduce the lifespan of this system and possibly void the warranty.

⚠ CAUTION:

The Celestica SE4200 does not produce or have any laser-related functions. If you connect and install a device that supports laser functions such as an optical transceiver, we recommend that you choose a product certified to the relevant standards as shown below.

- EN 60825-1, 1st Edition
- EN 60825-1 Safety of Laser Products — Part 1: Equipment Classification Requirements and Users' Guide
- EN 60825-2 Safety of Laser Products — Part 2: Safety of Optical Fiber Communication Systems
- FDA Regulation 21CFR 1040.10 and 1040.11

Power

Depending on the type of power system your device has, the following symbols may be used.

On - Connects power to the system. This can be AC or DC power depending on product and model.

Off - Disconnects power to the system.

Standby - The power switch is in standby mode (low power).

⚠ CAUTION: Please check the input to ensure proper grounding of the power supply unit (PSU) before powering on the system.

⚠ CAUTION: Improper power supply system grounding, extreme fluctuation of the input source, and transients (spikes) can result in data errors, or even hardware damage.

⚠ CAUTION: The product may be equipped with multiple power supplies. To remove all hazardous voltages, disconnect all power cords.

⚠ CAUTION: This device is designed to work with power systems having a grounded neutral or a grounded return for direct current (DC) powered products. To reduce the risk of electric shock, do not plug the chassis into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

⚠ CAUTION: The system may have more than one power supply cable. To reduce the risk of electrical shock, a trained service technician must disconnect all power supply cables before servicing the system.

ⓘ NOTE:

This symbol  is used when multiple power supplies are installed in a system. This warning label is typically found on the back of the device near the PSU.

Power Connection

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. For electrical power ratings on options, refer to the power rating label or the user documentation supplied with that option.

⚠ CAUTION: Do not use the power cord provided with your equipment with any other products. Only use the power cord(s) provided with the product to power it. Do not use household extension cords with your product.

ⓘ NOTE: To disconnect power, remove all power cords from unit.

ATTENTION: DÉBRANCHER LES TOUT CORDONS D'ALIMENTATION

POUR DÉCONNECTER L'UNITÉ DU SECTEUR.

WARNUNG: Wenn Sie das Gerät zwecks Wartungsarbeiten vom Netz trennen müssen, müssen Sie beide Netzteile abnehmen.

当心：如要切断电源，请将全部电源线都从机器上拔掉。

當心：如要切斷電源，請將全部電源線都從機器上拔掉

Contact Information

Celestica operates a customer service portal.

- Self-support resources (knowledge base, FAQ, common fixes, new firmware) are available.
- Our support teams are connected to the support portal and can receive notifications for requests.
- The portal also tracks and collects customer inputs for further improvements to our products and services.

Customers can register and request support (as well as search information in the knowledge base) at: https://customersupport.celestica.com/csm
In case there are any questions or issues using the customer portal visit: https://www.celestica.com/contact-us. For immediate questions, please feel free to call your responsible account manager.