Lenovo

ThinkSystem SR650 V4
System Configuration Guide



Machine Types: 7DGC, 7DGD, 7DGE, 7DGF, 7DLN, 7DK2

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

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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.

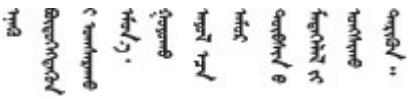
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

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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་སྤྱོད་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྡེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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 IEC 62368-1, 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.

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Chapter 1. Introduction

The ThinkSystem SR650 V4 server (7DGC, 7DGD, 7DGE, 7DGF, 7DLN, 7DK2) is a 2-socket 2U rack server featuring Intel® Xeon® 6 processors with P-cores (Granite Rapids-SP, GNR-SP). With a very configuration-rich offering, it is a great choice for enterprises of all sizes that need industry-leading reliability, management, and security, as well as maximizing performance and flexibility for future growth.

Figure 1. ThinkSystem SR650 V4



Features

Performance, ease of use, reliability, and expansion capabilities are 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 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 two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs.

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- **Large system-memory capacity**

  The server supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) and Compute Express Link (CXL) memory modules. For more information about the specific types and maximum amount of memory, see “Technical specifications” on page 3.
- **Large data-storage capacity and hot-swap capability**

  With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

  The server models support front, middle, and rear drive bays, scalable up to 40 x 2.5-inch hot-swap drives, 16 x 3.5-inch hot-swap drives, or 32 x E3.S 1T hot-swap drives. See “Technical specifications” on page 3 for more information.
- **Lightpath Diagnostics**

  Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see “System LEDs and diagnostics display” on page 38.
- **Mobile access to Lenovo Service Information website**

  The server provides a QR code on the system service label, 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 Converged, NeXtScale, System x, and ThinkServer 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**

  The server supports a variety of cooling options, including:
  - redundant air cooling by fans, which enables continued operation if one of the fan rotors fails
  - liquid cooling by Lenovo Processor Neptune® Core Module, which removes the heat from processors
  - liquid cooling by Lenovo Compute Complex Neptune Core module, which removes the heat from processors, memory, and voltage regulators
- **ThinkSystem RAID support**

  The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations, supporting RAID levels 0, 1, 5, 6, 10, 50, 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" on page 3	"Mechanical specifications" on page 10	"Environmental specifications" on page 11
Content	• Processor • Memory • Internal drives • Expansion slots • RAID adapter • Host bus adapter (HBA)/ Expander • Graphics processing units (GPU) • Integrated functions and I/O connectors • Network • System fan • Power supplies • Operating systems • Minimal configuration for debugging	• Dimension • Weight	• Acoustical noise emissions • Environment • Water requirements • Particulate contamination

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 for your server model.

Processor

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

- Up to two 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 four 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 order" in *User Guide* or *Hardware Maintenance Guide* for detailed information about memory configuration and setup.

- Slots:
  - Servers without Compute Complex Neptune Core Module: 32 dual inline memory module (DIMM) connectors that support up to 32 TruDDR5 DIMMs
  - Servers with Compute Complex Neptune Core Module: 16 DIMM connectors that support up to 16 TruDDR5 DIMMs
- Memory module types:
  - TruDDR5 6400 MHz x8 RDIMM: 16 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8)
  - TruDDR5 6400 MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4), 128 GB (2Rx4)
  - TruDDR5 6400 MHz 3DS RDIMM: 256 GB (4Rx4)
  - TruDDR5 8800 MHz MRDIMM: 32 GB (2Rx8), 64 GB (2Rx4)
  - CXL memory module (CMM): 96 GB, 128 GB

  Notes:
  - MRDIMMs are supported only on servers equipped with processor 6747P, 6761P, 6767P, 6781P, or 6787P.
  - CXL memory modules are not supported with Windows Server and VMware ESXi. For specifics, see https://lenovopress.lenovo.com/osig#servers=sr650-v4-xeon-6-p-cores-7dgc-7dgd-7dk2&os_families=microsoft-windows-server&os_families=vmware-esxi&support=all.
- Speed: The operating speed depends on processor model and UEFI settings.
  - 6400 MHz RDIMMs
    - 1 DPC: 6400 MT/s
    - 2 DPC: 5200 MT/s
  - 8800 MHz MRDIMMs
    - 1 DPC: 8000 MT/s
- Capacity:
  - Servers without Compute Complex Neptune Core Module
    - Minimum: 16 GB
    - Maximum: 8 TB (32 x 256 GB 3DS RDIMMs)
  - Servers with Compute Complex Neptune Core Module
    - Minimum: 32 GB (2 x 16 GB RDIMMs)
    - Maximum: 4 TB (16 x 256 GB 3DS RDIMMs)

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

Internal drives

Servers without Compute Complex Neptune Core Module:
- Front drive bays:
  - Up to 24 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 12 x 3.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 3.5-inch hot-swap NVMe drives
  - Up to 32 x E3.S 1T hot-swap drives
- Middle drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA or NVMe drives
- Rear drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 3.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 2.5-inch hot-swap SAS/SATA/NVMe drives
- Up to two internal non-hot-swap or front/rear hot-swap M.2 drives

Servers with Compute Complex Neptune Core Module:
- Front drive bays:
  - Up to 16 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 16 x E3.S 1T hot-swap drives
- Up to two internal non-hot-swap or front/rear hot-swap M.2 drives

Expansion slots

Depending on the model, your server supports up to ten PCIe slots at the rear.

PCIe slot availability is based on riser selection and rear drive bay selection. See “Rear view” on page 24 and “PCIe slots and PCIe adapters” in *User Guide* or *Hardware Maintenance Guide*.

RAID adapter

- Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID)
  - 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
  - Intel VROC Boot: requires an activation key and supports RAID level 1 only

    Note: Intel VROC Boot only supports two drives corresponding to the same controller and the same processor.
- Hardware RAID levels 0, 1, 10:
  - ThinkSystem RAID 545-8i PCIe Gen4 12Gb Adapter
- Hardware RAID levels 0, 1, 5, 10:
  - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
- Hardware RAID levels 0, 1, 5, 6, 10, 50, 60:
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter*
  - ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter

Notes:
- *Custom form factor (CFF) adapters that are supported only for server models with 2.5-inch front drive bays.
- For more information about the RAID/HBA adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference.

Host bus adapter (HBA)/Expander

- ThinkSystem 4350-16i SAS/SATA 12Gb HBA
- ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA*
- ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 48 port 12Gb Internal Expander*

Notes:

- *Custom form factor (CFF) adapters that are supported only for server models with 2.5-inch front drive bays.
- For more information about the RAID/HBA adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference.

Graphics processing unit (GPU)

Your server supports the following GPUs:

- Double-wide: NVIDIA® L40S, RTX 4500 Ada, RTX 6000 Ada, H100 NVL
- Single-wide: RTX 4000 Ada, L4

Note:

For GPU supporting rules, see “Thermal rules” in *User Guide* or *Hardware Maintenance Guide*.

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/.
  - One XCC system management port (10/100/1000 Mbps) on the rear to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions and runs at 10/100/1000 Mbps speed.
- Front connectors:
  - One Mini DisplayPort connector (optional)
  - 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
- Rear connectors:
  - One VGA connector
  - One USB 3.2 Gen1 (5 Gbps) connector
  - One USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)
  - One XCC system management port (10/100/1000 Mbps)
  - Two or four Ethernet connectors on each OCP module (optional)
  - One serial port (optional)

Note: The maximum video resolution is 1920 x 1200 at 60 Hz.

Network

- OCP module
  - The server features two OCP slots at the rear.
  - The installation priority of OCP slots in configurations with two processors is as follows:
    - configurations with only one OCP module: A x8 OCP module is installed in OCP slot 1; a x16 OCP module is installed in OCP slot 2.
    - configurations with two OCP modules: OCP slot 1 > OCP slot 2; x8 > x16
  - Both OCP slots are of x8 lanes as default, which can be upgraded to x16 lanes by using OCP cables in some configurations. For the cable routing of OCP modules with x16 connection, see ***Internal Cable Routing Guide***.

System fan

- Supported 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)
- Fan redundancy: N+1 redundancy, one redundant fan rotor
  - One processor: five hot-swap system fans
  - Two processors or middle/rear drive bays: six hot-swap system fans

Notes:

- Single-rotor hot-swap fans cannot be mixed with dual-rotor hot-swap fans.
- The redundant cooling by the fans in the server enables continued operation if one rotor of a fan fails.

Electrical input and power policy

Electrical input for power supply units

Common Redundant Power Supply (CRPS) and CRPS Premium are supported as listed below:

CAUTION:

- **240 V dc input is supported in Chinese Mainland ONLY.**
- **Power supply with 240 V dc 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.**
- **CRPS power supplies in the chassis must have the same wattage, vendor, and part number (or alternate part number).**

Power supply	**100–127 V ac**	**200–240 V ac**	**240 V dc**	**-48 V dc**	**HVDC 240–380 V dc**	**HVAC 200–277 V ac**	**CRPS**	**CRPS** Premium
800-watt 80 PLUS Platinum	√	√	√				√	
1300-watt 80 PLUS Platinum	√	√	√				√	
1300-watt -48 V dc				√				√
1300-watt HVAC/ HVDC 80 PLUS Platinum					√	√		√
2700-watt 80 PLUS Platinum		√	√				√	
800-watt 80 PLUS Titanium	√	√	√				√	√
1300-watt 80 PLUS Titanium	√	√	√				√	√
2000-watt 80 PLUS Titanium		√	√					√

Electrical input and power policy								
2700-watt 80 PLUS Titanium		√	√					√
3200-watt 80 PLUS Titanium		√	√					√

Power policy for power supply units

Following is one or two power supply units for redundancy or over-subscription (OVS) support:

Notes:
- Only CRPS Premium PSUs support OVS, Zero Output Mode, and Virtual-Reseat (VR).
- The following Lenovo XClarity Controller options are supported only when CRPS Premium PSUs are installed:
  - Power Redundant options such as **Zero Output Mode** and **Non-redundant**.
  - **AC Power Cycle Server** option under **Power Action**.
- Mixing of CRPS PSUs from different vendors are not supported.
- 1+0 indicates that the server has only one power supply unit installed and the system does not support power redundancy, while 1+1 indicates that two power supply units are installed and redundancy is supported.

Type	Watts	Redundancy		OVS
CRPS Premium	800-watt 80 PLUS Titanium	1+0	×	×
		1+1	√	√
	1300-watt 80 PLUS Titanium	1+0	×	×
		1+1	√	√
	1300-watt -48 V dc	1+1	√	√
	1300-watt HVAC/HVDC 80 PLUS Platinum	1+1	√	√
	2000-watt 80 PLUS Titanium	1+1	√	√
	2700-watt 80 PLUS Titanium	1+1	√	√
	3200-watt 80 PLUS Titanium	1+1	√	√
CRPS	800-watt 80 PLUS Platinum	1+1	√	×
	800-watt 80 PLUS Titanium	1+1	√	×
	1300-watt 80 PLUS Platinum	1+1	√	×
	1300-watt 80 PLUS Titanium	1+1	√	×
	2700-watt 80 PLUS Platinum	1+1	√	×

Operating systems

Supported and certified operating systems:
- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi
- Canonical Ubuntu

References:
- Complete list of available operating systems: https://lenovopress.com/osig.
- OS deployment instructions: see “Deploy the operating system” on page 78.

Minimal configuration for debugging

• Servers without Compute Complex Neptune Core Module
  – One processor in socket 1
  – One memory module in slot 7
  – One power supply unit
  – One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
  – Five system fans
• Servers with Compute Complex Neptune Core Module
  – Two processors
  – Two memory modules in slot 7 and slot 23
  – One power supply unit
  – One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
  – Six system fans

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

• Form factor: 2U
• Height: 87 mm (3.4 inches)
• Width:
  – With rack latches: 482 mm (19.0 inches)
  – Without rack latches: 445 mm (17.5 inches)
• Depth: 796 mm (31.3 inches)
 	
Note: The depth is measured with rack latches installed, but without the security bezel installed.

Weight
Up to 38.8 kg (85.5 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.

Attention: Environment quality must be maintained over the lifetime of the system to receive warranty and support on affecting components. For water quality requirement, see Lenovo Neptune Direct Water-Cooling Standards.

- "Acoustical noise emissions" on page 11
- "Environment" on page 12
- "Water requirements" on page 13

Acoustical noise emissions

Acoustical noise emissions

The server has the following acoustic noise emissions declaration.

Table 1. Acoustic noise emissions declaration

Acoustic performance @ 25°C ambient	Configuration	Min	Typical	Storage	GPU rich
Declared mean A-weighted sound power level, $L_{WA,m}$ (B) Statistical adder for verification, Kv (B) = 0.4	Idle mode	5.6	5.9	6.8	6.8
	Operating mode 1	5.9	6.2	6.8	7.3
	Operating mode 2	6.4	6.7	8.4	8.7
Declared mean A-weighted emission sound pressure level, $L_{pA,m}$ (dB) Bystander position	Idle mode	44	47	56	56
	Operating mode 1	47	50	56	62
	Operating mode 2	52	54	71	75

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 the maximum acoustic output of 50% CPU TDP or active storage drives. Operating mode 2 is the maximum acoustical output of 100% CPU TDP or GPU TDP.
- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration or conditions.
  - **Min**: 2 x 250 W CPUs, 8 x 64 GB RDIMMs, 8 x 2.5" SAS HDDs, 1 x RAID 940-8i, 1 x ThinkSystem Broadcom 5719 1GbE RJ45 4-port OCP Ethernet Adapter, 2 x 1300 W PSUs
  - **Typical**: 2 x 270 W CPUs, 16 x 64 GB RDIMMs, 16 x 2.5" SAS HDDs, 1 x RAID 940-16i, 2 x ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port OCP Ethernet Adapter, 2 x 1300W PSUs
  - **GPU rich**: 2 x 350 W CPUs, 2 x H100 NVL GPUs, 16 x 64 GB RDIMMs, 8 x 2.5" NVMe drives, 2 x ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter, 2 x 2700W PSUs
  - **Storage rich**: 2 x 270 W CPUs, 16 x 64 GB RDIMMs, 16 x 3.5" SAS HDDs, 1 x RAID 940-16i, 2 x ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port OCP Ethernet Adapter, 2 x 1300 W 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.

Environment

Environment
ThinkSystem SR650 V4 complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3 and Class A4 specifications. System performance may be impacted when the operating temperature is outside ASHRAE A2 specification. Depending on the hardware configuration, SR650 V4 server also complies with ASHRAE Class H1 specification. System performance may be impacted when the operating temperature is outside ASHRAE H1 specification. For detailed thermal information, see “Thermal rules” in *User Guide* or *Hardware Maintenance Guide*. **Note:** When the ambient temperature is greater than the supported max temperature (ASHRAE A4 45°C), the server will shut down. The server will not power on again until the ambient temperature falls within the supported temperature range. The restrictions to ASHRAE support are as follows (cooling by air): • The ambient temperature must be no more than 35°C in any of the following configurations: – standard configurations with ≥ 64 GB DIMMs or > 205 W processors – storage configurations without middle or rear drive bays – GPU configurations – configurations with special parts listed in “Thermal rules” in *User Guide* or *Hardware Maintenance Guide* • The ambient temperature must be no more than 30°C in any of the following configurations: – storage configurations with middle or rear drive bays – storage or GPU configurations with MRDIMMs or 256 GB 3DS RDIMMs – configurations with special parts listed in “Thermal rules” in *User Guide* or *Hardware Maintenance Guide* • The ambient temperature must be no more than 25°C in any of the following configurations: – storage configurations with ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220 – storage configurations with a ConnectX-8 adapter used with ThinkSystem NDR/NDR200 QSFP112 IB Multi Mode Solo-Transceiver – GPU configurations with 16 x 2.5" AnyBay front drive bays and ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220 – GPU configurations with 24 x 2.5" AnyBay front drive bays and a ConnectX-8 adapter used with ThinkSystem NDR/NDR200 QSFP112 IB Multi Mode Solo-Transceiver – configurations with special parts listed in “Thermal rules” in *User Guide* or *Hardware Maintenance Guide* The restrictions to ASHRAE support are as follows (cooling by Processor Neptune Core Module): • The ambient temperature must be no more than 30°C in any of the following configurations: – 36 NVMe configurations with standard fans – standard configurations with standard fans and MRDIMMs or 256 GB 3DS RDIMMs – GPU configurations with MRDIMMs or 256 GB 3DS RDIMMs – standard configurations with ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220 – storage configurations with ConnectX-8 adapter • The ambient temperature must be no more than 25°C in any of the following configurations: – storage configurations with 12 x 3.5" front drive bays, standard fans, and MRDIMMs or 256 GB 3DS RDIMMs – storage configurations with ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220 The restrictions to ASHRAE support are as follows (cooling by Compute Complex Neptune Core Module): • The ambient temperature must be no more than 35°C in the following configurations: – configurations with special parts listed in “Thermal rules” in *User Guide* or *Hardware Maintenance Guide* • The ambient temperature must be no more than 30°C in the following configurations: – configurations with ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16 B3220 • **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)

Environment

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: -10°C to 60°C (14°F to 140°F)
- Shipment/storage: -40°C to 70°C (-40°F to 158°F)

- **Maximum altitude**: 3,050 m (10,000 ft)
- **Relative Humidity** (non-condensing):
  - Operating
    - ASHRAE class H1: 8%–80%; maximum dew point: 17°C (62.6°F)
    - ASHRAE class A2: 20%–80%; maximum dew point: 21°C (70°F)
    - ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F)
    - ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F)
  - Shipment/storage: 8% to 90%

Water requirements

Water requirements

ThinkSystem SR650 V4 is supported in the following environment:

- Maximum pressure: 3 bars
- Water inlet temperature and flow rates:
  - For servers with Compute Complex Neptune Core Module, the water inlet temperature is 45°C (113°F), and the water flow rate is 1 lpm per server.
  - 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.

Attention: Environment quality must be maintained over the lifetime of the system to receive warranty and support on affecting components. For water quality requirement, see Lenovo Neptune Direct Water-Cooling Standards.

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.

Water quality requirement

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.

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/

Options	Description
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/
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/

Options	Description
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

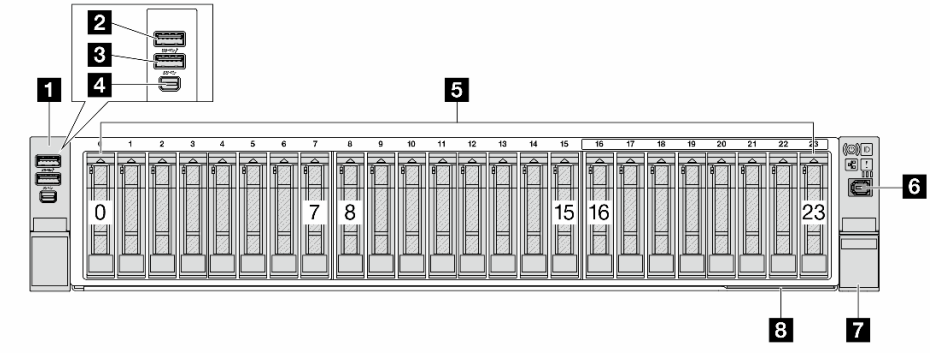
The front view of the server varies by model. Depending on the model, your server might look slightly different from the illustrations in this topic.

Refer to the following front views for different server models:

- “Front view of 2.5-inch chassis” on page 19
- “Front view of 2.5-inch chassis with M.2 drive bays” on page 20
- “Front view of E3.S chassis” on page 20
- “Front view of E3.S chassis with M.2 drive bays” on page 21
- “Front view of 3.5-inch chassis” on page 21

Note: For buttons and LEDs at the front of the server, see “Buttons and LEDs on the front view” on page 23.

Front view of 2.5-inch chassis



1 “Left rack latch” on page 22	2 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)” on page 22
3 “USB 3.2 Gen 1 (5Gbps) connector (optional)” on page 22	4 “Mini DisplayPort connector” on page 22
5 “Drive bays” on page 22	6 “External diagnostics connector” on page 22
7 “Right rack latch (with front operator panel)” on page 22	8 “Pull-out information tab” on page 23

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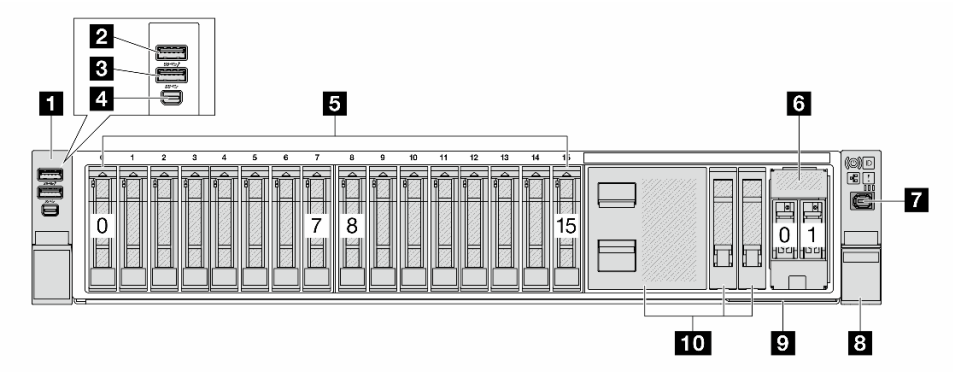
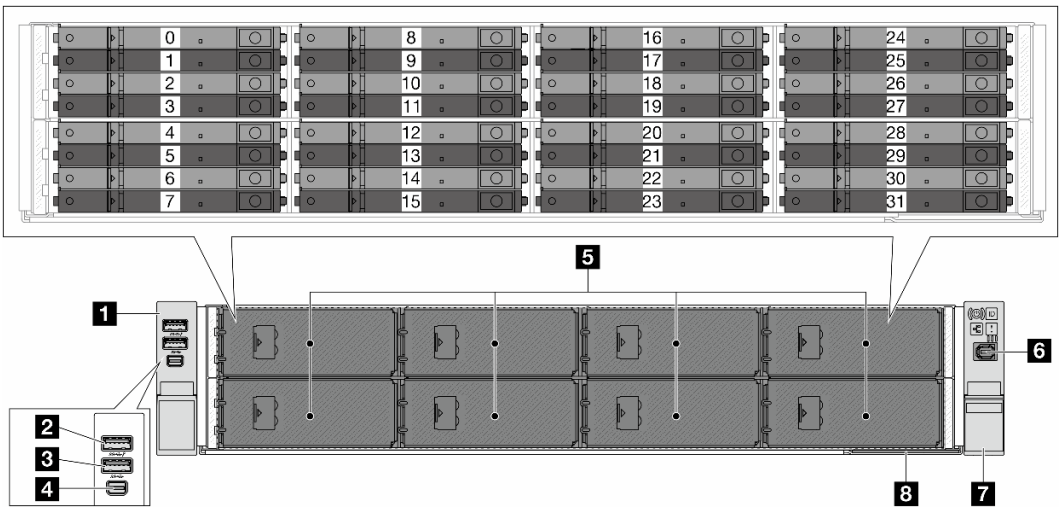
Front view of 2.5-inch chassis with M.2 drive bays



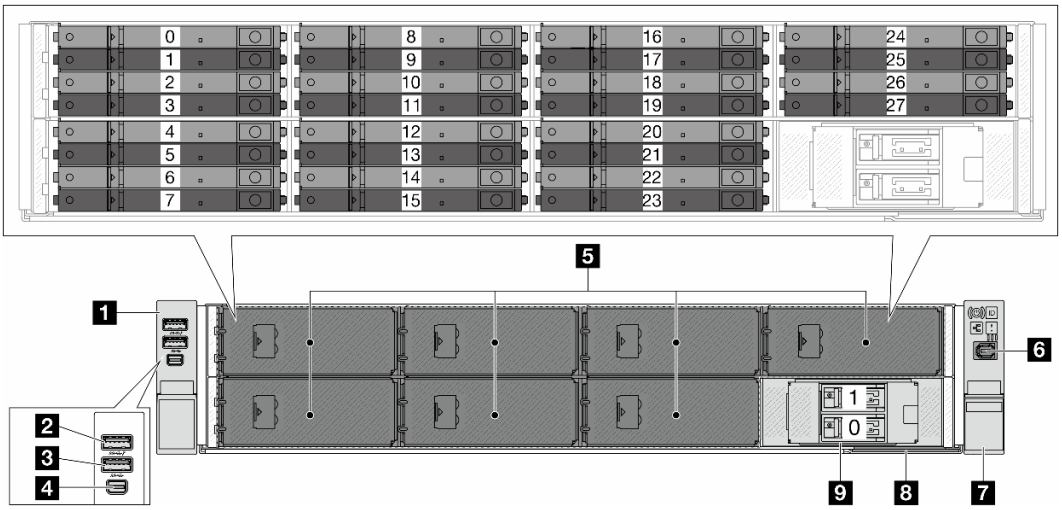
1 “Left rack latch” on page 22	2 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)” on page 22
3 “USB 3.2 Gen 1 (5Gbps) connector (optional)” on page 22	4 “Mini DisplayPort connector” on page 22
5 “Drive bays” on page 22	6 “M.2 drive bays” on page 23
7 “External diagnostics connector” on page 22	8 “Right rack latch (with front operator panel)” on page 22
9 “Pull-out information tab” on page 23	10 “Drive fillers” on page 22

Front view of E3.S chassis



1 “Left rack latch” on page 22	2 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)” on page 22
3 “USB 3.2 Gen 1 (5Gbps) connector (optional)” on page 22	4 “Mini DisplayPort connector” on page 22
5 “Drive bays” on page 22	6 “External diagnostics connector” on page 22
7 “Right rack latch (with front operator panel)” on page 22	8 “Pull-out information tab” on page 23

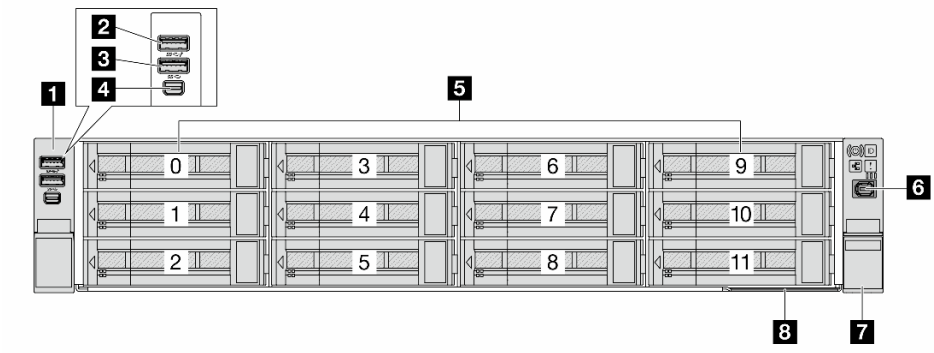
Front view of E3.S chassis with M.2 drive bays



1 “Left rack latch” on page 22	2 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)” on page 22
3 “USB 3.2 Gen 1 (5Gbps) connector (optional)” on page 22	4 “Mini DisplayPort connector” on page 22
5 “Drive bays” on page 22	6 “External diagnostics connector” on page 22
7 “Right rack latch (with front operator panel)” on page 22	8 “Pull-out information tab” on page 23
9 “M.2 drive bays” on page 23	

Front view of 3.5-inch chassis

Note: In the front 8 x 3.5" configuration with GPU adapters, drive bays 0, 3, 6, and 9 are covered by a 4-bay drive filler.



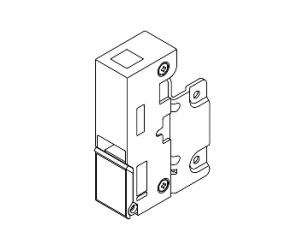
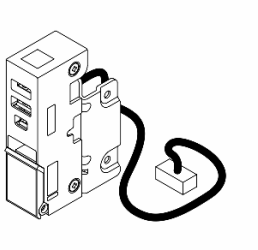
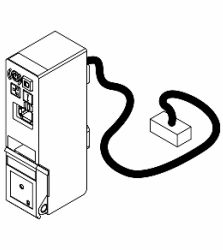
1 “Left rack latch” on page 22	2 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (optional)” on page 22
3 “USB 3.2 Gen 1 (5Gbps) connector (optional)” on page 22	4 “Mini DisplayPort connector” on page 22
5 “Drive bays” on page 22	6 “External diagnostics connector” on page 22
7 “Right rack latch (with front operator panel)” on page 22	8 “Pull-out information tab” on page 23

Front components overview

Rack 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.

The server supports the following types of rack latches.

<table>
<tr><td colspan="2">The server supports one of the following left rack latches:</td><td rowspan="2">Right rack latch (with front operator panel)</td></tr>
<tr><td>Standard left rack latch</td><td>Left rack latch with USB/MiniDP</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>

USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system 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.

USB 3.2 Gen 1 (5Gbps) connector

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

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. The maximum video resolution is 1920 x 1200 at 60 Hz.

Drive bays

The drive bays are designed for hot-swap drives or non-hot-swap E3.S CXL memory modules (CMMs). The number of the installed drives or CMMs in your server varies by model. When you install drives, follow the order of the drive bay numbers.

Note: When you install E3.S hot-swap drives or non-hot-swap CMMs, follow the supported E3.S configurations in ***Internal Cable Routing Guide***.

Drive fillers

The drive filler is used to cover a vacant drive bay. 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 fillers.

External diagnostics connector

The connector is for connecting an external diagnostics handset. For more about its functions, see .

Pull-out information tab

The Lenovo XClarity Controller network access label is attached on the pull-out information tab. The default Lenovo XClarity Controller hostname and the IPv6 Link Local Address (LLA) are provided on the tab.

For more information, see Set the network connection for the Lenovo XClarity Controller.

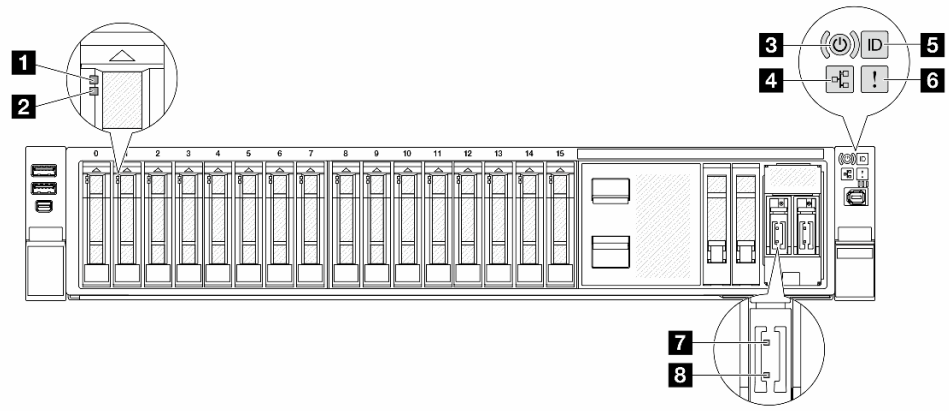
M.2 drive bays

The server supports two hot-swap M.2 drives at the front or rear.

Buttons and LEDs on the front view

The topic provides information about the buttons and LEDs at the front of the server. Depending on the model, your server might look different from the illustration in this topic.

Buttons and LEDs on the front view



1 Drive activity LED	See “Drive LEDs” on page 38.
2 Drive status LED	
3 Power button with power status LED	See “Front-operator-panel LEDs and buttons” on page 44.
4 Network activity LED	
5 System ID button with system ID LED	
6 System error LED	
7 M.2 drive activity LED	See “M.2 LEDs” on page 49.
8 M.2 drive status LED	

Rear view

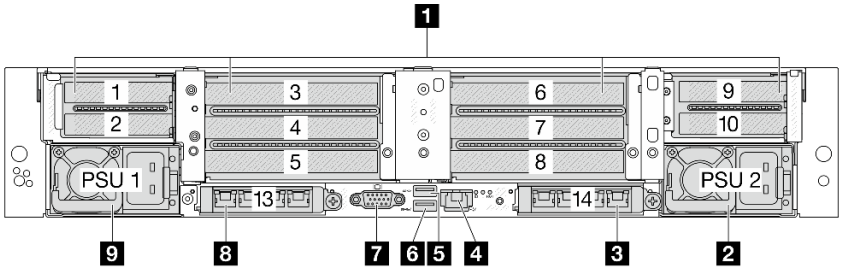
The rear of the server provides access to several connectors and components.

Refer to the following rear views for different server models:

- "Rear view with ten PCIe slots" on page 24
- "Rear view with four 2.5-inch rear drive bays and six PCIe slots" on page 24
- "Rear view with eight 2.5-inch rear drive bays and four PCIe slots" on page 25
- "Rear view with four 3.5-inch rear drive bays and two PCIe slots" on page 25

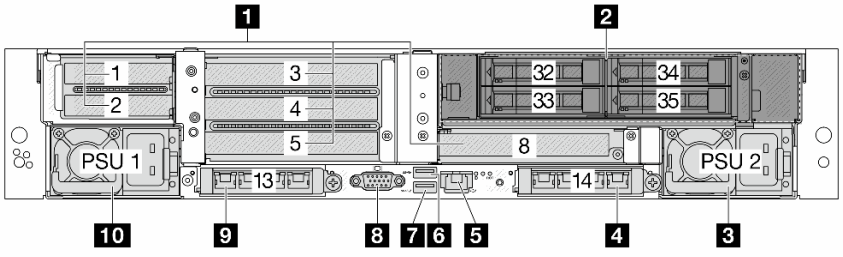
Note: For LEDs at the rear of the server, see "LEDs on the rear view" on page 27.

Rear view with ten PCIe slots



1 "PCIe slots" on page 26	2 "Power supply unit 2" on page 26
3 "OCP slot 2" on page 27	4 "XCC system management port (10/100/1000 Mbps)" on page 26
5 "USB 3.2 Gen 1 (5Gbps) connector" on page 26	6 "USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)" on page 26
7 "VGA connector" on page 26	8 "OCP slot 1" on page 27
9 "Power supply unit 1" on page 26	

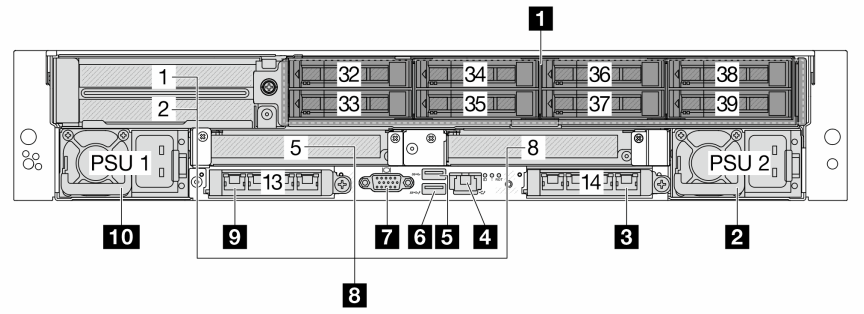
Rear view with four 2.5-inch rear drive bays and six PCIe slots



1 "PCIe slots" on page 26	2 "Drive bays" on page 26
3 "Power supply unit 2" on page 26	4 "OCP slot 2" on page 27
5 "XCC system management port (10/100/1000 Mbps)" on page 26	6 "USB 3.2 Gen 1 (5Gbps) connectors" on page 26

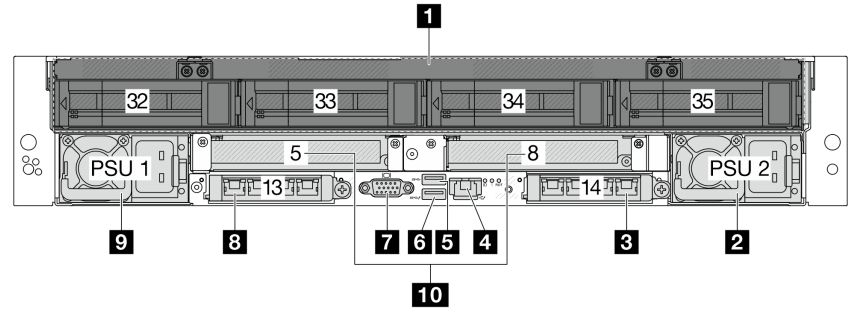
7 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)” on page 26	8 “VGA connector” on page 26
9 “OCP slot 1” on page 27	10 “Power supply unit 1” on page 26

Rear view with eight 2.5-inch rear drive bays and four PCIe slots



1 “Drive bays” on page 26	2 “Power supply unit 2” on page 26
3 “OCP slot 2” on page 27	4 “XCC system management port (10/100/1000 Mbps)” on page 26
5 “USB 3.2 Gen 1 (5Gbps) connectors” on page 26	6 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)” on page 26
7 “VGA connector” on page 26	8 “PCIe slots” on page 26
9 “OCP slot 1” on page 27	10 “Power supply unit 1” on page 26

Rear view with four 3.5-inch rear drive bays and two PCIe slots



1 “Drive bays” on page 26	2 “Power supply unit 2” on page 26
3 “OCP slot 2” on page 27	4 “XCC system management port (10/100/1000 Mbps)” on page 26
5 “USB 3.2 Gen 1 (5Gbps) connectors (3 DCIs)” on page 26	6 “USB 3.2 Gen 1 (5Gbps) connector with USB 2.0 XCC system management (depending on the configuration)” on page 26
7 “VGA connector” on page 26	8 “OCP slot 1” on page 27
9 “Power supply unit 1” on page 26	10 “PCIe slots” on page 26

Rear components overview

PCIe slots

The server supports up to 10 PCIe slots at the rear. Slot 5 or slot 8 supports hot-swap M.2 drives.

In configurations with Processor Neptune Core Module or Compute Complex Neptune Core Module, slot 8 is occupied by inlet and outlet hoses of the module. The inlet hose conveys warm water from the facility to the cold plates to cool down the processors, and the outlet hose conducts hot water out of the module to realize system cooling.

For more information, see “PCIe slots and PCIe adapters” in *User Guide* or *Hardware Maintenance Guide*.

Drive bays

The drive bays are designed for hot-swap drives. The number of the installed drives in your server varies by model. 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. Vacant drive bays must be occupied by drive fillers.

Power supply units

The hot-swap redundant power supply units help you avoid significant interruption to the operation of the system when a power supply unit fails. You can purchase a power supply option from Lenovo and install the power supply unit to provide power redundancy without turning off the server.

For information about the LEDs on the power supply unit, see “Power-supply-unit LEDs” on page 47.

USB 3.2 Gen 1 (5Gbps) connector

This connector is used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

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.

VGA connector

The VGA connector at the rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XCC system management port (10/100/1000 Mbps)

This RJ-45 connector is dedicated to Lenovo XClarity Controller (XCC) functions. You can access the Lenovo XClarity Controller directly by connecting your laptop to this connector 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.

For more information, see:

- Set the network connection for the Lenovo XClarity Controller

- “LEDs on the XCC system management port” on page 47

OCP slots

The server features two OCP slots at the rear and supports a maximum of two OCP modules. The OCP module provides two or four extra Ethernet connectors for network connections.

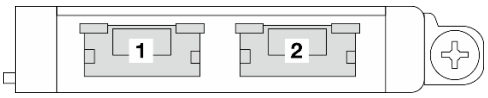


Figure 2. OCP module (two connectors)

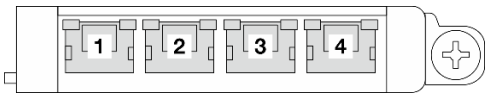


Figure 3. OCP module (four connectors)

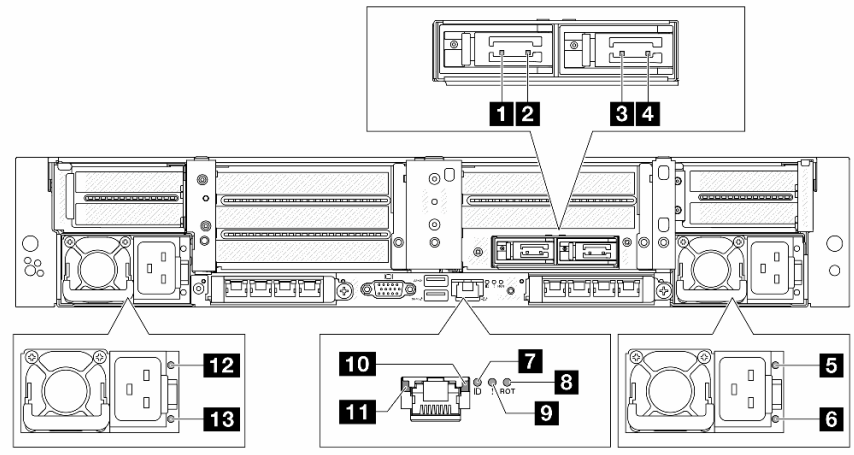
By default, any Ethernet connector on the OCP module can also function as a management connector using the shared management capacity.

Notes:
- Management NIC adapter and ThinkSystem OCP 4 to 1 Management Port Consolidation Adapter can be installed only on OCP slot 1.
- When ThinkSystem OCP 4 to 1 Management Port Consolidation Adapter is installed, OCP slot 2 is disabled.

LEDs on the rear view

The topic provides information about the LEDs at the rear of the server. Depending on the model, your server might look different from the illustration in this topic.

LEDs on the rear view



1 Activity LED of M.2 drive 0	See “M.2 LEDs” on page 49.
2 Status LED of M.2 drive 0	
3 Activity LED of M.2 drive 1	
4 Status LED of M.2 drive 1	
5 Output and fault status LED of PSU 2	See “Power-supply-unit LEDs” on page 47.
6 Input status LED of PSU 2	
7 System ID LED	See “System-board-assembly LEDs” on page 50.

8 RoT fault LED	
9 System error LED	
10 Activity LED of XCC system management port (10/100/1000 Mbps)	See “LEDs on the XCC system management port” on page 47.
11 Link LED of XCC system management port (10/100/1000 Mbps)	
12 Output and fault status LED of PSU 1	See “Power-supply-unit LEDs” on page 47.
13 Input status LED of PSU 1	

Top view

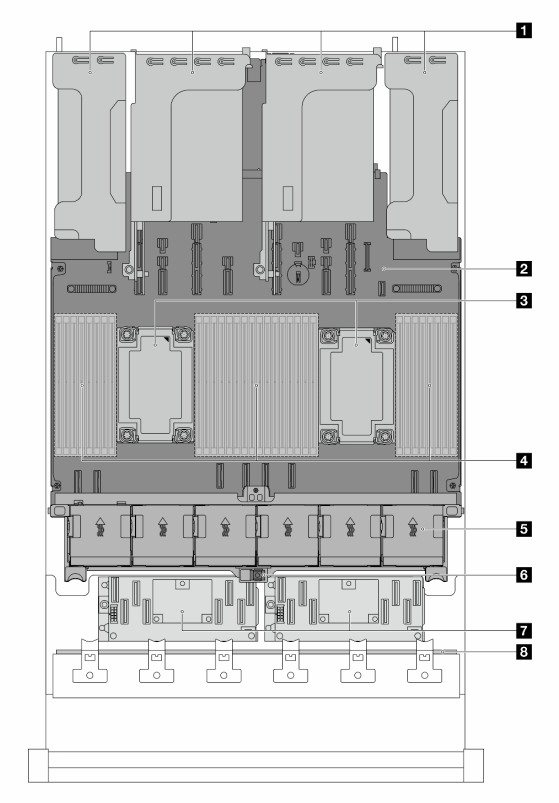
This section provides information about the top view of the server.

- “Top view with standard heat sinks” on page 29
- “Top view with Processor Neptune Core Module” on page 29
- “Top view with Compute Complex Neptune Core Module” on page 30

Notes:

- The following illustrations show the top view of the server without any air baffle, middle cage, or rear cage installed.
- The following illustrations show the server rear configuration with four riser assemblies. The server rear configurations vary by server model. For details, see “Rear view” on page 24.

Top view with standard heat sinks



1 Riser assemblies

2 System board assembly

3 Processor and heat sink module (PHM)

4 Memory modules

5 System fans

6 Intrusion switch

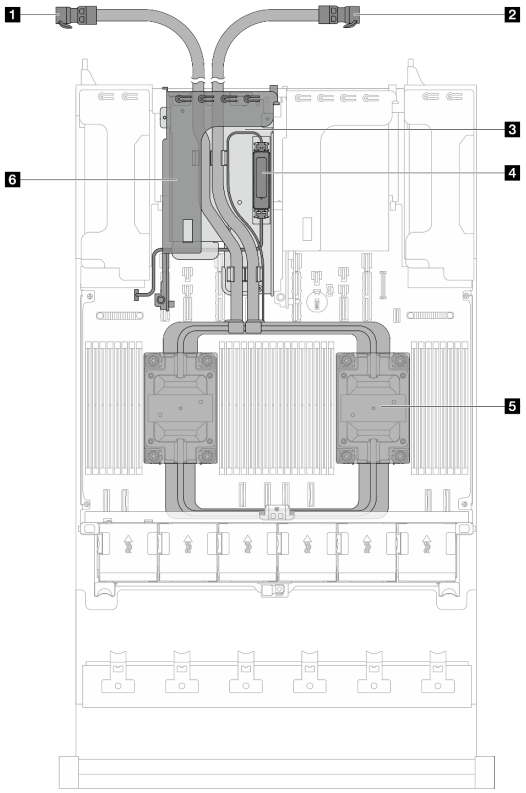
7 Internal CFF adapter

8 Front backplane(s)

Note: The illustration shows the server with internal CFF adapters which are available only in the 2.5-inch chassis. In some configurations, there might be installed with a RAID flash power module. For details, see “Location of RAID flash power modules” in *User Guide* or *Hardware Maintenance Guide*.

Top view with Processor Neptune Core Module

The illustration below singles out the module from other components in the chassis. The parts contained depend on the configuration of the server.



1 Outlet hose

2 Inlet hose

3 Hose holder

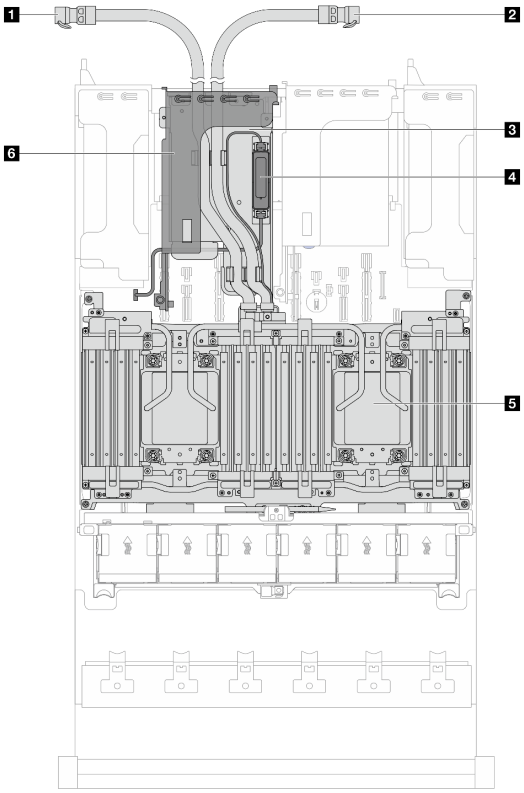
4 Leakage detection sensor module

5 Cold plate assembly

6 Riser cage for Neptune Core Module

Top view with Compute Complex Neptune Core Module

The illustration below singles out the module from other components in the chassis. The parts contained depend on the configuration of the server.



1 Outlet hose

2 Inlet hose

3 Hose holder

4 Leakage detection sensor module

5 Cold plate assembly

6 Riser cage for Neptune Core Module

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 the processor board.

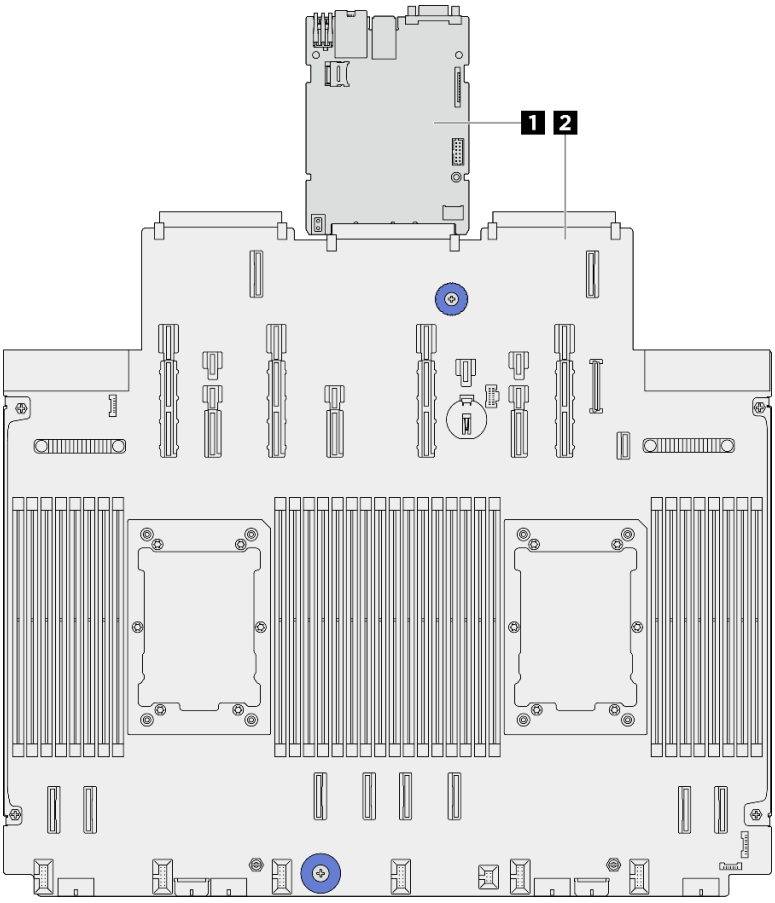


Figure 4. System-board-assembly layout

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 “System-board-assembly LEDs” on page 50.

System-board-assembly connectors

The following illustrations show the internal connectors on the system I/O board (DC-SCM) and processor board.

- “Servers *without* Compute Complex Neptune Core Module” on page 33
- “Servers *with* Compute Complex Neptune Core Module” on page 35

Servers *without* Compute Complex Neptune Core Module

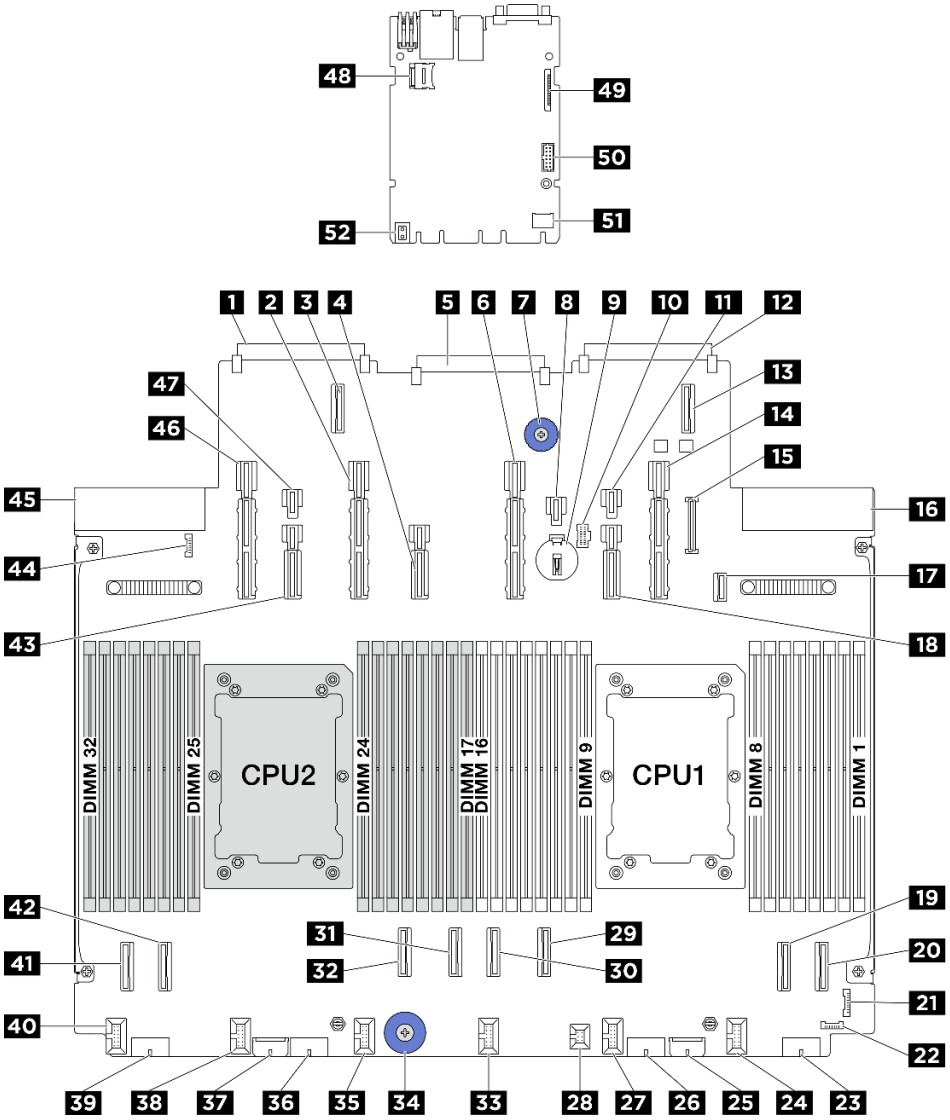


Figure 5. Servers *without* Compute Complex Neptune Core Module

1 OCP 3.0 network card connector 2	2 Power & PCIe connector 13
3 OCP expansion connector 2	4 Power & PCIe connector 12
5 System I/O board connector	6 Power & PCIe connector 11
7 Lift handle	8 Power connector 21
9 3V battery (CR2032)	10 M.2 power connector
11 Power connector 20	12 OCP 3.0 network card connector 1
13 OCP 1 expansion connector	14 Power & PCIe connector 9
15 Front panel USB connector	16 Power supply 1 connector
17 M.2 backplane signal connector	18 Power & PCIe connector 10
19 PCIe connector 2	20 PCIe connector 1

21 Front I/O connector	22 Leak detection connector 1
23 Power connector 4	24 Fan 1 connector
25 Internal expander power connector	26 Power connector 3
27 Fan 2 connector	28 Intrusion switch connector
29 PCIe connector 3	30 PCIe connector 4
31 PCIe connector 5	32 PCIe connector 6
33 Fan 3 connector	34 Lift handle
35 Fan 4 connector	36 Power connector 2
37 Internal RAID power connector	38 Fan 5 connector
39 Power connector 1	40 Fan 6 connector
41 PCIe connector 8	42 PCIe connector 7
43 Power & PCIe connector 14	44 Leak detection connector 2
45 Power supply 2 connector	46 Power & PCIe connector 15
47 Power connector 23	48 MicroSD socket
49 Second management Ethernet connector	50 Serial port connector
51 TCM connector	52 Lift handle

Servers *with* Compute Complex Neptune Core Module

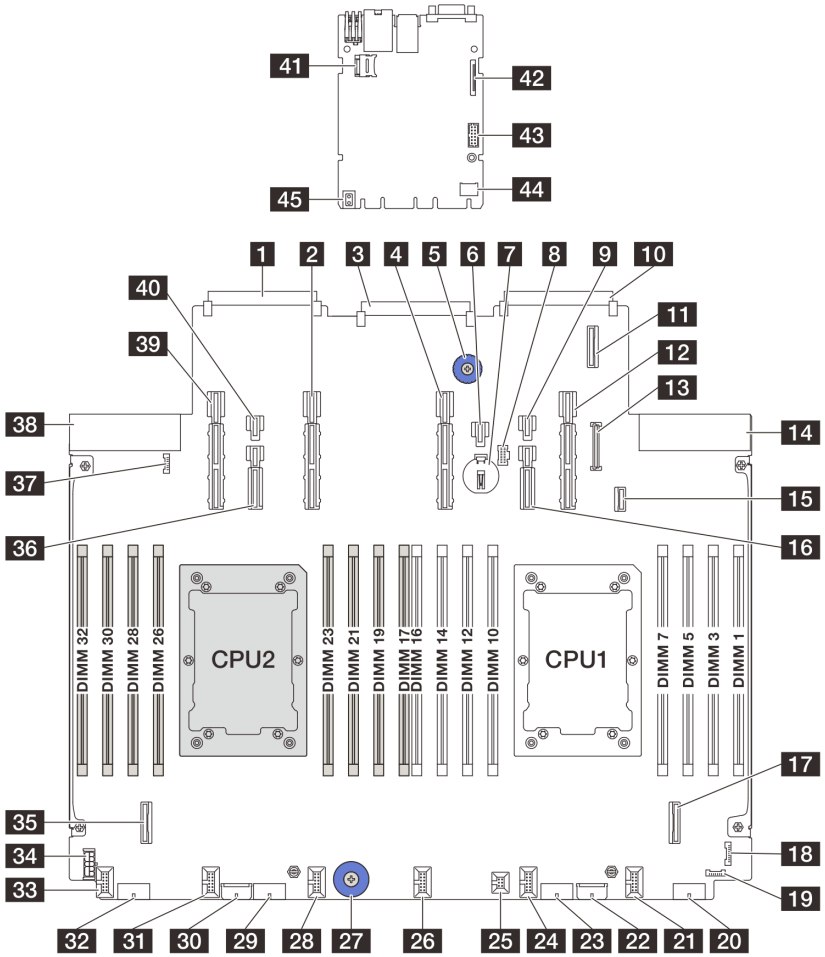


Figure 6. Servers with Compute Complex Neptune Core Module

1 OCP 3.0 network card connector 2	**2** Power & PCIe connector 13
3 System I/O board connector	**4** Power & PCIe connector 11
5 Lift handle	**6** Power connector 21
7 3V battery (CR2032)	**8** M.2 power connector
9 Power connector 20	**10** OCP 3.0 network card connector 1
11 OCP expansion connector 1	**12** Power & PCIe connector 9
13 Front panel USB connector	**14** Power supply 1 connector
15 M.2 backplane signal connector	**16** Power & PCIe connector 10
17 PCIe connector 2	**18** Front I/O connector
19 Leak detection connector 1	**20** Power connector 4
21 Fan 1 connector	**22** Expander power connector
23 Power connector 3	**24** Fan 2 connector
25 Intrusion switch connector	**26** Fan 3 connector

27 Lift handle	28 Fan 3 connector
29 Power connector 2	30 RAID power connector (SR650 V4)
31 Fan 5 connector	32 Power connector 1
33 Fan 6 connector	34 RAID power connector (SR630 V4)
35 PCIe connector 7	36 Power & PCIe connector 14
37 Leak detection connector 2	38 Power supply 2 connector
39 Power & PCIe connector 15	40 Power connector 23
41 MicroSD socket	42 Second management Ethernet connector
43 Serial port connector	44 TCM connector
45 Lift handle	

System-board-assembly switches

The following illustrations show the location of the switches, jumpers, and buttons on the system board assembly. Depending on the server model, the system board assembly might be different from the following illustration, but the location and the block description of the switches are the same.

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

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 switch or jumper block that is not shown in the illustrations in this document are reserved.

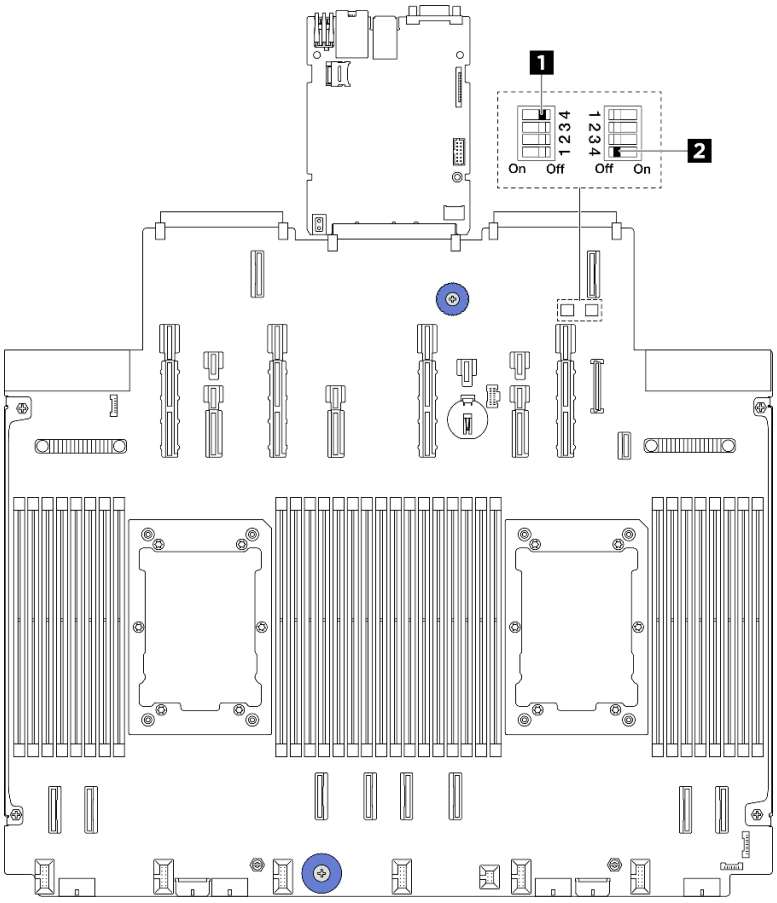


Figure 7. System-board-assembly switches

1 “Switch 1 (SW1)” on page 37	2 “Switch 2 (SW2)” on page 37

SW1 switch block

The following table describes the functions of the SW1 switch block on the system board assembly.

Table 3. SW1 switch block description

Switch-bit number	Switch name	Default position	Description
1 SW1–1	Reserved	OFF	Reserved
2 SW1–2	Reserved	OFF	Reserved
3 SW1–3	Reserved	OFF	Reserved
4 SW1–4	Clear CMOS	OFF	Clears the real-time clock (RTC) registry when switched to ON.

SW2 switch block

The following table describes the functions of the SW2 switch block on the system board assembly.

Table 4. SW2 switch block description

Switch-bit number	Switch name	Default position	Description
1 SW2–1	Reserved	OFF	Reserved
2 SW2–2	Reserved	OFF	Reserved
3 SW2–3	Reserved	OFF	Reserved
4 SW2–4	Password bypass	OFF	Bypass 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.

Drive LEDs

This topic provides information on drive LEDs.

Each drive comes with an activity LED and a status LED. Different colors and speeds indicate different activities or status of the drive. The following illustrations and tables describe the problems that are indicated by the activity LED and the status LED.

LEDs on hard disk drives or solid-state drives

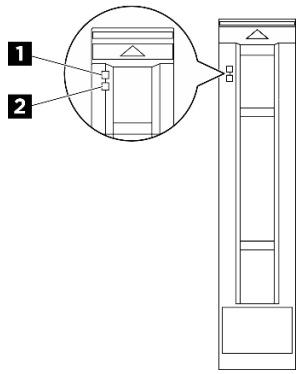


Figure 8. 2.5-inch/3.5-inch drive LEDs

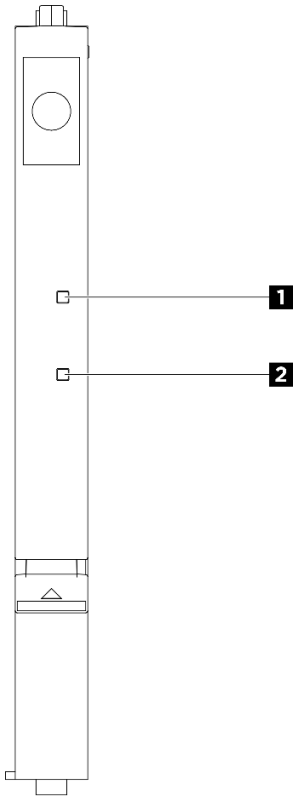


Figure 9. E3.S drive LEDs

Drive LED	Status	Description
1 Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
2 Drive status LED	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The drive is being identified.

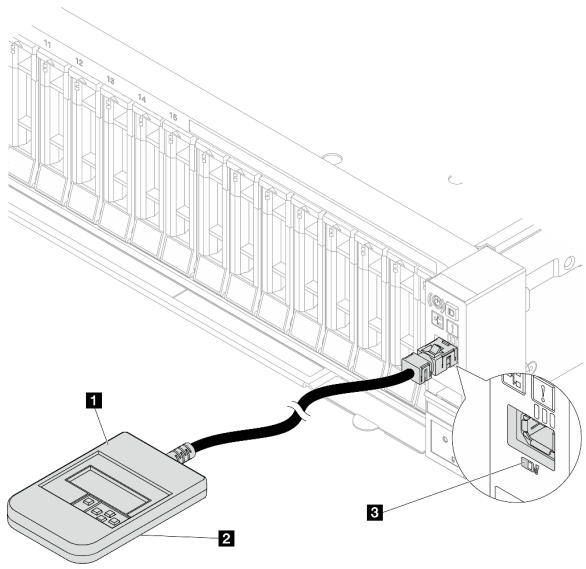
External diagnostics handset

The external diagnostics handset is an external device that can be 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.

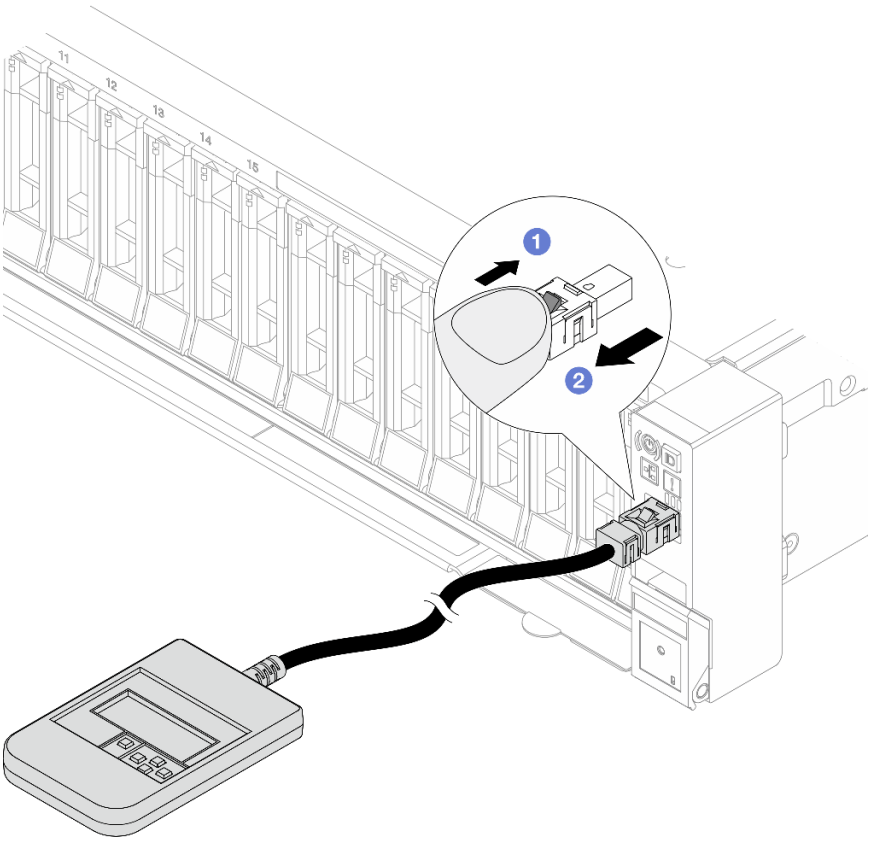
Note: The external diagnostics handset is an optional part that needs to be purchased separately.

- "Location of the External Diagnostics Handset" on page 39
- "Diagnostics panel overview" on page 40
- "Options flow diagram" on page 41
- "Full menu list" on page 42

Location of the external diagnostics handset

Location	Description
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:

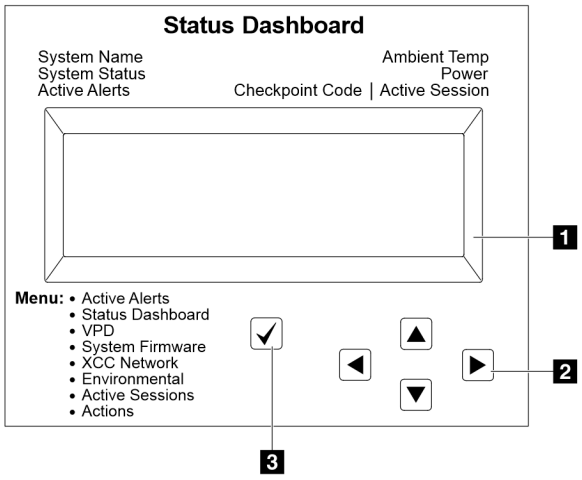


1 Press the plastic clip on the plug forward.

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.



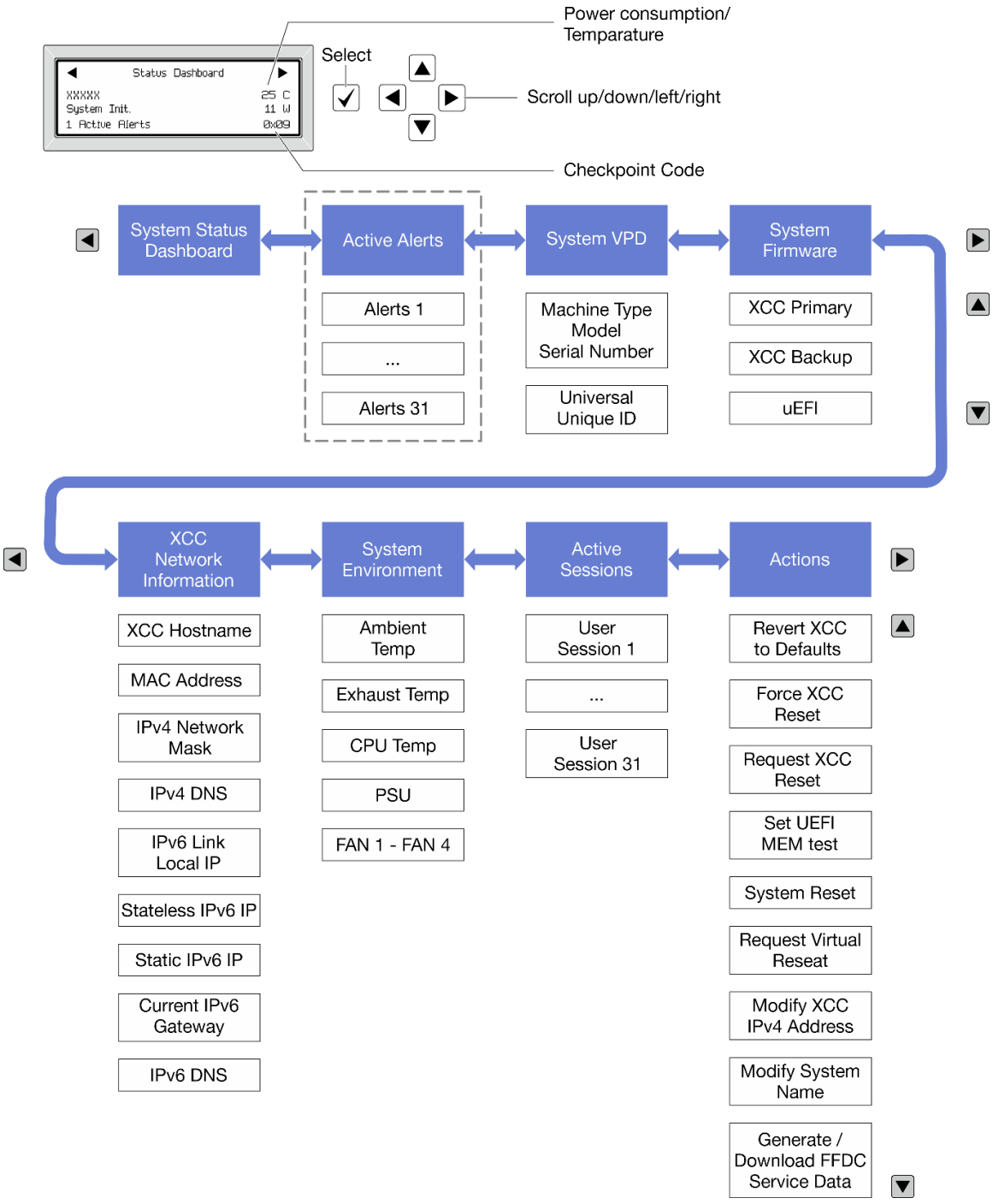
1 LCD display
2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.
3 Select button Press the select button to select from the options in the menu.

Option flow diagram

Note: SR650 V4 does not support the following functions: Request Virtual Reseat, Modify XCC Static IPv4 Address, Modify System Name, and Generate/Download FFDC Service Data.

The external diagnostics handset 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.

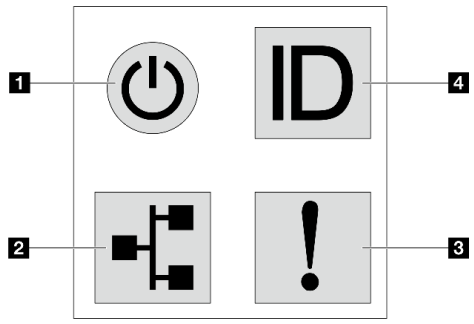


Figure 10. Diagnostics panel

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	There is no ac power applied to the server.

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 Compute Complex Neptune Core Module or 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 System LEDs and diagnostics display. • Save the log if necessary. **Note:** For server models with Compute Complex Neptune Core Module or 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 "LED on the leakage detection sensor module" on page 46.
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.

LED on the leakage detection sensor module

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

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

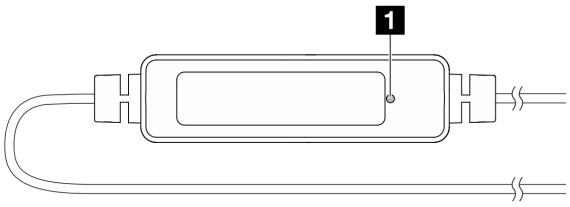


Figure 11. Leakage detection sensor LED

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

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 Processor Neptune Core Module or Compute Complex Neptune Core Module (trained technicians only). • If liquid leakage happens, see “Liquid cooling module problems (Processor Neptune Core Module)” in *User Guide* and *Hardware Maintenance Guide* or “Liquid cooling module problems (Compute Complex Neptune Core Module)” in *User Guide* and *Hardware Maintenance Guide*.

LEDs on the XCC system management port

This topic provides information on LEDs of XCC system management port (10/100/1000 Mbps).

The following table describes the problems that are indicated by LEDs on XCC system management port (10/100/1000 Mbps).

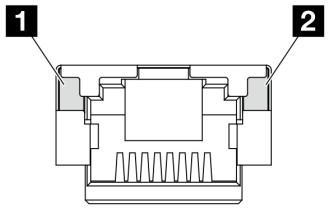


Figure 12. LEDs on the XCC system management port (10/100/1000 Mbps)

LED	Description
1 XCC system management port (10/100/1000 Mbps) (1 GB 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 (10/100/1000 Mbps) (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.

Power-supply-unit LEDs

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

The following minimal configuration is required for the server to start:
- Servers without Compute Complex Neptune Core Module
  - One processor in socket 1

  - One memory module in slot 7
  - One power supply unit
  - One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
  - Five system fans
- Servers with Compute Complex Neptune Core Module
  - Two processors
  - Two memory modules in slot 7 and slot 23
  - One power supply unit
  - One HDD/SSD drive, one M.2 drive (if OS is needed for debugging)
  - Six system fans

The following table describes the problems that are indicated by various combinations of the power-supply unit LEDs and the power-on LED and suggested actions to correct the detected problems.

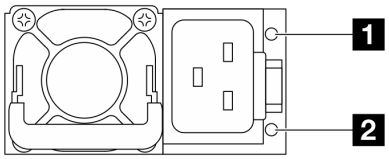


Figure 13. LEDs on a CRPS Premium *power supply unit*

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.

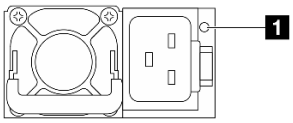


Figure 14. LED on a CRPS PSU (1)

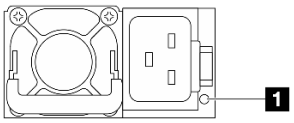


Figure 15. LED on a CRPS PSU (2)

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
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.

M.2 LEDs

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

- "LEDs on the M.2 interposer" on page 49
- "LEDs on the rear M.2 backplane" on page 50

LEDs on the M.2 interposer

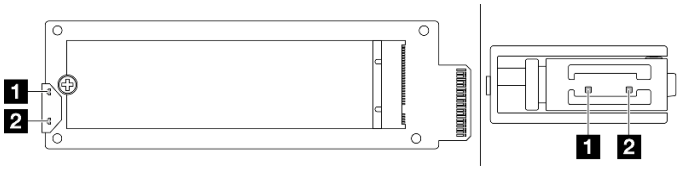


Figure 16. M.2 interposer LEDs

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.

LED	Status and description
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

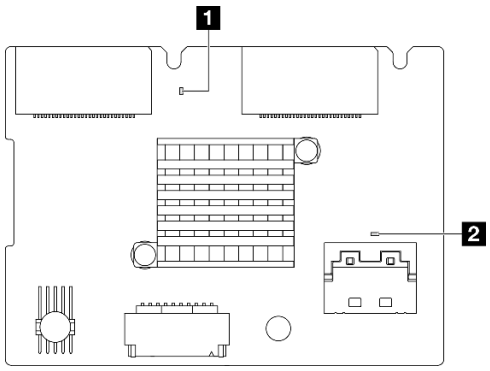


Figure 17. Rear M.2 backplane LEDs

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.

System-board-assembly LEDs

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

- “Processor-board LEDs” on page 51
- “System I/O board LEDs” on page 52

Processor-board LEDs

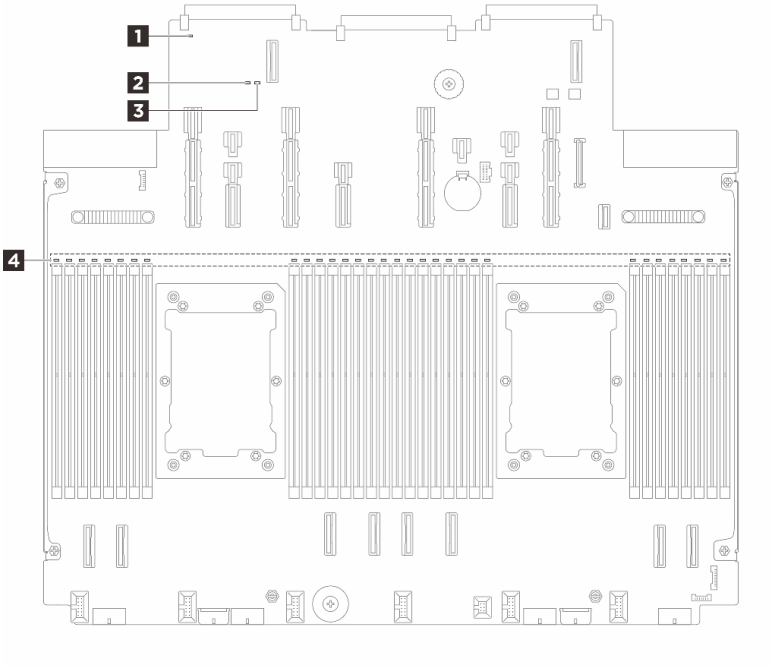


Figure 18. LEDs on the processor board

1 System error LED (yellow)

2 System status LED (green)

3 FPGA heartbeat LED (green)

4 DIMM error LEDs (amber)

1 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 44.

2 System status LED (green)	
Description	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.
Action	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the XCC heartbeat LED and follow the actions for the XCC heartbeat LED. • 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.

3 FPGA heartbeat LED (green)	
Description	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.
Action	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.

4 DIMM error LEDs (amber)	
Description	When a memory module error LED is lit, it indicates that the corresponding memory module has failed.
Action	For more information, see “Memory problems” in the *User Guide*.

System I/O board LEDs

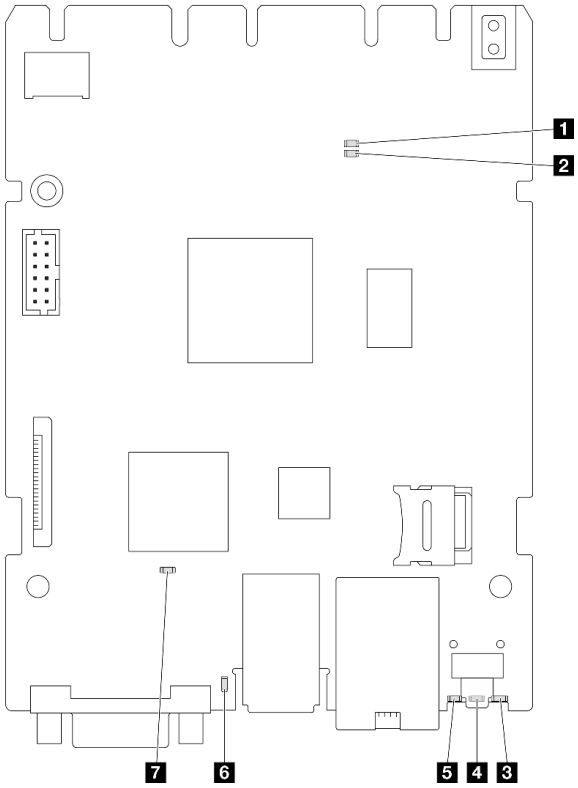


Figure 19. LEDs on the system I/O board (DC-SCM)

1 Table 5 “AP0 LED (green)” on page 53

2 Table 5 “AP1 LED (green)” on page 53

3 Table 5 “RoT fault LED (yellow)” on page 53

4 System error LED (yellow)

5 System ID LED (blue)

6 XCC heartbeat LED (green)

7 Table 5 “SCM FPGA heartbeat LED (green)” on page 53

Table 5. LEDs description

Scenario	1 AP0 LED	2 AP1 LED	3 RoT fault LED	7 SCM FPGA heart-beat LED	6 XCC 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.
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	On	Blink (1 Hz)	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 44.

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.

Chapter 3. Parts list

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

- “2.5-inch drive bay chassis” on page 55
- “E3.S bay chassis” on page 58
- “3.5-inch drive bay chassis” on page 61

2.5-inch drive bay chassis

Use the parts list in this section to identify each of the components that are available for server models with 2.5-inch front drive bays.

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. Some parts are available only on some models.

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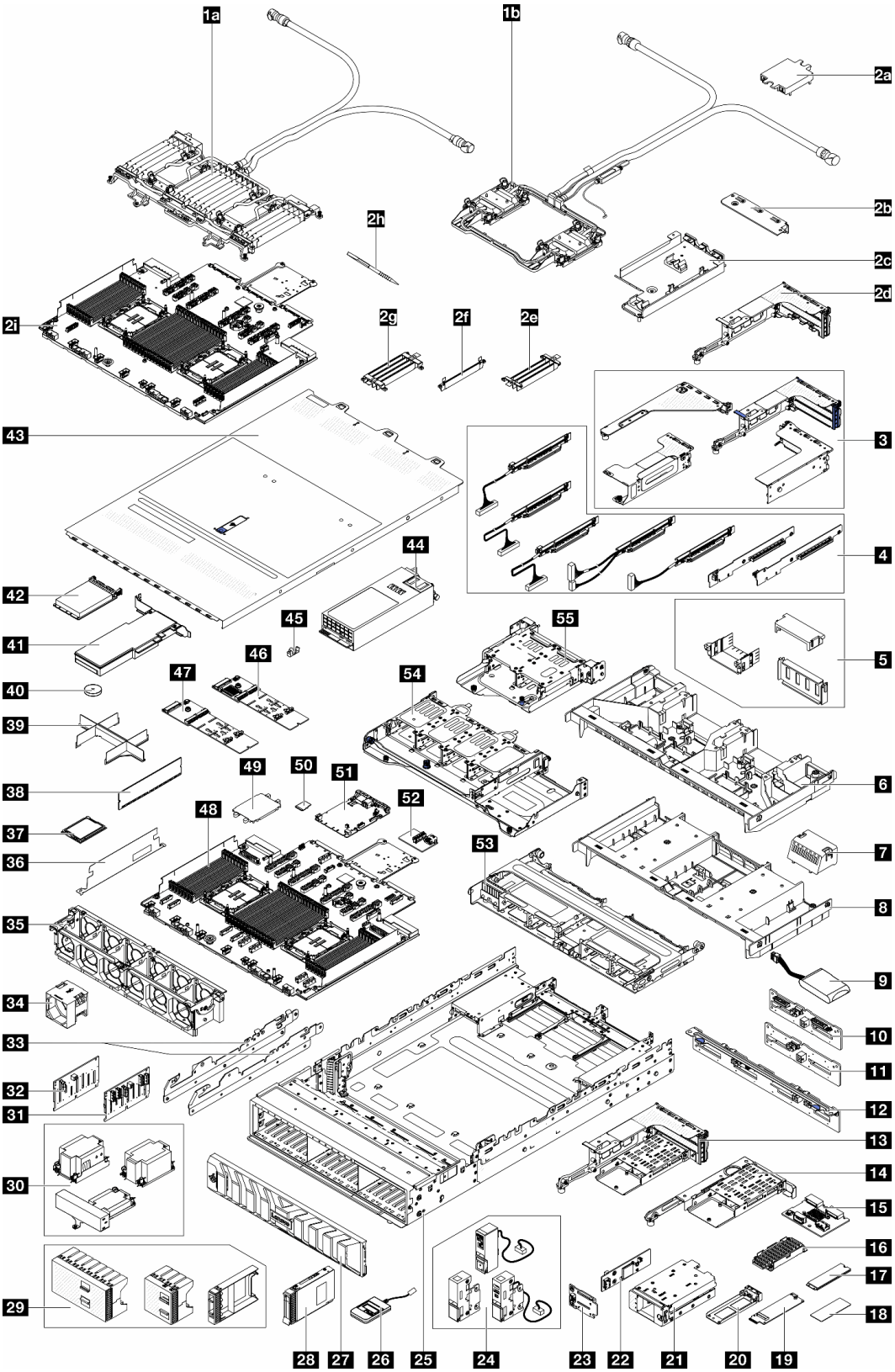

Figure 20. Server components (2.5-inch drive bay chassis)

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.

Notes:
- For details about riser cages (3), see “Rear riser assembly and PCIe adapter replacement” in *User Guide* or *Hardware Maintenance Guide*.
- For details about riser cards (4), see “PCIe slots and PCIe adapters” in *User Guide* or *Hardware Maintenance Guide*. The riser card for slot 1/2/9/10 is a FRU, and other riser cards are T1 CRUs.
- For details about GPU air baffle fillers (5), see “GPU replacement” in *User Guide* or *Hardware Maintenance Guide*.
- For details about rack latches (24), see “Front view” on page 19.

Description	Type	Description	Type
1a Compute Complex Neptune Core Module	F	1b Processor Neptune Core Module	F
2a Cold plate cover	C	2b 1FH bracket for Neptune Core Module	C
2c Hose holder	C	2d 3FH riser cage for Neptune Core Module	C
2e Middle DIMM bracket 1	T1	2f Middle DIMM bracket 2	T1
2g Side DIMM bracket	T1	2h DIMM tool	T1
2i Processor board for Compute Complex Neptune Core Module	F	3 Riser cages	C
4 Riser cards	T1/F	5 GPU air baffle fillers	C
6 GPU air baffle	T1	7 Standard air baffle filler	C
8 Standard air baffle	T1	9 RAID flash power module (supercap)	T1
10 4 x 2.5" AnyBay middle/rear backplane	F	11 4 x 2.5" SAS/SATA middle/rear backplane	T2
12 8 x 2.5" SAS/SATA rear backplane	T2	13 3FH M.2 riser cage	C
14 1FH M.2 riser cage	C	15 Rear M.2 backplane	T2
16 M.2 heat sink	F	17 M.2 drive	T1
18 M.2 thermal pad	F	19 M.2 interposer	T2
20 M.2 drive tray	C	21 Front M.2 cage	C
22 Front M.2 controller board	F	23 Front M.2 boot backplane	F
24 Rack latches	T1	25 Chassis	F
26 External diagnostics handset	T1	27 Security bezel	T1
28 2.5" drive	T1	29 2.5" drive fillers	C
30 Heat sinks	F	31 8 x 2.5" AnyBay front backplane	T2
32 8 x 2.5" SAS/SATA front backplane	T2	33 Middle brackets	T1
34 Fan	T1	35 Fan cage	C
36 2U cable wall	C	37 Processor	F

Description	Type	Description	Type
38 Memory module	T1	39 Processor and heat sink module filler	C
40 CMOS battery (CR2032)	C	41 PCIe adapter	T1
42 OCP module	T1	43 Top cover	T1
44 Power supply unit	T1	45 M.2 retainer	T2
46 M.2 RAID SATA/NVMe 2-bay backplane	T2	47 M.2 non-RAID NVMe 2-bay backplane	T2
48 Processor board	F	49 Processor socket cover	C
50 MicroSD card	T1	51 System I/O board (DC-SCM)	F
52 USB I/O board	T1	53 8 x 2.5" middle drive cage	C
54 8 x 2.5" rear drive cage	C	55 4 x 2.5" rear drive cage	C

E3.S bay chassis

Use the parts list in this section to identify each of the components that are available for server models with E3.S front bays.

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. Some parts are available only on some models.

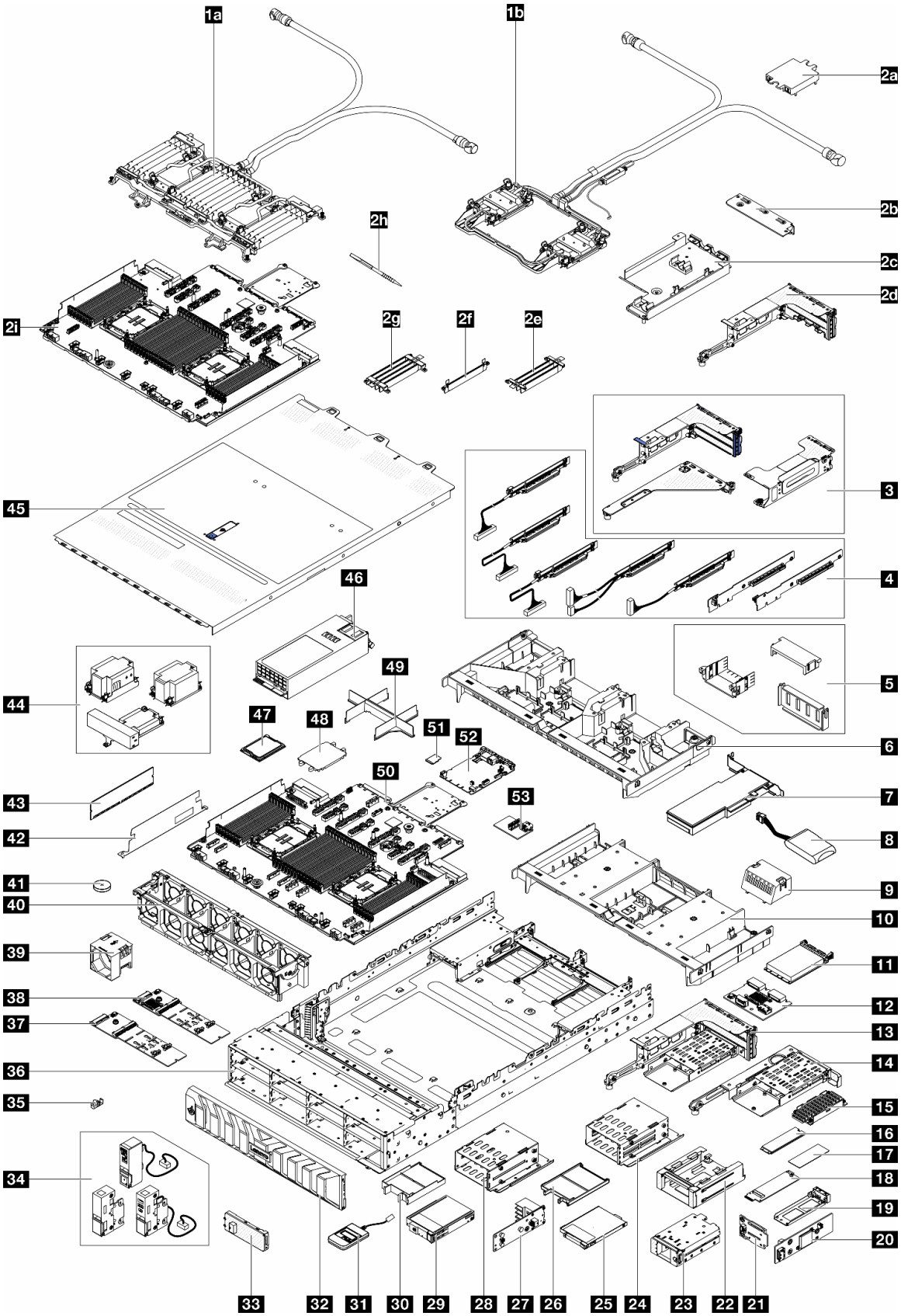

Figure 21. Server components (E3.S bay chassis)

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.

Notes:

- For details about riser cages (3), see "Rear riser assembly and PCIe adapter replacement" in *User Guide* or *Hardware Maintenance Guide*.
- For details about riser cards (4), see "PCIe slots and PCIe adapters" in *User Guide* or *Hardware Maintenance Guide*. The riser card for slot 1/2/9/10 is a FRU, and other riser cards are T1 CRUs.
- For details about GPU air baffle fillers (5), see "GPU replacement" in *User Guide* or *Hardware Maintenance Guide*.
- For details about rack latches (34), see "Front view" on page 19.

Description	Type	Description	Type
1a Compute Complex Neptune Core Module	F	1b Processor Neptune Core Module	F
2a Cold plate cover	C	2b 1FH bracket for Neptune Core Module	C
2c Hose holder	C	2d 3FH riser cage for Neptune Core Module	C
2e Middle DIMM bracket 1	T1	2f Middle DIMM bracket 2	T1
2g Side DIMM bracket	T1	2h DIMM tool	T1
2i Processor board for Compute Complex Neptune Core Module	F	3 Riser cages	C
4 Riser cards	T1/F	5 GPU air baffle fillers	C
6 GPU air baffle	T1	7 PCIe adapter	T1
8 RAID flash power module (supercap)	T1	9 Standard air baffle filler	C
10 Standard air baffle	T1	11 OCP module	T1
12 Rear M.2 backplane	T2	13 3FH M.2 riser cage	C
14 1FH M.2 riser cage	C	15 M.2 heat sink	F
16 M.2 drive	T1	17 M.2 thermal pad	F
18 M.2 interposer	T2	19 M.2 drive tray	C
20 Front M.2 controller board	F	21 Front M.2 boot backplane	F
22 Front M.2 cage frame	C	23 Front M.2 cage	C
24 E3.S 1T drive cage	C	25 E3.S 1T drive	T1
26 E3.S 1T drive filler	C	27 E3.S backplane	T2
28 E3.S 2T CMM cage	C	29 E3.S 2T CMM	T1
30 E3.S 2T CMM filler	C	31 External diagnostics handset	T1
32 Security bezel	T1	33 E3.S bezel	T1
34 Rack latches	T1	35 M.2 retainer	T2

Description	Type	Description	Type
36 Chassis	F	37 M.2 non-RAID NVMe 2-bay backplane	T2
38 M.2 RAID SATA/NVMe 2-bay backplane	T2	39 Fan	T1
40 Fan cage	C	41 CMOS battery (CR2032)	C
42 2U cable wall	C	43 Memory module	T1
44 Heat sinks	F	45 Top cover	T1
46 Power supply unit	T1	47 Processor	F
48 Processor socket cover	C	49 Processor and heat sink module filler	C
50 Processor board	F	51 MicroSD card	T1
52 System I/O board (DC-SCM)	F	53 USB I/O board	T1

3.5-inch drive bay chassis

Use the parts list in this section to identify each of the components that are available for server models with 3.5-inch front drive bays.

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. Some parts are available only on some models.

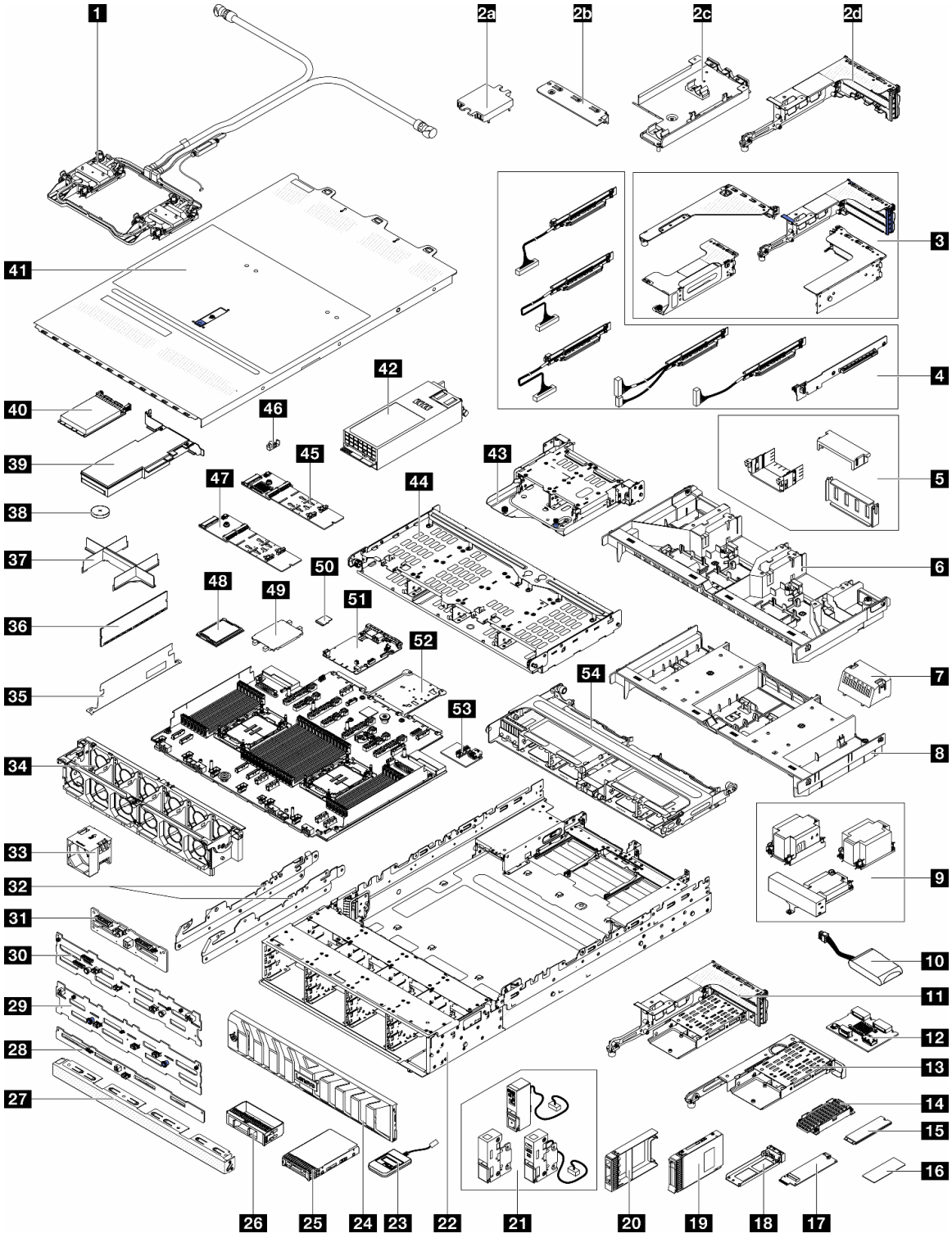

Figure 22. Server components (3.5-inch drive bay chassis)

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.

Notes:
- For details about riser cages (3), see “Rear riser assembly and PCIe adapter replacement” in *User Guide* or *Hardware Maintenance Guide*.
- For details about riser cards (4), see “PCIe slots and PCIe adapters” in *User Guide* or *Hardware Maintenance Guide*. The riser card for slot 1/2/9/10 is a FRU, and other riser cards are T1 CRUs.
- For details about GPU air baffle fillers (5), see “GPU replacement” in *User Guide* or *Hardware Maintenance Guide*.
- For details about rack latches (21), see “Front view” on page 19.

Description	Type	Description	Type
1 Processor Neptune Core Module	F	2a Cold plate cover	C
2b 1FH bracket for Neptune Core Module	C	2c Hose holder	C
2d 3FH riser cage for Neptune Core Module	C	3 Riser cages	C
4 Riser cards	T1/F	5 GPU air baffle fillers	C
6 GPU air baffle	T1	7 Standard air baffle filler	C
8 Standard air baffle	T1	9 Heat sinks	F
10 RAID flash power module (supercap)	T1	11 3FH M.2 riser cage	C
12 Rear M.2 backplane	T2	13 1FH M.2 riser cage	C
14 M.2 heat sink	F	15 M.2 drive	T1
16 M.2 thermal pad	F	17 M.2 interposer	T2
18 M.2 drive tray	C	19 2.5" drive	T1
20 2.5" drive filler	C	21 Rack latches	T1
22 Chassis	F	23 External diagnostics handset	T1
24 Security bezel	T1	25 3.5" drive	T1
26 3.5" drive filler (1-bay)	C	27 3.5" drive filler (4-bay)	C
28 4 x 3.5" SAS/SATA rear backplane	T1	29 12 x 3.5" SAS/SATA front backplane	T2
30 12 x 3.5" AnyBay front backplane	T2	31 4 x 2.5" AnyBay middle/rear backplane	F
32 Middle brackets	T1	33 Fan	T1
34 Fan cage	C	35 2U cable wall	C
36 Memory module	T1	37 Processor and heat sink module filler	F
38 CMOS battery (CR2032)	C	39 PCIe adapter	T1
40 OCP module	T1	41 Top cover	T1
42 Power supply unit	T1	43 4 x 2.5" rear drive cage	C
44 4 x 3.5" rear drive cage	C	45 M.2 RAID SATA/NVMe 2-bay backplane	T2
46 M.2 retainer	T2	47 M.2 non-RAID NVMe 2-bay backplane	T2
48 Processor	F	49 Processor socket cover	C

Description	Type	Description	Type
50 MicroSD card	T1	51 System I/O board (DC-SCM)	F
52 Processor board	F	53 USB I/O board	T1
54 8 x 2.5" middle drive cage	C		

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 68 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 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.

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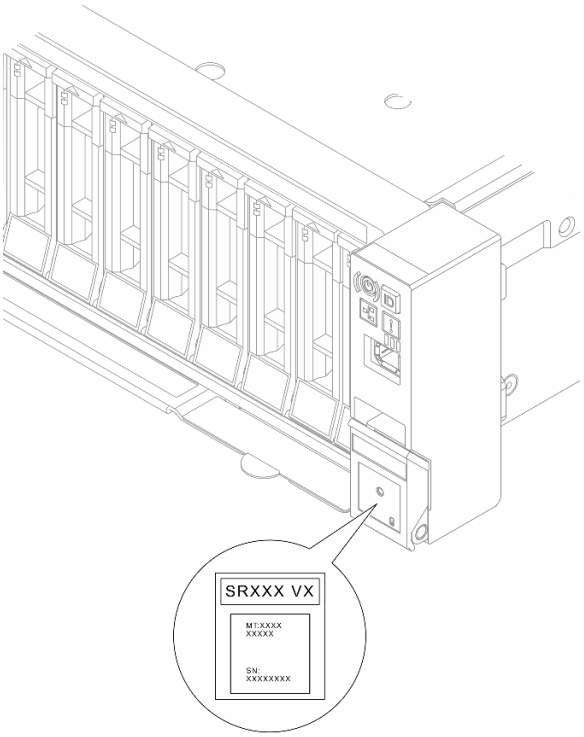

Figure 23. Location of the ID label

Lenovo XClarity Controller network access label

The Lenovo XClarity Controller (XCC) network access label is attached to the pull-out information tab in the front of the chassis, with MAC address accessible with a pull. After you receive the server, peel the XCC network access label away and store it in a safe place.

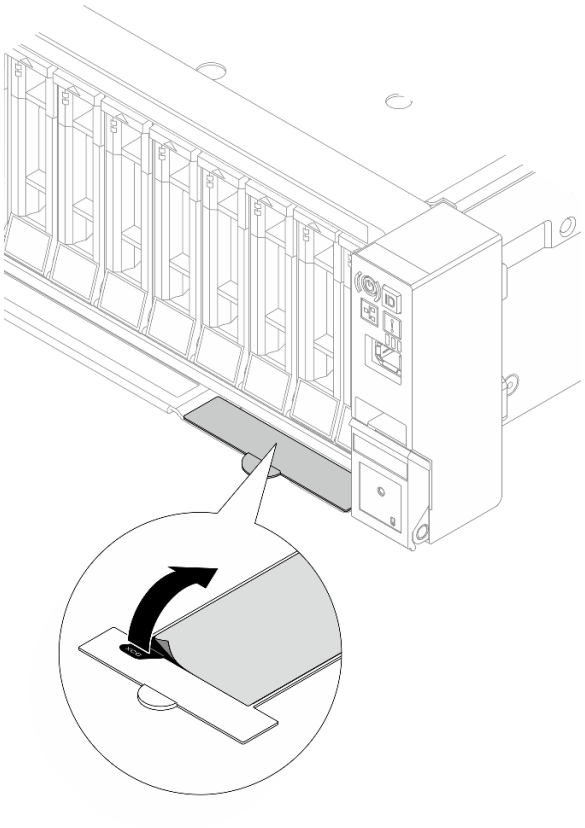

Figure 24. Lenovo XClarity Controller network access label on the pull-out information tab

Service information QR code

On the inside surface of the tray 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 solution support.

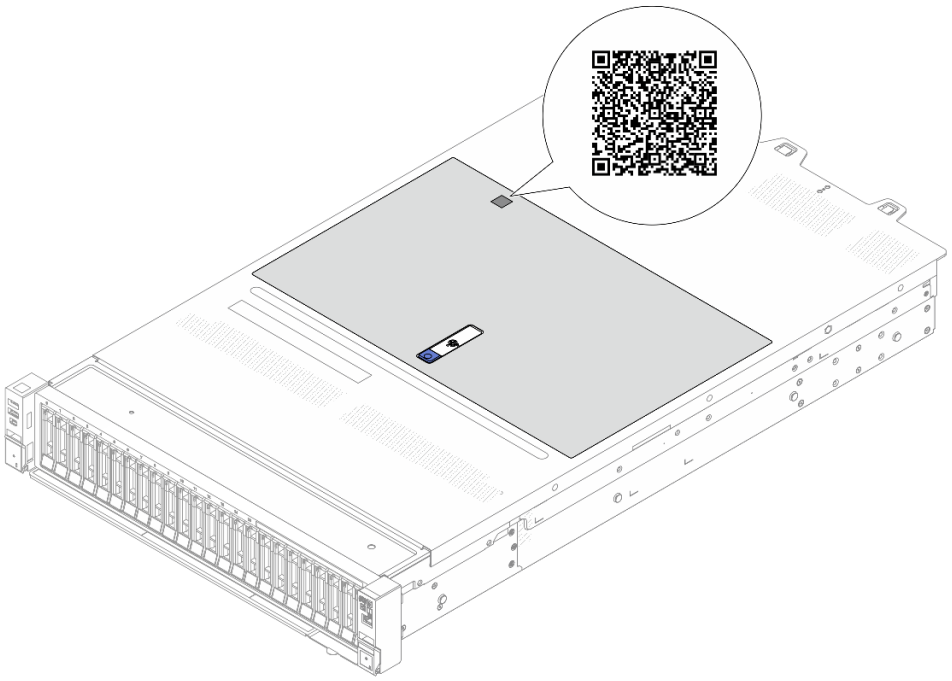

Figure 25. Service information QR code

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 65.
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 19 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 status LED are specified in:

   - Chapter 2 “Server components” on page 19
   - “System LEDs and diagnostics display” on page 38.

   The server can be turned on (power status 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 status LED, Ethernet connector LED, and network LED are lit with green light, which means the server hardware was set up successfully.

   See “System LEDs and diagnostics display” on page 38 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 71.

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.com/lp0578-lenovo-raid-introduction
   - https://lenovopress.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 (10/100/1000 Mbps) on your server. For the location of the XCC system management port (10/100/1000 Mbps), see Chapter 2 “Server components” on page 19.

  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 65.

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.

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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 19.
-  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 19 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:
  - http://lenovopress.com/LP0656
- The latest firmware can be found at the following site:
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v4/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.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 sever 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.com/lp0578-lenovo-raid-introduction

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

https://lenovopress.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 SR650 V4, see Technical specifications.
- 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
Bootable RAID	• 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
- VMware ESXi

- Canonical Ubuntu

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

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

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

  – Lenovo XClarity Essentials OneCLI

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

- **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/

  – Lenovo XClarity Essentials OneCLI

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

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/sr650v4/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.

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- 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 65.
- 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/sr650-v4/pdf_files

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***CMA Installation Guide***
  - Cable management arm (CMA) 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, cable routing, and troubleshooting.
- ***PCIe Slot Installation Guide***
  - PCIe slot installation rules.
- ***Cable Routing Guide***
  - Cable routing information.
- ***Messages and Codes Reference***
  - XClarity Controller, LXPM, and UEFI events
- ***UEFI Manual***
  - UEFI setting introduction

Note: SR650 V4 configured with Processor Neptune Core Module or Compute Complex Neptune Core Module can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem SR650 V4

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  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v4/downloads/driver-list/
- Lenovo Data Center Forum
  - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem SR650 V4
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v4
- Lenovo License Information Documents
  - https://datacentersupport.lenovo.com/documents/lnvo-eula
- Lenovo Press website (Product Guides/Datasheets/White papers)
  - http://lenovopress.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

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Important notes

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.

Maximum memory might require replacement of the standard memory with an optional memory module.

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.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

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.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

TCO Certified

Selected models/configurations meet the requirements of TCO Certified.

Note: TCO Certified is an international third-party sustainability certification for IT products. For details, go to https://www.lenovo.com/us/en/compliance/tco/.