Smarter technology for all

Servicing the ThinkSystem ST650 V3

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Prerequisites

- [ES42373 – Intel Xeon processor architecture for ThinkSystem V3 servers](#)

- [ES51757B – Introducing ThinkSystem tools](#)

- [ES52374 – ThinkSystem tools for the ThinkSystem V3 platform](#)

- [ES41759C – ThinkSystem problem determination](#)

- [ES51780C – Servicing the ThinkSystem storage controllers](#)

- [ES42190 – Servicing the ThinkSystem 4350/5350/9350 RAID/HBA series adapters](#)

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Objectives

After completing the course, you will be able to:
- Describe the features and specifications of the ThinkSystem ST650 V3
- Identify the components of the ST650 V3
- Describe the configurations of the ST650 V3
- Describe the ST650 V3 management tools
- Describe the specific problem determination steps and explain how to troubleshoot issues with the ST650 V3

Product overview

Product description and front, rear, and inside views

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ThinkSystem ST650 V3 product overview

The ThinkSystem ST650 V3 is the successor to the ST650 V2, and it inherited the mechanical design of the ST650 V2. The ST650 V3 is a 4U, two-socket tower server that features 4th Generation Intel Xeon Scalable processors (Intel code name: Sapphire Rapids). The ST650 V3 supports up to two processors, 32 DIMMs, and 32 2.5-inch drives or 16 3.5-inch drives. As with the ST650 V2, the ST650 V3 supports the Rack Enablement Kit, which converts the ST650 V3 from a tower to a 4U rack-mountable server.

There are two ST650 V3 machine types:

• 7D7A (three-year warranty)

• 7D7B (one-year warranty)

The following machine type is for the PRC only, and it uses the ThinkSystem ST658 V3 machine name:
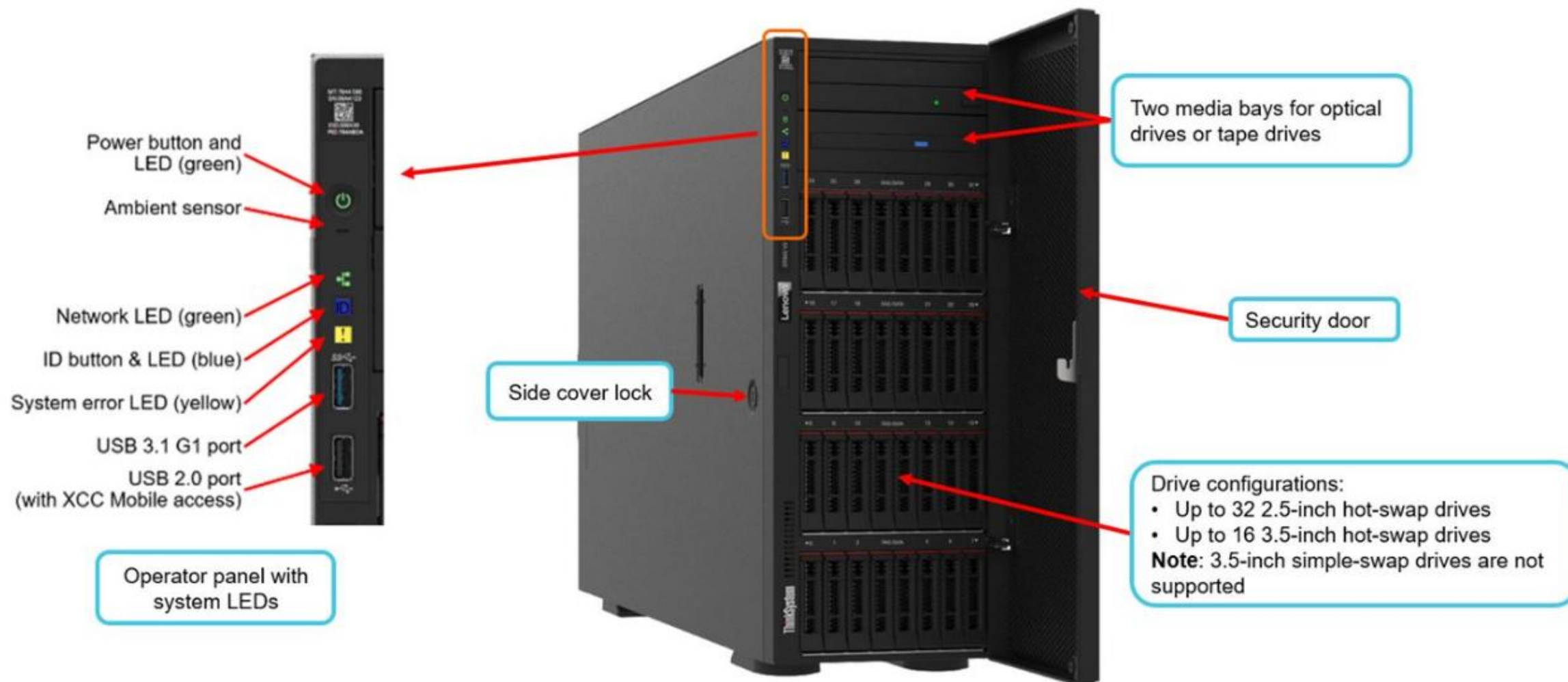
• 7D7C (three-year warranty)

ST650 V3 specifications

Attribute	Specifications
Form factor	Tower or optional 4U rack (requires the Rack Enablement Kit)
Processor	Up to two 4th Generation Intel Xeon Scalable processors (Intel code name: Sapphire Rapids), up to 250 W
Chipset	Intel Emmitsburg
Memory	• 32 DIMM slots (sixteen DIMMs per processor), DDR5 • Each processor has eight memory channels, with two DIMMs per channel (2DPC) • DIMMs operate at up to 4800 MHz at 1DPC and up to 4400 MHz at 2DPC
Drive bays	• Up to 32 2.5-inch hot-swap drives or 16 3.5-inch hot-swap drives at the front • The option of two M.2 adapters inside the server for OS boot or storage
Network interface	• Two onboard 10GBASE-T Ethernet RJ45 ports based on a Broadcom BCM57416 controller • Additional dedicated Gigabit port for XCC management port
I/O expansion slots	• Up to nine PCIe slots – slots 1, 2, 3, 4, and 5 are PCIe 5.0, and slots 6, 7, 8, and 9 are PCIe 4.0 All nine slots support up to 75 W • All slots are full-height, full-length (FHFL) with rear access • Use of slots 5 to 8 require CPU 2 to be installed
Cooling	• Four N+1 redundant hot-swap fans • One additional fan is integrated in each of the power supplies
Power supplies	Up to two hot-swap redundant power supplies

Note: For the latest specifications, refer to the Lenovo Press product guide.

ST650 V3 specifications

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Cooling	• Four N+1 redundant hot-swap fans • One additional fan is integrated in each of the power supplies
Power supplies	Up to two hot-swap redundant power supplies
Storage controller	• Onboard software RAID supports SATA and NVMe drives (with the Intel VROC feature) • RAID controllers with 8, 16, or 32 ports (optional) • Non-RAID HBA with 8 or 16 ports (optional) • Retimer card to support NVME drives (required for more than 12 NVME drives)

Note: For the latest specifications, refer to the Lenovo Press product guide.

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Front view – tower mode

Power button and
LED (green)

Ambient sensor

Network LED (green)

ID button & LED (blue)

System error LED (yellow)

USB 3.1 G1 port

USB 2.0 port
(with XCC Mobile access)

Operator panel with
system LEDs

Two media bays for optical
drives or tape drives

Security door

Side cover lock

Drive configurations:
- Up to 32 2.5-inch hot-swap drives
- Up to 16 3.5-inch hot-swap drives

Note: 3.5-inch simple-swap drives are not
supported

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Tower mode front views

With security door

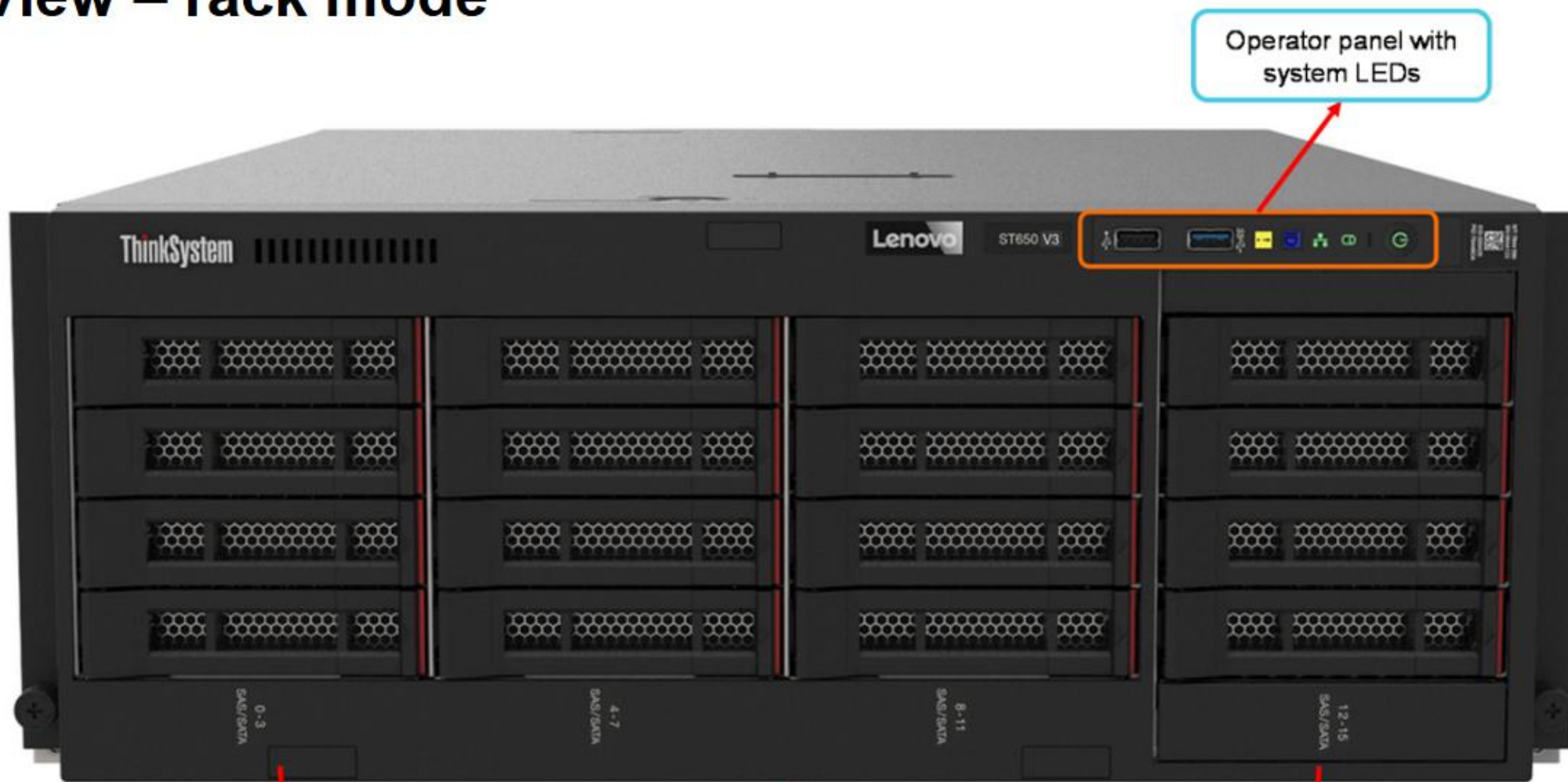2.5-inch hot-swap drives
with optical or tape drives

3.5-inch hot-swap drives
without optical or tape drives
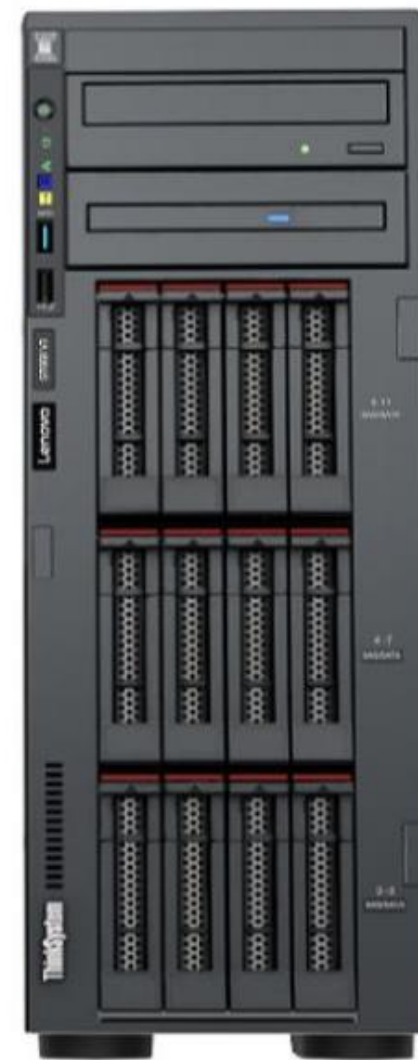
3.5-inch drives with
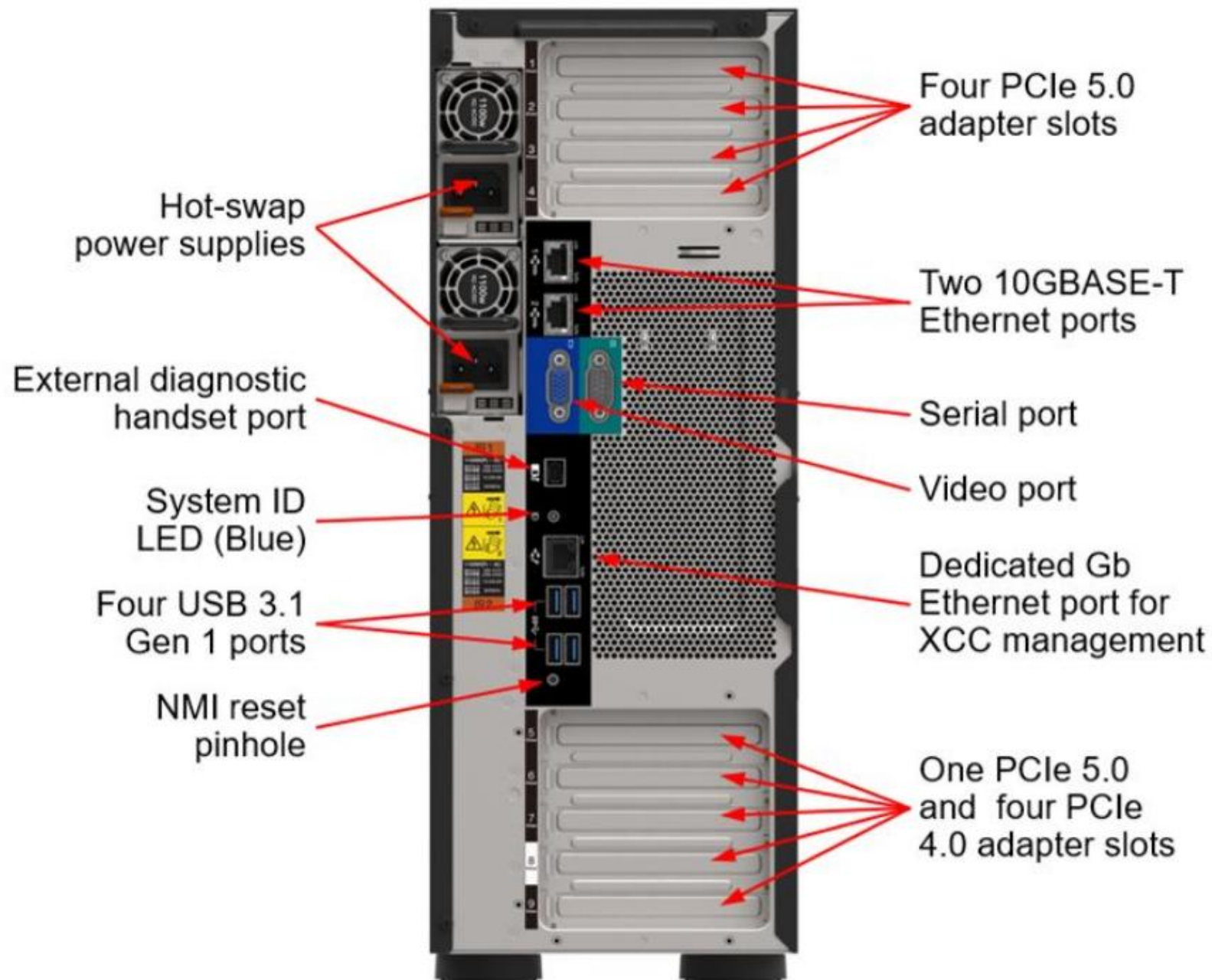optical or tape drives

Front view – rack mode

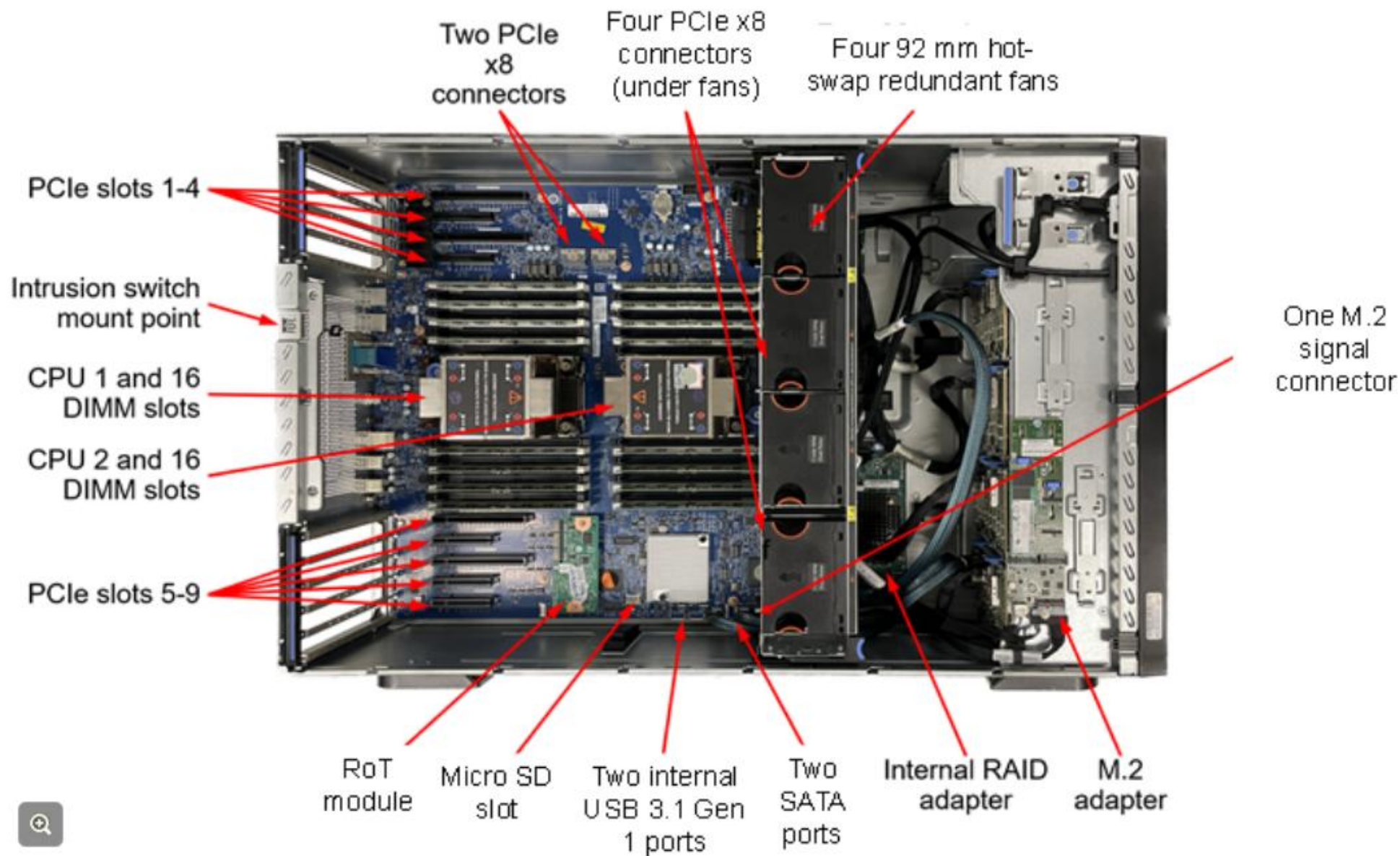Operator panel with system LEDs

Drive configurations:
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- Up to 16 3.5-inch hot-swap drives

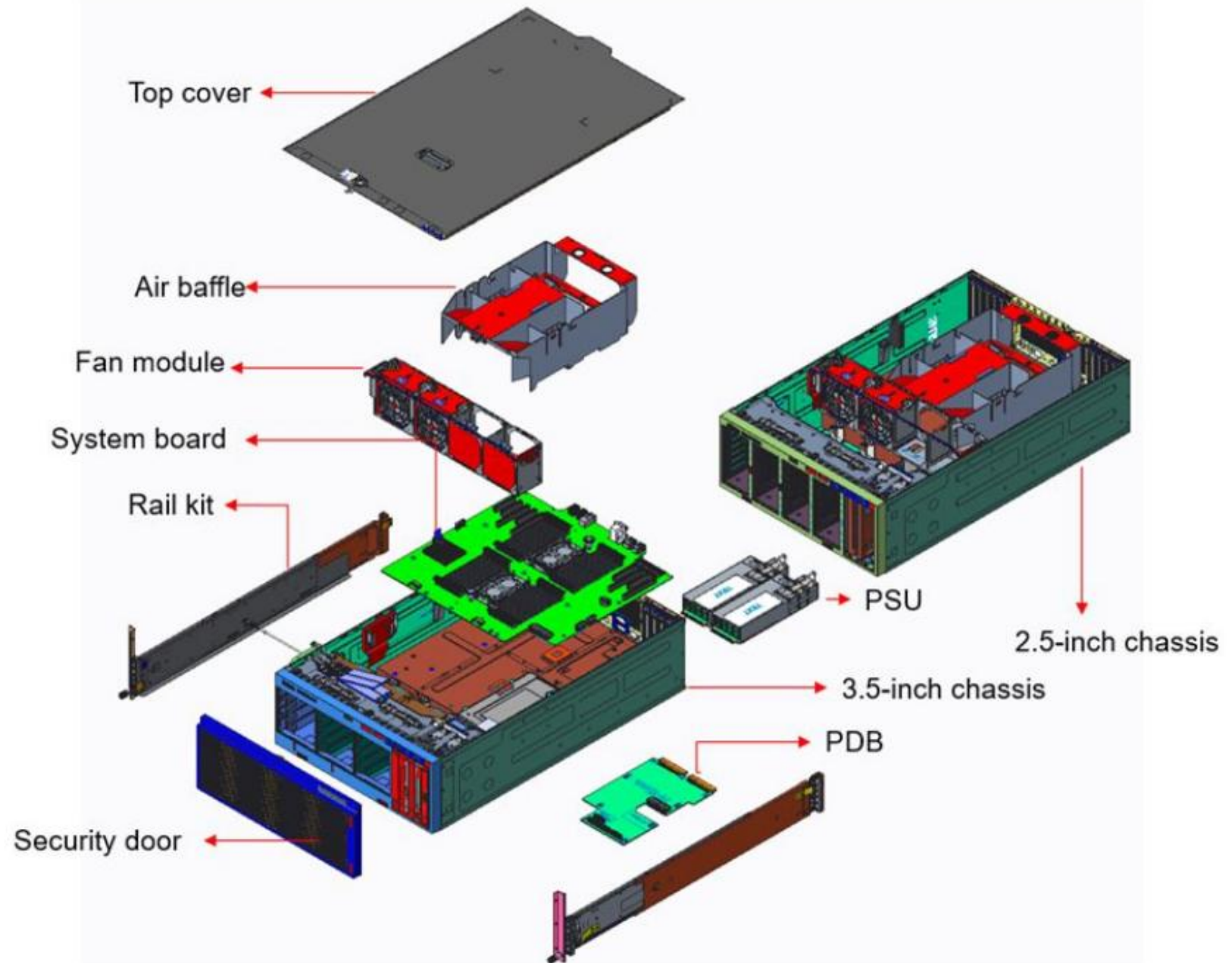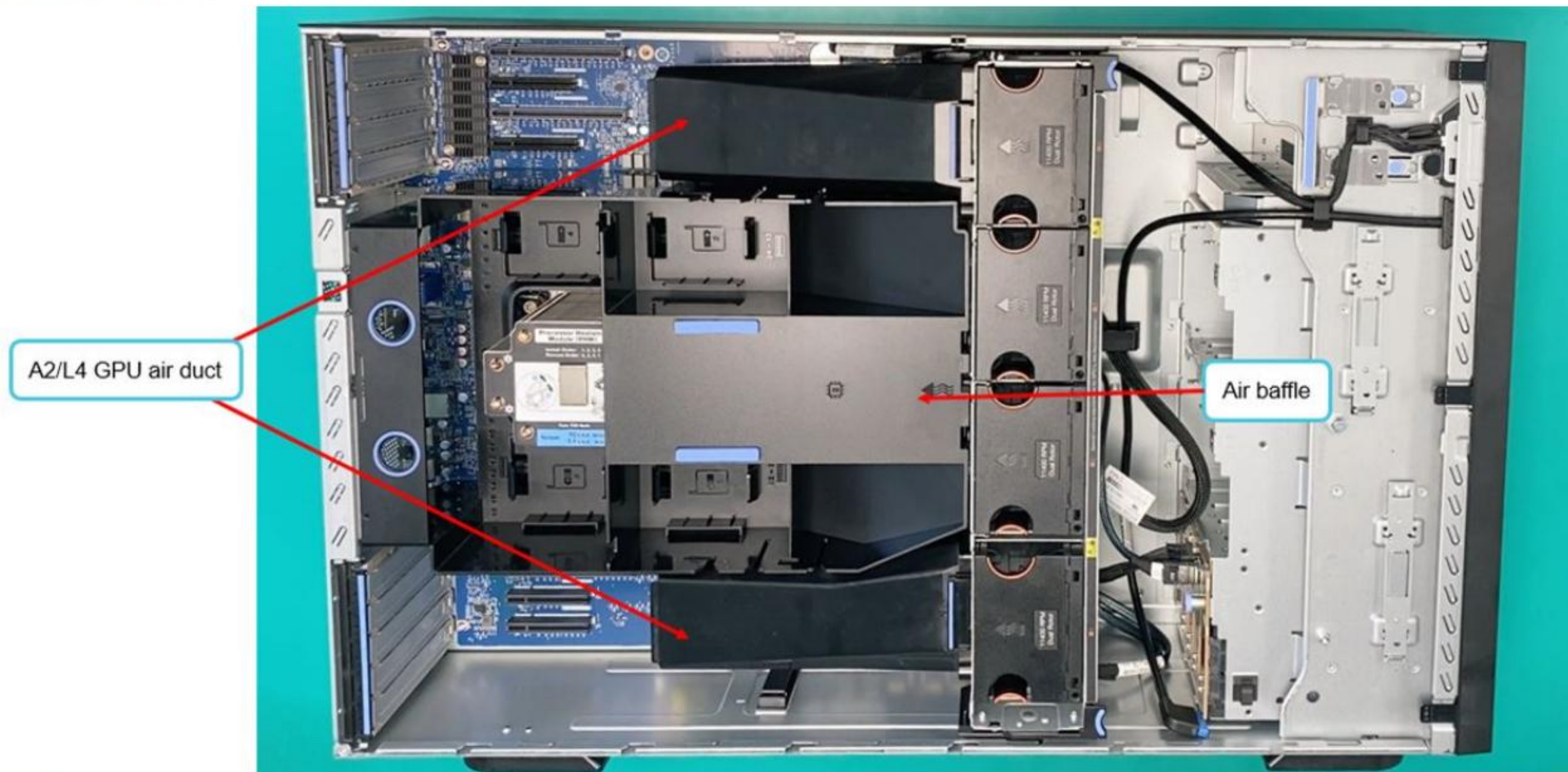**Note**: 3.5-inch simple-swap drives are not supported

Rear view

Four PCIe 5.0 adapter slots

Hot-swap power supplies

Two 10GBASE-T Ethernet ports

External diagnostic handset port

Serial port

System ID LED (Blue)

Video port

Four USB 3.1 Gen 1 ports

Dedicated Gb Ethernet port for XCC management

NMI reset pinhole

One PCIe 5.0 and four PCIe 4.0 adapter slots

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Inside view

Two PCIe x8 connectors

Four PCIe x8 connectors (under fans)

Four 92 mm hot-swap redundant fans

PCIe slots 1-4

Intrusion switch mount point

CPU 1 and 16 DIMM slots

CPU 2 and 16 DIMM slots

PCIe slots 5-9

One M.2 signal connector

RoT module

Micro SD slot

Two internal USB 3.1 Gen 1 ports

Two SATA ports

Internal RAID adapter

M.2 adapter

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Exploded view

Top cover

Air baffle

Fan module

System board

Rail kit

Security door

PSU

2.5-inch chassis

3.5-inch chassis

PDB

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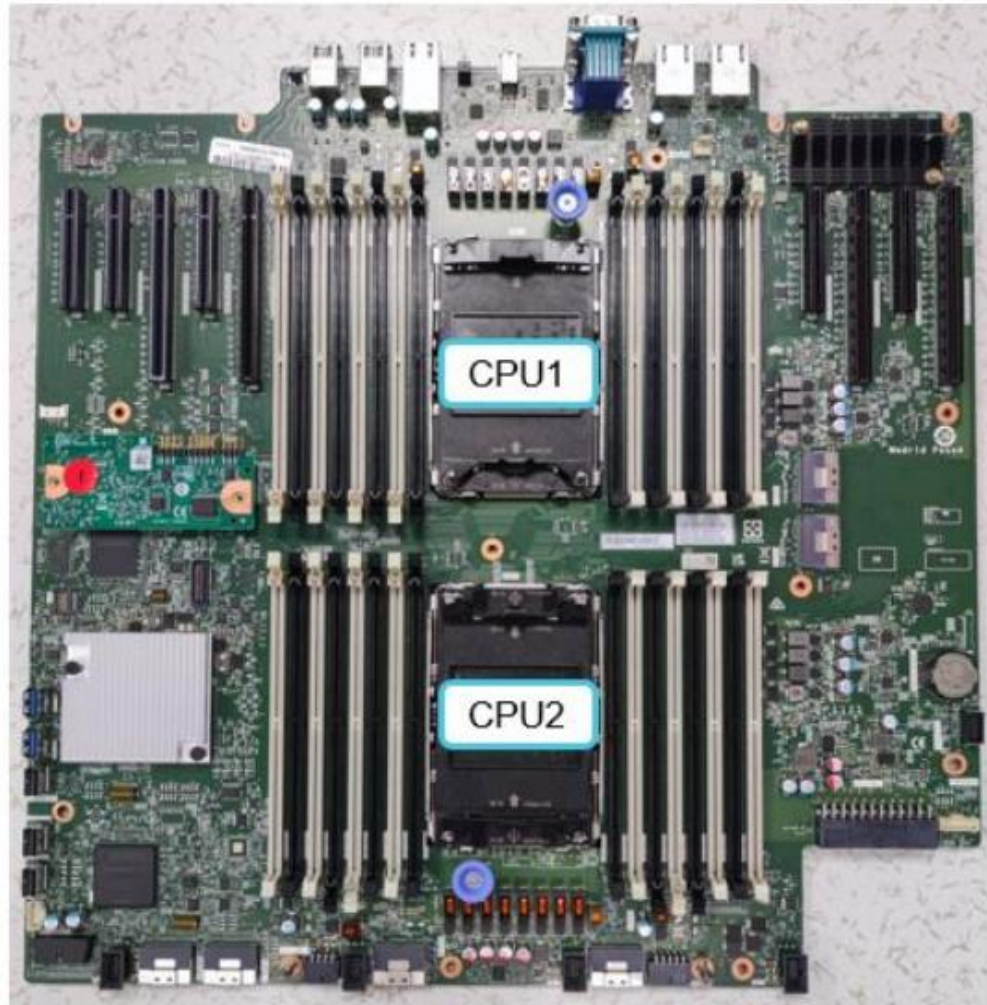# Inside view with air baffle

A2/L4 GPU air duct

Air baffle

System board components and connectors

Rear side

Front side
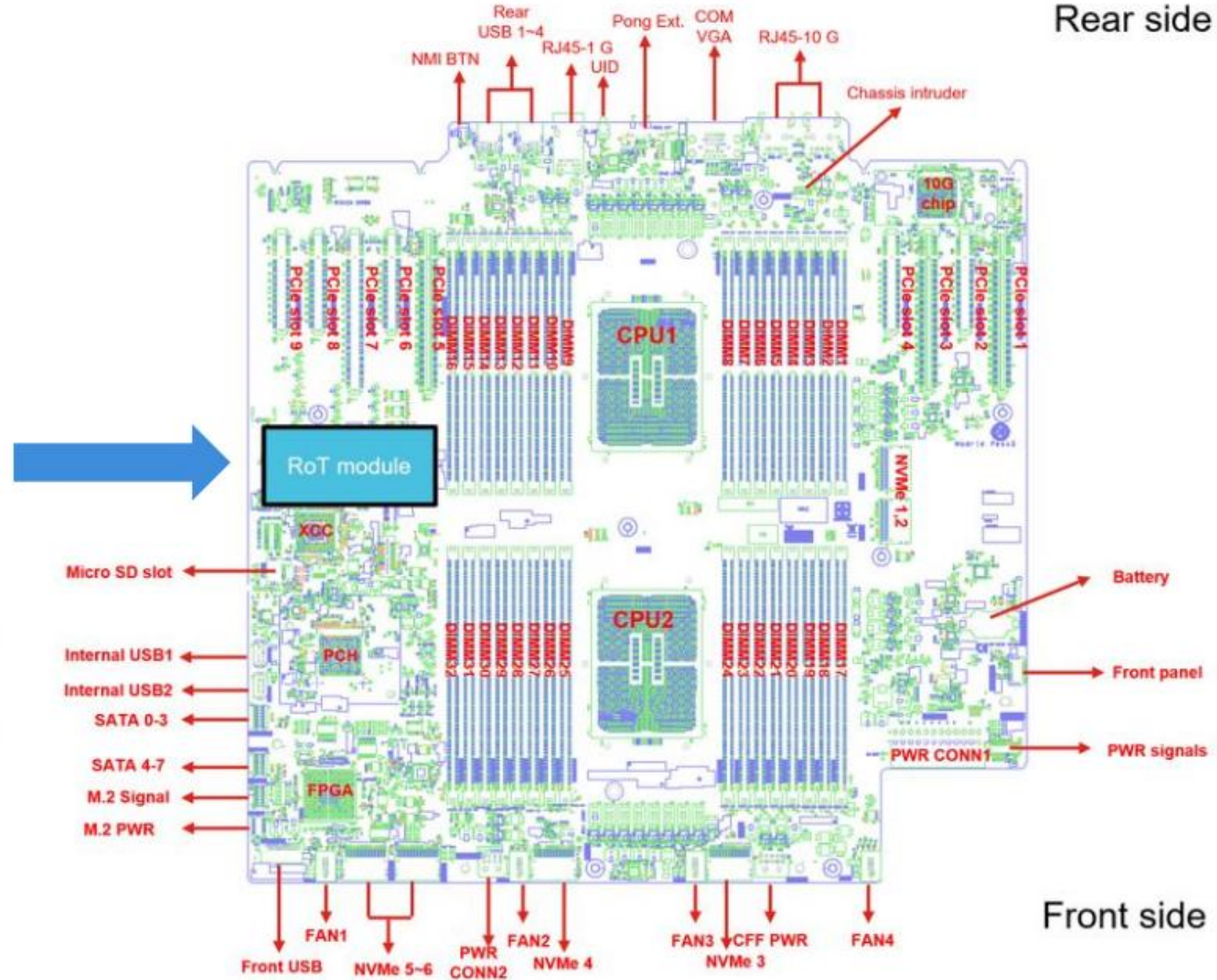
NVLink bridge

The ST650 V3 supports NVIDIA GPUs with optional NVLink bridges. The NVLink bridge provides GPU-to-GPU interconnection bandwidth to enhance GPU performance.
Only selected NVIDIA double-width PCIe GPU adapter configurations support NVLink.

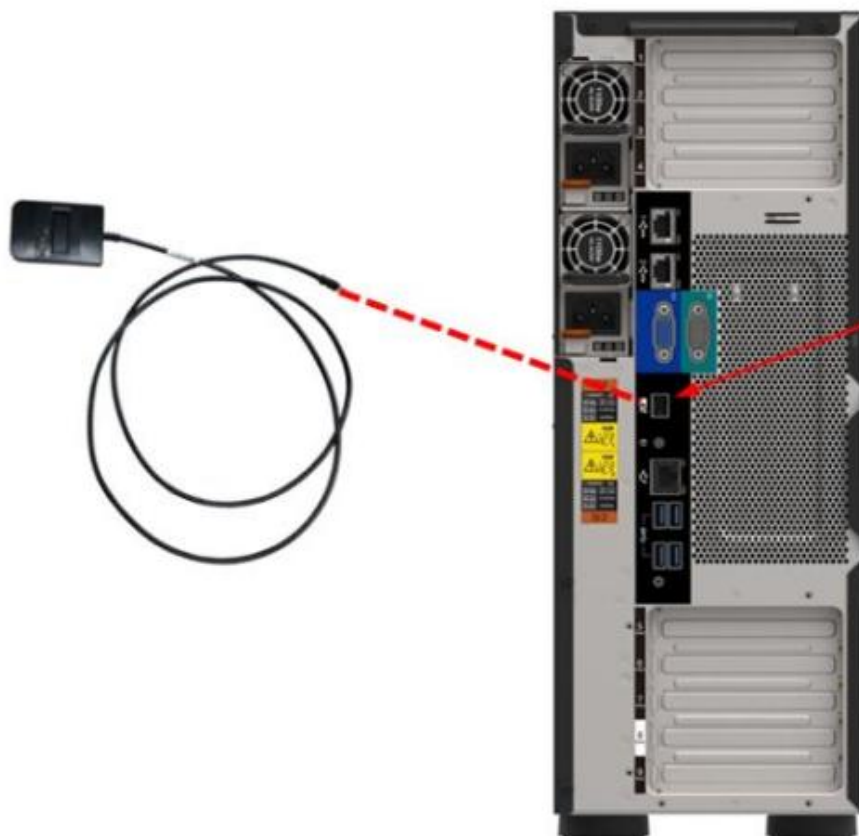For more information about NVLink technology, refer to the following NVIDIA web page

T4 filler

When one or more A2/L4 GPU adapters are installed in the server, a T4 filler is required for proper cooling and airflow. Refer to the NVIDIA A2 GPU and NVIDIA L4 GPU web pages for more information.

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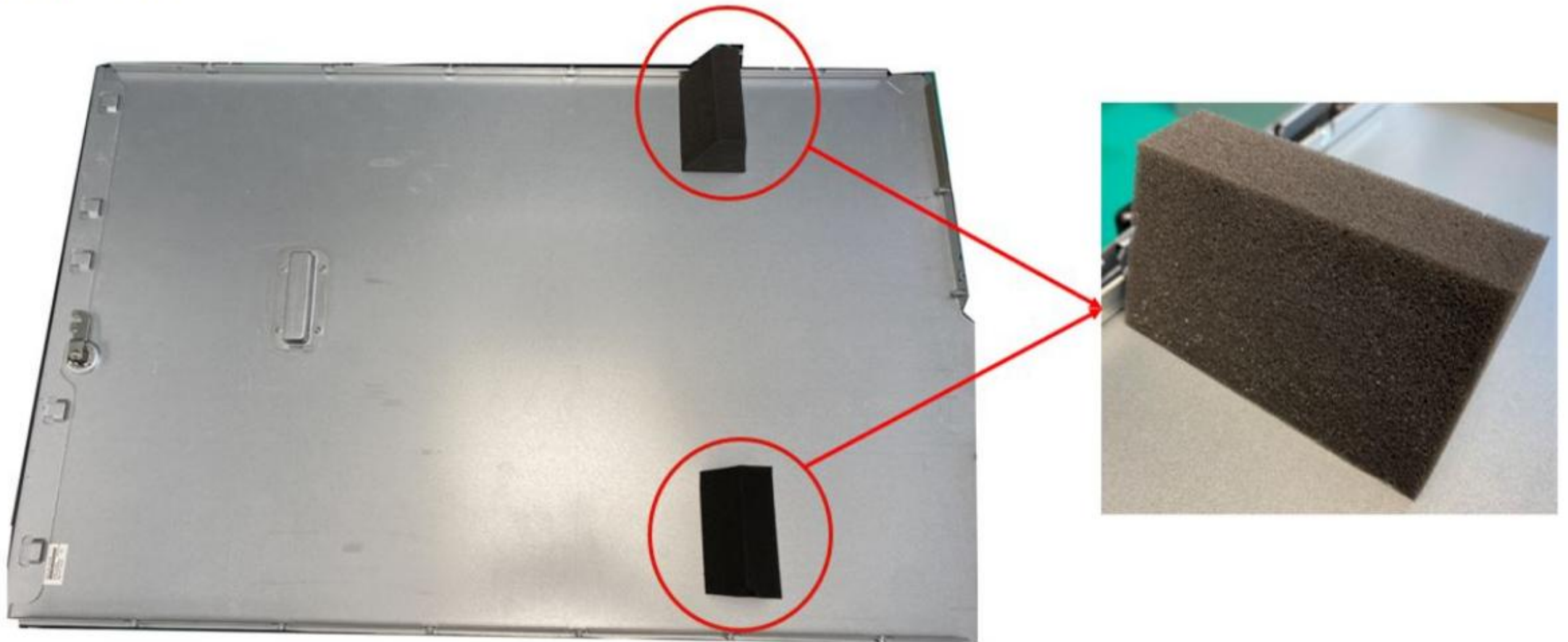
LCD diagnostic panel

The ST650 V3 supports the external LCD diagnostic panel. The panel can be used to quickly access system information, such as active errors, system health status, firmware version, network connection status, and health information. A demo video is available on the course landing page.

External diagnostic handset port (pong)

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