



ThinkEdge SE455 V3 System Configuration Guide



Machine Types: 7DBY

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>

Fifth Edition (April 2024)

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Contents

Contents	i	Server setup checklist	51
Safetyiii	Chapter 5. System configuration	53
Safety inspection checklist	iv	Set the network connection for the Lenovo XClarity Controller	53
Chapter 1. Introduction	1	Activate/unlock the system and configure ThinkEdge security features	53
Features.	1	Activate or unlock the system	54
Tech Tips	3	System Lockdown Mode	56
Security advisories	3	Manage the Self Encryption Drive Authentication Key (SED AK)	57
Specifications	3	Set dust filter measurement	58
Technical specifications.	4	Update the firmware	60
Mechanical specifications	8	Configure the firmware	64
Environmental specifications	9	Memory module configuration	65
Management options.	17	RAID configuration	65
Chapter 2. Server components	21	Deploy the operating system.	65
Front view	21	Back up the server configuration	66
Top view	25	Appendix A. Getting help and technical assistance	67
System-board layout.	26	Before you call	67
System-board connectors	26	Collecting service data	68
System-board switches	28	Contacting Support	69
System LEDs and diagnostics display	30	Appendix B. Documents and supports	71
Troubleshooting by system LEDs and diagnostics display	30	Documents download	71
Drive LEDs	30	Support websites	71
Front LEDs	30	Appendix C. Notices.	73
Power supply LEDs	33	Trademarks	74
System-board LEDs	34	Important notes.	74
Firmware and RoT security module LEDs	37	Electronic emission notices	74
XCC system management port LEDs.	38	Taiwan Region BSMI RoHS declaration	75
External Diagnostics Handset	39	Taiwan Region import and export contact information	75
Chapter 3. Parts list	45		
Power cords	48		
Chapter 4. Unboxing and setup	49		
Server package contents	49		
Identify the server and access the Lenovo XClarity Controller	49		

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte 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་ཐབས་འདི་བདེ་སྤྱད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་མེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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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: This device is not intended for use in the direct field of view at visual display workplaces. To avoid incommoding reflections at visual display workplaces, this device must not be placed in the direct field of view.

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

CAUTION:

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

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.

Chapter 1. Introduction

The ThinkEdge SE455 V3 server (Type 7DBY) is a new edge server offering. It is specifically designed to meet the needs of edge computing, edge AI, hybrid cloud and workloads at the edge locations. ThinkEdge SE455 V3 is a rugged compact sized edge solution with a focus on smart connectivity, business security and manageability for the harsh environment. Built for long life and dependable performance to support your demanding IoT workloads at the Edge. Compact and rugged it is designed for the non-datacenter environment, ideal for remote locations such as retail, manufacturing and factory locations.



Figure 1. ThinkEdge SE455 V3

Features

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

Your server implements the following features and technologies:

- **Features on Demand**

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

<https://fod.lenovo.com/lkms>

- **Lenovo XClarity Controller (XCC)**

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

The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.

- **UEFI-compliant server firmware**

Lenovo ThinkEdge 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 ThinkEdge 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).

- **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 supports up to four 2.5-inch SAS/SATA/NVMe hot-swap drives in the front drive cage, and up to four optional 2.5-inch SAS/SATA/NVMe non-hot-swap drives in the internal drive cage.

Notes:

- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.
- RAID adapter/HBA is required for 2.5-inch SAS drives.

- **Lightpath Diagnostics**

Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see [“Troubleshooting by system LEDs and diagnostics display” on page 30](#).

- **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, ThinkServer, ThinkSystem and ThinkEdge 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.

- **Redundant cooling**

The redundant cooling by the fans in the server enables continued operation if one rotor of the fans fails.

- **Optional power capabilities**

The server supports up to two 1100-watt or 1800-watt power supply units.

- **RAID support**

The RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations. RAID adapter with RAID 0, 1, 10, 5, 50, 6, 60 is available for purchase.

- **Integrated Trusted Platform Module (TPM)**

This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification.

- **Lenovo XClarity Controllers System Lockdown Mode**

System lockdown will be enforced under specific circumstances to protect the server from information breach, particularly when the server is transported by non-certified carriers to remote environments. See [“System Lockdown Mode” on page 56](#) for details.

Tech Tips

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

To find the Tech Tips available for your server:

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

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

Security advisories

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

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

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

Specifications

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

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

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	<ul style="list-style-type: none"> • Processor • Memory • M.2 Drive • Storage expansion • Expansion slots • Graphics processing units (GPU) and accelerator • Integrated functions and I/O connectors • Network • RAID adapter • Host bus adapter • System fan • Electrical input • Minimal configuration for debugging • Operating systems 	<ul style="list-style-type: none"> • Dimension • Weight 	<ul style="list-style-type: none"> • Acoustical noise emissions • Ambient temperature management • Environmental

Technical specifications

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

Processor
<p>Supports AMD® EPYC™ 8004 series processors.</p> <ul style="list-style-type: none"> • Scalable up to 64 cores • Designed for LGA 4844 (SP6) socket • Supports 96 lanes of high speed I/O • Thermal Design Power (TDP): up to 200 watts • Configurable Thermal Design Power (cTDP): up to 225 watts <p>For a list of supported processors, see: https://serverproven.lenovo.com.</p>

Memory
<p>See “Memory module installation rules and order” in <i>User Guide</i> or <i>Hardware Maintenance Guide</i> for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Capacity <ul style="list-style-type: none"> – Minimum: 16 GB – Maximum: 576 GB • Memory module types: Double-data-rate 5 (TruDDR5) error correcting code (ECC) 4800 MT/s registered DIMM (RDIMM) • Slots: 6 dual inline memory module (DIMM) connectors <p>For a list of supported memory modules, see: https://serverproven.lenovo.com.</p>

M.2 Drive

Supports up to two SATA/NVMe M.2 drives.

- Capacity
 - 128 GB
 - 240 GB
 - 480 GB
 - 960 GB

Notes: Depending on the M.2 backplane installed, SE455 V3 supports different RAID configurations.

- With SATA/x4 NVMe M.2 backplane (ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit) installed:
 - The non-RAID configuration of M.2 drives supports NVMe only.
 - The RAID configuration of M.2 drives is supported with one of the following RAID adapters:
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: SATA
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: NVMe
- With SATA/NVMe M.2 backplane (ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter) installed:
 - The non-RAID configuration of M.2 drives supports SATA/NVMe.
 - The RAID configuration of M.2 drives supports SATA/NVMe.

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

Storage expansion

Front drives

- Up to four 2.5-inch SAS/SATA/NVMe hot-swap drives

Note: When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.

Internal drives (optional)

- Up to four 2.5-inch SAS/SATA/NVMe non-hot-swap drives

Note: RAID adapter/HBA is required for SAS drives.

Expansion slots

Supported expansion slots vary by configuration.

- **M.2 drive bay (optional):** support up to two M.2 SATA/NVMe drives

- Slot 1 / M.2 bay 0
- Slot 2 / M.2 bay 1

Note: RAID adapter/HBA is required for M.2 SATA drives.

- **PCIe slots:** all PCIe slots support 75W

Note: Performance may degrade when a x16 PCIe adapter is installed in a x8 lane PCIe slot.

- **PCIe riser 1**

- Slot 3: x16 (Gen5 x16 lanes)
- Slot 4: x16 (Gen4 x8 lanes)
- Slot 5: x16 (Gen4 x8 lanes)

Notes:

- When the serial port module is installed, Slot 5 is not supported.
- When a double-wide GPU is installed in Slot 3, Slot 4 is not supported.

- **PCIe riser 2 (optional)**

- Slot 6: x16 (Gen4 x8 lanes)
- Slot 7: x16 (Gen5 x16 lanes)
- Slot 8: x16 (Gen4 x8 lanes)

Notes:

- Slot 6 and Slot 8 are not supported in the following configurations:
 - Front SATA drive backplane and internal NVMe drive backplane connect to the system board
 - Front NVMe drive backplane and internal NVMe drive backplane connect to the system board
- When a double-wide GPU is installed in Slot 7, Slot 6 is not supported.

- **OCP module slot**

- Slot 9: Gen5 x16 lanes (with NC-SI support)

Graphics processing unit (GPU) and accelerator

Supports one of the following:

- Up to two double-wide 330W GPUs (Slot 3 and Slot 7)
- Up to six single-wide 75W GPUs/accelerators

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 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.
- **Front I/O connectors**
 - One XCC system management port on the front to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed.
 - A group of two or four Ethernet connectors on OCP module
 - One USB 2.0 Type-A connector with Lenovo XClarity Controller management
 - Two USB 3.2 Gen 1 (5 Gbps) Type-A connectors
 - One USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support
 - One external diagnostics connector

Network

- OCP 3.0 module: Supports one OCP 3.0 Ethernet network adapter in Slot 9 (with NC-SI support)
- Supports up to six PCIe Ethernet adapters

RAID adapter

- ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: RAID 0, 1, 10, 5
- ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: RAID 0, 1, 10
- ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter: RAID 0, 1, 10, 5, 50, 6, 60

Important: **Do not** enable the SED management of RAID adapter, and **do not** connect encryption-enabled SEDs to RAID adapters. The SED management of RAID adapter might conflict with system AK management.

Notes:

Depending on the M.2 backplane installed, SE455 V3 supports different RAID configurations.

- With SATA/x4 NVMe M.2 backplane (ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit) installed:
 - The non-RAID configuration of M.2 drives supports NVMe only.
 - The RAID configuration of M.2 drives is supported with one of the following RAID adapters:
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter: SATA
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter: NVMe
- With SATA/NVMe M.2 backplane (ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter) installed:
 - The non-RAID configuration of M.2 drives supports SATA/NVMe.
 - The RAID configuration of M.2 drives supports SATA/NVMe.

Host bus adapter

- ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 4350-8i SAS/SATA 12Gb HBA

System fan

- Five 60 mm x 60 mm x 56 mm dual-rotor fans

Electrical input

Supports up to two units of power supplies with N+N redundancy. Following is the list of supported types:

- 1800-watt Platinum, input power 230 VAC
- 1100-watt Titanium, input power 230 VAC
- 1100-watt Platinum, input power 115-230 VAC
- 1100-watt -48V DC power supply unit

Important: Power supplies installed in the server must be with the same power rating, wattage or level.

Minimal configuration for debugging

- One processor
- One DDR5 DRAM memory modules in slot 3 (DIMM3)
- One power supply unit in PSU bay 1 (PSU1)
- One M.2 boot drive (if OS is needed for debugging)
- Five system fans

Operating systems

Supported and certified operating systems:

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

References:

- Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.
- OS deployment instructions, see “Deploy the operating system” on page 65.

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

- Depth:
 - Without security bezel (from the EIA brackets to the rear end of the chassis): 440.0 mm (17.32 inches)
 - With security bezel: 546.5 mm (21.51 inches)
- Height: 86.5 mm (3.41 inches)
- Width:
 - Without EIA brackets: 444.6 mm (17.50 inches)
 - With EIA brackets: 480.5 mm (18.92 inches)

Weight

Maximum: 19.36 kg (42.68 lbs)

Environmental specifications

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

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound power level (L_{WAd})
 - Idling:
 - Minimum: 5.5 Bel
 - GPU Rich: 5.5 Bel
 - Storage Rich: 5.8 Bel
 - Operating profile 1:
 - Minimum: 5.5 Bel
 - GPU Rich: 5.5 Bel
 - Storage Rich: 5.8 Bel
 - Operating profile 2:
 - Minimum: 5.5 Bel
 - GPU Rich: 7.4 Bel
 - Storage Rich: 6.0 Bel
- Sound pressure level (L_{pAm}):
 - Idling:
 - Minimum: 39.0 dBA
 - GPU Rich: 39.0 dBA
 - Storage Rich: 42.8 dBA
 - Operating profile 1:
 - Minimum: 39.0 dBA
 - GPU Rich: 39.0 dBA
 - Storage Rich: 42.8 dBA
 - Operating profile 2:
 - Minimum: 39.0 dBA
 - GPU Rich: 58.2 dBA
 - Storage Rich: 44.6 dBA

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296. Operating profile 1 is represented by 50% CPU TDP. Operating profile 2 is represented by 100% CPU TDP or 70%/30% storage write/read or 100% GPU. Testing was conducted at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ to align with ISO7779 procedures.
- The declared acoustic sound levels are based on the specified configurations, which may change depending on configuration/conditions.
 - Minimum: 1x AMD EPYC 8024P (8 core, 90W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-port OCP Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for M.2 RAID, 4x ThinkSystem 2.5" 5400 MAX 3.84TB Mixed Use SATA 6Gb HS SSD data drives with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for SATA RAID, 2x AC PSU 1100W
 - GPU Rich: 1x AMD EPYC 8224P (24 core, 160W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-port OCP Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for M.2 RAID, 4x ThinkSystem 2.5" 5400 MAX 3.84TB Mixed Use SATA 6Gb HS SSD data drives with 1x ThinkSystem RAID 5350-8i PCIe 12Gb Adapter for SATA RAID, 4x ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU, 2x AC PSU 1100W

Acoustical noise emissions

- Storage Rich: 1x AMD EPYC 8124P (16 core, 125W) CPU, 1x 2U heat sink, 4x ThinkSystem 32GB TruDDR5 4800MHz (2Rx8) RDIMMs, 1x ThinkSystem Intel X710-T2L 10GBASE-T 2-Port PCIe Ethernet Adapter, 2x 5400 Pro 2280 M.2 SATA SSD 960GB boot drive with M.2 RAID B540i-2i adapter for M.2 RAID, 8x ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD, 2x AC PSU 1100W
- 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.

Acoustic modes and ambient temperature

Depending on the selected acoustic mode, specific components require proper ambient temperature to prevent performance degradation.

- ThinkEdge SE455 V3 supports three acoustic modes with different acoustic performance.
 - **Disabled:** The server operates at default fan speeds.
 - **Mode 1:** The server operates with sound pressure level of 45 dBA at 25°C or lower ambient temperature with proper configuration.
 - **Mode 2:** The server operates with sound pressure level of 40 dBA at 25°C or lower ambient temperature with proper configuration.

Notes: For Acoustic mode 1 and mode 2:

- 2U heat sink is necessary.
- Throttling might momentarily occur.
- To change the acoustic mode, enter the Setup Utility and go to **System settings → Operating Modes → Acoustic mode**.
- See the corresponding table for more information of different acoustic modes and ambient temperature:
 - [Table 1 “Acoustic mode Disabled” on page 11](#)
 - [Table 2 “Acoustic mode 1” on page 13](#)
 - [Table 3 “Acoustic mode 2” on page 14](#)

Table 1. Acoustic mode Disabled

Component		Maximum ambient temperature
<ul style="list-style-type: none"> • The components not listed in this table are recommended to operate with ambient temperature lower than 55°C. • If the ambient temperature is the maximum ambient temperature, performance degradation or throttled event might occur. 		
Processor		
	AMD EPYC 8124P processor	50°C
	AMD EPYC 8434PN, 8534PN processor with PCIe riser 2 installed Note: In configurations without PCIe riser 2, AMD EPYC 8434PN/8534PN processor supports ambient temperature up to 55°C.	50°C
	AMD EPYC 8224P, 8324P, 8434P, 8534P processor	45°C
Memory modules		

Table 1. Acoustic mode Disabled (continued)

Component		Maximum ambient temperature
	64GB	50°C
	96GB	45°C
PCIe adapters		
	<ul style="list-style-type: none"> • ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter • ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter • ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter 	50°C
	Single-wide GPU adapter or accelerator	45°C
	Double-wide GPU adapter	40°C
OCP module		
	ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter	50°C
Front NVMe drives		
	<ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7450 MAX SSD (800GB) 	50°C
	<ul style="list-style-type: none"> • U.2 P5520 SSD (7.68TB or larger) • U.2 P5620 SSD (6.4TB or larger) 	45°C
	<ul style="list-style-type: none"> • U.3 7450 PRO SSD (3.84TB or larger) • U.3 7450 MAX SSD (1.6TB or larger) 	35°C
Internal SATA drives		45°C
Internal NVMe drives Notes: <ul style="list-style-type: none"> • The following internal NVMe drives might be throttled when ambient temperature is higher than 30°C: <ul style="list-style-type: none"> – U.2 P5520 SSD (7.68TB) – U.2 P5620 SSD (6.4TB) • The following NVMe drives of specific capacity are not supported as internal drives: <ul style="list-style-type: none"> – U.2 P5520 SSD (15.36TB) – U.2 P5620 SSD (12.8TB) – U.3 7450 PRO SSD (3.84TB or larger) – U.3 7450 MAX SSD (1.6TB or larger) 		35°C

Table 1. Acoustic mode Disabled (continued)

Component	Maximum ambient temperature
M.2 SATA drives	50°C
M.2 NVMe drives	45°C

Table 2. Acoustic mode 1

<p>In Acoustic mode 1, the server operates with sound pressure level of 45 dBA at 25°C or lower ambient temperature with proper configuration.</p> <ul style="list-style-type: none"> • 2U heat sink is necessary. • Throttling might momentarily occur. <p>See the following information for configurations supported in Acoustic mode 1.</p> <p>Note: When one of the components listed as "not recommended" is installed, system fan speed will impact acoustic performance. However, if the not-recommended component is lightly loaded, it may still be possible to run the server in the acoustic mode and lower the system noise.</p>	
Processor	<ul style="list-style-type: none"> • AMD EPYC 8024P, 8124P processor • AMD EPYC 8024PN, 8124PN, 8224PN, 8324PN processor
Memory modules	16, 32, 48GB
PCIe adapters	<ul style="list-style-type: none"> • Supports up to two single-wide GPU adapters. The following GPU adapters are supported: <ul style="list-style-type: none"> – ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC • RAID adapter and Ethernet adapter are supported.
Front SATA drives	Supported
Front NVMe drives	<ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7450 MAX SSD (800GB)
Internal SATA drives	Supported
Internal NVMe drives	Not recommended
M.2 SATA drives	Supported
M.2 NVMe drives	Not recommended

Table 3. Acoustic mode 2

<p>In Acoustic mode 2, the server operates with sound pressure level of 40 dBA at 25°C or lower ambient temperature with proper configuration.</p> <ul style="list-style-type: none"> • 2U heat sink is necessary. • Throttling might momentarily occur. <p>See the following information for configurations supported in Acoustic mode 2.</p> <p>Note: When one of the components listed as "not recommended" is installed, system fan speed will impact acoustic performance. However, if the not-recommended component is lightly loaded, it may still be possible to run the server in the acoustic mode and lower the system noise.</p>	
Processor	<ul style="list-style-type: none"> • AMD EPYC 8024P processor • AMD EPYC 8024PN, 8124PN processor
Memory modules	16, 32, 48GB
PCIe adapters	<ul style="list-style-type: none"> • GPU adapter and accelerator are not recommended. • RAID adapter and Ethernet adapter are supported, except for ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter.
Front SATA drives	Supported
Front NVMe drives	<ul style="list-style-type: none"> • U.2 P5520 SSD (3.84TB or smaller) • U.2 P5620 SSD (3.2TB or smaller) • U.3 7450 PRO SSD (1.92TB or smaller) • U.3 7450 MAX SSD (800GB)
Internal SATA drives	Not recommended
Internal NVMe drives	Not recommended
M.2 SATA drives	Supported
M.2 NVMe drives	Not recommended

Environment

ThinkEdge SE455 V3 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 operating temperature is outside ASHRAE A2 specification.

- Air temperature:
 - Operating
 - ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
 - ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175m (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 125m (410 ft) increase in altitude above 900 m (2,953 ft).
 - Server off: 5°C to 45°C (41°F to 113°F)
 - Shipment/storage: -40°C to 60°C (-40°F to 140°F)
 - Extended operation temperature (with limited configuration):
 - Server on: 5°C to 55°C (41°F to 131°F)
 - Server off: 5°C to 55°C (41°F to 131°F)

Note: See [Table 1 “Acoustic modes and ambient temperature” on page 11](#) for the supported components at different ambient temperature.

- Maximum altitude: 3,050 m (10,000 ft)
- Relative Humidity (non-condensing):
 - Operating
 - ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
 - ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F)
 - ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F)
 - Shipment/storage: 8% to 90%
- Particulate contamination
 - SE455 V3 supports use of a dust filter that is installed inside the security bezel. The dust filter has a Minimum Efficiency Rating Value (MERV) of 2, per ASHRAE Standard 52.2-2017.

Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see [“Particulate contamination” on page 16](#).

Shock and vibration specifications

The following information is a summary of the shock and vibration specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Table 4. Shock and vibration specifications

ThinkEdge SE455 V3	Vibration	Shock	Drop
Operation shock & vibration	0.21Grms, 5-500 Hz, 15 min/axis	15G, 3ms, half-sine, $\pm X$, $\pm Y$, $\pm Z$	-
Fragility shock & vibration (when the server is not in operation, such as in shipping)	1.04Grms, 2-200 Hz	52G, 152in/sec	-
Rack-load vibration & drop	0.8Grms, 2-200 Hz	-	Free-fall drop height: 40-100mm Equivalent shock: 40-70 inch/sec, 2-3 ms

Table 5. Environmental criteria (NEBs GR63)

ThinkEdge SE455 V3 Environmental criteria (NEBs GR63)	Bench handling drop	Office vibration	Earthquake test
	Edge drop height (each edge): 100mm Free-fall drop height: 75mm	0.21Grms, 5-100 Hz, 30 min/axis	GR63 earthquake zone 4

Particulate contamination

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

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

Table 6. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).² The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).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	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> 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. <p>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.</p> <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>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.</p> <p>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.</p>	

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	<p>Baseboard management controller (BMC)</p> <p>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).</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application • Web GUI interface • Mobile application • Redfish API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxcc-overview/</p>
Lenovo XCC Logger Utility	<p>Application that reports the XCC events to local OS system log.</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application <p>Usage and downloads</p> <ul style="list-style-type: none"> • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI interface • Mobile application • REST API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxca/</p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p>Interface</p> <ul style="list-style-type: none"> • OneCLI: CLI application • Bootable Media Creator: CLI application, GUI application • UpdateXpress: GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxce-overview/</p>

Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>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/.</p>
Lenovo XClarity Integrator	<p>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.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>

Functions

Options		Functions						
		Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Events/alert monitoring	Inventory/logs	Power mgmt
Lenovo XClarity Controller				√	√ ²	√	√ ⁴	
Lenovo XCC Logger Utility						√		
Lenovo XClarity Administrator		√	√	√	√ ²	√	√ ⁴	
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ ²	√	√	
	Bootable Media Creator			√	√ ²		√ ⁴	
	UpdateXpress			√	√ ²			
Lenovo XClarity Provisioning Manager			√	√	√ ³		√ ⁵	
Lenovo XClarity Integrator		√	√ ⁶	√	√	√	√	√ ⁷
Lenovo XClarity Energy Manager		√				√		√
Lenovo Capacity Planner								√ ⁸

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. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

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

Front view

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

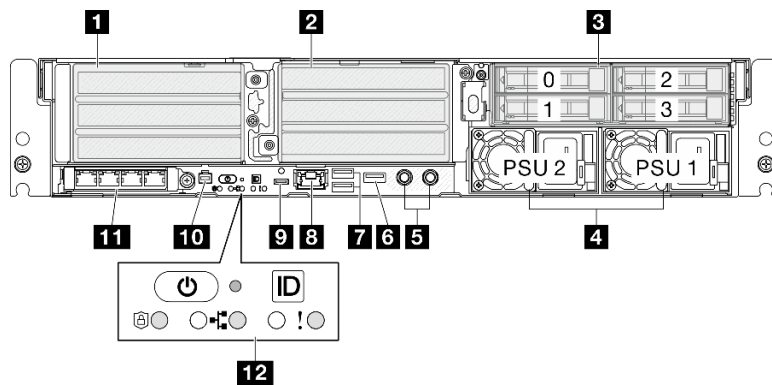


Figure 2. Front view

Table 7. Components on the front view

1 “PCIe riser 1” on page 21	7 “USB 3.2 Gen 1 (5 Gbps) Type-A connectors” on page 23
2 “PCIe riser 2” on page 21	8 “XCC system management port” on page 23
3 “Front drive bays” on page 22	9 “USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support” on page 23
4 “Power supply unit bays” on page 22	10 “External diagnostics handset connector” on page 23
5 “Grounding points” on page 22	11 “OCP 3.0 module” on page 23
6 “USB 2.0 Type-A connector with Lenovo XClarity Controller management” on page 22	12 “System buttons and LEDs” on page 24

1 / 2 PCIe riser assemblies

Install PCIe adapters into these riser assemblies. See the following table for PCIe slots corresponding to the PCIe riser assembly.

Note: Performance may degrade when a x16 PCIe adapter is installed in a x8 lane PCIe slot.

Table 8. **PCIe riser assemblies and corresponding slots**

PCIe riser assembly	PCIe slots (top to bottom)
1 PCIe riser 1	<ul style="list-style-type: none"> Slot 3: x16 (Gen5 x16 lanes) Slot 4: x16 (Gen4 x8 lanes) Slot 5: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> When the serial port module is installed, Slot 5 is not supported. When a double-wide GPU is installed in Slot 3, Slot 4 is not supported.
2 PCIe riser 2 Note: PCIe riser 2 is optional. The models without PCIe riser 2 come with a riser blank filler.	<ul style="list-style-type: none"> Slot 6: x16 (Gen4 x8 lanes) Slot 7: x16 (Gen5 x16 lanes) Slot 8: x16 (Gen4 x8 lanes) Notes: <ul style="list-style-type: none"> Slot 6 and Slot 8 are not supported in the following configurations: <ul style="list-style-type: none"> Front SATA drive backplane and internal NVMe drive backplane connect to the system board Front NVMe drive backplane and internal NVMe drive backplane connect to the system board When a double-wide GPU is installed in Slot 7, Slot 6 is not supported.

3 Front drive bays (Bay 0-3)

Install 2.5-inch drives to these bays. See “Install a front hot-swap drive” in *User Guide* or *Hardware Maintenance Guide* for more information.

4 Power supply unit bays (PSU 1-2)

Install power supply units to these bays, and connect power cords to the power supply units. Make sure the power cords are connected properly. SE455 V3 supports the following types of power supplies:

- 1800-watt Platinum, input power 230 VAC
- 1100-watt Titanium, input power 230 VAC
- 1100-watt Platinum, input power 115-230 VAC
- 1100-watt -48V DC power supply unit

For more information on the power supply LEDs, see [“Power supply LEDs” on page 33](#).

5 Grounding points

Connect the grounding wires to these threaded studs.

6 USB 2.0 Type-A connector with Lenovo XClarity Controller management

Connection to Lenovo XClarity Controller is primarily intended for users with a mobile device running the Lenovo XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the Lenovo XClarity Controller.

Only one mode is supported:

- **BMC only mode**

In this mode, the USB port is always solely connected to Lenovo XClarity Controller.

7 USB 3.2 Gen 1 (5 Gbps) Type-A connectors (USB Port 1-2)

Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors.

8 XCC system management port (1GbE RJ-45)

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

See the following for more information:

- [“Set the network connection for the Lenovo XClarity Controller” on page 53](#)
- [“XCC system management port LEDs” on page 38](#)

Note: In addition to the standard 1000 Mbps data transfer rate, the XCC system management port also supports 10 Mbps, 100 Mbps speeds.

9 USB 3.2 Gen 1 (5 Gbps) Type-C connector with display support (USB Port 3)

Connect a USB device, such as a mouse, keyboard, monitor, or other devices, to either of this connector. This connector supports display.

10 External diagnostics handset connector

Connect the external diagnostics handset to this connector. See “External diagnostics handset” in *ThinkEdge SE455 V3 User Guide* or *ThinkEdge SE455 V3 Hardware Maintenance Guide* for more details.

11 OCP 3.0 module (Slot 9)

Slot 9 is with NC-SI support.

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



Figure 3. Port numbering — 2-port OCP module

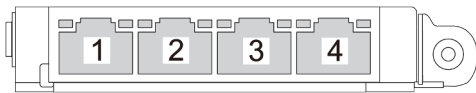


Figure 4. Port numbering — 4-port OCP 3.0 module

12 System buttons and LEDs

The buttons and LEDs provide controls and system status. The following buttons and LEDs are in this area:

- Power button with power status LED (green)
- Security LED (green)
- NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

- Network activity LED (green)
- System ID button with system ID LED (blue)
- System error LED (yellow)

See [“Front LEDs” on page 30](#) for more information.

Front I/O fillers

Install the I/O fillers when the connectors are not used. The connectors could be damaged without proper protection of the fillers.

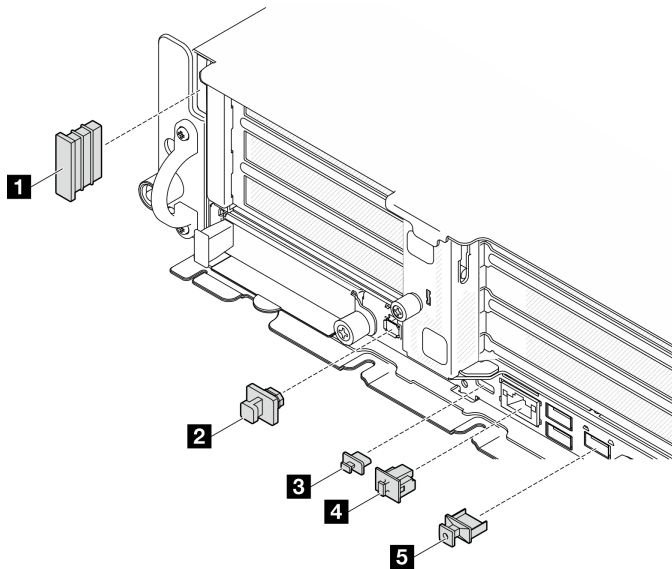


Figure 5. Front I/O fillers

1 Security bezel slot filler (x2)	4 RJ-45 filler (x1)
2 External diagnostic handset connector filler (x1)	5 USB Type-A filler (x3)
3 USB Type-C filler (x1)	

Top view

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

Refer to the following table for top view identification of the server

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

Top view: top layer

The following illustration is the top view after removing the top cover.

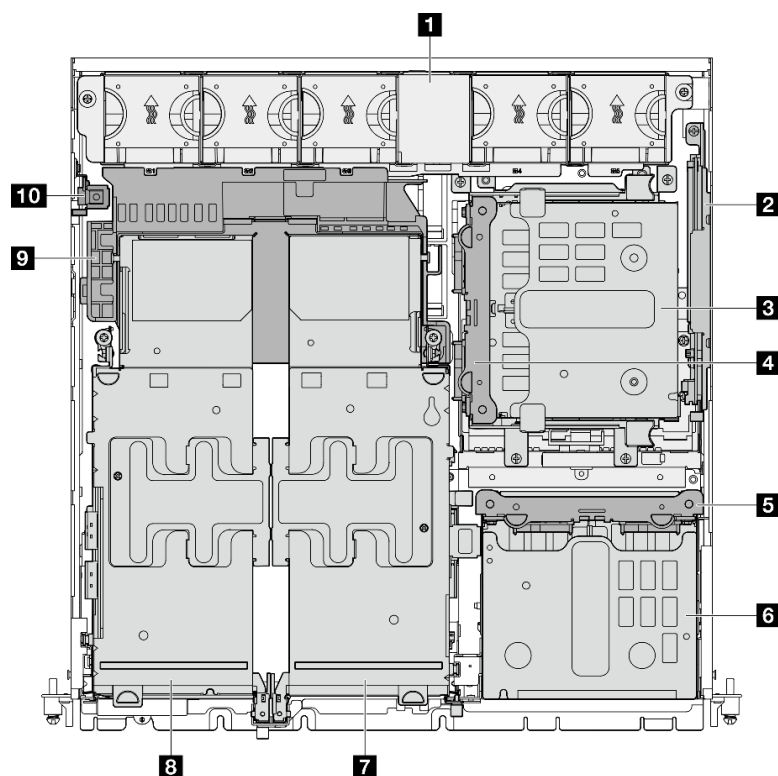


Figure 6. Top view: top layer

Table 9. Components on the top view: top layer

1 System fans	6 Front drive cage
2 (Optional) M.2 backplane assembly	7 (Optional) PCIe riser 2
3 (Optional) Internal drive cage	8 PCIe riser 1
4 (Optional) Internal drive backplane	9 Processor air baffle
5 Front drive backplane	10 Intrusion switch

Top view: bottom layer

The following illustration is the top view after removing the top cover and the removable components on the top layer.

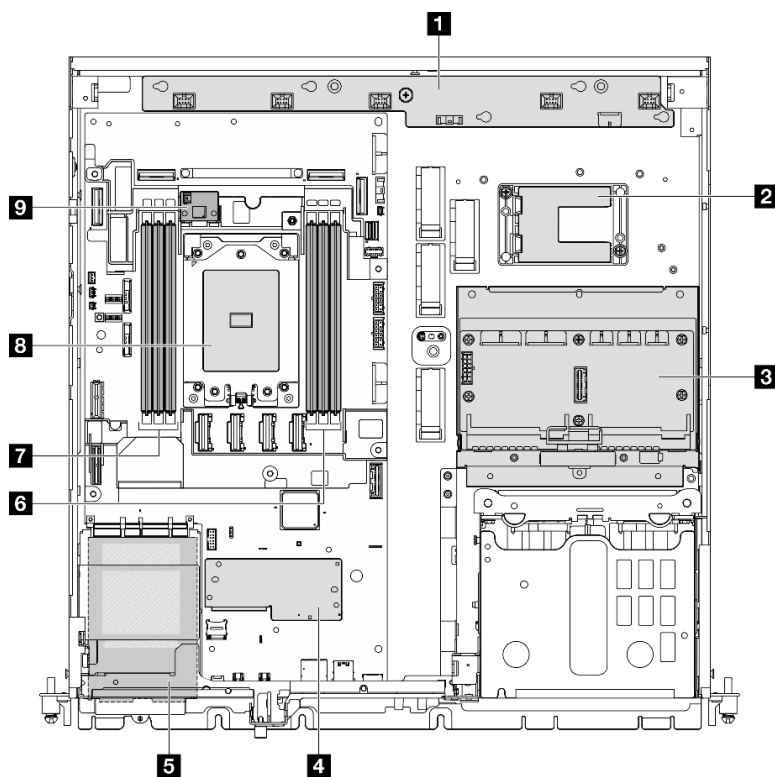


Figure 7. Top view: bottom layer

Table 10. Components on the top view: bottom layer

1 Fan control board (FCB)	6 Memory module slots (DIMM 1-3, right to left)
2 RAID flash power module holder Note: RAID flash power module (supercap) is an optional part installed in the holder.	7 Memory module slots (DIMM 4-6, right to left)
3 Power distribution board (PDB)	8 Processor
4 Firmware and RoT security module	9 (Optional) Air flow sensor board
5 OCP 3.0 module	

System-board layout

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

For more information about the LEDs that are available on the system board, see [“System-board LEDs” on page 34](#).

System-board connectors

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

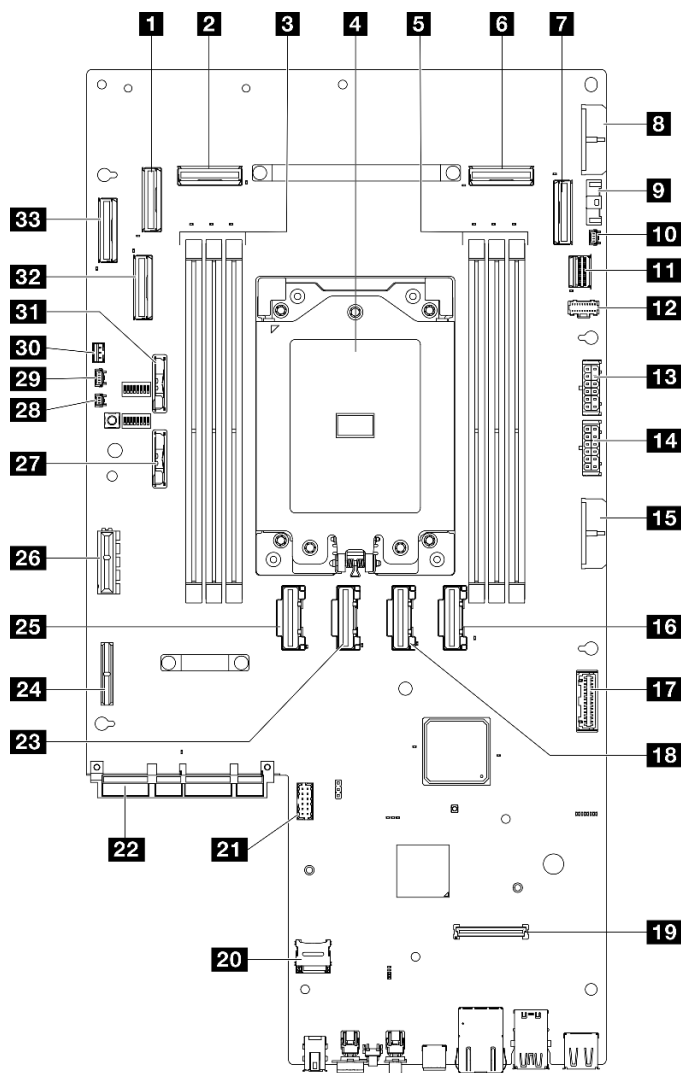


Figure 8. System-board connectors

Table 11. System-board connectors

1 PCIe 9 connector	18 PCIe 5 connector
2 PCIe 8 connector	19 Firmware and RoT security module connector
3 Memory module slots (DIMM 4-6, right to left)	20 MicroSD socket
4 Processor	21 Serial port connector (COM)
5 Memory module slots (DIMM 1-3, right to left)	22 OCP module connector
6 PCIe 3 connector	23 PCIe 6 connector
7 PCIe 2 connector	24 Riser 1 power connector
8 System board power 2 connector (PDB PWR 2)	25 PCIe 7 connector
9 Fan signal connector (FCB Sideband)	26 Riser 1 signal connector (Riser1 Sideband)
10 Heat sink detect connector	27 3V system battery (CR2032)
11 M.2 signal connector (PCIe 1)	28 Bezel detect connector

Table 11. System-board connectors (continued)

12 M.2 power connector (M.2 Sideband)	29 Air flow sensor board connector (Air Velocity Sensor)
13 Internal backplane power connector	30 Intrusion switch connector
14 Front backplane power connector	31 3V security battery (CR2032)
15 System board power 1 connector (PDB PWR 1)	32 PCIe 10 connector
16 PCIe 4 connector	33 PCIe 11 connector
17 Power distribution board signal connector (PDB Sideband)	

System-board switches

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

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:

- 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*.
- Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

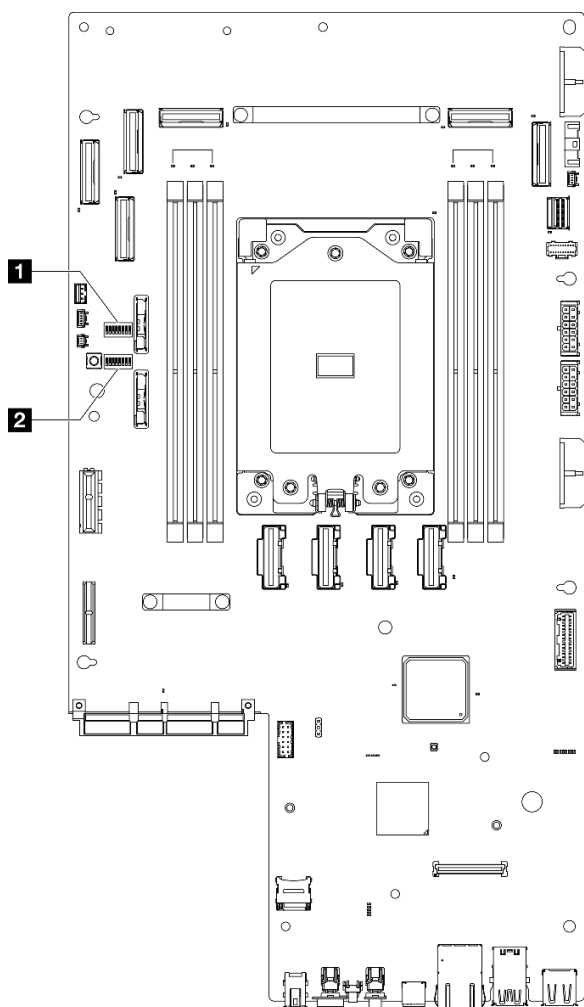


Figure 9. System-board switches

1 SW4	2 SW5
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The following table describes the switches on the system board.

Table 12. System-board switches

Switches block	Switch number	Switch name	Usage description	
			On	Off
SW4	3	CMOS clear	Clears the real-time clock (RTC) registry	Normal (default)
SW5	3	XClarity Controller boot backup	The node will boot by using a backup of the XClarity Controller firmware	Normal (default)
	4	Password override	Overrides the power-on password	Normal (default)
	5	Low security	Enable low security	Normal (default)
	7	XClarity Controller force update	Enables XClarity Controller force update	Normal (default)

System LEDs and diagnostics display

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

For more information, refer to [“Troubleshooting by system LEDs and diagnostics display” on page 30](#).

Troubleshooting by system LEDs and diagnostics display

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

Drive LEDs

This topic provides information on drive LEDs.

The following table describes the problems that are indicated by drive activity LED and drive status LED.

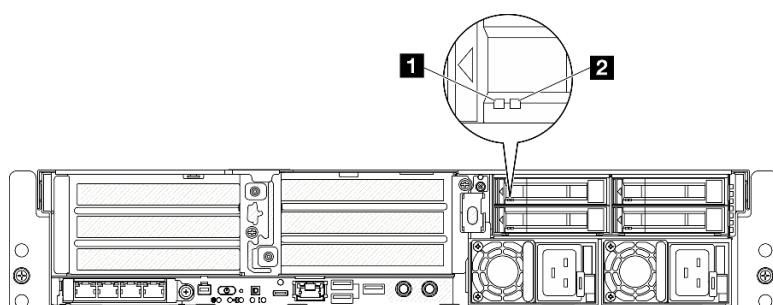


Figure 10. Drive LEDs

LED	Description
1 Drive activity LED (green)	Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.
2 Drive status LED (yellow)	The drive status LED indicates the following status: <ul style="list-style-type: none">• The LED is lit: the drive has failed.• The LED is flashing slowly (once per second): the drive is being rebuilt.• The LED is flashing rapidly (three times per second): the drive is being identified.

Front LEDs

This topic provides information about the buttons and LEDs at front of the server.

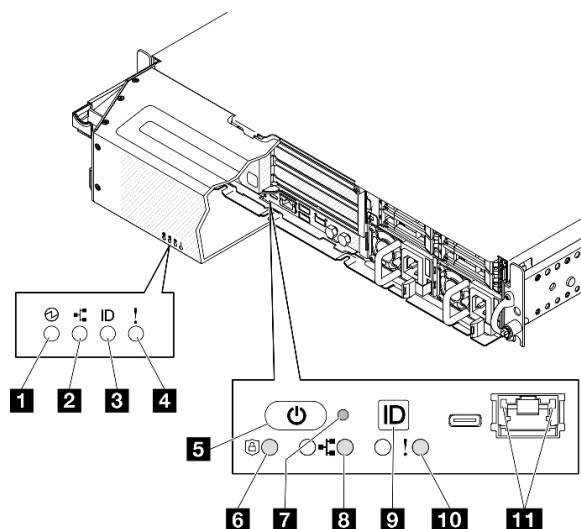


Figure 11. Front LEDs

Table 13. Front LEDs

LEDs visible from	
Security bezel	Server front view
1 "Power status LED (green)" on page 31	5 "Power button with power status LED (green)" on page 31
2 "Network activity LED (green)" on page 32	6 "Security LED (green)" on page 32
3 "System ID LED (blue)" on page 32	7 "NMI button" on page 32
4 "System error LED (yellow)" on page 32	8 "Network activity LED (green)" on page 32
	9 "System ID button with system ID LED (blue)" on page 32
	10 "System error LED (yellow)" on page 32
	11 "XCC system management port" on page 32

1 Power status LED (green) / 5 Power button with power status LED (green)

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 states of the power LED are as follows:

Status	Color	Description
Off	None	No power supply is properly installed, or the LED itself has failed.
Flashing rapidly (four times per second)	Green	The server is turned off and is not ready to be turned on. The power button is disabled. This will last approximately 5 to 10 seconds.
Flashing slowly (once per second)	Green	The server is turned off and is ready to be turned on. You can press the power button to turn on the server.
Lit	Green	The server is turned on.

2 / 8 Network activity LED (green)

When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

3 System ID LED (blue) / 9 System ID button with system ID LED (blue)

Use the system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED 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 LED to assist in visually locating the server among other servers.

4 / 10 System Error LED (yellow)

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

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include one or more of the following errors: <ul style="list-style-type: none">• 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.• The power supply has a critical error.• The power supply is not connected to the power.	Check the Event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

6 Security LED (green)

The states of security LED are as following:

Solid on: The server is operating with security feature enabled.

Blinking: The server is in System Lockdown Mode. Activate or unlock the system for operation.

Off: No security feature is enabled on the server.

7 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

11 XCC system management port LEDs

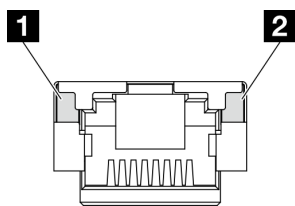


Figure 12. XCC system management port LEDs

LED	Description
1 XCC system management port (1GB RJ-45) Ethernet port link LED	Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> • Off: The network link is disconnected. • Green: The network link is established.
2 XCC system management port (1GB RJ-45) Ethernet port activity LED	Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> • Off: The server is disconnected from a LAN. • Blinking: The network is connected and active.

Power supply LEDs

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

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

- One processor
- One DDR5 DRAM memory modules in slot 3 (DIMM3)
- One power supply unit in PSU bay 1 (PSU1)
- One M.2 boot drive (if OS is needed for debugging)
- Five system fans

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

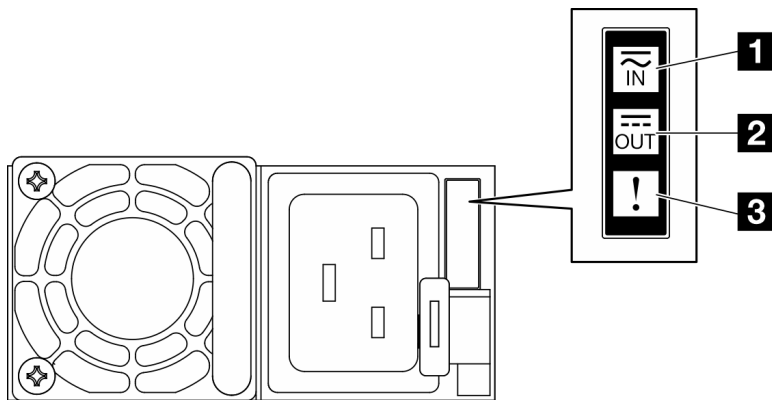


Figure 13. Power supply LEDs

LED	Description
1 Input status	<p>The input status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Off: The power supply is disconnected from the AC power source. • Green: The power supply is connected to the AC power source.
2 Output status	<p>The output status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply. • Blinking green (about one flash each 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. <p>Zero-output mode can be disabled via Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state.</p> <ul style="list-style-type: none"> – Log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. • Green: The server is on and the power supply is working normally.
3 Fault LED	<ul style="list-style-type: none"> • Off: The power supply is working normally • Amber: The power supply may have failed. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing.

System-board LEDs

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

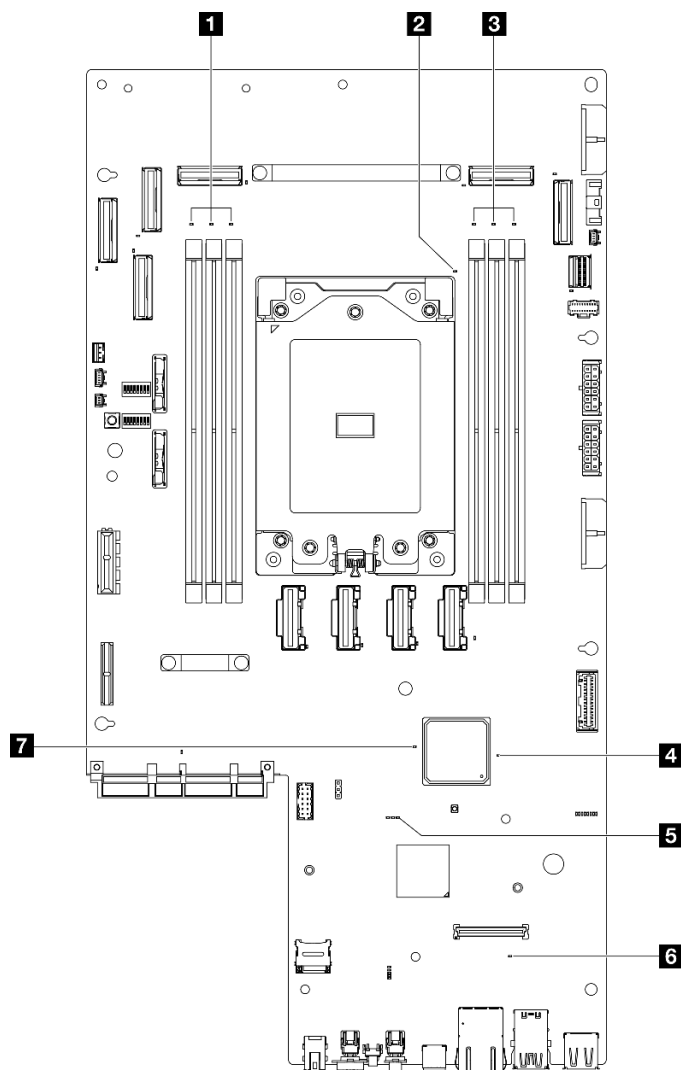


Figure 14. System-board LEDs

Table 14. System board LEDs description and actions

LED	Description	Action
1 DIMM 4-6 error LED (amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see “Memory problems” in the <i>User Guide</i> .
2 Processor error LED (amber)	LED on: an error has occurred to the processor the LED represents.	Replace the processor.
3 DIMM 1-3 error LED (amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see “Memory problems” in the <i>User Guide</i> .

Table 14. System board LEDs description and actions (continued)

LED	Description	Action
4 FPGA power status LED (green)	<p>The FPGA power LED helps to identify different FPGA errors.</p> <ul style="list-style-type: none"> • LED blinking rapidly (four times per second): The FPGA permission is delayed. • LED blinking slowly (once per second): The FPGA is ready to power on. • LED on: The FPGA power is on. 	<p>If FPGA power status LED is always blinking rapidly over 5 minutes, do the following:</p> <ul style="list-style-type: none"> • If XCC can be accessed: <ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 2. Save the log if necessary, and clear the log afterwards. • If XCC cannot be accessed: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support.
5 XCC heartbeat LED (green)	<p>The XCC heartbeat LED helps to identify the XCC status.</p> <ul style="list-style-type: none"> • Blinking (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. 	<ul style="list-style-type: none"> • If the XCC heartbeat LED is always off or always on, do the following: <ul style="list-style-type: none"> – If XCC cannot be accessed: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. (Trained technician only) Replace the system board. – If XCC can be accessed: <ol style="list-style-type: none"> 1. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 2. Save the log if necessary, and clear the log afterwards. • If the XCC heartbeat LED is always blinking fast over 5 minutes, do the following: <ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. (Trained technician only) Replace the system board. • If the XCC heartbeat LED is always blinking slow for over 5 minutes, do the following:

Table 14. System board LEDs description and actions (continued)

LED	Description	Action
		<ol style="list-style-type: none"> 1. Re-plug the power cord. 2. Check and ensure that the system board is installed correctly. (Trained technician only) Reinstall it if needed. 3. If the problem remains, contact Lenovo Support.
6 System error LED (amber)	LED on: an error has occurred.	<p>Complete the following steps:</p> <ol style="list-style-type: none"> 1. Check the identification LED and check log LED and follow the instructions. 2. Check the Lenovo XClarity Controller event log and the system error log for information about the error. 3. Save the log if necessary, and clear the log afterwards.
7 FPGA heartbeat LED (green)	<p>The FPGA heartbeat LED helps to identify the FPGA status.</p> <ul style="list-style-type: none"> • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working. 	<p>If FPGA heartbeat LED is always off or always on, do the following:</p> <ol style="list-style-type: none"> 1. (Trained technician only) Replace the system board. 2. If the problem remains, contact Lenovo Support.

Firmware and RoT security module LEDs

The following illustrations show the light-emitting diodes (LEDs) on the Firmware and Root of Trust Security Module (firmware and RoT security module).

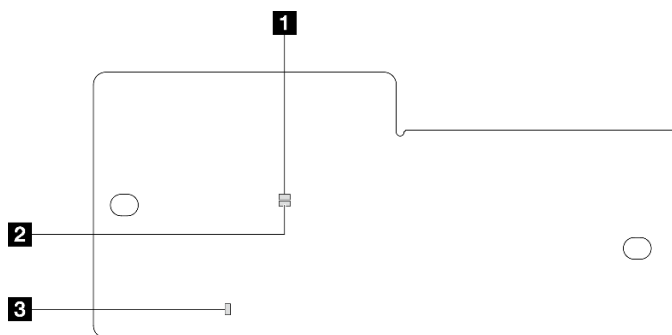


Figure 15. LEDs on the firmware and RoT security module

1 AP0 LED (Green)	2 AP1 LED (Green)	3 Fatal Error LED (Amber)
--------------------------	--------------------------	----------------------------------

Table 15. LEDs description

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heart-beat LED ^{note}	XCC heart-beat LED ^{note}	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	On	N/A	Replace the firmware and RoT security module.
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 backplane. If the PSU or power backplane has any error, replace it. 2. If the PSU or power backplane is good, replace the system 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	On	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	On	Information only. No action is required.

Note: For locations of the FPGA LED and XCC heartbeat LED, see [“System-board LEDs” on page 34](#).

XCC system management port LEDs

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

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

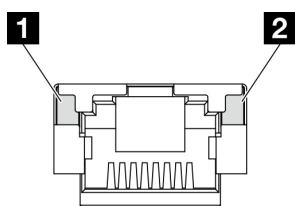


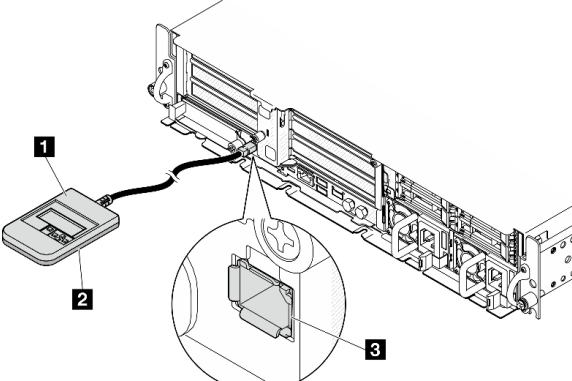
Figure 16. XCC system management port LEDs

LED	Description
1 XCC system management port (1GB RJ-45) Ethernet port link LED	Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> Off: The network link is disconnected. Green: The network link is established.
2 XCC system management port (1GB RJ-45) Ethernet port activity LED	Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> Off: The server is disconnected from a LAN. Blinking: The network is connected and active.

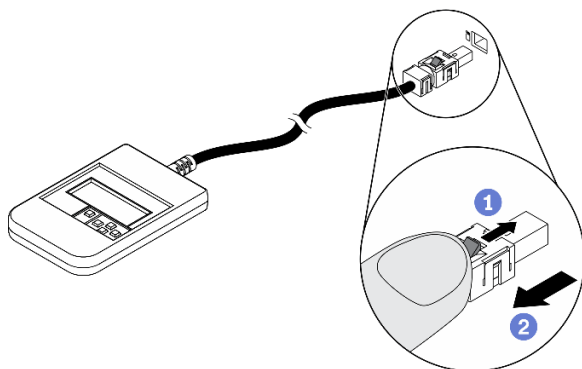
External Diagnostics Handset

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

Location of the External Diagnostics Handset

Location	Callouts
<p>The External Diagnostics Handset is connected to the server with an external cable.</p> 	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.

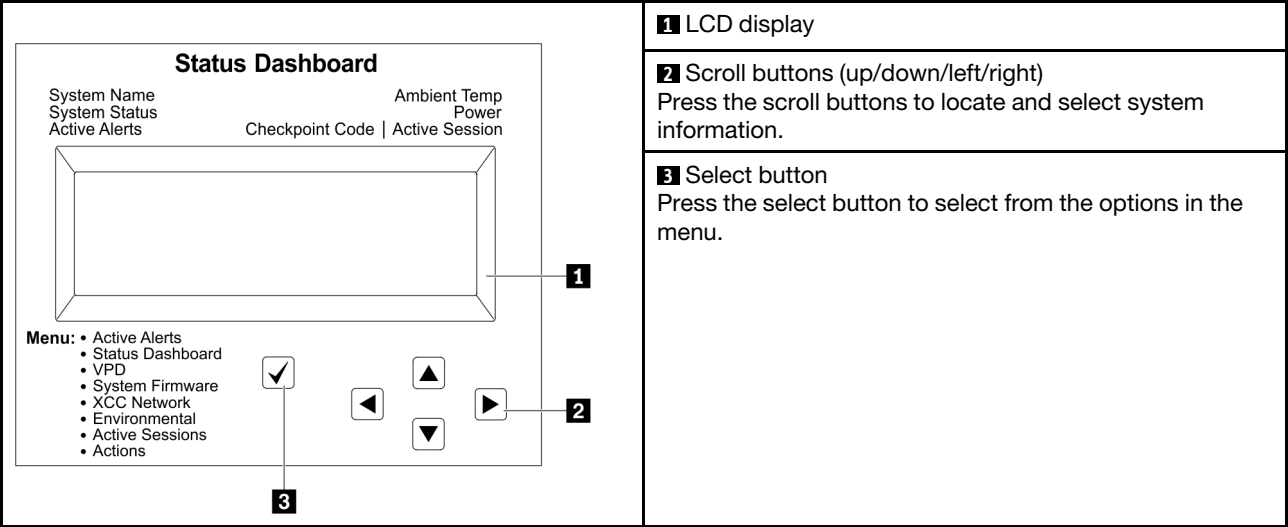
Note: When unplugging the External Diagnostics Handset, see the following instructions:



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

Display panel overview

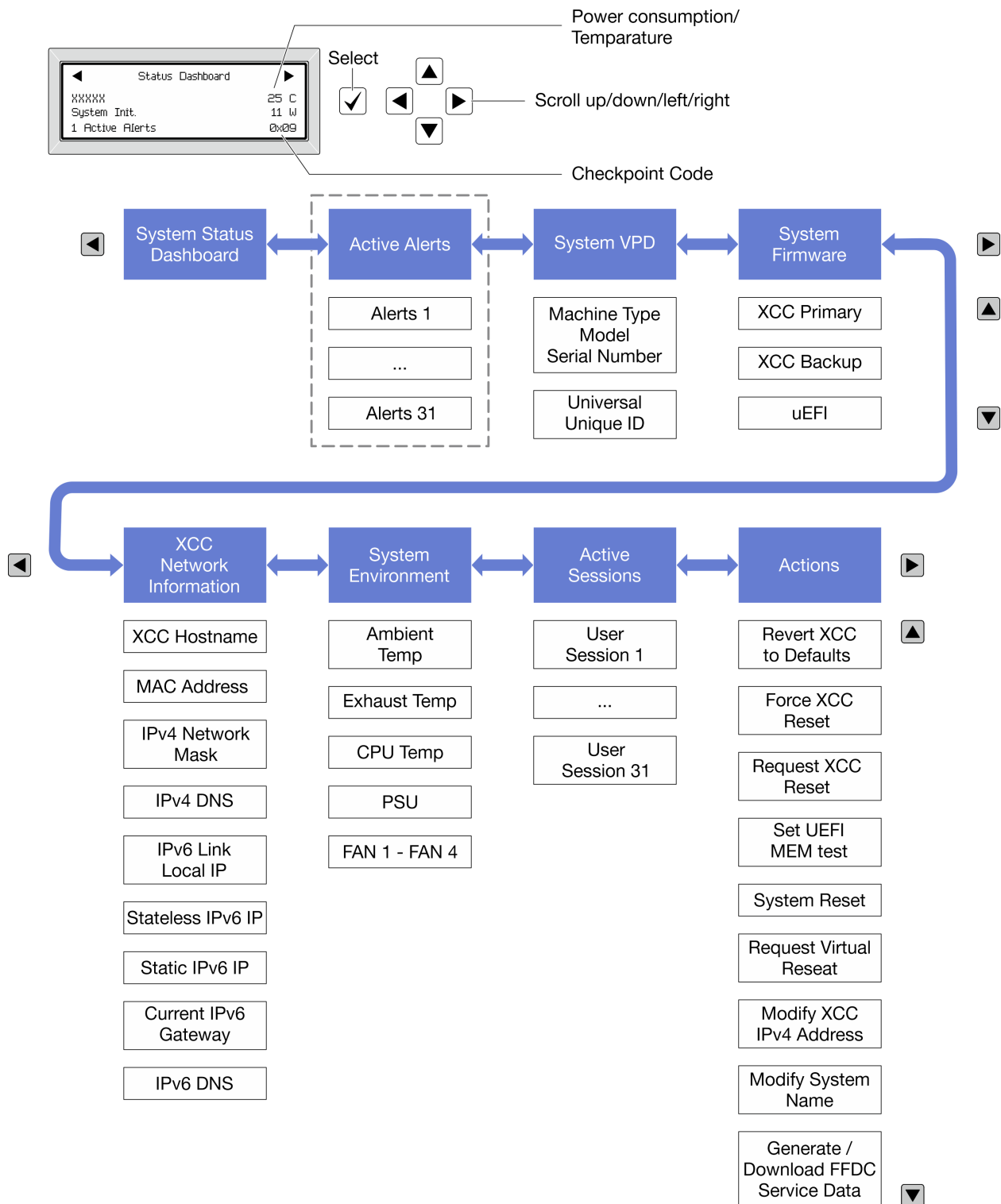
The diagnostics device consists of an LCD display and 5 navigation buttons.



Option flow diagram

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

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

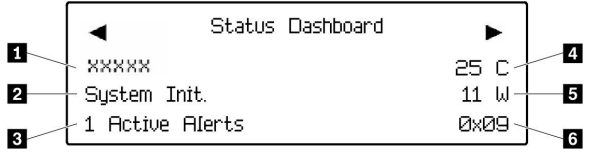


Full menu list

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

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

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	 <p>The screenshot shows a 'Status Dashboard' window. On the left, there is a list of system metrics: 'xxxxxx' (1), 'System Init.' (2), and '1 Active Alerts' (3). On the right, there are temperature and power consumption readings: '25 C' (4), '11 W' (5), and '0x09' (6). The window has a title bar with left and right navigation arrows.</p>

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: <ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI <ul style="list-style-type: none">Firmware level (status)Build IDVersion numberRelease date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none">XCC hostnameMAC addressIPv4 Network MaskIPv4 DNSIPv6 Link Local IPStateless IPv6 IPStatic IPv6 IPCurrent IPv6 GatewayIPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	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
<ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• Restore 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

Chapter 3. Parts list

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

For more information about ordering parts:

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

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

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

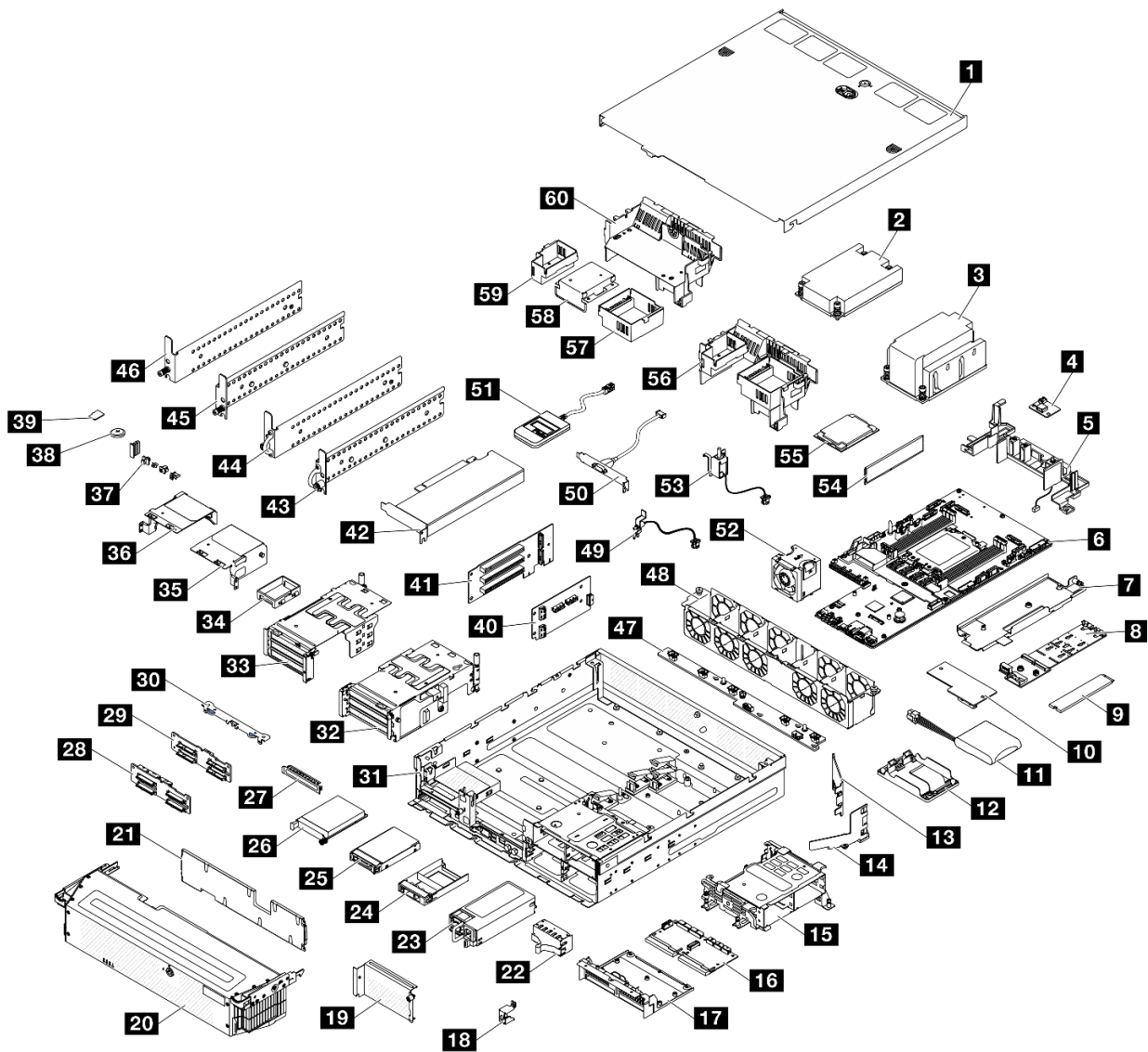


Figure 17. Server components

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

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

Table 16. Parts list

Description	Type	Description	Type
For more information about ordering parts: <ol style="list-style-type: none"> 1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server. 2. Click Parts. 3. Enter the serial number to view a listing of parts for your server. 			
1 Top cover	T1	31 Chassis	T1
2 1U processor heat sink	F	32 PCIe riser 2 cage	T2
3 2U processor heat sink	F	33 PCIe riser 1 cage	T2
4 Air flow sensor board	F	34 Low-profile filler	T1
5 Cable wall with heat sink detect switch	F	35 PCIe riser 2 extender	T2
6 System board	F	36 PCIe riser 1 extender	T2
7 M.2 backplane tray	T2	37 Front I/O fillers	T1
8 M.2 backplane	T2	38 CMOS battery	C
9 M.2 drive	T1	39 MicroSD card	T1
10 Firmware and RoT security module	F	40 Riser card for PCIe riser 2	T2
11 RAID flash power module (supercap)	F	41 Riser card for PCIe riser 1	T2
12 RAID flash power module holder	T1	42 PCIe adapter	F
13 M.2 air baffle, rear	T2	43 Security EIA bracket, right	T2
14 M.2 air baffle, front	T2	44 Security EIA bracket, left	T2
15 Internal drive cage	F	45 Standard EIA bracket, right	T2
16 Power distribution board (PDB)	F	46 Standard EIA bracket, left	T2
17 PDB cage	F	47 Fan control board (FCB)	F
18 Security bezel keylock bracket	T1	48 Fan cage	F
19 Riser 2 blank filler	T2	49 Bezel detect switch with cable	F
20 Security bezel	T1	50 Serial port module (COM port cable)	T2
21 Dust filter	T1	51 External diagnostic handset	T1
22 PSU filler	T1	52 Fan module	T1
23 Power supply unit	T1	53 Intrusion switch with cable	F
24 2.5-inch drive filler	T1	54 Memory module	F
25 2.5-inch drive	T1	55 Processor	F
26 OCP 3.0 module	T1	56 Processor air baffle for 2U heat sink	T2
27 OCP filler	T1	57 Riser 2 filler for processor air baffle	T2
28 NVMe drive backplane	T2	58 Middle filler for processor air baffle	T1
29 SATA drive backplane	T2	59 Riser 1 filler for processor air baffle	T2
30 Backplane bracket	T1	60 Processor air baffle for 1U heat sink	T1

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 51](#) 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.
- Material box, including items such as power cords*, accessory kit, key for security EIA brackets*, 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. You can also add other system information labels to the front of the server in the customer label spaces.

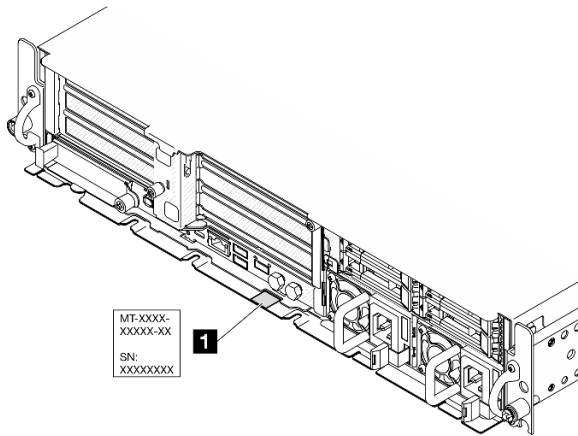


Figure 18. Location of the ID label

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller network access label is attached to the pull-out information tab located near the upper right corner in the front of the chassis, with MAC address accessible with a pull.

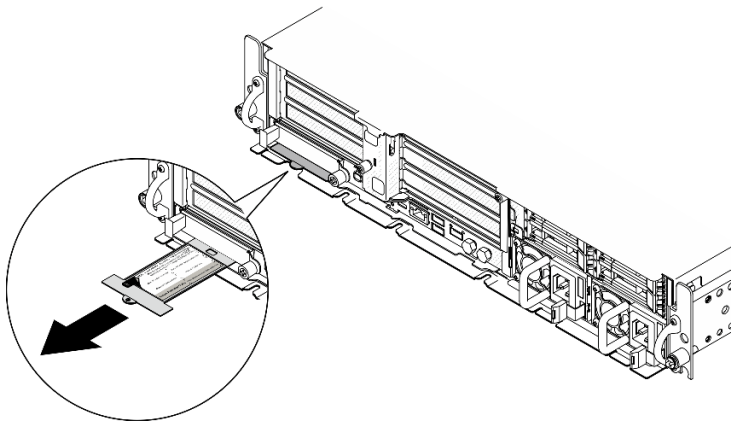


Figure 19. Lenovo XClarity Controller network access label on the pull-out information tab

Service Label and QR code

In addition, the system Service Label is located on the inside surface of the tray cover, provides a quick reference (QR) code for 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.

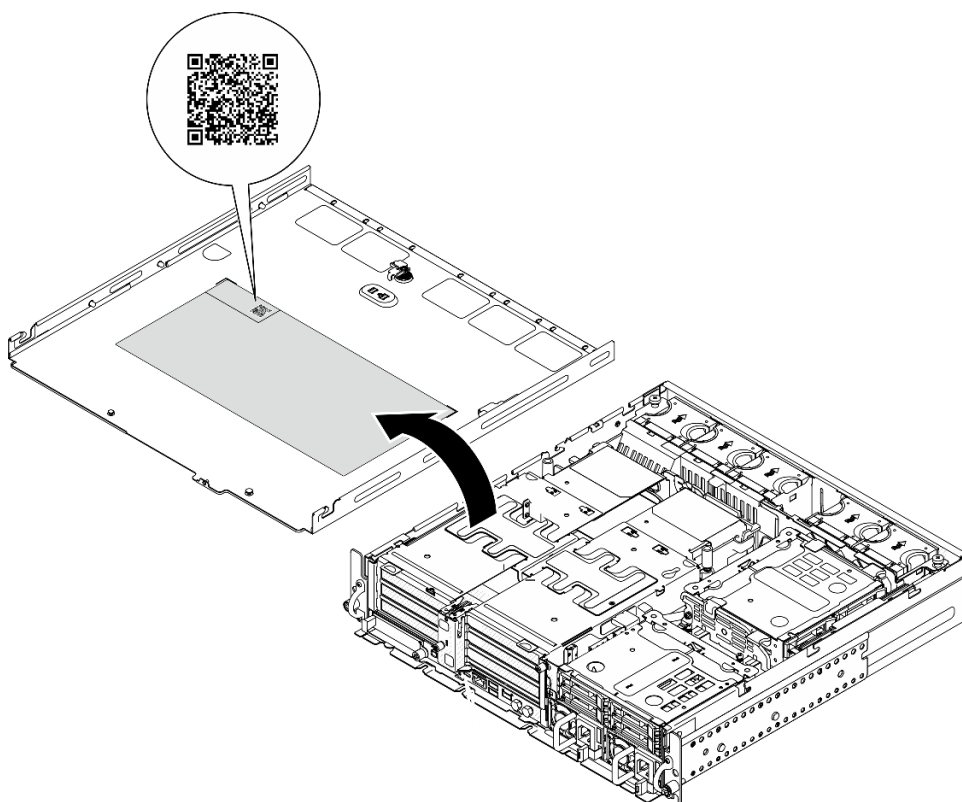


Figure 20. Service Label and QR code

Server setup checklist

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

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

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

Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See [“Server package contents” on page 49](#).
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 server into a standard rack cabinet. See “Configuration guide” in *User Guide* or *Hardware Maintenance Guide*.
4. Connect all external cables to the server. See [Chapter 2 “Server components” on page 21](#) 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
5. If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Activate or unlock the system” on page 54](#).
 6. Power on the server.

Power button location and power LED are specified in:

- [Chapter 2 “Server components” on page 21](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 30](#)

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

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

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

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

See [“Troubleshooting by system LEDs and diagnostics display” on page 30](#) 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 53](#).

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

The following information is available for RAID configuration:

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

4. Install the operating system.
5. Back up the server configuration.
6. Install the applications and programs for which the server is intended to be used.
7. Configure ThinkEdge security features. See [“Activate/unlock the system and configure ThinkEdge security features” on page 53](#).

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.

Activate/unlock the system and configure ThinkEdge security features

ThinkEdge SE455 V3 supports ThinkEdge unique security features. With the security features enabled, the system will enter System Lockdown Mode when tamper events occur, and encrypted data can not be accessed before the system is activated or unlocked. The status of ThinkEdge unique security features can be changed in Lenovo XClarity Controller.

Setup the security features

Complete the following steps to setup the security features:

1. If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Activate or unlock the system” on page 54](#).
2. Maintain backup of SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 57](#).

3. Configure the security features in Lenovo XClarity Controller. See [“System Lockdown Mode” on page 56](#) to change the status of security features.

Note: The following sections contain the procedure of configuring ThinkEdge security features in Lenovo XClarity Controller web interface. For more information, see <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

Customer's responsibility:

- Keep the Secure Activation Code (provided in flyer).
- To use ThinkShield Edge Mobile Management App, prepare proper USB cable for mobile phone if necessary.
- Maintain backup of SED AK. See [“Manage the Self Encryption Drive Authentication Key \(SED AK\)” on page 57](#).
 - Set and remember the password of SED AK backup file to restore SED AK in the future.
- Engage IT department so they can help to claim or activate device when required.
- Confirm if the SE455 V3 system is claimed by your organization. If not, work with IT department to claim the device.
- Confirm the wireless (network) connectivity is working. Service technician cannot help examine the network connection of the device.
- Move SE455 V3 system to a safe working place for service.
- Place SE455 V3 system back to the working place after service.

Activate or unlock the system

Being shipped, encountering tamper events, or receiving lockdown command from Lenovo management software, the server would be in System Lockdown Mode for security. Before operation, the server needs to be activated or unlocked to be able to boot up and go fully functional. Complete the steps in this topic to activate or unlock the system.

If the security LED of the server is blinking, the server is in System Lockdown Mode. Activate or unlock the system for operation. See [“Front LEDs” on page 30](#) to locate the security LED.

System Lockdown Mode Control

To distinguish whether the system needs to be activated or unlocked, see **System Lockdown Control** status on the home page of Lenovo XClarity Controller web interface. System Lockdown Control status would be one of the following:

- **ThinkShield Portal:** The system can be activated through ThinkShield Key Vault Portal. See [“Activate the system” on page 55](#) to activate the system.
- **XClarity Controller:** The system can be unlocked through Lenovo XClarity Controller. See [“Unlock the system” on page 56](#) to unlock the system.

Important:

- When System Lockdown Control status is XClarity Controller, if XClarity Controller is reset to defaults, the default credentials can be used to login to XClarity Controller and unlock the system. It is important to use security controls such as an UEFI PAP to prevent unauthorized users from executing an XClarity Controller reset to defaults. For the highest level of security, it is recommended to set System Lockdown Control to ThinkShield Portal.
- Once the System Lockdown Control status is changed to ThinkShield Portal, it cannot be changed back to XClarity Controller.

- To set System Lockdown Control to ThinkShield Portal, use Lenovo XClarity Essentials UpdateXpress. See “Upgrading lockdown control mode” section in <https://pubs.lenovo.com/lxce-ux/> for the details.

Activate the system

Complete the following steps to activate the system through ThinkShield Key Vault Portal.

Have a Lenovo ID with proper permission

Before activating a system for the first time, make sure to have a Lenovo ID with proper permission to log in to the ThinkShield Key Vault Portal web interface or ThinkShield mobile app.

Note: The role of Lenovo ID should be **Organization Admin**, **Maintenance User** or **Edge User** to activate the system.

- For Lenovo ID setup, see <https://passport.lenovo.com>.
- To log in to the Lenovo ThinkShield Key Vault Portal, see <https://portal.thinkshield.lenovo.com>.

Activation methods

There are different methods to activate the system through ThinkShield Key Vault Portal. Depending on the environment of the server, decide the most suitable way to activate the system.

• Mobile App activation

For Mobile App activation method, you will need an Android or iOS based smart phone with cellular data connection.

1. Connect the power cable to your ThinkEdge SE455 V3.
2. Download the ThinkShield Edge Mobile Management App from Google Play Store or Apple App Store to your Android or iOS based smart phone (search term: “ThinkShield Edge”).
3. Log-in to the ThinkShield Edge Mobile Management App using your Organization registered ID.
4. When App instructs to do so, connect USB cable with USB mobile phone charging cable to the ThinkEdge SE455 V3.

Note: When the smart phone prompts for the USB connection purpose, choose data transfer.

5. Follow the “Activate Device” on-screen instructions to complete secure activation of the system.
6. When activated successfully, ThinkShield Edge Mobile Management App will provide “Device Activated” screen.

Note: For the detailed steps, see *ThinkShield Edge Mobile Management Application User Guide* in <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

• Portal automatic activation

Note: To activate the system through ThinkShield Key Vault Portal web interface for the first time, the system should be claimed by your organization. **Machine Type**, **Serial Number**, and **Activation Code** are required to claim a device. For more information of claiming the device, see <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

1. Connect the power cable to your ThinkEdge SE455 V3.
2. Connect the XClarity Controller Management Ethernet port to a network that has access to the internet.

Note: Outbound TCP port 443 (HTTPS) must be open for activation to occur.

3. Log in to the ThinkShield Key Vault Portal with your Organization registered ID.

4. If the server is not claimed by your organization, claim the server. Add the device by clicking the **Claim device** button in **Device Manager**. Enter machine type, serial number, and secure activation code in the corresponding fields.
5. From the **Device Manager**, select the server you plan to activate and click **activate**. The status of the server will change to Ready.
6. Server will be activated within 15 minutes and power on automatically. After successful activation, the status of the server will change to Active on the ThinkShield Key Vault Portal.

Notes:

- If the server activation is not initiated within 2 hours after the power cable plug in, perform a disconnect then re-connect of the power cable to your ThinkEdge SE455 V3.
- For the detailed steps, see *ThinkShield Key Vault Portal Web Application User Guide* in <https://lenovopress.lenovo.com/lp1725-thinkedge-security>.

Unlock the system

Important:

- When System Lockdown Control status is XClarity Controller, if XClarity Controller is reset to defaults, the default credentials can be used to login to XClarity Controller and unlock the system. It is important to use security controls such as an UEFI PAP to prevent unauthorized users from executing an XClarity Controller reset to defaults. For the highest level of security, it is recommended to set System Lockdown Control to ThinkShield Portal. See “[System Lockdown Mode Control](#)” on page 54 for the details.

Complete the following steps to unlock the system in Lenovo XClarity Controller web interface

Notes: To unlock the system, the role of XCC user should be one of the following:

- Administrator
 - Administrator+
1. Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → System Lockdown Mode**.
 2. Press **Active** button, and then press **Apply** button. When the status of System Lockdown Mode switches to Inactive, the system is unlocked.

System Lockdown Mode

See this topic to learn about System Lockdown Mode and related features in Lenovo XClarity Controller.

When System Lockdown Mode is active, the system can not be booted up, and the access to SED AK is not allowed.

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → System Lockdown Mode** to configure the security features.

Note: When the **System Lockdown Mode Control** status on the home page of Lenovo XClarity Controller web interface is XClarity Controller, the status of System Lockdown Mode can be changed in XCC. See “[Activate or unlock the system](#)” on page 54 for more information.

Chassis Intrusion Detection

When Chassis Intrusion Detection is **Enabled**, the system detects physical movements of the top cover. If the top cover is opened unexpectedly, the system enters System Lockdown Mode automatically.

Manage the Self Encryption Drive Authentication Key (SED AK)

For ThinkEdge SE455 V3 with SED installed, the SED AK can be managed in Lenovo XClarity Controller. After setting up the server or making changes to the configuration, backing up the SED AK is a must operation to prevent data loss in the hardware failure case.

SED Authentication Key (AK) Manager

Log in to Lenovo XClarity Controller web interface, and go to **BMC Configuration → Security → SED Authentication Key (AK) Manager** to manage the SED AK.

Notes: The operation of SED AK Manager is not allowed in the following conditions:

- System Lockdown Mode is in **Active** state. SED AK is locked until the system is activated or unlocked. See [“Activate or unlock the system” on page 54](#) to activate or unlock the system.
- Current user does not have the authority to manage SED AK.
 - To generate, backup, and recover the SED AK with passphrase or backup file, the role of XCC user should be **Administrator**.
 - To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

SED encryption

The status of SED encryption can be changed from Disabled to Enabled. Complete the following process to enable SED encryption.

1. Press **Enabled** button.
2. Select the SED AK generation method:
 - **Generate key using Passphrase:** Set the password and re-enter it for the confirmation.
 - **Generate key randomly:** A Random SED AK will be generated.
3. Press **Apply** button.

Attention:

- Once SED encryption is Enabled, it cannot be changed back to Disabled.
- When SED encryption is enabled, it is necessary to power cycle the system after installing an SED; without power cycling, the SED will not be recognized by the host OS.

Change the SED AK

- **Generate key using Passphrase:** Set the password and re-enter it for the confirmation. Click **Re-generate** to get the new SED AK.
- **Generate key randomly:** Click **Re-generate** to get a Random SED AK.

Backup the SED AK

Set the password and re-enter it for the confirmation. Click **Start Backup** to backup the SED AK; then, download the SED AK file and store it safely for future use.

Note: If you use the backup SED AK file to restore a configuration, the system will ask for the password that you set here.

Recover the SED AK

- **Recover SED AK using Passphrase:** Use the password that was set in **Generate key using Passphrase** to recover the SED AK.
- **Recover SED AK from Backup file:** Upload the backup file generated in **Backup the SED AK** mode and enter the corresponding backup file password to recover the SED AK.

- **Recover SED AK from Automatic backup:** After system board replacement, use automatic backup to recover the SED AK for the installed SED.

Note: To recover the SED AK from automatic backup, the role of XCC user should be **Administrator+**.

Set dust filter measurement

With air flow sensor board installed, SE455 V3 BMC supports dust filter measurement to check the status of the dust filter.

Log in to Lenovo XClarity Controller web interface, and go to **Utilization → Fan Speed (RPM) → Dust Filter Measurement** to take the measurement by selecting **Run immediately (once)**, or by setting a regular schedule.

Note: When taking the measurement, the fans will operate at full fan speed for about 30 seconds.

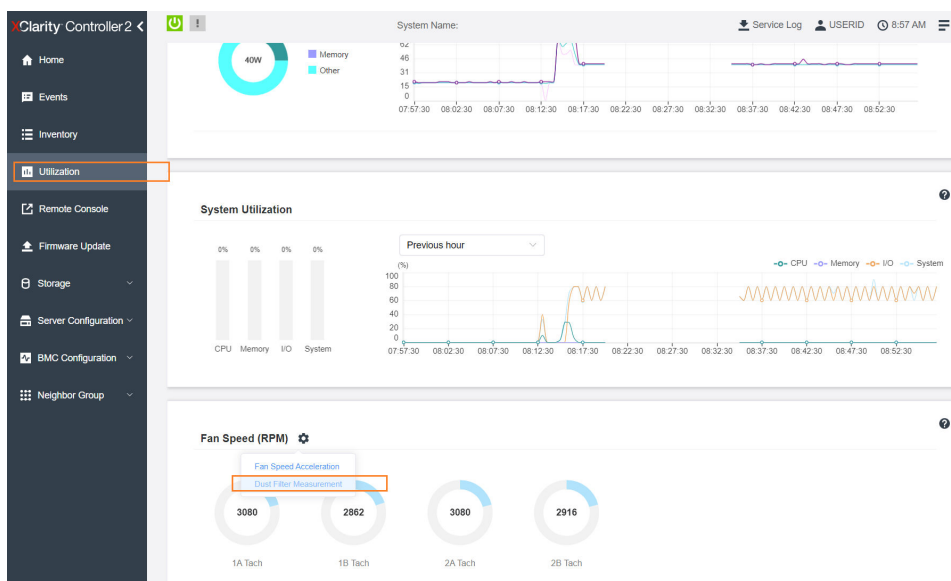


Figure 21. Dust filter measurement

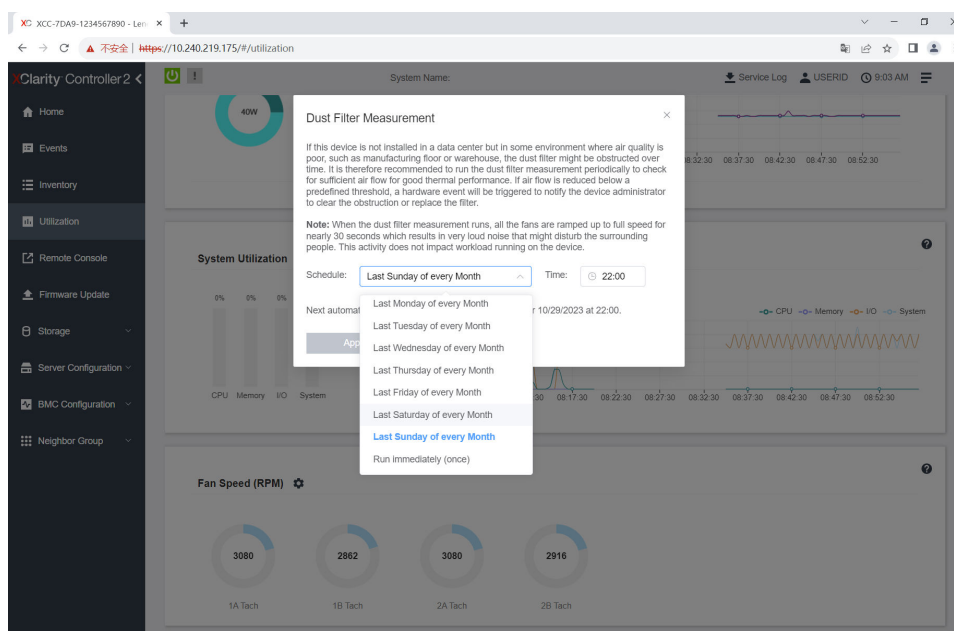


Figure 22. Dust filter measurement settings

After taking the measurement, see Lenovo XClarity Controller Event Log for the status of dust filter. For proper operation, replace the dust filter according to the action suggestions in the generated event.

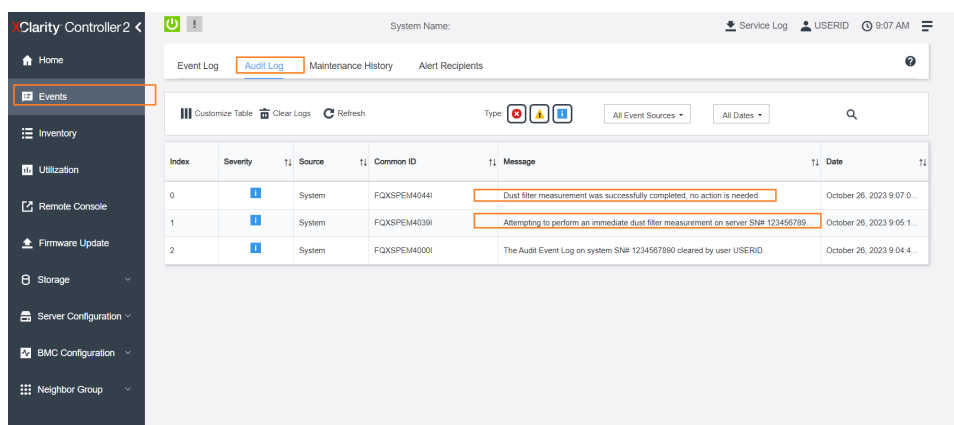


Figure 23. Dust filter measurement events

Index	Severity	Source	Common ID	Message	Date
0	Warning	System	FQXSPEN4040I	Dust filter measurement is completed. The airflow pathway is obstructed, check and rep.	October 27, 2023 8:06:2...
1	Info	System	FQXSPEN4039I	Attempting to perform an immediate dust filter measurement on server SN# 123456789.	October 27, 2023 8:04:3...
2	Info	System	FQXSPEN4000I	The Audit Event Log on system SN# 123456789 cleared by user USERID.	October 27, 2023 8:04:0...

Figure 24. Dust filter measurement events

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.

- Best practices related to updating firmware is available at the following site:
 - <https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices>
- The latest firmware can be found at the following site:
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dby/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		✓	✓
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		✓		

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 Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	✓	All I/O devices		✓		✓
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	✓	All I/O devices		✓		✓
Notes: <ol style="list-style-type: none"> For I/O firmware updates. For BMC and UEFI firmware updates. Drive firmware update is only supported by the tools and methods below: <ul style="list-style-type: none"> XCC Bare Metal Update (BMU): In-band, and requires system reboot. Lenovo XClarity Essentials OneCLI: <ul style="list-style-type: none"> For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot. For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.). 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/Invo-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/Invo-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.

Important: Lenovo does not recommend setting option ROMs to **Legacy**, but you can conduct this setting if necessary. Note that this setting prevents UEFI drivers for the slot devices from loading, which may cause negative side effects to Lenovo software, such as LXCA, OneCLI, and XCC. These side effects include but are not limited to the inability to determine adapter card details, such as model name and firmware levels. For example, "ThinkSystem RAID 930-16i 4GB Flash" may be displayed as "Adapter 06:00:00". In some cases, the functionality on a specific PCIe adapter may not be enabled properly.

- **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 updating firmware using Lenovo XClarity Administrator are available at:

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

- **Lenovo XClarity Controller**

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

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

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

Memory module configuration

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

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

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

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

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

RAID configuration

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

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

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

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

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

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

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

Deploy the operating system

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

Available operating systems

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

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

Tool-based deployment

- **Multi-server**

Available tools:

- Lenovo XClarity Administrator
https://pubs.lenovo.com/lxca/compute_node_image_deployment
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

- **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
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

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/thinkedge/se455v3/7dby/downloads/driver-list/>
 - Operating system support center
 - <https://datacentersupport.lenovo.com/solutions/server-os>
 - Operating system installing instructions
 - <https://pubs.lenovo.com/thinkedge#os-installation>
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software are supported by your product.
- Refer to “Problem Determination” in *User Guide* or *Hardware Maintenance Guide* for instructions on isolating and solving issues.

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

To find the Tech Tips available for your server:

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

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

- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

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

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

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see “Identify the server and access the Lenovo XClarity Controller” on page 49.
- 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 `ffdc` 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/se455-v3/pdf_files.html

- **Rail Installation Guides**
 - Rail installation in a rack
- **Activation Guide**
 - Activation process and activation code
- **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.
- **Messages and Codes Reference**
 - XClarity Controller, LXPM, and uEFI events
- **UEFI Manual**
 - UEFI setting introduction

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkEdge SE455 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dbby/downloads/driver-list/>
- Lenovo Data Center Forum
 - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkEdge SE455 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinkedge/se455v3/7dbby>
- Lenovo License Information Documents
 - <https://datacentersupport.lenovo.com/documents/Invo-eula>
- Lenovo Press website (Product Guides/Datasheets/White papers)

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

Appendix C. Notices

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

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Morrisville, NC 27560
U.S.A.
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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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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	○	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模組	—	○	○	○	○	○
處理器模組	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
電源供應器	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
印刷電路板	—	○	○	○	○	○
<p>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。</p> <p>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.</p> <p>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。</p> <p>Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—” 係指該項限用物質為排除項目。</p> <p>Note3 : The “-” indicates that the restricted substance corresponds to the exemption.</p>						

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

