Lenovo

ThinkSystem SR860 V4
System Configuration Guide

Machine Type: 7DJN, 7DJR, and 7DJQ

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
https://pubs.lenovo.com/safety_documentation/

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:
http://datacentersupport.lenovo.com/warrantylookup

First Edition (September 2025)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information （安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

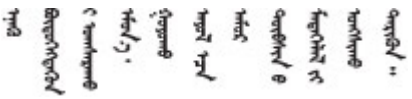
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྒྲིག་མ་བྱས་གོང་། ་སྔོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: The set-up of the server is made in the server room only.

CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
   - Make sure that the power cord is the correct type.

     To view the power cords that are available for the server:

     a. Go to:

http://dcsc.lenovo.com/#/

b. Click **Preconfigured Model** or **Configure to order**.
c. Enter the machine type and model for your server to display the configurator page.
d. Click **Power → Power Cables** to see all line cords.

- Make sure that the insulation is not frayed or worn.

3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.
7. The design of the electrical distribution system must take into consideration the total grounding leakage current from all power supplies in the server.

CAUTION:

High touch current. Connect to earth before connecting to supply.

Chapter 1. Introduction

The ThinkSystem SR860 V4 server (Types 7DJN, 7DJR, and 7DJQ) is a 4-socket 4U rack server based on Intel® Xeon® 6 processors. This high-performance, multi-core server is ideally suited for networking environments that require superior processor performance, input/output (I/O) flexibility, and high manageability.

Figure 1. ThinkSystem SR860 V4

Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Features on Demand**

  If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

  https://fod.lenovo.com/lkms

- **Lenovo XClarity Controller (XCC)**

  The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board (system board assembly). Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

  The server supports Lenovo XClarity Controller 3 (XCC3). For additional information about Lenovo XClarity Controller 3 (XCC3), refer to https://pubs.lenovo.com/lxcc-overview/.

- **UEFI-compliant server firmware**

  Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

  Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The server does not support Disk Operating System (DOS).

- **Active Memory**

  The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on one or two DIMMs within the channel (DIMM configuration must match between the mirrored channels). If a failure occurs, the memory controller switches from the primary memory DIMMs to the backup DIMMs.

- **Large system-memory capacity**

  The server supports up to 64 TruDDR5 DIMMs and up to 16 Compute Express Link (CXL) memory expansion modules in E3.S 2T form factor. For more information about the specific types and maximum amount of memory, see "Technical specifications" on page 3.

- **Lightpath Diagnostics**

  Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see "Troubleshooting by system LEDs and diagnostics display" on page 35.

- **Mobile access to Lenovo Service Information website**

  The server provides a QR code on the system service information, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Active Energy Manager**

  Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant networking connection**

  The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Cooling**
  - Redundant air cooling by fans, which enables continued operation if one of the fan rotors fails.
  - Liquid cooling by Processor Neptune® Core Module, which removes the heat from processors.

- **ThinkSystem RAID support**

  The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations, supporting 0, 1, 10, 5, 50, 6, and 60.

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

https://datacentersupport.lenovo.com/product_security/home

Specifications

Summary of the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Refer to the below table for specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	• Processor • Memory • M.2 Drive • Storage expansion • Expansion slots • Integrated functions and I/O connectors • Network • RAID adapter • Host bus adapter • System fan • Power supply • Minimal configuration for debugging • Operating systems	• Dimension • Weight	• Acoustical noise emissions • Ambient temperature management • Environmental

Technical specifications

Summary of the technical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Processor

Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology.

- Up to four Intel Xeon 6 processors with P-cores (Granite Rapids-SP, GNR-SP)
- Designed for the Land Grid Array (LGA) 4710 socket
- Up to 86 cores per socket
- Up to three UPI links at up to 24 GT/s
- Thermal Design Power (TDP): up to 350 watts

Note: For a list of supported processors, see https://serverproven.lenovo.com.

Memory

See “Memory module installation rules and order” in *User Guide* or *Hardware Maintenance Guide* for detailed information about memory configuration and setup.

- 64 dual inline memory module (DIMM) slots that support up to 64 DRAM DIMMs
- Up to 16 Compute Express Link (CXL) memory modules in the E3.S 2T form factor
- Memory module types:
  - TruDDR5 6400 MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4)
  - TruDDR5 6400 MHz RDIMM: 128 GB (2Rx4)
  - TruDDR5 6400 MHz 3DS RDIMM: 256 GB (4Rx4)
  - CXL memory module (CMM): 96 GB, 128 GB

  Notes:
  - E3.S CXL memory modules are supported only by server models with E3.S 2T bays.
  - CXL memory modules are not supported with Windows Server and VMware ESXi. For specifics, see https://lenovopress.lenovo.com/osig.
  - Intel® VMD is not supported with E3.S 2T CMMs.
- Speed: The operating speed depends on processor model and UEFI settings.
  - 1 DPC: 6400 MT/s
  - 2 DPC: 5200 MT/s
- Capacity:
  - Minimum: 64 GB (2 x 32 GB RDIMMs)
  - Maximum: 16 TB (64 x 256 GB 3DS RDIMMs)

For a list of supported memory modules, see https://serverproven.lenovo.com.

M.2 Drive

Depending on the configuration, the server supports one of the following:

- Up to two internal non-hot-swap M.2 drives
- Up to two rear hot-swap M.2 drives on riser 3 assembly (slot 15 or slot 20)

For a list of supported M.2 drives, see https://serverproven.lenovo.com.

Storage expansion

Supported storage expansion varies by model.

- Server models with 2.5-inch front drive bays:
  - Up to 48 SAS/SATA hot-swap drives
  - Up to 24 NVMe hot-swap drives and 24 SAS/SATA hot-swap drives
- Server models with E3.S bays:
  - Up to 32 E3.S 1T hot-swap drives and 24 SAS/SATA hot-swap drives
  - Up to 16 E3.S 2T bays for CXL memory and 24 SAS/SATA hot-swap drives

For information about storage configurations, see Overview of storage configurations.

For a list of supported drives, see https://serverproven.lenovo.com.

Expansion slots

- Up to 18 PCIe slots (depending on the server model):
  - Riser 1: up to six full-height (FH) PCIe slots
  - Riser 2: up to six low-profile (LP) PCIe slots
  - Riser 3: up to six FH PCIe slots
- Up to two OCP slots

Graphics processing unit (GPU)

The server supports the following GPU configurations:

- Up to eight single-wide GPUs
- Up to four double-wide GPUs

For a list of supported GPUs, see https://serverproven.lenovo.com.

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
  - The server supports Lenovo XClarity Controller 3 (XCC3). For additional information about Lenovo XClarity Controller 3 (XCC3), refer to https://pubs.lenovo.com/lxcc-overview/.
- Front connectors:
  - One Mini DisplayPort connector (optional)[1]
  - One USB 3.2 Gen1 (5 Gbps) connector (optional)
  - One USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)
  - One external diagnostics connector
- Internal connector:
  - One internal USB 3.2 Gen1 (5 Gbps) connector (optional)
- Rear connectors:
  - One VGA connector[1]
  - One serial port (optional)
  - One XCC system management port (10/100/1000 Mbps RJ-45)
  - Two or four Ethernet connectors on each OCP module (optional)
  - Two USB 3.2 Gen1 (5 Gbps) connectors[2]

Notes:

1. The maximum video resolution is 1920 x 1200 at 60 Hz.
2. The lower USB connector at the rear functions as a USB 2.0 connector with XCC system management when there are no USB connectors at the front.

Network

- Two or four Ethernet connectors on each OCP module (optional)
- One XCC system management port (10/100/1000 Mbps RJ-45)

Storage controller

Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID):

- Intel VROC RAID1 Only: requires an activation key and supports RAID level 1 only
- Intel VROC Standard: requires an activation key and supports RAID levels 0, 1, and 10
- Intel VROC Premium: requires an activation key and supports RAID levels 0, 1, 5, and 10

RAID adapters for hardware RAID support:

- RAID 545-8i adapter: RAID 0, 1, 10
- RAID 940-8i adapter: RAID 0, 1, 10, 5, 50, 6, 60
- RAID 940-16i adapter: RAID 0, 1, 10, 5, 50, 6, 60

HBA adapters support JBOD only:

- HBA 440-16i adapter
- HBA 440-16e adapter

M.2 adapter: RAID levels 0, 1

For more information about the RAID/HBA adapters or M.2 adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference or Lenovo ThinkSystem M.2 Adapters.

System fan

The server supports one of the following fan types:

- Standard fan (60 x 60 x 38 mm, single-rotor, 24000 RPM)
- Performance fan (60 x 60 x 56 mm, dual-rotor, 20000 RPM)
- Ultra fan (60 x 60 x 56 mm, dual-rotor, 21000 RPM)

Note: Do not mix different fan types in the same server.

Power supplies

The server supports up to four power supplies with N+N redundancy.

Following is the list of supported types:

- CRPS Premium (CFFv5)
  - 1300W 230V/115V Titanium
  - 2000W 230V/115V Titanium
  - 2700W 230V/115V Titanium
  - 3200W 230V/115V Titanium
  - 1300W HVAC/HVDC Platinum
  - 1300W -48V DC
- CRPS
  - 1300W 230V/115V Platinum
  - 2700W 230V/115V Platinum

Supported power supply configurations:

- 4 PSUs: 2 + 2
- 2 PSUs: 1 + 1
- 1 PSU: 1+0 (only supported with 2700-watt CRPS Premium PSUs)

Important:

- Power supplies and redundant power supplies in the server must be with the same power rating, wattage or level.
- Mixing of CRPS PSUs from different vendors are not supported.

CAUTION:

- **240 Vdc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.**
- **Power supply with 240 Vdc input cannot support hot-plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**

Notes:

- The actual power efficiency depends on system configuration.
- Only CRPS Premium power supplies support Over-subscription (OVS), Virtual Reseat, Zero-Output mode.
- The following Lenovo XClarity Controller options are supported only when CRPS Premium power supplies are installed:
  - Power redundant options such as **Zero Output Mode** and **Non-redundant**
  - **AC Power Cycle Server** option under **Power Action**

Minimal configuration for debugging

- Two processors in processor socket 1 and 2
- Two DRAM DIMMs in slot 10 and 26
- Two power supplies
- One 2.5-inch drive or E3.S drive, or one M.2 drive (if OS is needed for debugging)
- Six system fan modules

Operating systems
Supported and certified operating systems: • Microsoft Windows Server • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • Canonical Ubuntu References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions, see “Deploy the operating system” on page 68.

Mechanical specifications

Summary of the mechanical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Dimension
4 U server • Height: 175 mm (6.9 inches) • Width: – With rack handles: 482 mm (18.98 inches) – Without rack handles: 434.4 mm (17.10 inches) • Depth: – Chassis with 2.5-inch drive bays: 869 mm (34.21 inches) – Chassis with E3.S bays: 909 mm (35.79 inches)

Weight
• Chassis with 2.5-inch drive bays: Up to 59 kg (130.1 lb), depending on the server configuration • Chassis with E3.S bays: Up to 64 kg (141.1 lb), depending on the server configuration

Environmental specifications

Summary of the environmental specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

Table 1. Acoustic noise emissions declaration

Acoustic performance @ 25°C ambient	Working mode	Configuration	
		Typical	Max.
Declared mean A-weighted sound power level, $L_{WA,m}$ (B) Statistical adder for verification, Kv (B) = 0.4	Idle	6.8	6.8
	Operating mode 1	7.2	7.9
	Operating mode 2	7.9	8.5

Table 1. Acoustic noise emissions declaration (continued)

Acoustic performance @ 25°C ambient	**Working mode**	**Configuration**	
		Typical	**Max.**
Declared mean A-weighted emission sound pressure level, $L_{pA,m}$ (dB) Bystander position	Idle	53	53
	Operating mode 1	58	66
	Operating mode 2	66	72

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- Idle mode is the steady state in which the server is powered on but not operating any intended function. Operating mode 1 is 50% CPU TDP. Operating mode 2 is 100% CPU TDP.
- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration or conditions.
  - **Typical**: 4 x 270W CPUs, 32 x 64 GB RDIMMs, 24 x 2.5" SAS HDDs, 1 x RAID 545-8i, 1 x Intel E610-T4 10GBASE-T 4-port OCP, 4 x 2000W PSUs
  - **Max.**: 4 x 350W CPUs, 64 x 64 GB RDIMMs, 48 x 2.5" SAS HDDs, 3 x RAID 940-16i, 2 x Intel E610-T4 10GBASE-T 4-port OCP, 4 x 3200W PSUs
- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Ambient temperature management

Manage the ambient temperature for your server depending on the specific hardware components installed.

Note: The tables below show the temperature limits for servers without a liquid-cooling module (Processor Neptune® Core Module). When the liquid-cooling module is installed, the CPU supports temperatures up to 45°C regardless of the fan type or number of drives. However, other components like the GPU and NIC adapters still need to follow the same temperature limits as air-cooled systems, which are listed below.

Server models with 2.5-inch drive bays

System fan	Max. ambient temp.[1]	CPU TDP	DIMM capacity (per module)	Max. drive qty.	Rear M.2 drives	GPU adapter	NIC adapter
Standard fans	40°C/45°C	<= 165W	<= 32 GB	48	None	None	None
Standard fans	35°C	<=210W	<= 32 GB	48	None	None	None
Standard fans	30°C	<=270W	<= 64 GB[2]	48	2	None	None
Standard fans	25°C	<=270W	<= 64 GB[2]	48	2	None	See note[3]
Perform-ance fans	40°C/45°C	<=270W	<= 32 GB	48	None	None	None
Perform-ance fans	35°C	<=350W	<= 64 GB	48	None	None	See note[3,4]
Perform-ance fans	30°C	<=350W	<= 128 GB	48	2	See note[5]	See note[3,4,5]
Perform-ance fans	25°C	<=350W	<= 128 GB	48	2	See note[5]	See note[3,4,5]
Ultra fans	40°C/45°C	<=270W	<= 64 GB	48	None	None	None
Ultra fans	35°C	<=350W	<= 128 GB	48	2	None	See note[3,4]
Ultra fans	30°C	<=350W	<= 128 GB	48	2	See note[6]	See note[3,4,5]
Ultra fans	25°C	<=350W	<= 256 GB[7]	48	2	See note[6]	See note[3,4,5]

Notes:

1. The server's performance may be impacted if operated under 40°C/45°C.
2. The 64 GB RDIMMs are supported in servers with only 24 x 2.5-inch drives.
3. NIC adapters without active optic cables (AOC) are supported.
4. NIC adapters with AOC cables are supported. When the CPU TDP is 270W or lower, the ambient temperature can be up to 35°C.
5. The Broadcom BCM57608 2x200G OCP Ethernet adapter is supported in servers with only 24 x 2.5-inch drives.
6. A maximum of four double-wide (DW) GPU adapters or eight single-wide (SW) GPU adapters are supported. When DW GPU adapters are installed, the 2U performance heat sinks must be used for processor 1 and processor 2.
7. The 256 GB RDIMMs are supported in servers with only 24 x 2.5-inch drives.

Server models with E3.S bays

System fan	Max. ambient temp.	CPU TDP	DIMM capacity (per module)	Max. drive qty.[1]	Rear M.2 drives	GPU adapter	NIC adapter
Ultra fans	35°C	<=350W	<= 128 GB	32 + 24	None	None	See note[2,3]
Ultra fans	30°C	<=350W	<= 128 GB	32 + 24	2	See note[4]	See note[2,3]
Ultra fans	25°C	<=350W	<= 128 GB	32 + 24	2	See note[4]	See note[2,3]

Notes:

1. Supports up to 32 x E3.S 1T drives and 24 x 2.5-inch drives.
2. NIC adapters without active optic cables (AOC) are supported.
3. NIC adapters with AOC cables are supported. When the CPU TDP is 270W or lower, the ambient temperature can be up to 35°C.
4. A maximum of four double-wide (DW) GPU adapters or eight single-wide (SW) GPU adapters are supported. When DW GPU adapters are installed, the 2U performance heat sinks must be used for processor 1 and processor 2.

Environment

Environment
ThinkSystem SR860 V4 complies with ASHRAE Class A2 specifications under most hardware configurations, and depending on specific hardware configuration, it may also comply with ASHRAE Class A3, Class A4, or Class H1 specifications. Refer to "Ambient temperature management" on page 10 for information about temperature requirement for specific hardware. The server's performance may be impacted if operated outside the specified ASHRAE temperature classes it complies with. **Note:** The server is designed for standard data center environment and recommended to be placed in industrial data center. • Air temperature: – Operating – ASHRAE Class H1: 5°C to 25°C (41°F to 77°F); the maximum ambient temperature decreases by 1°C for every 500 m (1640 ft) increase in altitude above 900 m (2,953 ft). – ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). – ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft). – ASHRAE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft). – Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative Humidity (non-condensing): – Operating – ASHRAE Class H1: 8% to 80%; maximum dew point: 17°C (62.6°F) – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F) – ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F) – ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F) – Shipment/storage: 8% to 90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 12.

Water requirements

Water requirements

ThinkSystem SR860 V4 is supported in the following environment:

- Maximum pressure: 3 bars
- Water inlet temperature and flow rates:
  - For servers with Processor Neptune® Core Module, the water inlet temperature and water flow rate can be as follows:

Water inlet temperature	Water flow rate
50°C (122°F)	**1.5** liters per minute (lpm) per server
45°C (113°F)	**1** liter per minute (lpm) per server
40°C (104°F) or lower	**0.5** liters per minute (lpm) per server

Attention: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures. Environment quality must be maintained over the lifetime of the system to receive warranty and support on affecting components. For more information, see Lenovo Neptune Direct Water-Cooling Standards.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[3] • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

[1] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

[4] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[5] Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

Overview

Options	Description
Lenovo XClarity Controller	Baseboard management controller (BMC) Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board (system board assembly). **Interface** • CLI application • Web GUI interface • Mobile application • Redfish API **Usage and downloads** https://pubs.lenovo.com/lxcc-overview/
Lenovo XCC Logger Utility	Application that reports the XCC events to local OS system log. **Interface** • CLI application **Usage and downloads** • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** https://pubs.lenovo.com/lxca/
Lenovo XClarity Essentials toolset	Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts. **Important:** To read and configure UEFI and BMC settings, use the latest versions of OneCLI 5.x, BoMC 14.x, and UpdateXpress 5.x. **Interface** • **OneCLI**: CLI application • **Bootable Media Creator**: CLI application, GUI application • **UpdateXpress**: GUI application **Usage and downloads** https://pubs.lenovo.com/lxce-overview/

Options	Description
Lenovo XClarity Provisioning Manager	UEFI-based embedded GUI tool on a single server that can simplify management tasks. **Interface** • Web interface (BMC remote access) • GUI application **Usage and downloads** https://pubs.lenovo.com/lxpm-overview/ **Important:** Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.
Lenovo XClarity Integrator	Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency. **Interface** • GUI application **Usage and downloads** https://pubs.lenovo.com/lxci-overview/
Lenovo XClarity Energy Manager	Application that can manage and monitor server power and temperature. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lxem
Lenovo Capacity Planner	Application that supports power consumption planning for a server or rack. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lcp

Functions

Options		Functions							
		Multi-system mgmt	**OS deploy-ment**	**System configu-ration**	**Firm-ware up-dates[1]**	**Event-s/alert moni-toring**	**Inven-tory/ logs**	**Pow-er mgmt**	**Power planning**
Lenovo XClarity Controller				√	√[2]	√	√[4]		
Lenovo XCC Logger Utility						√			
Lenovo XClarity Administrator		√	√	√	√[2]	√	√[4]		
Lenovo XClarity Essen-tials toolset	OneCLI	√		√	√[2]	√	√		
	Bootable Media Creator			√	√[2]		√[4]		
	UpdateXpress			√	√[2]				
Lenovo XClarity Provisioning Manager			√	√	√[3]		√[5]		
Lenovo XClarity Integrator		√		√	√	√	√	√[6]	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√[7]

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
7. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

This section contains information about each of the components associated with the server.

Front view

This section contains information about the controls, LEDs, and connectors on the front of the server.

Front view of the sever model with 2.5-inch bays

This section contains information on the front view of the sever model with 2.5-inch drives.

Front view of the sever model with 2.5-inch bays

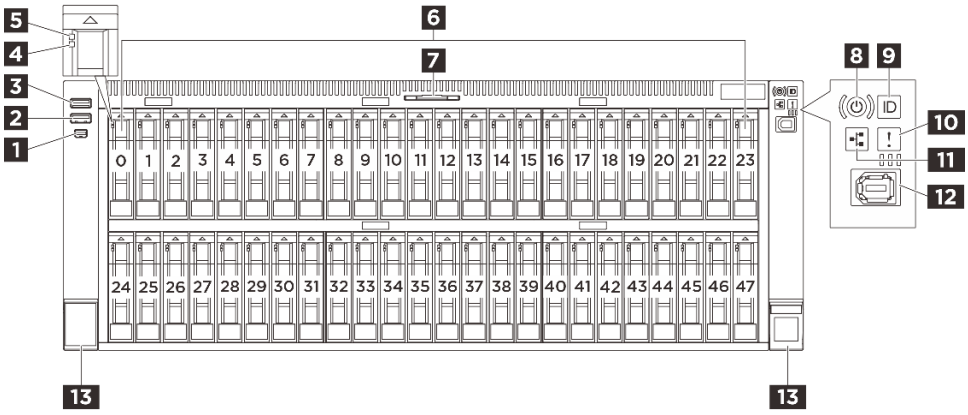


Figure 2. Front view of the sever model with 2.5-inch bays

1 Mini DisplayPort connector	2 USB 3.2 Gen 1 (5 Gbps) connector
3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management	4 Drive status LED (yellow)
5 Drive activity LED (green)	6 2.5-inch drive bays
7 Pull-out information tab	8 Power button with LED (green)
9 System ID button with LED (blue)	10 System error LED (yellow)
11 Network activity LED (green)	12 External diagnostics connector
13 Rack release latches	

1 Mini DisplayPort connector

The Mini DisplayPort (MiniDP) connector can be used to attach a high-performance monitor and a direct-drive monitor with a video converter, or the devices that use a MiniDP connector.

2 USB 3.1 Gen 1 (5 Gbps) connector

The USB 3.1 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management

The connector can function as a regular USB 3.2 Gen 1 connector to the host OS; it can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

In addition, the connector can function as a USB 2.0 Lenovo XClarity Controller management port.

4 5 2.5-inch drive LEDs

Each 2.5-inch drive comes with an activity LED and a status LED.

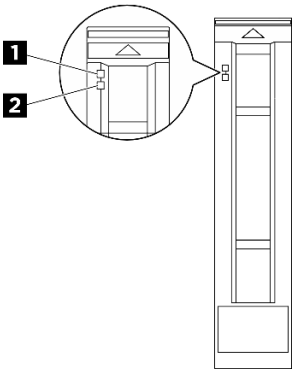


Figure 3. 2.5-inch drive LEDs

LED	Status	Description
1 Drive activity LED (green)	Solid on	The drive is powered but not active.
	Blinking	The drive is being accessed (reading or writing data).
2 Drive status LED (yellow)	Solid on	The drive has an error.
	Slow blinking (about one flash per second)	The drive is being rebuilt.
	Fast blinking (about three flashes per second)	The drive is being identified.

6 2.5-inch drive bays

The drive bays are used to install hot-swap 2.5-inch drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

7 Pull-out information tab

This tab contains network information such as MAC address and XCC network access label.

8 Power button with LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).

Status	Color	Description
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	Power is not present, or the power supply has failed.

9 System ID button with LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

10 System error LED (yellow)

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune® Core Module.	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See “Troubleshooting by system LEDs and diagnostics display” on page 35. • Save the log if necessary. **Note:** For server models with Processor Neptune® Core Module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see “Leakage detection sensor module LED” on page 44.
Off	None	The server is off or the server is on and is working correctly.	None.

11 Network activity LED (green)

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

12 External diagnostics connector

The connector is for connecting an external diagnostics handset. See “External diagnostics handset” in *ThinkSystem SR860 V4 User Guide* or *Hardware Maintenance Guide* for more details.

13 Rack release latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas.

Front view of the sever model with E3.S 1T bays

This section contains information on the front view of the sever model with E3.S 1T bays.

Front view of the sever model with E3.S 1T bays

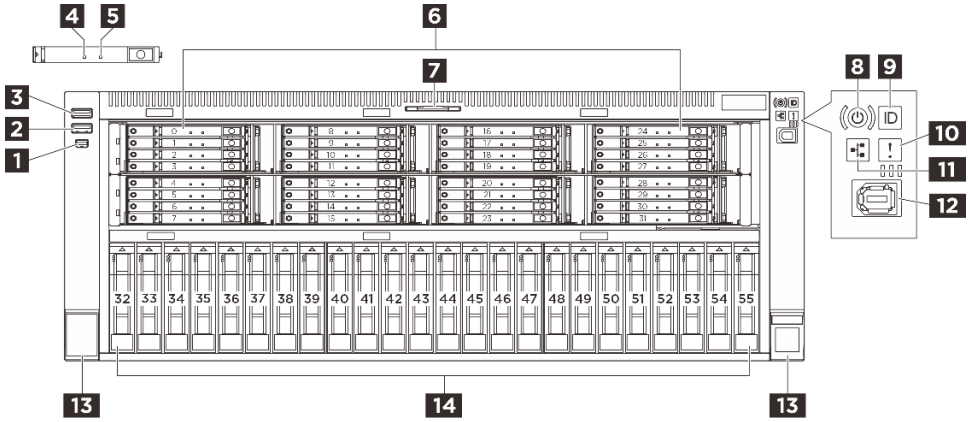


Figure 4. Front view of the sever model with E3.S 1T bays

1 Mini DisplayPort connector	2 USB 3.2 Gen 1 (5 Gbps) connector
3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management	4 Drive status LED (yellow)
5 Drive activity LED (green)	6 E3.S bays
7 Pull-out information tab	8 Power button with LED (green)
9 System ID button with LED (blue)	10 System error LED (yellow)
11 Network activity LED (green)	12 External diagnostics connector
13 Rack release latches	14 2.5-inch drive bays

1 Mini DisplayPort connector

The Mini DisplayPort (MiniDP) connector can be used to attach a high-performance monitor and a direct-drive monitor with a video converter, or the devices that use a MiniDP connector.

2 USB 3.1 Gen 1 (5 Gbps) connector

The USB 3.1 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management

The connector can function as a regular USB 3.2 Gen 1 connector to the host OS; it can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

In addition, the connector can function as a USB 2.0 Lenovo XClarity Controller management port.

4 5 E3.S drive LEDs

Each E3.S drive comes with an activity LED and a status LED.

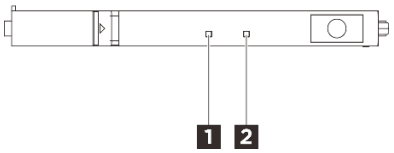


Figure 5. E3.S 1T drive LEDs

LED	Status	Description
1 Drive status LED (yellow)	Solid on	The drive has an error.
	Slow blinking (about one flash per second)	The drive is being rebuilt.
	Fast blinking (about three flashes per second)	The drive is being identified.
2 Drive activity LED (green)	Solid on	The drive is powered but not active.
	Blinking	The drive is being accessed (reading or writing data).

6 E3.S drive bays

The drive bays are used to install E3.S hot-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

7 Pull-out information tab

This tab contains network information such as MAC address and XCC network access label.

8 Power button with LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	Power is not present, or the power supply has failed.

9 System ID button with LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity

Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

10 System error LED (yellow)

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune® Core Module.	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See “Troubleshooting by system LEDs and diagnostics display” on page 35. • Save the log if necessary. **Note:** For server models with Processor Neptune® Core Module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see “Leakage detection sensor module LED” on page 44.
Off	None	The server is off or the server is on and is working correctly.	None.

11 Network activity LED (green)

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

12 External diagnostics connector

The connector is for connecting an external diagnostics handset. See “External diagnostics handset” in *ThinkSystem SR860 V4 User Guide* or *Hardware Maintenance Guide* for more details.

13 Rack release latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas.

14 2.5-inch drive bays

The drive bays are used to install hot-swap 2.5-inch drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

Front view of the sever model with E3.S 2T bays

This section contains information on the front view of the sever model with E3.S 2T bays for CXL memory modules (CMM).

Front view of the sever model with E3.S 2T bays

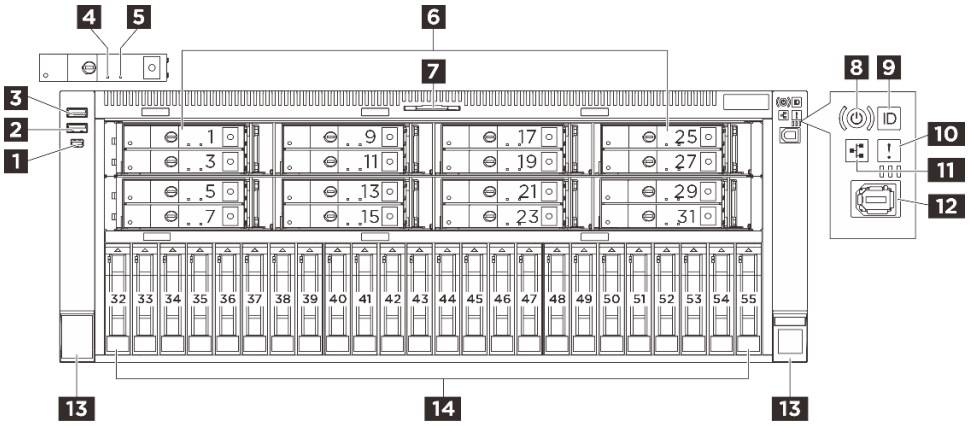


Figure 6. Front view of the sever model with E3.S 2T bays

1 Mini DisplayPort connector	2 USB 3.2 Gen 1 (5 Gbps) connector
3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management	4 CMM fault LED (amber)
5 CMM health LED (white)	6 E3.S bays
7 Pull-out information tab	8 Power button with LED (green)
9 System ID button with LED (blue)	10 System error LED (yellow)
11 Network activity LED (green)	12 External diagnostics connector
13 Rack release latches	14 2.5-inch drive bays

1 Mini DisplayPort connector

The Mini DisplayPort (MiniDP) connector can be used to attach a high-performance monitor and a direct-drive monitor with a video converter, or the devices that use a MiniDP connector.

2 USB 3.1 Gen 1 (5 Gbps) connector

The USB 3.1 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

3 USB 3.2 Gen 1 (5 Gbps) with connector USB2.0 XCC management

The connector can function as a regular USB 3.2 Gen 1 connector to the host OS; it can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

In addition, the connector can function as a USB 2.0 Lenovo XClarity Controller management port.

4 5 E3.S CMM LEDs

Each E3.S CMM comes with an activity LED and a status LED.

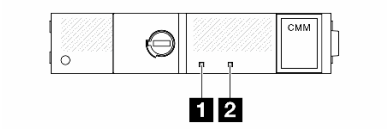


Figure 7. E3.S CMM LEDs

LED	Status	Description
1 Fault LED (amber)	Off	The CMM is healthy.
	On	The CMM is faulty.
2 Health LED (white)	On	The CMM is powered but not active. Removal is not permitted.
	Blinking	The CMM is active. Removal is not permitted.
	Off	The CMM is not powered. Removal is permitted.

6 E3.S bays

The drive bays are used to install non-hot-swap E3.S CXL memory modules (CMMs). When you install CMMs, follow the order of the bay numbers. The EMI integrity and cooling of the server are protected by having all E3.S bays occupied. The vacant bays must be occupied by drive bay fillers or drive fillers.

7 Pull-out information tab

This tab contains network information such as MAC address and XCC network access label.

8 Power button with LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	Power is not present, or the power supply has failed.

9 System ID button with LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

10 System error LED (yellow)

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune® Core Module.	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See “Troubleshooting by system LEDs and diagnostics display” on page 35. • Save the log if necessary. **Note:** For server models with Processor Neptune® Core Module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see “Leakage detection sensor module LED” on page 44.
Off	None	The server is off or the server is on and is working correctly.	None.

11 Network activity LED (green)

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

12 External diagnostics connector

The connector is for connecting an external diagnostics handset. See “External diagnostics handset” in *ThinkSystem SR860 V4 User Guide* or *Hardware Maintenance Guide* for more details.

13 Rack release latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas.

14 2.5-inch drive bays

The drive bays are used to install hot-swap 2.5-inch drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

Rear view

The rear of the server provides access to several components, including the power supplies, PCIe adapters, serial port, and Ethernet ports.

Note: Depending on the configuration, your server might be slightly different from the image.

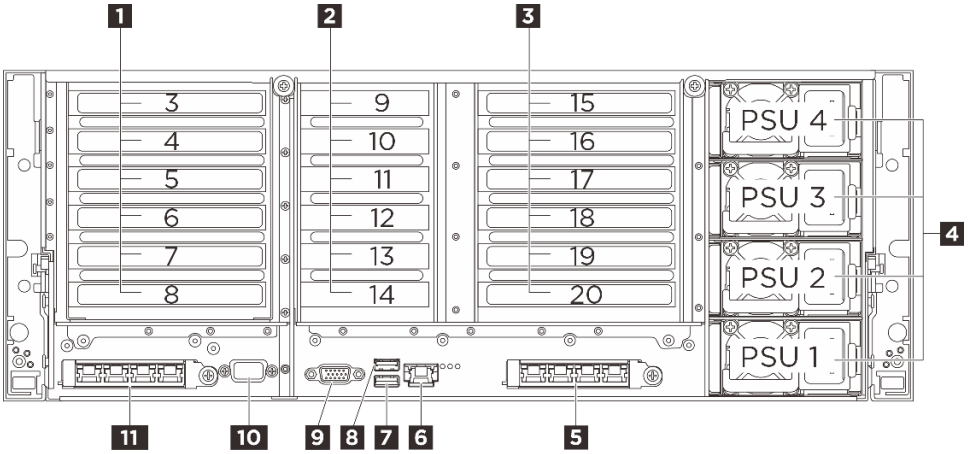


Figure 8. Rear view

1 PCIe riser 1 (PCIe slot 3-8)	2 PCIe riser 2 (PCIe slot 9-14)
3 PCIe riser 3 (PCIe slot 15-20)*	4 Power supply bays 1-4
5 OCP slot 2	6 XCC system management port (1 GB RJ-45)
7 USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)	8 USB 3.2 Gen 1 (5 Gbps) connector
9 VGA connector	10 Serial port (optional)
11 OCP slot 1	

Note: An optional M.2 drive assembly can be installed on PCIe slot 15 or 20.

1 PCIe riser 1

See the following table for PCIe slots corresponding to the PCIe risers.

Table 3. PCIe riser 1 and corresponding PCIe slots

PCIe slot	x8x8 PCIe G4 Riser	2x8 & 4x16 PCIe G5 Riser
Slot 3	N/A	x16 (Gen5 x8)
Slot 4	N/A	x16 (Gen5 x16)*
Slot 5	N/A	x16 (Gen4 x8)
Slot 6	N/A	x16 (Gen5 x16)*
Slot 7	x16 (Gen4 x8)	x16 (Gen5 x16)
Slot 8	x16 (Gen4 x8)	x16 (Gen5 x16)

Notes:

- * Slot 4 supports a double-wide GPU that occupies slot 3 and 4.
- * Slot 6 supports a double-wide GPU that occupies slot 5 and 6.

2 PCIe riser 2

See the following table for PCIe slots corresponding to the PCIe riser.

Table 4. PCIe riser 2 and corresponding PCIe slots

PCIe slot	6x8 PCIe G5 Riser
Slot 9	x16 (Gen5 x8)
Slot 10	x16 (Gen5 x8)
Slot 11	x16 (Gen5 x8)
Slot 12	x16 (Gen5 x8)
Slot 13	x16 (Gen5 x8)
Slot 14	x16 (Gen5 x8)

3 PCIe riser 3

See the following table for PCIe slots corresponding to the PCIe risers.

Table 5. PCIe riser 3 and corresponding PCIe slots

PCIe slot	x8x8 PCIe G4 Riser		2x8 & 4x16 PCIe G5 Riser	
Slot 15	N/A	M.2 drive bays (optional)	x16 (Gen5 x8)	x16 (Gen5 x8)
Slot 16	N/A	N/A	x16 (Gen5 x16)*	x16 (Gen5 x16)*
Slot 17	N/A	N/A	x16 (Gen4 x8)	x16 (Gen4 x8)
Slot 18	N/A	N/A	x16 (Gen5 x16)*	x16 (Gen5 x16)*
Slot 19	x16 (Gen4 x8)	x16 (Gen4 x8)	x16 (Gen5 x16)	x16 (Gen5 x16)
Slot 20	x16 (Gen4 x8)	x16 (Gen4 x8)	x16 (Gen5 x16)	M.2 drive bays (optional)

Notes:

- * Slot 16 supports a double-wide GPU that occupies slot 15 and 16.
- * Slot 18 supports a double-wide GPU that occupies slot 17 and 18.

4 Power supply bays 1-4 (bottom to top)

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. See “Technical specifications” on page 3 for the power supplies supported by this system.

For information about the LEDs, see “Power supply LEDs” on page 49.

5 11 OCP slots

The system may support a 2-port or a 4-port OCP module for network connections. Port numbering is shown in the illustrations below.

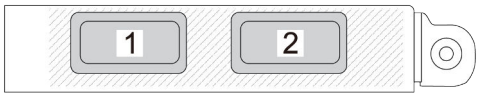


Figure 9. Port numbering — 2-port OCP module

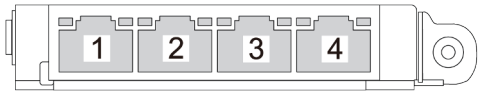


Figure 10. Port numbering — 4-port OCP 3.0 module

6 XCC system management port (1 GB RJ-45)

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller (XCC) functions. Through the system management port, you can access the Lenovo XClarity Controller directly by connecting your laptop to the management port using an Ethernet cable. Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings. A dedicated management network provides additional security by physically separating the management network traffic from the production network.

See the following for more information:

- "Set the network connection for the Lenovo XClarity Controller" on page 61
- "XCC system management port LEDs" on page 52

7 USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)

The connector can function as a regular USB 3.2 Gen 1 connector to the host OS; it can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

When there are no USB connectors at the front, this connector can function as a USB 2.0 Lenovo XClarity Controller management port.

8 USB 3.2 Gen 1 (5 Gbps) connectors

The connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

9 VGA connector

Connect a monitor to this connector.

10 Serial port (optional)

Connect a 9-pin serial device to this connector. The serial port is shared with XCC. XCC can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

Rear LEDs

This topic provides information about LEDs on the rear of the server.

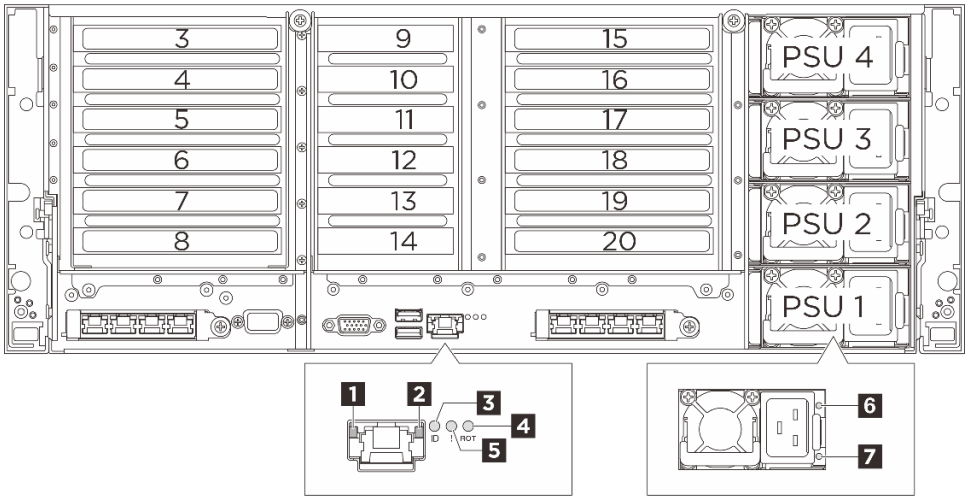


Figure 11. Rear LEDs

Table 6. LEDs on the rear view

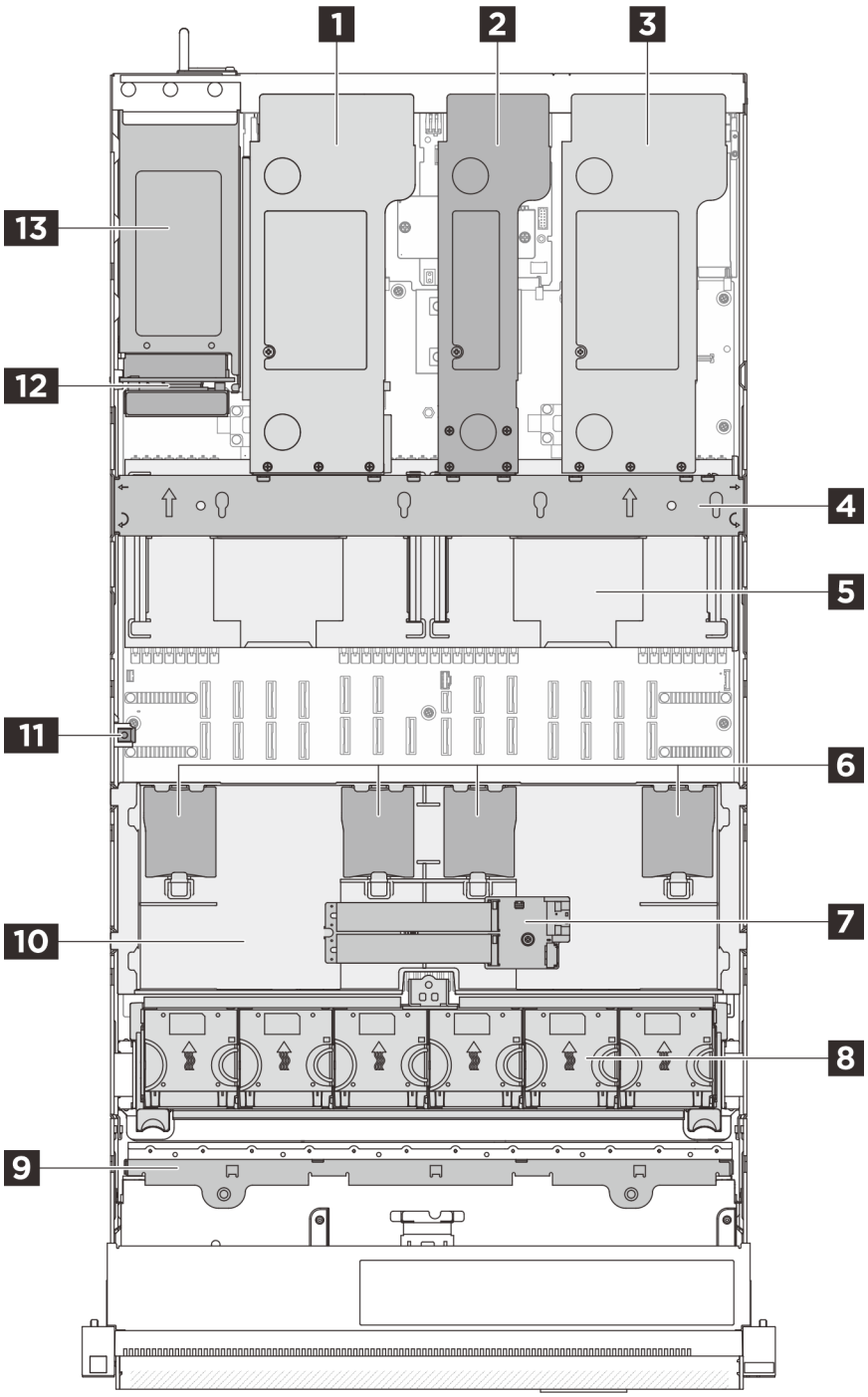
LED	Description
1 Link LED of XCC system management port (green)	See "XCC system management port LEDs" on page 52 for more information.
2 Activity LED of XCC system management port (green)	
3 System ID LED (blue)	See "System I/O board LEDs" on page 46 for more information.
4 System error LED (yellow)	
5 RoT fault LED (yellow)	
6 7 PSU LEDs	See "Power supply LEDs" on page 49 for more information.

Top view

This section contains information on the top view of the server.

The following illustration shows the top view of the server with half-length PCIe risers installed.

Note: Depending on the server model and configuration, your server might be slightly different from the image.



1 PCIe riser 3

2 PCIe riser 2

3 PCIe riser 1

4 Crossbar

5 Rear air baffle

6 RAID flash power modules

7 M.2 boot adapter

8 Fans and fan cages

9 Drive backplanes

10 Front air baffle

11 Intrusion switch

12 Power distribution board (PDB)

13 Power supplies

Figure 12. Server top view

System-board-assembly layout

The illustrations in this section provide information about the connectors, switches, and jumpers that are available on the system board assembly.

The following illustration shows the layout of the system board assembly which contains the system I/O board (DC-SCM) and processor board.

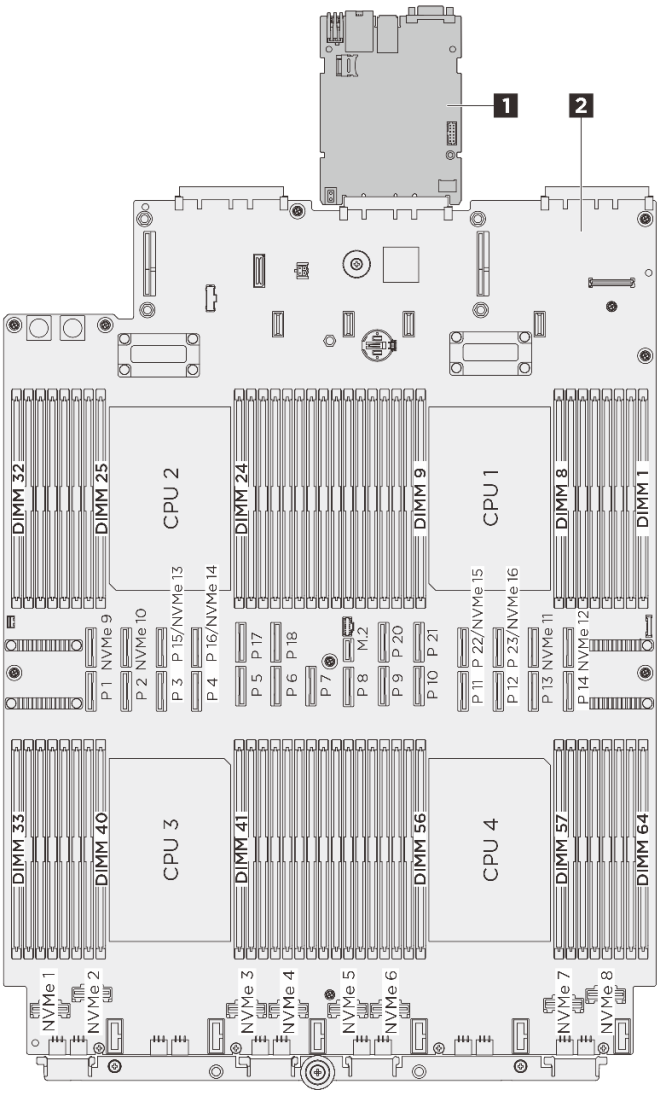


Figure 13. System-board-assembly layout

1 System I/O board (DC-SCM)	2 Processor board

For more information about the LEDs that are available on the system board assembly, see “Processor board LEDs” on page 45.

System-board-assembly connectors

The following illustrations show the internal connectors on the system board assembly.

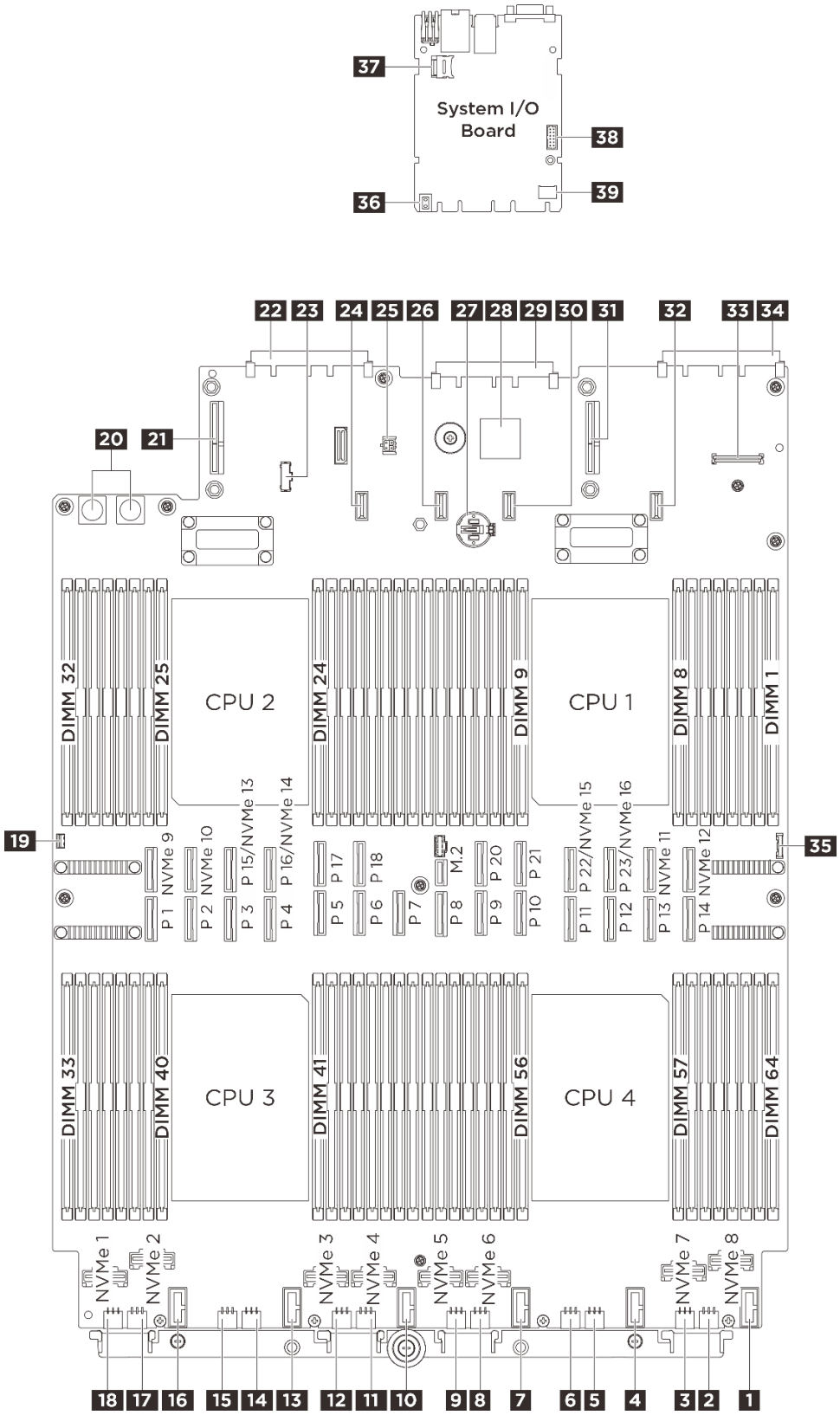


Figure 14. System-board-assembly connectors

Table 7. System-board-assembly connectors

1 Fan 6 connector	2 Backplane 12 power connector
3 Backplane 11 power connector	4 Fan 5 connector
5 Backplane 10 power connector	6 Backplane 9 power connector
7 Fan 4 connector	8 Backplane 8 power connector
9 Backplane 7 power connector	10 Fan 3 connector
11 Backplane 6 power connector	12 Backplane 5 power connector
13 Fan 2 connector	14 Backplane 4 power connector
15 Backplane 3 power connector	16 Fan 1 connector
17 Backplane 2 power connector	18 Backplane 1 power connector
19 Intrusion switch connector	20 PDB power connector
21 Riser 3 power connector	22 OCP slot 2 connector
23 PDB sideband connector	24 Riser C power connector (reserved)
25 Leakage sensor connector	26 Riser 2 power connector
27 3V battery (CR2032)	28 FPGA
29 System I/O board connector	30 Riser B power connector (reserved)
31 Riser 1 power connector	32 Riser A power connector (reserved)
33 Front panel USB connector	34 OCP slot 1 connector
35 Front I/O connector	36 Lift handle
37 MicroSD socket	38 Serial port connector
39 TCM connector	

System-board-assembly switches

The following illustrations show the location of the switches, jumpers, and buttons on the server.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the following information:
   - https://pubs.lenovo.com/safety_documentation/
   - “Installation Guidelines”, “Handling static sensitive devices”, and “Power off the server” in *User Guide* or *Hardware Maintenance Guide*.
2. Any system-board-assembly switch or jumper block that is not shown in the illustrations in this document are reserved.

Note: If there is a clear protective sticker on the top of the switch blocks, remove and discard it to access the switches.

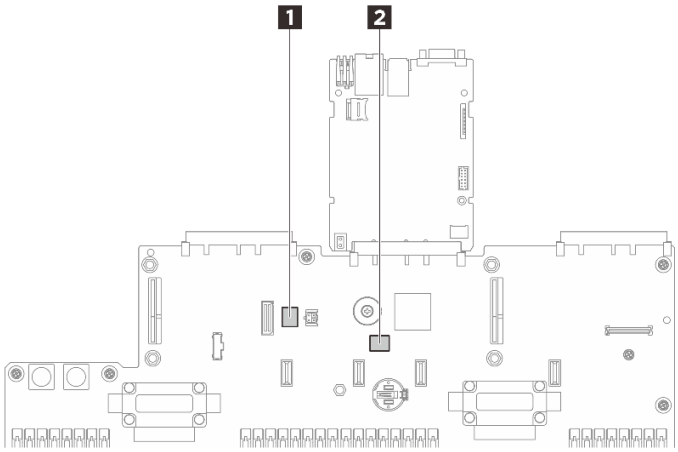


Figure 15. System-board-assembly switches

1 SW3	2 SW621

SW3 switch block

The following table describes the functions of the SW3 switch block on the system board assembly.

Table 8. System-board-assembly SW3 switch block description

Switch number	Default position	Description
1	Off	Reserved
2	Off	Reserved
3	Off	Reserved
4	Off	Clears the real-time clock (RTC) registry when switched to ON.

SW621 switch block

The following table describes the functions of the SW621 switch block on the system board assembly.

Table 9. System-board-assembly SW621 switch block description

Switch number	Default position	Description
1	Off	Reserved
2	Off	Reserved
3	Off	Reserved
4	Off	Bypasses the power-on password when switched to ON.

System LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

For more information, refer to “Troubleshooting by system LEDs and diagnostics display” on page 35.

Troubleshooting by system LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

Drive LEDs

This topic provides information on the drive LEDs.

2.5-inch drive LEDs

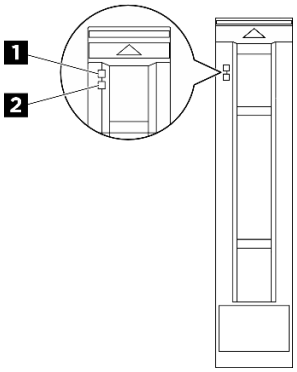


Figure 16. 2.5-inch drive LEDs

LED	Status	Description
1 Drive activity LED (green)	Solid on	The drive is powered but not active.
	Blinking	The drive is being accessed (reading or writing data).
2 Drive status LED (yellow)	Solid on	The drive has an error.
	Slow blinking (about one flash per second)	The drive is being rebuilt.
	Fast blinking (about three flashes per second)	The drive is being identified.

E3.S 1T drive LEDs

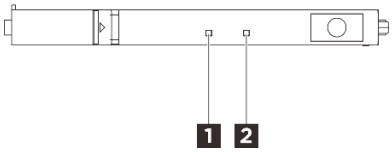


Figure 17. E3.S 1T drive LEDs

LED	Status	Description
1 Drive status LED (yellow)	Solid on	The drive has an error.
	Slow blinking (about one flash per second)	The drive is being rebuilt.

LED	Status	Description
	Fast blinking (about three flashes per second)	The drive is being identified.
2 Drive activity LED (green)	Solid on	The drive is powered but not active.
	Blinking	The drive is being accessed (reading or writing data).

E3.S CMM LEDs

This topic provides information on LEDs of E3.S Compute Express Link (CXL) memory (CMM).

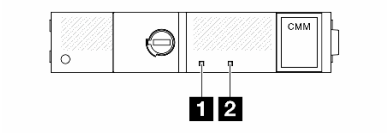


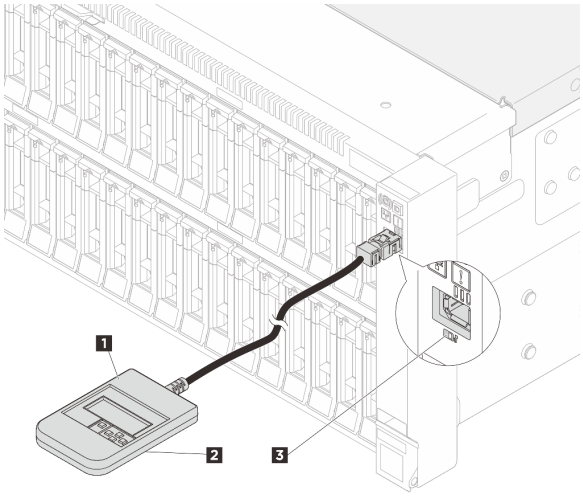
Figure 18. E3.S CMM LEDs

LED	Status	Description
1 Fault LED (amber)	Off	The CMM is healthy.
	On	The CMM is faulty.
2 Health LED (white)	On	The CMM is powered but not active. Removal is not permitted.
	Blinking	The CMM is active. Removal is not permitted.
	Off	The CMM is not powered. Removal is permitted.

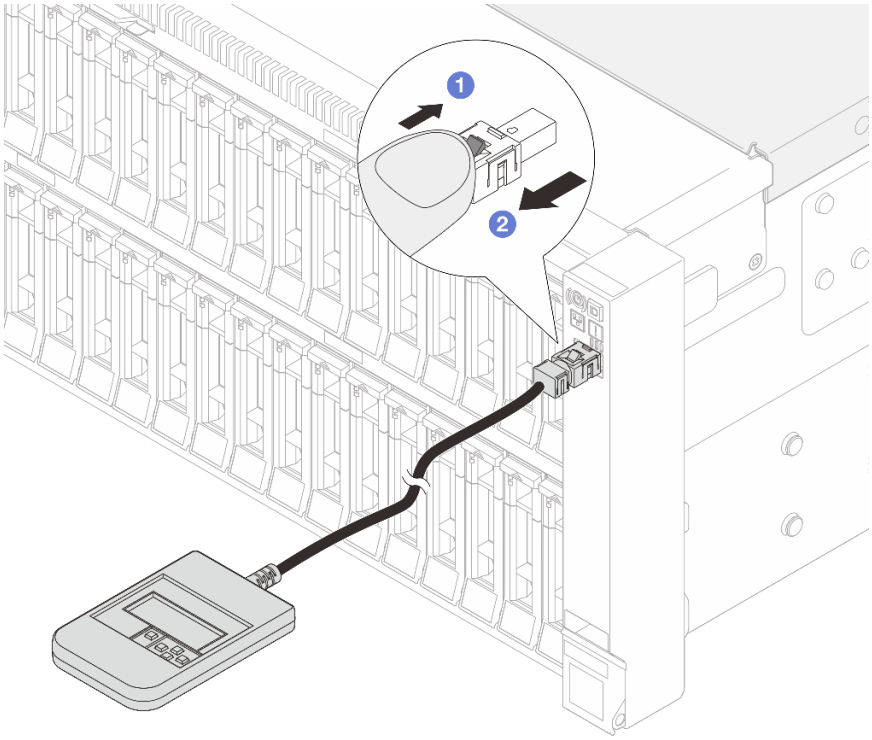
External diagnostics handset

The external diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the external diagnostics handset

Location	Callouts
The external diagnostics handset is connected to the server with an external cable. 	1 External diagnostics handset
	2 Magnetic bottom With this component, the diagnostic handset can be attached to the top or side of the rack with hands spared for service tasks.
	3 External diagnostics connector This connector is located on the front of the server, and is used to connect an external diagnostics handset.

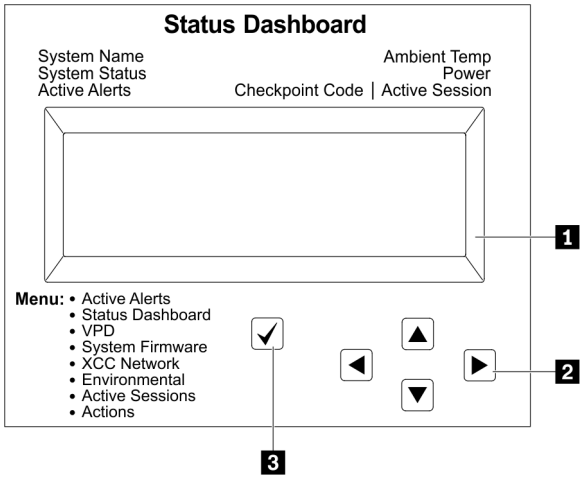
Note: When unplugging the external diagnostics handset, see the following instructions:



1. Press the plastic clip on the plug forward.
2. Hold the clip and remove the cable from the connector.

Display panel overview

The diagnostics device consists of an LCD display and 5 navigation buttons.

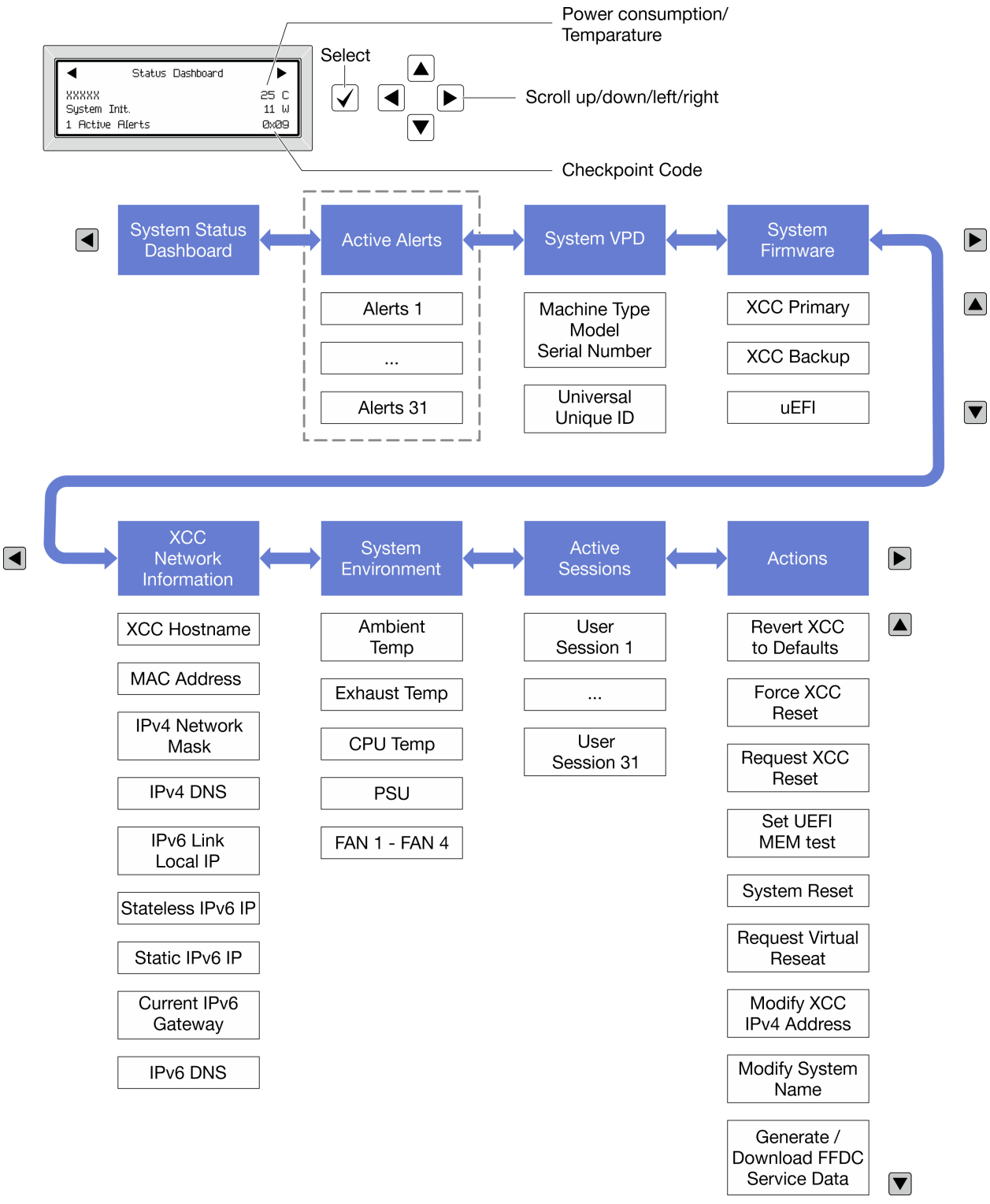


1 LCD display
2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.
3 Select button Press the select button to select from the options in the menu.

Option flow diagram

The LCD panel displays various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.

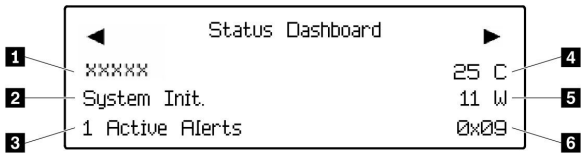


Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Depending on the model, the options and entries on the LCD display might be different.

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	

Active Alerts

Sub Menu	Example
Home screen: Active error quantity **Note:** The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
• Machine type and serial number • Universal Unique ID (UUID)	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary • Firmware level (status) • Build ID • Version number • Release date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup • Firmware level (status) • Build ID • Version number • Release date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
• XCC hostname • MAC address • IPv4 Network Mask • IPv4 DNS • IPv6 Link Local IP • Stateless IPv6 IP • Static IPv6 IP • Current IPv6 Gateway • IPv6 DNS **Note:** Only the MAC address that is currently in use is displayed (extension or shared).	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x

System Environmental Information

Sub Menu	Example
• Ambient temperature • Exhaust temperature • CPU temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions are available: • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Request Virtual Reseat • Modify XCC Static IPv4 Address/Net mask/Gateway • Modify System Name • Generate/Download FFDC Service Data	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

Front-operator-panel LEDs and buttons

The front operator panel of the server provides controls, connectors, and LEDs.

Note: Diagnostics panel with an LCD display is available for some models. For details, see “External diagnostics handset” on page 36.

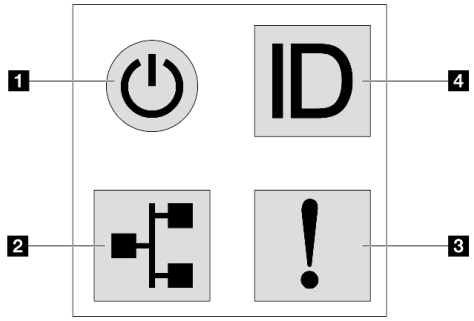


Figure 19. Diagnostics panel

1 Power button with power status LED

You can press the power button to power on the server when you finish setting up the server. You also can hold the power button for several seconds to power off the server if you cannot shut down the server from the operating system. The power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on. • System-board-assembly power has failed.
Off	None	Power is not present, or the power supply has failed.

2 Network activity LED

Compatibility of the NIC adapter and the network activity LED

NIC adapter	Network activity LED
OCP module	Support
PCIe NIC adapter	Not support

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

3 System error LED

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Amber	An error has been detected on the server. Causes might include but are not limited to the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • A hot-swap fan has been removed. • The power supply has a critical error. • The power supply is not connected to the power. • A processor error. • A system I/O board or processor board error. • Abnormal status is detected on the Processor Neptune® Core Module.	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs in the server are lit. It will direct you to the error source. See "Troubleshooting by system LEDs and diagnostics display" on page 35. • Save the log if necessary. **Note:** For server models with Processor Neptune® Core Module installed, it is required to open the top cover to check the LED status of the leakage detection sensor module. For more instructions, see "Leakage detection sensor module LED" on page 44.
Off	None	The server is off or the server is on and is working correctly.	None.

4 System ID button with system ID LED

Use this system ID button and the blue system ID LED to visually locate the server. A system ID LED is also located on the rear of the server. Each time you press the system ID button, the state of both the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

Leakage detection sensor module LED

This topic provides information about the LED on the leakage detection sensor module.

The leakage detection sensor module on the Processor Neptune® Core Module comes with one LED. The following illustration shows the LED on the module.

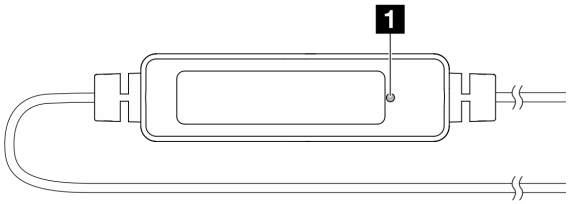


Figure 20. Leak detection LED

The following table describes the status that are indicated by the leakage detection sensor module LED.

1 Leakage detection sensor LED (green)	
Description	• On: No liquid leakage or cable break alert. • Slow blinking (about two flashes per second): Cable break alert. • Fast blinking (about five flashes per second): Liquid leak alert.
Action	• If the cable breaks, replace the liquid cooling module (trained technicians only). • If liquid leakage happens, see “Liquid cooling module problems” in *User Guide* and *Hardware Maintenance Guide*.

Processor board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the processor board assembly.

Press the power button to light the LEDs on the processor board assembly when the power source has been removed from the server.

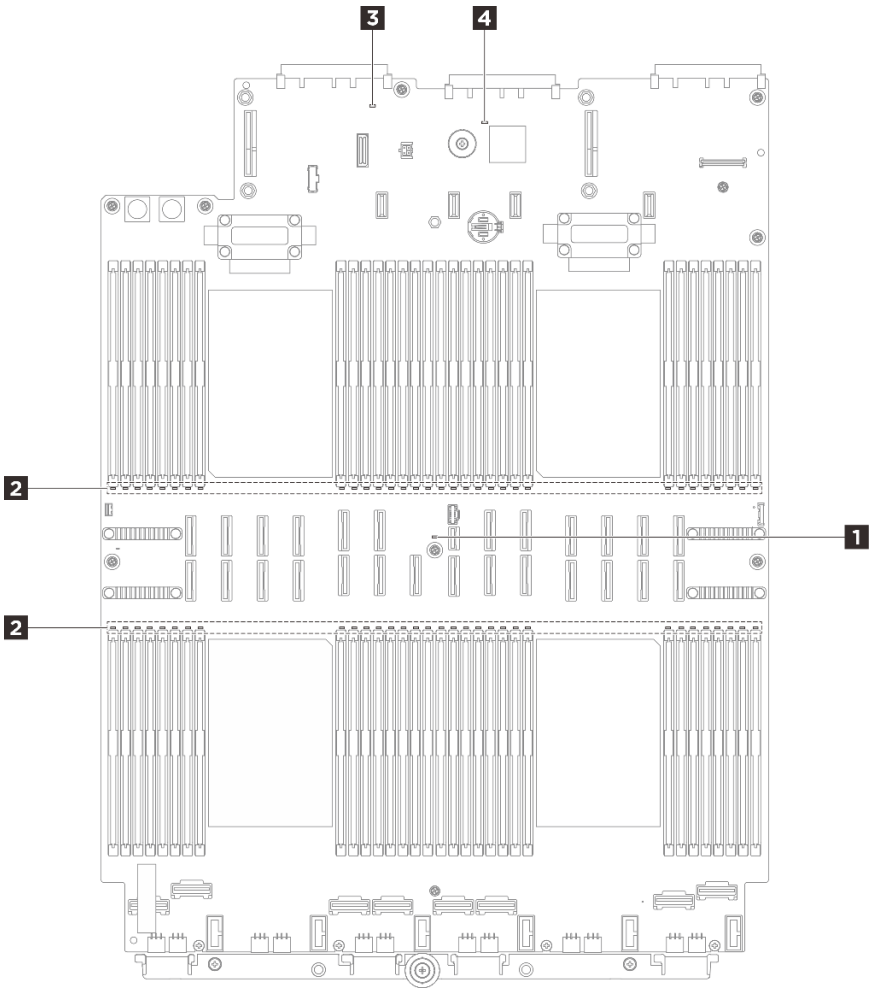


Figure 21. Processor board LEDs

Table 10. Processor board LEDs

LED	Description	Action
1 System error LED (yellow)	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.	Check system logs or internal error LEDs to identify the failed part. For more information, see "Front-operator-panel LEDs and buttons" on page 42.
2 DIMM error LEDs (amber)	When a memory module error LED is lit, it indicates that the corresponding memory module has failed.	For more information, see "Memory problems" in the *User Guide*.
3 System status LED (green)	The FPGA heartbeat LED helps you identify the FPGA status. • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working.	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the Table 11 "XCC heartbeat LED" on page 47. • If the system status LED remains off or is blinking fast (about four flashes per second) and the system error LED on the front panel is on (yellow), the system is in a power fault status. Do the following: 1. Re-plug the power cord. 2. Remove installed adapters/devices, one at a time, until you reach the minimal configuration for debugging. 3. (Trained technicians only) If the problem remains, capture FFDC log, and replace the processor board. 4. If the problem still remains, contact Lenovo Support.
4 FPGA heartbeat LED (green)	The system status LED indicates the working status of the system. • Fast blinking (about four flashes per second): Power fault or is waiting for XCC power permission ready. • Slow blinking (about one flash per second): Power off and is ready to be powered on (standby state). • On: Power on.	If FPGA heartbeat LED is always off or always on, do the following: 1. Replace the processor board. 2. If the problem remains, contact Lenovo Support.

System I/O board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system I/O board, also known as Datacenter Secure Control Module (DC-SCM).

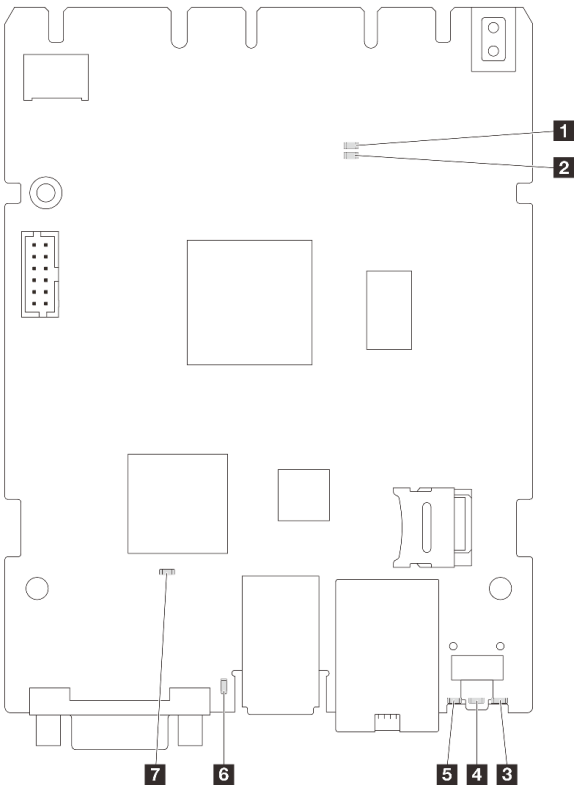


Figure 22. LEDs on the system I/O board (DC-SCM)

1 AP0 LED (green)

2 AP1 LED (green)

3 RoT fault LED (yellow)

4 System error LED (yellow)

5 System ID LED (blue)

6 XCC heartbeat LED (green)

7 SCM FPGA heartbeat LED (green)

Table 11. LEDs description

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	6 XCC heart-beat LED	7 SCM FPGA heart-beat LED	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the system I/O board.
	Blink	N/A	On	N/A	N/A	Replace the system I/O board.
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power interposer board (PIB) if any. If the PSU or PIB has any error, replace it. 2. If the PSU or PIB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.

Table 11. LEDs description (continued)

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	6 XCC heart-beat LED	7 SCM FPGA heart-beat LED	Actions
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	Blink (1 Hz)	On	Information only. No action is required.

4 System error LED (yellow)	
Description	When this yellow LED is lit, another one or more LEDs in the server might also be lit to direct you to the error source.
Action	Check system logs or internal error LEDs to identify the failed part. For more information, see “Front-operator-panel LEDs and buttons” on page 42.

5 System ID LED (blue)	
Description	The front system ID LED helps you locate the server.
Action	Each time you press the system ID button, the state of both system ID LEDs changes, and the state can be on, blinking, or off.

6 XCC heartbeat LED (green)	
Description	The XCC heartbeat LED helps you identify the XCC status. • Blinking (1 Hz, about one flash per second) : XCC is working normally. • Blinking at other speeds or always on: XCC is at the initial phase or is working abnormally. • Off: XCC is not working.
Action	• If the XCC heartbeat LED is always off or always on, do the following: – If XCC cannot be accessed: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (Trained technicians only) Replace the system I/O board. – If XCC can be accessed, replace the system I/O board. • If the XCC heartbeat LED is always blinking fast over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. (Trained technicians only) Replace the system I/O board. • If the XCC heartbeat LED is always blinking slow over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board is installed correctly. (Trained technicians only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support.

Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:

- Two processors in processor socket 1 and 2
- Two DRAM DIMMs in slot 10 and 26
- Two power supplies
- One 2.5-inch drive or E3.S drive, or one M.2 drive (if OS is needed for debugging)
- Six system fan modules

LEDs on a CRPS Premium power supply

The following figure and table describe the LEDs on a CRPS Premium power supply.

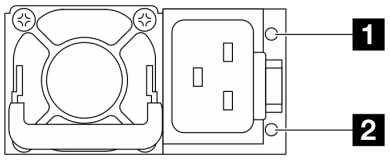


Figure 23. LEDs on a CRPS Premium *power supply*

LED	Description
1 Output and fault status (bi-color, green and yellow)	The output and fault status LED can be in one of the following states: • Off: The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit. • Slow blinking green (about one flash per second): The power supply is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server. • Fast blinking green (about five flashes per second): The power supply unit is in firmware update mode. • Green: The server is on and the power supply unit is working normally. • Yellow: The power supply unit may have failed. Dump the FFDC log from the system and contact Lenovo back-end support team for PSU data log reviewing. Zero-output mode can be disabled via Setup Utility or Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state. • Start the Setup utility, go to **System Settings → Power → Zero Output** and select **Disable**. If you disable zero-output mode, both power supplies will be in the active state. • Log in to the Lenovo XClarity Controller web interface, choose **Server Configuration → Power Policy**, disable **Zero Output Mode**, and then click **Apply**.
2 Input status (single color, green)	The input status LED can be in one of the following states: • Off: The power supply unit is disconnected from the input power source. • Green: The power supply unit is connected to the input power source. • Blinking (1Hz): The input power is unhealthy.

LEDs on a CRPS power supply

The following figures and table describe the LEDs on a CRPS power supply.

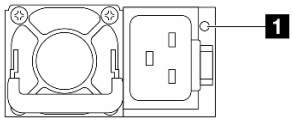


Figure 24. LED on a CRPS PSU (1)

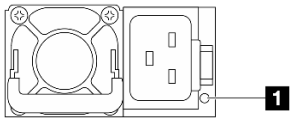


Figure 25. LED on a CRPS PSU (2)

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
On (green)	The server is on and the power supply unit is working normally.
Blinking (green, about two flashes per second)	The power supply unit is in firmware updating mode.
On (yellow)	When the power supply unit is lit yellow: • Scenario 1: One of the two power supply units has powered off or is unplugged from the power cord, and at the same time, the other one has power on. • Scenario 2: The power supply unit has failed due to one of the issues listed below: – Over-temperature protection (OTP) – Over-current protection (OCP) – Over-voltage protection (OVP) – Short circuit protection (SCP) – Fan failure

1 Power-supply-unit LED (bi-color, green and yellow)	
Status	**Description**
Blinking (yellow, about one flash per second)	The power supply unit is showing warnings, indicating over-temperature warning (OTW), over-current warning (OCW), or a slow fan speed.
Off	The server is powered off, or the power supply unit is not working properly. If the server is powered on but the LED is off, replace the power supply unit.

Rear M.2 LEDs

This topic provides troubleshooting information for the M.2 drive assembly.

- "LEDs on the rear M.2 interposer" on page 51
- "LEDs on the rear M.2 backplane" on page 51

LEDs on the rear M.2 interposer

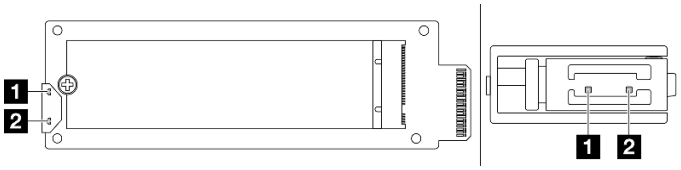


Figure 26. Rear M.2 interposer LEDs

LED	Status and description
1 Activity LED (green)	On: The M.2 drive is idle.
	Off: The M.2 drive appears de-asserted.
	Blinking (about four flashes per second): The I/O activity of the M.2 drive is in progress.
2 Status LED (yellow)	On: A drive fault occurs.
	Off: The M.2 drive is working normally.
	Fast blinking (about four flashes per second): The M.2 drive is being located.
	Slow blinking (about one flash per second): The M.2 drive is being rebuilt.

LEDs on the rear M.2 backplane

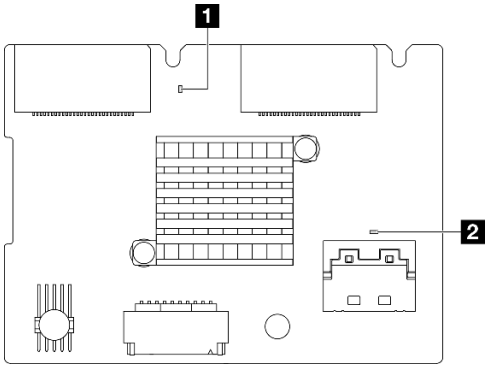


Figure 27. Rear M.2 backplane LEDs

LED	Status and description
1 System heartbeat LED (green)	Blinking: Power on and the RAID firmware is working normally.
	Off: Power off or the RAID firmware is working abnormally.
2 PSoC heartbeat LED (green)	On: The PSoC firmware is working abnormally.
	Off: Power off or the PSoC firmware is working abnormally.
	Fast blinking (about one flash per second): Updating code (bootloader mode).
	Slow blinking (about one flash every two seconds): Exiting initialization (application mode). The PSoC firmware is working normally.

XCC system management port LEDs

This topic provides information on LEDs of XCC system management port.

The following table describes the problems that are indicated by LEDs on XCC system management port.

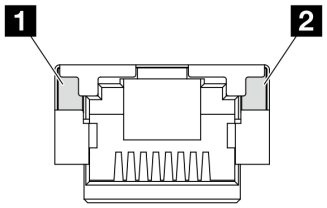


Figure 28. LEDs on the XCC system management port

Table 12. XCC system management port LEDs

LED	Description
1 XCC system management port (1GB RJ-45) Ethernet port link LED	Use this green LED to distinguish the network connectivity status: • Off: The network link is disconnected. • Green: The network link is established.
2 XCC system management port (1 GB RJ-45) Ethernet port activity LED	Use this green LED to distinguish the network activity status: • Off: The server is disconnected from a LAN. • Green: The network is connected and active.

Chapter 3. Parts list

Identify each of the components that is available for your server with the parts list.

For more information about ordering parts:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your server might look slightly different from the illustration.

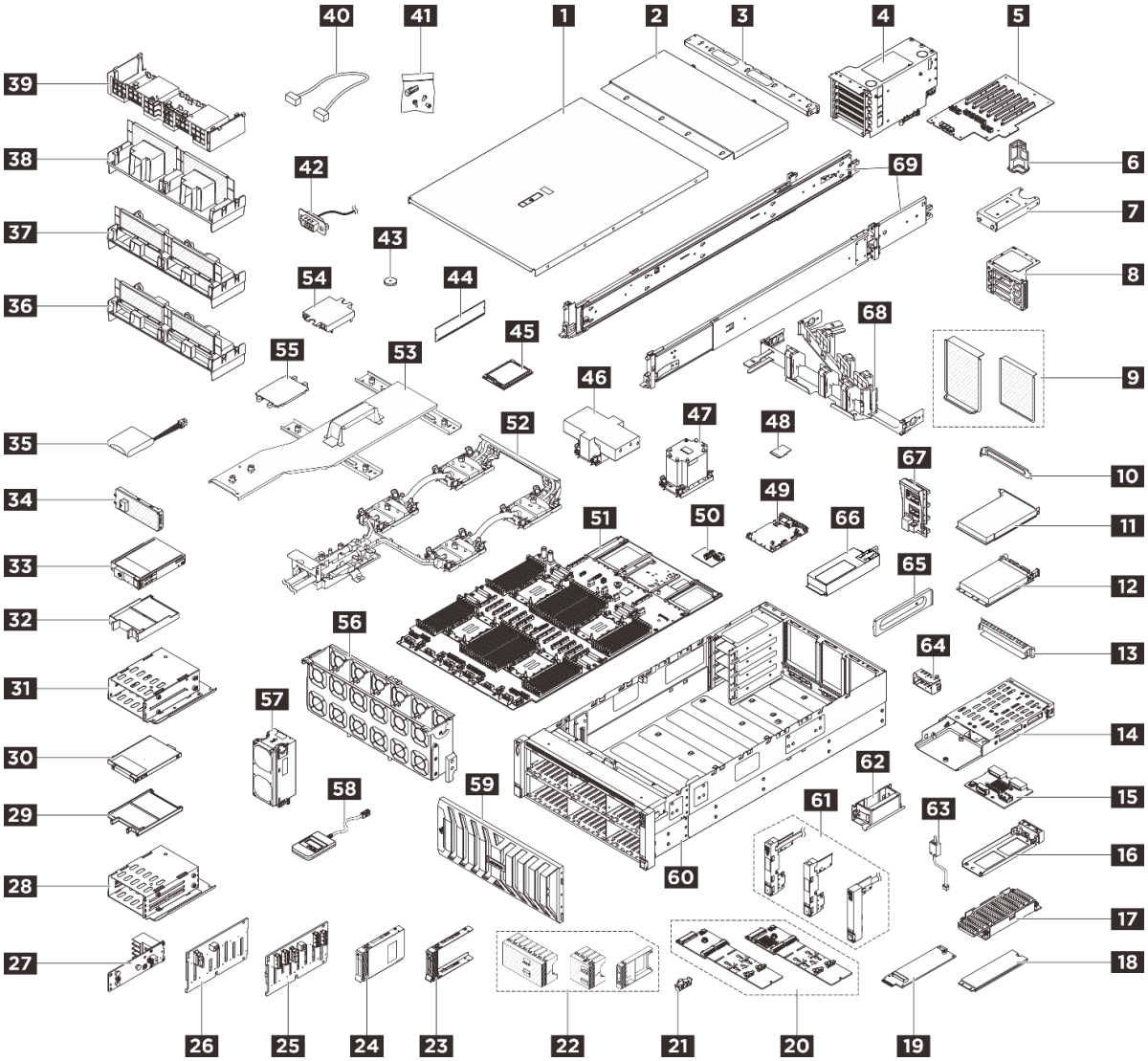


Figure 29. Server components

The parts listed in the following table are identified as one of the following:

- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Index	Description	Type	Index	Description	Type
For more information about ordering parts: 1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server. 2. Click **Parts**. 3. Enter the serial number to view a listing of parts for your server.					
1	Front top cover	T1	2	Rear top cover	T1
3	Crossbar	T1	4	PCIe riser cage	T1
5	PCIe riser card	T2	6	PCIe riser cable retainer	T1
7	Riser cage extender (half height)	T2	8	Riser cage extender (full height)	T2
9	Riser cage filler	C	10	PCIe adapter bracket filler	C
11	PCIe adapter	T1/ T2*	12	OCP module	T1
13	OCP module filler	C	14	Rear M.2 drive cage	T1
15	Rear M.2 backplane	T2	16	Rear M.2 drive tray	T1
17	M.2 heat sink	F	18	M.2 drive	T1
19	M.2 interposer	T2	20	Internal M.2 backplane	T2
21	M.2 retainer	T1	22	2.5-inch drive filler	C
23	2.5-inch drive tray	T1	24	2.5-inch drive	T1
25	2.5-inch AnyBay drive backplane	T2	26	2.5-inch SAS/SATA drive backplane	T2
27	E3.S backplane	T2	28	E3.S 1T drive cage	T2
29	E3.S 1T drive filler	C	30	E3.S 1T drive	T1
31	E3.S 2T drive cage	T2	32	E3.S 2T drive filler	C
33	E3.S 2T CMM	T1	34	E3.S bezel	C
35	RAID flash power module (supercap)		36	Rear air baffle with sponge (liquid cooling)	T1
37	Rear air baffle (2U performance PHM)	T1	38	Rear air baffle (3U standard PHM)	T1
39	Front air baffle	T1	40	Cable	T1
41	Miscellaneous parts kit (screws, labels, or fillers)	T1	42	Serial port module	T1
43	CMOS battery (CR2032)	C	44	Memory module	T2
45	Processor	F	46	2U performance heat sink	F

Index	Description	Type	Index	Description	Type
47	3U standard heat sink	F	48	MicroSD card	T1
49	System I/O board (DC-SCM)	F	50	USB I/O board	T1
51	Processor board	F	52	Processor Neptune® Core Module	F
53	Water loop shipping bracket	T1	54	Cold plate cover	T1
55	Processor socket cover	C	56	Fan cage	T1
57	Fan	T1	58	External diagnostics handset	
59	Security bezel	C	60	Chassis	F
61	Rack latch	T1	62	Chassis lift handle	T1
63	Intrusion switch	T1	64	Power supply filler	C
65	Power supply bracket	T1	66	Power supply	T1
67	PDB board	T1	68	Cable management arm	T1
69	Rail kit	T2			

Notes: *: CRU type for PCIe adapter:

- PCIe Ethernet adapters: T1
- PCIe RAID/HBA adapters: T2

Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:

   http://dcsc.lenovo.com/#/
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power → Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

- Power cords for a specific country or region are usually available only in that country or region.

Chapter 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in “Server setup checklist” on page 59 when setting up the server.

Server package contents

When you receive your server, verify that the shipment contains everything that you expected to receive.

The server package includes the following items:

- Server
- Rail installation kit*. Installation guide is provided in the package.
- Cable management arm*. Installation guide is provided in the package.
- Material box, including items such as lift handles*, power cords*, accessory kit, and printed documents.

Notes:

- Some of the items listed are available on select models only.
- Items marked with asterisk (*) are optional.

If any item is missing or damaged, contact your place of purchase. Ensure that you retain your proof of purchase and packing material. They might be required to receive warranty service.

Identify the server and access the Lenovo XClarity Controller

This section contains instruction on how to identify your server and where to find the Lenovo XClarity Controller access information.

Identifying your server

When you contact Lenovo for help, the machine type, model, and serial number information help support technicians to identify your server and provide faster service.

The illustration below shows the location of the ID label which contains the model number, machine type, and serial number of the server.

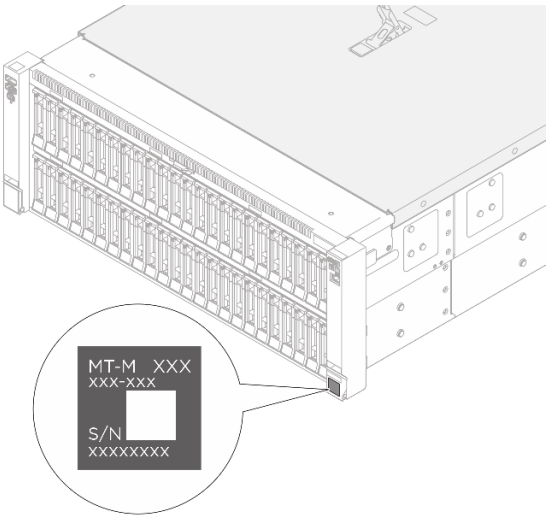


Figure 30. Location of the ID label

Lenovo XClarity Controller network access label

The Lenovo XClarity Controller network access label is attached to the pull-out information tab in the front of the chassis, with MAC address accessible with a pull.

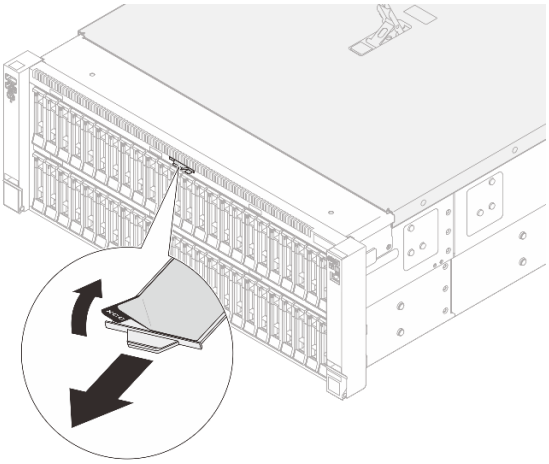


Figure 31. Lenovo XClarity Controller network access label on the pull-out information tab

Service information and QR code

On the inside surface of the front top cover, there is a quick response (QR) code that provides mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for server support.

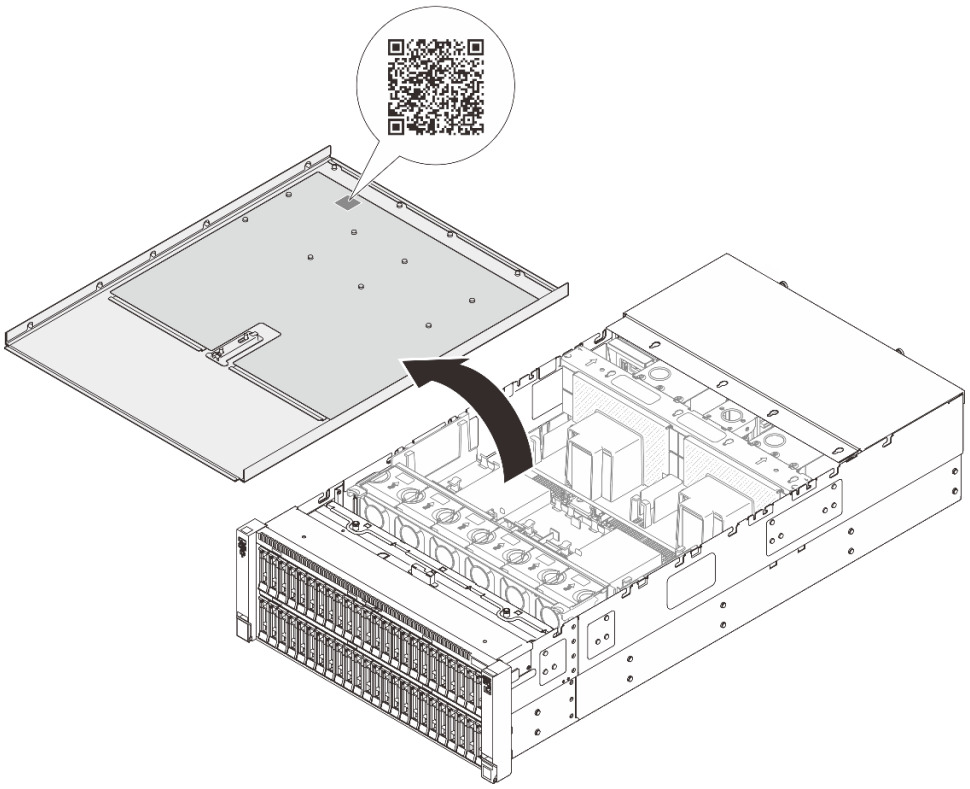


Figure 32. Service information and QR code

Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an AC power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server.

Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See “Server package contents” on page 57.
2. Install any required hardware or server options. See the related topics in “Hardware replacement procedures” in *User Guide* or *Hardware Maintenance Guide*.
3. If necessary, install the rail and CMA to a standard rack cabinet. Follow the instruction in *Rail Installation Guide* and *CMA Installation Guide* that comes with the rail installation kit.
4. If necessary, install the server into a standard rack cabinet. See “Install the server to rack” in *User Guide* or *Hardware Maintenance Guide*.
5. Connect all external cables to the server. See Chapter 2 “Server components” on page 17 for connectors locations.

   Typically, you will need to connect the following cables:

- Connect server to the power source
- Connect server to the data network
- Connect the server to the storage device
- Connect the server to the management network

6. Power on the server.

   Power button location and power LED are specified in:

   - Chapter 2 “Server components” on page 17
   - “Troubleshooting by system LEDs and diagnostics display” on page 35

   The server can be turned on (power LED on) in any of the following ways:

   - You can press the power button.
   - The server can restart automatically after a power interruption.
   - The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

   Note: You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

7. Validate the server. Make sure that the power LED, Ethernet connector LED, and network LED are lit with green light, which means the server hardware was set up successfully.

   See “Troubleshooting by system LEDs and diagnostics display” on page 35 for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to Chapter 5 “System configuration” on page 61.

1. Set the network connection for the Lenovo XClarity Controller to the management network.
2. Update the firmware for the server, if necessary.
3. Configure the firmware for the server.

   The following information is available for RAID configuration:

   - https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction
   - https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources

4. Install the operating system.
5. Back up the server configuration.
6. Install the applications and programs for which the server is intended to be used.

Chapter 5. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

  Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

  1. Start the server.
  2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
  3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
     - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
     - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
  4. Click **OK** to apply the setting and wait for two to three minutes.
  5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

     Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.
- If no monitor is attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to XCC system management port on your server. For the location of the XCC system management port, see Chapter 2 “Server components” on page 17.

  Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

  The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab. See “Identify the server and access the Lenovo XClarity Controller” on page 57.

Set USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

Server support

To see if your server supports accessing Lenovo XClarity Controller through the USB port, check one of the following:

- Refer to Chapter 2 “Server components” on page 17.
-  If there is a wrench icon on the USB port of your server, you can set the management USB port to connect to Lenovo XClarity Controller. It is also the only USB port that supports USB automation update of the system I/O board (or firmware and RoT security module).

Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 17 for ID button location.
- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the “Command-line interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration → Network → USB Management Port Assignment**. For information about Lenovo XClarity Controller web interface functions, see the “Description of XClarity Controller functions on web interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration → Network → USB Management Port Assignment**). See the “Command-line interface” and “Description of XClarity Controller functions on web interface” sections in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

Notes: It is recommended to update the firmware in the following sequence:
- BMC (XCC)
- FPGA HPM
- FPGA SCM
- UEFI

- Best practices related to updating firmware is available at the following site:
  - https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices
- The latest firmware can be found at the following site:
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v4/7djn/downloads/driver-list
- You can subscribe to product notification to stay up to date on firmware updates:

– https://datacentersupport.lenovo.com/solutions/ht509500

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update**. The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update**. The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **Update Bundles (Service Packs)**. Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Provisioning Manager (LXPM)	In-band[2] On-Target	√			√		
Lenovo XClarity Controller (XCC)	In-band[4] Out-of-band Off-Target	√	Selected I/O devices	√[3]	√		√
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√[3]		√	√

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices		√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices		√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.
3. Drive firmware update is only supported by the tools and methods below:
   - XCC Bare Metal Update (BMU): In-band, and requires system reboot.
   - Lenovo XClarity Essentials OneCLI: In-band, and does not require system reboot.
4. Bare Metal Update (BMU) only.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

  Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that

default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

"Firmware Update" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

  Notes:

  – To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

    For additional information about configuring Ethernet over USB, see:

    "Configuring Ethernet over USB" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  – If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

  For additional information about using Lenovo XClarity Controller to update firmware, see:

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

  For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

  You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-xpress

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

  You can obtain Lenovo XClarity Essentials BoMC from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-bomc

- **Lenovo XClarity Administrator**

  If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-

compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

https://pubs.lenovo.com/lxca/update_fw

- **Lenovo XClarity Integrator offerings**

  Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

  For additional information about using Lenovo XClarity Integrator to update firmware, see:

  https://pubs.lenovo.com/lxci-overview/

Configure the firmware

Several options are available to install and set up the firmware for the server.

Note: UEFI **Legacy Mode** is not supported by ThinkSystem V4 products.

- **Lenovo XClarity Provisioning Manager (LXPM)**

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

  Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

  See the following documentations for more information:

  - Search for the LXPM documentation version compatible with your server at https://pubs.lenovo.com/lxpm-overview/
  - *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/

- **Lenovo XClarity Essentials OneCLI**

  You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

  For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity Administrator**

  You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

  Specific details about configuring the server using Lenovo XClarity Administrator are available at:

https://pubs.lenovo.com/lxca/server_configuring

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

  For information about configuring the server using Lenovo XClarity Controller, see:

  "Configuring the Server" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.lenovo.com/servers/options/memory

In addition, you can take advantage of a memory configurator, which is available at the following site:

https://dcsc.lenovo.com/#/memory_configuration

Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

Step 1. **Make sure** to refer to "Memory module installation rules and order" section in the *User Guide* or *Hardware Maintenance Guide*, which specifies whether your server supports SGX and lists the memory module population sequence for SGX configuration. (DIMM configuration must be at least 8 DIMMs per socket to support SGX.)

Step 2. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)

Step 3. Go to **System settings → Processors → Total Memory Encryption (TME)** and enable the option.

Step 4. Save the changes, then go to **System settings → Processors → SW Guard Extension (SGX)** and enable the option.

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical

drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources

Intel VROC

Enabling Intel VROC

Before setting up RAID for NVMe drives, follow the below steps to enable VROC:

1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. Go to **System settings → Devices and I/O Ports → Intel® VMD technology → Enable/Disable Intel® VMD** and enable the option.
3. Save the changes and reboot the system.

Intel VROC configurations

Intel offers various VROC configurations with different RAID level and SSD support. See the following for more details.

Notes:
- Supported RAID levels varies by model. For the RAID level supported by SR860 V4, see “Technical specifications” on page 3.
- For more information about acquiring and installing the activation key, see https://fod.lenovo.com/lkms.

Intel VROC configurations for PCIe NVMe SSDs	Requirements
Intel VROC Standard	• Supports RAID levels 0, 1, and 10 • Requires an activation key
Intel VROC Premium	• Supports RAID levels 0, 1, 5, and 10 • Requires an activation key
Intel VROC RAID1 Only	• RAID 1 only • Requires an activation key

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

- Canonical Ubuntu

Complete list of available operating systems: https://lenovopress.lenovo.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

    https://pubs.lenovo.com/lxca/compute_node_image_deployment

- **Single-server**

  Available tools:

  – Lenovo XClarity Provisioning Manager

    “OS Installation” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding *OS Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to https://datacentersupport.lenovo.com/solutions/server-os.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

  “Backing up the BMC configuration” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

  Use your backup methods to back up the operating system and user data for the server.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The online help also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

https://pubs.lenovo.com/

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. (See the following links) The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
  - Drivers and software downloads
    - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v4/7djn/downloads/driver-list
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/thinksystem#os-installation
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com to make sure that the hardware and software are supported by your product.
- Refer to “Problem Determination” in *User Guide* or *Hardware Maintenance Guide* for instructions on isolating and solving issues.

- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.

  To find the Tech Tips available for your server:

  1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

     Follow the on-screen instructions to choose the category for the problem that you are having.
- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see "Identify the server and access the Lenovo XClarity Controller" on page 57.
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

  Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.
- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  – For more information about using the web interface to collect service data, see the "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  - For more information about using the CLI to collect service data, see the “XCC `servicelog` command” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at https://pubs.lenovo.com/lxca/admin_setupcallhome.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Appendix B. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://pubs.lenovo.com/sr860v4/pdf_files.html

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***User Guide***
  - Complete overview, system configuration, hardware components replacing, and troubleshooting.

    Selected chapters from *User Guide*:
    - ***System Configuration Guide* :** Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
    - ***Hardware Maintenance Guide* :** Installing hardware components and troubleshooting.
- ***Cable Routing Guide***
  - Cable routing information.
- ***Messages and Codes Reference***
  - XClarity Controller, LXPM, and uEFI events
- ***UEFI Manual***
  - UEFI setting introduction

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem SR860 V4
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v4/7djn/downloads/driver-list
- Lenovo Data Center Forum
  - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem SR860 V4
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr860v4/7djn
- Lenovo License Information Documents
  - https://datacentersupport.lenovo.com/documents/lnvo-eula
- Lenovo Press website (Product Guides/Datasheets/White papers)
  - https://lenovopress.lenovo.com/

- Lenovo Privacy Statement
  - https://www.lenovo.com/privacy
- Lenovo Product Security Advisories
  - https://datacentersupport.lenovo.com/product_security/home
- Lenovo Product Warranty Plans
  - http://datacentersupport.lenovo.com/warrantylookup
- Lenovo Server Operating Systems Support Center website
  - https://datacentersupport.lenovo.com/solutions/server-os
- Lenovo ServerProven website (Options compatibility lookup)
  - https://serverproven.lenovo.com
- Operating System Installation Instructions
  - https://pubs.lenovo.com/thinksystem#os-installation
- Submit an eTicket (service request)
  - https://support.lenovo.com/servicerequest
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
  - https://datacentersupport.lenovo.com/solutions/ht509500

Appendix C. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

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Morrisville, NC 27560
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Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

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Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝-〞係指該項限用物質為排除項目。

Note3 : The “-“ indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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