ThinkAgile MX450 Edge Integrated System
Product Guide

The Lenovo ThinkAgile MX450 Edge Integrated System is designed for deploying highly available, hyper-converged infrastructure (HCI) from Microsoft on purpose-built Lenovo edge servers in the remote offices/branch offices (ROBO) and at the edge. The ThinkAgile MX450 Edge Integrated System delivers fully validated and integrated Lenovo hardware and firmware that is certified for Microsoft Azure Stack HCI solutions.

This product guide provides essential technical and pre-sales information on the Lenovo ThinkAgile MX450 Edge IS, their key features and specifications, components and options, and configuration guidelines.

This guide is intended for technical specialists, sales specialists, sales engineers, IT architects, and other IT professionals who want to learn more about the ThinkAgile MX450 Edge Integrated System and consider their use in IT solutions.

The ThinkAgile MX450 Edge Integrated System is a validated platform that help modernize on-premises infrastructure with pre-tested, pre-configured, and easy-to-order configurations, with seamless Azure integration.

The ThinkAgile MX450 Edge Integrated System includes the Azure Stack HCI operating system and Lenovo ThinkAgile support with one single point of contact for support of the hardware and for software support Lenovo can open a support case with Microsoft to provide a warm-case transfer. Deployment and update features in Windows Admin Center and tight integration with Lenovo XClarity make cluster management, hardware and software update management & enforcing site wide policies easy for the IT administrators. Native integration with Azure services makes it easy for customers to adopt a hybrid cloud strategy for their workloads.

The systems offer one 3rd Generation Intel Xeon processor, up to 1 TB memory, up to four internal SSD drive bays, and up to 100Gb network connectivity and with a 2U height and short depth case that can go almost anywhere. It can be mounted on a wall, placed on the floor like a tower server, or mounted in a rack. The rugged ThinkAgile MX450 Edge IS can handle continuous operating temperatures from 5°C and 45°C; and some configurations are designed to meet NEBS Level-3 and ETSI requirements for 96 hours operating excursions from -5°C and 55°C as well as tolerance to locations with high-dust and vibration. The system is optimized for various types of edge and ROBO workloads that need compute power, data storage, and network closer to where data is generated, such as IoT, Smart Surveillance, or AI, and require small compute footprint and operations in rugged environments.

Figure 1. ThinkAgile MX450 Edge Integrated System

Did you know?

As a new direct and indirect Microsoft Cloud Solution Provider, Lenovo offers cloud services and subscriptions through the Lenovo Cloud Marketplace, which enable HCI use cases with the ThinkAgile MX platforms.

The ThinkAgile MX450 Edge Integrated System offers a compact design, low power usage, high performance, and security for edge locations. They can be wall-mounted, stacked on a shelf, or installed in a rack cabinet, and they are designed to operate in rugged environments with temperatures of up to 55°C and extreme shock and vibration.

Key features

The ThinkAgile MX450 Edge Integrated System offers the following key features:

- Quick and convenient path to implement a hyperconverged solution powered by the Azure Stack HCI OS with Hyper-V virtualization, Microsoft Storage Spaces Direct (S2D) Software Defined Storage (SDS), and Software Defined Networking (SDN) network virtualization.

- Streamlined management of Azure Arc enabled servers with unified single-pane-of-glass for creating and managing VMs, S2D volumes, and virtual networks through Windows Admin Center (WAC) in the Azure Portal.

- Consistent, low latency performance with hypervisor-embedded architecture, built-in read and write cache, and support for NVMe PCIe drives.

- Provides per-VM storage performance management with policy-driven Quality of Service (QoS) and continuous built-in monitoring and alerting with cluster-wide performance and capacity metrics.

- Can sustain drive, server, or component failures with built-in resiliency for continuous availability.

- GPU support to enable AI training, inferencing and data visualization scenarios, HPC workloads, virtual desktops and graphics intensive applications.

- Built on proven and reliable Lenovo ThinkEdge servers that provide compute power and space efficiency for a variety of edge workloads and applications.

- Provides comprehensive hardware management with advanced systems management capabilities with XClarity

- Delivers fully validated and integrated hardware and firmware that is certified for Microsoft Azure Stack HCI solutions.

- Ready for out-of-box deployment with the mandatory Azure Stack HCI OS pre-loaded, with the option to purchase a Windows Server 2022 Datacenter license if unlimited guest OS VMs are desired.

- Includes Lenovo ThinkAgile Advantage Single Point of Support for quick 24/7 problem reporting and resolution.

- Includes Lenovo deployment services to get customers up and running quickly.

Hardware features

The ThinkAgile MX450 Edge Integrated System is based on the ThinkEdge SE450 server and have the following hardware features:

Scalability and performance

The ThinkAgile MX450 Edge Integrated System offer numerous features to boost performance, improve scalability and reduce costs:

- Supports one third-generation Intel Xeon Processor Scalable processor
    - Up to 36 cores and 64 threads
    - Core speeds of up to 3.0 GHz
    - TDP ratings of up to 205W

- Support for up to 8 TruDDR4 memory DIMMs an up to 1 TB of memory using 128 GB DIMMs

- DIMMs operate at up to 3200 MHz means you have the fastest available memory subsystem

- Supports up to four single-width GPUs or two double-wide GPUs, for substantial processing power in an edge system.

- Offers a choice of internal drive SSD bays supporting SATA or NVMe drives, or hot-swap front-accessible drive bays supporting SAS, SATA or NVMe drives.

- Supports two M.2 drives for convenient operating system boot functions.
- Supports 4x NVMe drives without oversubscription of PCIe lanes (1:1 connectivity). The use of NVMe drives maximizes drive I/O performance, in terms of throughput and latency.
- The server offers up to four PCIe 4.0 slots plus a slot dedicated to the OCP adapter.
- Support for up to four network adapters, up to 100 Gb Ethernet for high-speed networking to back-end servers.
- **Availability and serviceability**

  The ThinkAgile MX450 Edge Integrated System provides many features to simplify serviceability and increase system uptime:

- The server offers Single Device Data Correction (SDDC, also known as Chipkill), Adaptive Double-Device Data Correction (ADDDC, also known as Redundant Bit Steering or RBS), and memory mirroring for redundancy in the event of a non-correctable memory failure.
- The M.2 adapter supports Non-RAID NVMe or 4350-8i SAS/SATA 12Gb HBA .
- The server has up to two hot-swap redundant power supplies and up to six simple-swap N+1 redundant fans to provide availability for business-critical applications.
- Solid-state drives (SSDs) offer more reliability and performance than traditional mechanical HDDs for greater uptime.
- Proactive Platform Alerts (including PFA and SMART alerts): Processors, voltage regulators, memory, internal storage (SSDs, M.2 storage), fans, power supplies, RAID controllers, server ambient and subcomponent temperatures. Alerts can be surfaced through the XClarity Controller to managers such as Lenovo XClarity Administrator and Microsoft System Center. These proactive alerts let you take appropriate actions in advance of possible failure, thereby increasing server uptime and application availability.
- The built-in XClarity Controller continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failures to minimize downtime.
- Built-in diagnostics in UEFI, using Lenovo XClarity Provisioning Manager, speed up troubleshooting tasks to reduce service time.
- Lenovo XClarity Provisioning Manager supports diagnostics and can save service data to a USB key drive or remote CIFS share folder for troubleshooting and reduce service time.
- Auto restart in the event of a momentary loss of AC power (based on power policy setting in the XClarity Controller service processor)
- Offers a diagnostics port on the front of the server to allow you to attach an external diagnostics handset for enhanced systems management capabilities.
- Support for the XClarity Administrator Mobile app running on a supported smartphone or tablet and connected to the server through the service-enabled USB port, enables additional local systems management functions.
- Three-year or one-year customer-replaceable unit and onsite limited warranty (varies by geography), 9 x 5 next business day. Optional service upgrades are available.
- **Manageability and security**

  Systems management features simplify local and remote management of the ThinkAgile MX450 Edge Integrated System :

- The server includes an XClarity Controller (XCC) to monitor server availability. Optional upgrade to XCC Advanced to provide remote control (keyboard video mouse) functions. Optional upgrade to XCC Enterprise enables the additional support for the mounting of remote media files (ISO and IMG image files), boot capture, and power capping.
- Lenovo XClarity Administrator offers comprehensive hardware management tools that help to increase uptime, reduce costs and improve productivity through advanced server management

capabilities.

- IT Administrators can securely claim and activate the ThinkAgile MX450 Edge Integrated System remotely through the ThinkShield Key Vault Portal, available on the web. They can also manage and unlock their global IoT edge fleet for initial operation and in case of tamper. The ThinkShield Edge Mobile Management app enables Edge Users to securely claim and activate the MX450 in an easy-to-use Web UI.

- UEFI-based Lenovo XClarity Provisioning Manager, accessible from F1 during boot, provides system inventory information, graphical UEFI Setup, platform update function, RAID Setup wizard, operating system installation function, and diagnostic functions.

- Support for Lenovo XClarity Energy Manager, which captures real-time power and temperature data from the server and provides automated controls to lower energy costs.

- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.

- Support for industry standard management protocols, IPMI 2.0, SNMP 3.0, Redfish REST API, serial console via IPMI

- An integrated hardware Trusted Platform Module (TPM) supporting TPM 2.0 enables advanced cryptographic functionality, such as digital signatures and remote attestation.

- Administrator and power-on passwords help protect from unauthorized access to the server.

- Supports Secure Boot to ensure only a digitally signed operating system can be used. Supported with HDDs and SSDs, as well as M.2 drives.

- Industry-standard Advanced Encryption Standard (AES) NI support for faster, stronger encryption.

- Intel Execute Disable Bit functionality can prevent certain classes of malicious buffer overflow attacks when combined with a supported operating system.

- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system.

- Additional physical security features are an available chassis intrusion switch and available lockable front bezel and top cover.

- **Energy efficiency**

  The ThinkAgile MX450 Edge Integrated System offers the following energy-efficiency features to save energy, reduce operational costs, and increase energy availability:

- Energy-efficient system board components help lower operational costs.

- High-efficiency power supplies with 80 PLUS Platinum and Titanium certifications

- Solid-state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.

- Optional Lenovo XClarity Energy Manager provides advanced data center power notification, analysis, and policy-based management to help achieve lower heat output and reduced cooling needs.

Components and connectors

The following figures show the front view of the ThinkAgile MX450 Edge Integrated System
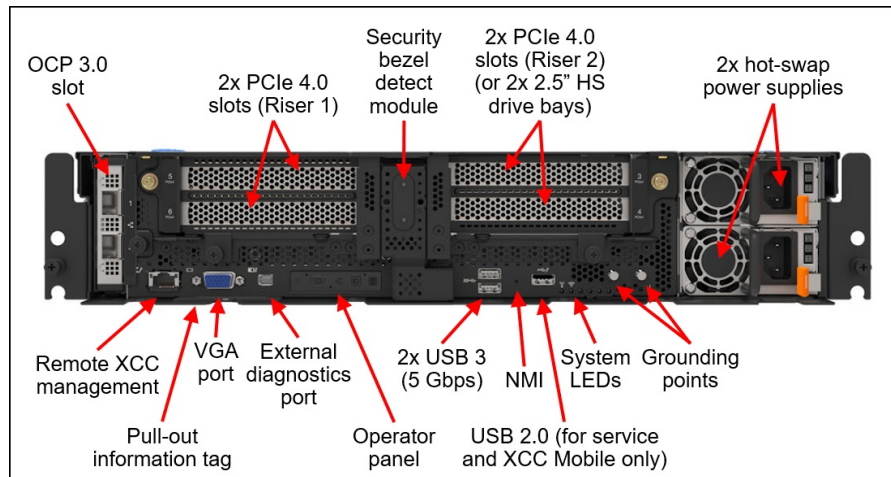

Figure 2. ThinkAgile MX450 Edge Integrated System Front view

The following figures show the rear view of the ThinkAgile MX450 Edge Integrated System
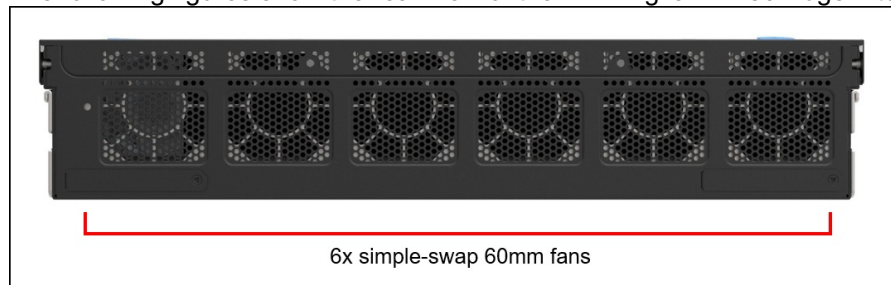

Figure 3. ThinkAgile MX450 Edge Integrated System : Rear view

The ThinkAgile MX450 Edge Integrated System optionally supports a security bezel which helps restrict physical access to the front of the server while still allowing cables to be properly routed through side panels. The bezel also duplicates the system LEDs that would otherwise be covered up by the bezel. The following figure shows the server with the security bezel attached.
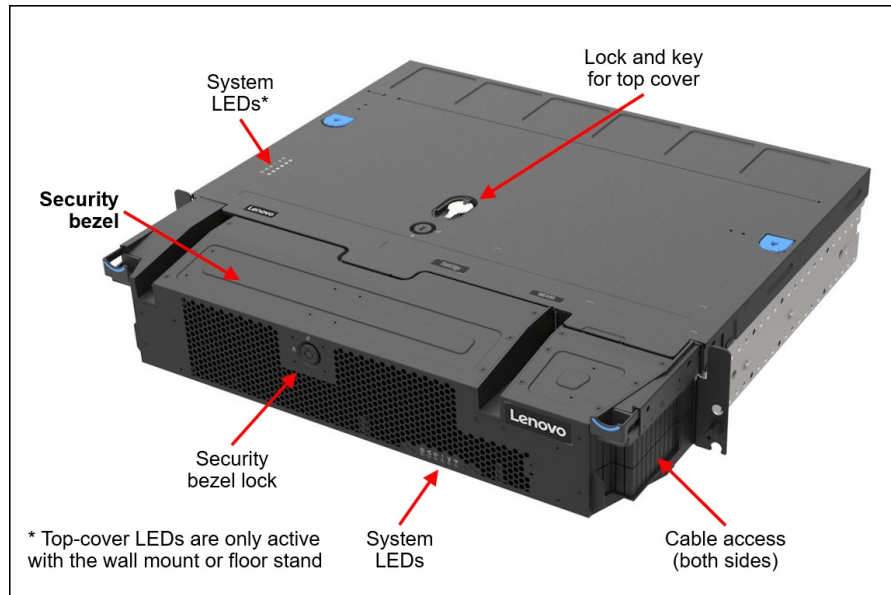

Figure 4. View of the ThinkAgile MX450 Edge Integrated System with security bezel attached

The following figure shows the locations of key components inside the server. The two riser cards and various brackets have been removed to show the components on the system board.
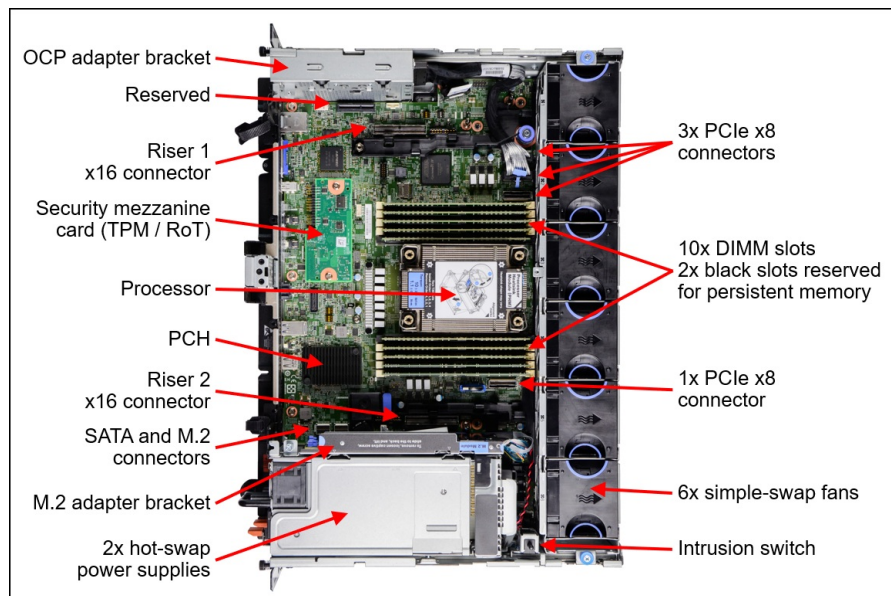

Figure 5. Internal view of the ThinkAgile MX450 Edge Integrated System

System specifications

The following table lists the system specifications for the ThinkAgile MX450 Edge Integrated System.

Table 1. System specifications

Attribute	Specification
Machine type	ThinkAgile MX450 Edge Integrated System: 7DG7
Form factor	2U rack server, 300mm or 360mm depth
Processor	1x 3rd Gen Intel Xeon Scalable processor (formerly codenamed "Ice Lake"). Supports Silver, Gold and Platinum processors up to 36 cores, core speeds of up to 3.0 GHz, and TDP ratings of up to 205W.
Memory	8 DIMM slots (four processor's memory channels with one DIMM per channel). Support for TruDDR4 RDIMMs and 3DS RDIMMs are supported. DIMMs operate at up to 3200 MHz.. **Note:** All memory DIMMs must be of the same type and capacity.
Memory capacity	Max 1TB using 8x 128GB 3DS RDIMMs
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Platinum or Gold processors), and memory mirroring.
Drive bays	• Up to 4x internal SSD drive bays supporting non-hot-swap trayless NVMe or SATA SSD drives • 2x M.2 drives for boot functions, supporting SATA drives
Storage controller	• 4x Onboard SATA ports (Intel VROC SATA RAID, formerly known as Intel RSTe RAID) • Up to 4x Onboard NVMe ports • RAID adapter and HBA support for SAS and SATA drive connectivity
GPU Support	Supports up to 4x single-wide GPUs or up to 2x double-wide GPUs (Optional)
Network interfaces	Dedicated OCP 3.0 SFF slot with PCIe 4.0 x16 host interface (not available in all configurations based on PCIe lane availability). OCP slot supports a variety of 2-port and 4-port adapters with 1GbE, 10GbE, 25GbE or 100GbE network connectivity. One port can optionally be shared with the XClarity Controller (XCC) management processor for Wake-on-LAN and NC-SI support. Additional network adapters supported in the PCIe slots.
Boot drive	480 GB or 960 GB M.2 non-hot-swap SSDs (RAID-1).
Ports	Front: 2x USB 3.2 G1 (5 Gb/s) ports, VGA port, USB 2.0 port for XCC local management only (not visible to the operating system), dedicated RJ-45 1GbE remote systems management port, External diagnostics port for local systems management, NMI pinhole
Cooling	6x simple-swap 60 mm dual-rotor fans (all standard), N+1 redundant in most configurations.
Power Supply	Up to two hot-swap redundant power supplies • 1100W Titanium or Platinum AC power supplies • 1800W Platinum AC power supply • 1100W -48V DC power supply Note: Power supplies are front-mounted so fan rotation is reversed compared to other ThinkSystem servers.
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.

Attribute	Specification
Systems management	Operator panel with status LEDs on the front of the server. Duplicate status LEDs on the top of the server. Optional External Diagnostics Handset with LCD display. XClarity Controller (XCC) embedded management based on ASPEED AST2600 management processor, XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XClarity Controller Advanced and Enterprise to enable remote control functions. ThinkShield Edge Mobile Management mobile app and XClarity Mobile app for local onsite ThinkAgile MX450 Edge Integrated System server management.
Security features	ThinkShield Key Vault Portal web site for security management. Trusted Platform Module, supporting TPM 2.0. Lockable top cover, optional front locking security bezel with duplicate status LEDs, intrusion detection, self-encrypting drive (SED) support, power-on password, administrator's password.
Software	Microsoft Azure Stack HCI operating system is preloaded, with an option to purchase a Windows Server 2022 license (Standard or Datacenter edition) to provide guest OS licenses for virtual machines running in the solution. Standard edition provides 2 guest OS licenses, while Datacenter edition provides unlimited guest OS licenses.
Warranty and support	Three-year customer-replaceable unit and onsite limited hardware warranty with 9x5 next business day (NBD). ThinkAgile Advantage Support is available and includes Premier Support Foundation once ThinkAgile Advantage is no longer available.
Dimensions	300mm chassis: Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 323 mm (12.7 in.) 360mm chassis: Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 383 mm (15.1 in.)
Weight	300mm chassis: 14.8 kg (32.7 lb) 360mm chassis: 17.4 kg (38.4 lb)

Models

ThinkAgile MX450 Edge Integrated System is configured by using the Lenovo Data Center Solution Configurator (DCSC):
http://dcsc.lenovo.com

The following table lists the CTO base models of the ThinkAgile MX450 Edge IS .

Table 2. CTO base models

Machine Type/Model	Description
ThinkAgile MX450 Edge Integrated System	
7DG7CTO1WW	ThinkAgile MX450 Edge Integrated System

The following table lists the base chassis for the ThinkAgile MX450 Edge Integrated System and Enclosures.

Table 3. Base chassis

Feature code	Description
C0RT	MX450 Edge IS 360mm Chassis
C0WA	MX450 Edge IS 300mm Chassis

Processors

The ThinkAgile MX450 Edge Integrated System ships with one processor that is embedded into the system board. The following table lists the processor options that are available for selection.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#processors

Table 4. Processor selection options

Part number	Feature	Description	Maximum supported MX450 Edge IS
None	BB34	Intel Xeon Silver 4310T 10C 105W 2.3GHz Processor	1
None	BB2Z	Intel Xeon Silver 4314 16C 135W 2.4GHz Processor	1
None	BB39	Intel Xeon Silver 4316 20C 150W 2.3GHz Processor	1
None	BB3N	Intel Xeon Gold 6330N 28C 165W 2.2GHz Processor	1
None	BB30	Intel Xeon Gold 5317 12C 150W 3.0GHz Processor	1
None	BB3E	Intel Xeon Gold 5318N 24C 150W 2.1GHz Processor	1
None	BB2Y	Intel Xeon Gold 5320T 20C 150W 2.3GHz Processor	1
None	BB4E	Intel Xeon Gold 6326 16C 185W 2.9GHz Processor	1
None	BB3H	Intel Xeon Gold 6330 28C 205W 2.0GHz Processor	1
None	BB3S	Intel Xeon Gold 6336Y 24C 185W 2.4GHz Processor	1
None	BB31	Intel Xeon Gold 6338N 32C 185W 2.2GHz Processor	1
None	BB33	Intel Xeon Gold 6338T 24C 165W 2.1GHz Processor	1
None	BB2U	Intel Xeon Gold 6354 18C 205W 3.0GHz Processor	1
None	BB2S	Intel Xeon Platinum 8352V 36C 195W 2.1GHz Processor	1
None	BB2V	Intel Xeon Platinum 8352Y 32C 205W 2.2GHz Processor	1

Memory

The ThinkAgile MX450 Edge Integrated System supports Lenovo TruDDR4 memory. TruDDR4 memory uses the highest-quality components sourced from Tier 1 DRAM suppliers and only memory that meets strict requirements is selected. It is compatibility tested and tuned to maximize performance and reliability.

The processor has 4 memory controllers and 8 memory channels; with all-memory configurations, the DIMMs are installed 1 RDIMM per channel. This corresponds to all the white DIMM slots on the system board.

Lenovo TruDDR4 RDIMMs and 3DS RDIMMs are supported. With 8x 128 GB 3DS RDIMMs installed, the ThinkAgile MX450 Edge Integrated System supports a total of 1 TB of system memory.

The following table lists the memory options that are available for selection.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#memory-options

Table 5. Memory options

Part number	Feature	Description	Maximum supported MX450 Edge IS
RDIMMs			
4X77A08632	B963	ThinkSystem 16GB TruDDR4 3200 MHz (2Rx8 1.2V) RDIMM	8
4X77A08633	B964	ThinkSystem 32GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM	8
4X77A08634	B965	ThinkSystem 32GB TruDDR4 3200 MHz (2Rx8 1.2V) RDIMM	8
4X77A08635	B966	ThinkSystem 64GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM	8
3DS RDIMMs			
4X77A08636	BA62	ThinkSystem 128GB TruDDR4 3200 MHz (4Rx4 1.2V) 3DS RDIMM	8

Internal storage

The ThinkAgile MX450 Edge Integrated System supports the following configurations for data storage:

- Up to 4x internal SSD drive bays supporting non-hot-swap trayless NVMe or SATA SSD drives
- Up to 2x M.2 drives for boot functions, supporting SATA

In addition, the systems support two internal M.2 SATA SSDs for the Windows Server boot volume.

The following table lists the internal storage options.

Table 6. Internal storage options for the ThinkAgile MX450 Edge Integrated System

Description	Feature code	Maximum quantity
Internal Drive Cage		
ThinkEdge SE450 Internal HDD Cage	BMGT	1
Enablement kit		
ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit	B5XJ	1
Riser Cards		
ThinkEdge SE450 Riser 1	BMGL	1
ThinkEdge SE450 Riser 2 (Optional)	BMGM	1

Table 7. Internal storage adapter

Part Number	Feature	Description
SAS/SATA adapter		
4Y37A72480	BJHH	ThinkSystem 4350-8i SAS/SATA 12Gb HBA

Drives for internal storage

The following table lists drive options for the ThinkAgile MX450 Edge Integrated System.

Table 8. Drives Supported in the MX450.

Part number	Feature	Description	Maximum supported MX450 Edge IS
M.2 SSDs - 6 Gb SATA -Boot Drive			
4XB7A82287	BQ1Y	ThinkSystem M.2 5400 PRO 480GB Read Intensive SATA 6Gb NHS SSD	2
4XB7A82288	BQ20	ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSD	2
7mm 2.5-inch trayless SSDs - 6 Gb SATA			
CTO Only	BS2W	ThinkSystem 2.5" 7mm 5400 PRO 480GB Read Intensive SATA 6Gb Trayless SSD	4
CTO Only	BS2V	ThinkSystem 2.5" 7mm 5400 PRO 960GB Read Intensive SATA 6Gb Trayless SSD	4
CTO Only	BS2U	ThinkSystem 2.5" 7mm 5400 PRO 1.92TB Read Intensive SATA 6Gb Trayless SSD	4
CTO Only	BS2T	ThinkSystem 2.5" 7mm 5400 PRO 3.84TB Read Intensive SATA 6Gb Trayless SSD	4
CTO Only	BS2S	ThinkSystem 2.5" 7mm 5400 PRO 7.68TB Read Intensive SATA 6Gb Trayless SSD	4
4XB7A77058	BKSV	ThinkSystem 2.5" 7mm S4520 960GB Read Intensive SATA 6Gb Trayless SSD	4
4XB7A77059	BKSW	ThinkSystem 2.5" 7mm S4520 1.92TB Read Intensive SATA 6Gb Trayless SSD	4
4XB7A78627	BM1D	ThinkSystem 2.5" 7mm S4520 3.84TB Read Intensive SATA 6Gb Trayless SSD	4
4XB7A78628	BM1E	ThinkSystem 2.5" 7mm S4520 7.68TB Read Intensive SATA 6Gb Trayless SSD	4
4XB7A77057	BKSU	ThinkSystem Intel S4520 2.5" 7mm 480GB Entry SATA 6Gb Non-Hot Swap SSD Trayless	4
7mm 2.5-inch SSDs - U.3 PCIe 4.0 NVMe			
4XB7A13975	BKSQ	ThinkSystem 2.5" 7mm U.3 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	4
4XB7A13976	BKWR	ThinkSystem 2.5" 7mm U.3 7450 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	4
4XB7A13977	BKWS	ThinkSystem 2.5" 7mm U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	4

Network adapters

The ThinkAgile MX450 Edge Integrated System supports the following networking options.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#i-o-expansion
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#network-adapters

Table 9. OCP network adapters

Part number	Feature	Description	Maximum supported MX450 Edge IS
10 Gb Ethernet - 10GBASE-T			
4XC7A79794	BMHF	ThinkEdge SE450 Intel X710-T2L 10GBASE-T 2-port OCP Ethernet Adapter	1
25 Gb Ethernet			
CTO Only	BMHG	ThinkEdge SE450 Intel E810-DA2 10/25GbE SFP28 2-Port OCP Ethernet Adapter	1
4XC7A79796	BMHD	ThinkEdge SE450 Mellanox CX6 Lx 10/25GbE SFP28 2-Port OCP Ethernet Adapter	1

Table 10. PCIe network adapters

Part number	Feature	Description	Maximum supported MX450 Edge IS
10 Gb Ethernet - 10GBASE-T			
7ZT7A00496	AUKP	ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter	4
4XC7A08245	B5SU	ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter	4
25 Gb Ethernet			
4XC7A08295	BCD6	ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
7XC7A05523	B0WY	ThinkSystem Intel XXV710-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
4XC7A62580	BE4U	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
100 Gb Ethernet			
4XC7A08248	B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	4

GPU adapters

The ThinkAgile MX450 Edge Integrated System supports the following GPU options.

Note: NVIDIA GPUs L40 and L4 will be available after February 2024 once the qualification is completed.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#gpu-adapters

Table 11. GPU Adapter

Part number	Feature	Description	Maximum supported MX450 Edge IS
4X67A81547	BQZT	ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC	4

For information about the GPU, see the ThinkSystem GPU Summary, available at:
https://lenovopress.com/lp0768-thinksystem-thinkagile-gpu-summary

Power supplies and cables

The ThinkAgile MX450 Edge Integrated System supports one or two hot-swap power supplies, installed at the front of the server. When two are installed, they are redundant in most configurations. Ordering information is listed in the following table.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#power-supplies

Table 12. Power options

Part number	Feature	Description	Maximum supported MX450 Edge IS
AC power supply units			
4P57A78281	BMH8	ThinkEdge 1100W 230V/115V Platinum Hot-Swap Power Supply	2
4P57A78358	BRH9	ThinkEdge 1100W 230V Titanium Hot-Swap Power Supply	2
4P57A78282	BMH9	ThinkEdge 1800W 230V Platinum Hot-Swap Power Supply	2
DC power supply unit			
4P57A78283	BMHA	ThinkEdge 1100W -48V DC Hot-Swap Power Supply	2

Mounting

The ThinkAgile MX450 Edge Integrated System support the following mounting capabilities.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#rack-installation

Rack installation

The ThinkAgile MX450 Edge Integrated System can be installed can be installed in a rack cabinet, either 2-post, 4-post long, or 4-post short. The following table lists the rack installation options that are available.

Table 13. Rack installation

Part number	Feature	Description	Maximum supported MX450 Edge IS
Rack Installation Mount			
4XF7A81940	BMH0	ThinkEdge 1000mm Friction Rail Kit	1
4XF7A81942	BMH2	ThinkEdge 600mm Ball Bearing Rail Kit	1
4XF7A81943	BMH5	ThinkEdge SE450 550mm Ball Bearing Rail Kit	1
4XF7A81941	BMH1	ThinkEdge 2-Post Friction Rail Kit	1

Software

The ThinkAgile MX450 Edge Integrated System includes the preloaded Azure Stack HCI operating system only and requires activation via a CSP such as Lenovo Cloud Marketplace

The following table lists the Windows Server software options that are available for selection from Lenovo for the ThinkAgile MX450 Edge Integrated System.

Table 14. Windows Server software selection options

Part number	Feature	Description	Maximum supported MX450 Edge IS
None	BFXP	SW Stack MS Azure Stack HCI 22H2	1

Systems management

The ThinkAgile MX450 Edge Integrated System supports the following systems management tools:

- Activation
- Lenovo XClarity Controller
- Lenovo XClarity Administrator and XClarity Pro
- Lenovo XClarity Integrator for Microsoft Windows Admin Center
- Lenovo XClarity Integrator for Microsoft System Center
- Lenovo XClarity Energy Manager

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#systems-management

Activation

Activation is an optional security feature of the MX450 that ensures that the system delivered from the factory is only used by its intended recipient and that all data and applications remains secure. Activation is enabled on a factory order when the Security Pack Enabled feature code (feature BLZ2) is selected as described in the Security Pack section.

> **Enabled by default**: Activation is enabled by default for new CTO orders. Activation can be disabled in the factory order as described in the Security Pack section.

If Activation is enabled, the system is delivered in system lockdown and will require activation before operation. There are three ways the server can be activated:

- Using a mobile device (iOS or Android) connect to the server to the USB management port on the front of the server and running the ThinkShield Edge Mobile Management app .
- Connecting the system to the Internet via the XCC management port on the front of the server and accessing the ThinkShield Key Vault Portal from a web browser on another system.
- In a disconnected mode, where neither a mobile device or an internet connection to the MX450 are available.

For further information on activation and the use of the ThinkShield Edge Mobile Management app, including videos and tours, see this support page:
https://support.lenovo.com/us/en/solutions/ht509033

Lenovo XClarity Controller

The ThinkAgile MX450 Edge Integrated System contains Lenovo XClarity Controller (XCC) Enterprise, which provides advanced service-processor control, monitoring, and alerting functions.

XClarity Controller Enterprise offers the following capabilities in these systems:

- Gathering and viewing system information and inventory
- Monitoring system status and health
- Alerting and notifications
- Event logging
- Syslog alerting
- Configuring security
- Updating system firmware
- Real-time power usage monitoring
- Displaying graphics for real-time and historical power usage data and temperature
- Capping power usage
- Remotely controlling power (Power on, Power off, Restart)

The XClarity Controller provides remote node management through the following interfaces:

- IPMI Version 2.0
- SNMP Version 3
- Common Information Model (CIM)
- DCMI Version 1.5
- Redfish REST API
- Web browser with HTML5 support
- Command-line interface
- Virtual Operator Panel with XClarity Mobile App via the front USB port with XClarity Controller access

Virtual Operator Panel provides quick access to system status, firmware, network, health, and alerts information. With proper authentication, it also allows to configure systems management and network settings and to control system power (Power on, Power off, Restart). The Virtual Operator Panel can be accessed from the XClarity Mobile App running on the Android or iOS mobile device that is connected to the front USB port with XClarity Controller access (See Components and connectors).

Lenovo XClarity Administrator and XClarity Pro

Lenovo XClarity Administrator is a centralized systems management solution that helps administrators deliver infrastructure faster. This solution integrates easily with Lenovo x86 servers, appliances, certified nodes, Top-of-Rack Ethernet switches, and storage systems, providing automated agent-less discovery, inventory, monitoring, and alerts across multiple systems. In addition, some managed endpoints support firmware updates and configuration management.

Lenovo XClarity Administrator is an optional software component for managing ThinkAgile MX450 Edge Integrated System which can be downloaded and used at no charge to discover and monitor the nodes and manage firmware upgrades for them.

If software support is required for XClarity Administrator and XClarity Integrator for System Center, Lenovo XClarity Pro software subscription should be ordered. Lenovo XClarity Pro is licensed on a per managed system basis, that is, each managed Lenovo system requires a license.

The following table lists the Lenovo XClarity Pro license options available for selection.

Table 15. Lenovo XClarity Pro licenses

Description	Feature code
Lenovo XClarity Pro, per Managed Server w/3 Yr SW S&S	B3XS
Lenovo XClarity Pro, per Managed Server w/5 Yr SW S&S	B3XT

Lenovo XClarity Administrator offers the following standard features that are available at no charge:

- Auto-discovery and monitoring of Lenovo x86 servers, appliances, certified nodes, Top-of-Rack Ethernet switches, and DM/DE/DS Series storage systems

- Firmware updates and compliance enforcement

- External alerts and notifications via SNMP traps, syslog remote logging, and e-mail

- Secure connections to managed endpoints

- NIST 800-131A or FIPS 140-2 compliant cryptographic standards between the management solution and managed endpoints

- Integration into existing higher-level management systems such as cloud automation and orchestration tools through REST APIs, providing extensive external visibility and control over hardware resources

- An intuitive, easy-to-use GUI

- Scripting with Windows PowerShell, providing command-line visibility and control over hardware resources

For more information, refer to the Lenovo XClarity Administrator Product Guide:
http://lenovopress.com/tips1200

Lenovo XClarity Integrator for Microsoft Windows Admin Center

Lenovo XClarity Integrator for Microsoft Windows Admin Center is a software plug-in module for Lenovo XClarity Administrator that provides customers a smooth and seamless management experience across Windows Server hyperconverged and physical infrastructure in a single unified user interface.

Lenovo XClarity Integrator for Windows Admin Center offers the following features:

- Monitoring health status of cluster hardware and generating alerts
- Collecting inventory, including available firmware updates
- Managing firmware updates for nodes and clusters
- Performing remote management, including remote power on/off and remote control.

Lenovo XClarity Integrator for Windows Admin Center can be downloaded and used at no charge. For more information, refer to the Lenovo XClarity Integrator for Microsoft System Center web page:
http://support.lenovo.com/us/en/solutions/ht507549

Lenovo XClarity Integrator for Microsoft System Center

Lenovo XClarity Integrator for Microsoft System Center is a software plug-in module for Lenovo XClarity Administrator that allows customers to integrate the management features of the Lenovo x86 servers, appliances, and certified nodes with Microsoft System Center.

Lenovo XClarity Integrator for System Center offers the following features:

- Integrated end-to-end management of node hardware with monitoring of both physical node and virtual server health

- Deployment of the latest Lenovo firmware and driver update management

- Non-disruptive node maintenance in clustered environments that reduces workload downtime by dynamically migrating workloads from affected hosts during rolling firmware updates

- Greater service level uptime and assurance in clustered environments during unplanned hardware events by dynamically triggering workload migration from impacted hosts when impending hardware failures are predicted

Lenovo XClarity Integrator for System Center can be downloaded and used at no charge. For more information, refer to the Lenovo XClarity Integrator for Microsoft System Center web page:
http://support.lenovo.com/us/en/solutions/lnvo-manage

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager provides a stand-alone, web-based agent-less power management console that provides real time data and enables you to observe, plan and manage power and cooling for Lenovo servers, appliances, and certified nodes. Using built-in intelligence, it identifies node power consumption trends and ideal power settings and performs cooling analysis so that you can define and optimize power-saving policies.

Lenovo XClarity Energy Manager offers the following capabilities:

- Monitors room, row, rack, and device levels in the data center
- Reports vital system information, such as power, temperature and resource utilization
- Monitors inlet temperature to locate hot spots, reducing the risk of data or device damage
- Provides finely grained controls to limit platform power in compliance with IT policy
- Generates alerts when a user-defined threshold is reached

Lenovo XClarity Energy Manager is an optional software component for the MX systems that is licensed on a per managed node basis, that is, each managed system requires a license. The 1-node Energy Manager license is included in the XClarity Controller Enterprise upgrade.

For more information, refer to the Lenovo XClarity Energy Manager web page:
http://datacentersupport.lenovo.com/us/en/solutions/lnvo-lxem

Security

The ThinkAgile MX450 Edge Integrated System offers a number of security features, both electronic and physical.

For details about these options, including configuration rules, see the ThinkEdge SE450 server product guide:
https://lenovopress.com/lp1540-thinkedge-se450-edge-server#security

Physical security features:

- Intrusion detection (optional, CTO only).

- Front security bezel with key lock (optional, available as a field upgrade, but requires the bezel detect module added in the factory)

- EIA mounting flange with security key (optional, CTO only)
  Available EIA bracket that uses a security screw to attach the server to the front flange of the rack cabinet. See EIA bracket with security screw for more information.

Electronic security features include:

- Automatic actions on tamper detection
  In the event of an intrusion or movement, the server can be configured in XCC to perform actions, including server shutdown and disabling remote access to the XCC from the network ports (referred to as the BMC network bridge).

- Self-encrypting (SED) drives that ensure data is secured when the drives are powered off

- Administrator password and a power-on password in UEFI

- Trusted Platform Module (TPM) supporting TPM 2.0, implemented on a mezzanine card, enables advanced cryptographic functionality in the operating system and applications. (not available for

customers in PRC)

- Optional support for a secure manufacturing supply chain using Intel Transparent Supply Chain

The server is NIST SP 800-147B compliant.

Security Pack

The Security Pack is the collection of security and activation features of the MX450:

- Enablement of local Self-encrypting (SED) authentication key (AK) management
- Mandatory claiming and activation process to identify the owner of MX450 when the server is first delivered/powered on

Table 16. Security Pack ordering information

Feature code	Description
BLZ2	ThinkEdge Security Pack Enabled
BKFC	ThinkEdge Security Pack Disabled

Notes:

- The Security Pack features setting cannot be changed after the system leaves the factory. For example, if you select feature BLZ2 to enable the Security Pack features, then the system will *require* activation before it can be first used. Similarly, if your system was configured in the factory with Security Pack disabled, you cannot enable it at a later time.
- Customers can use the ThinkShield Portal to determine which of their systems have Security Pack enabled or disabled (you will see "Standard" if the system has Security Pack disabled).

Intel Transparent Supply Chain

Add a layer of protection in your data center and have peace of mind that the server hardware you bring into it is safe authentic and with documented, testable, and provable origin.

Lenovo has one of the world's best supply chains, as ranked by Gartner Group, backed by extensive and mature supply chain security programs that exceed industry norms and US Government standards. Now we are the first Tier 1 manufacturer to offer Intel® Transparent Supply Chain in partnership with Intel, offering you an unprecedented degree of supply chain transparency and assurance.

To enable Intel Transparent Supply Chain for the Intel-based servers in your order, add the following feature code in the DCSC configurator, under the Security tab.

Table 17. Intel Transparent Supply Chain ordering information

Feature code	Description
BB0P	Intel Transparent Supply Chain

For more information on this offering, see the paper *Introduction to Intel Transparent Supply Chain on Lenovo ThinkSystem Servers*, available from https://lenovopress.com/lp1434-introduction-to-intel-transparent-supply-chain-on-thinksystem-servers.

Physical specifications

The ThinkAgile MX450 Edge Integrated System has the following overall physical dimensions, excluding components that extend outside the standard chassis, such as EIA flanges, front security bezel (if any), and power supply handles:

300mm chassis:

- Width: 445 mm (17.5 inches)
- Height: 87 mm (3.4 inches)
- Depth: 323 mm (12.7 inches)

360mm chassis:

- Width: 445 mm (17.5 inches)
- Height: 87 mm (3.4 inches)
- Depth: 383 mm (15.1 inches)

Operating environment

The ThinkAgile MX450 Edge Integrated System complies with ASHRAE Class A3 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A4 specifications.

Topics in this section:

- Configuration requirements
- Temperature and humidity
- NEBS support
- Acoustical noise emissions
- Shock and vibration

Configuration requirements

Components installed in the ThinkAgile MX450 Edge Integrated System have the following ambient temperature requirements:

- Persistent Memory is supported up to 40°C ambient temperature

- The following trayless drive is supported up to 35°C ambient temperature:
    - ThinkSystem 2.5" 7mm U.3 7400 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD, 4XB7A80376

- The following hot-swap drive is supported up to 40°C ambient temperature:
    - ThinkSystem 2.5" U.3 7400 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD, 4XB7A80378

- 360mm chassis config 3 (see Configurations section) is only supported up to 40°C ambient temperature if both of the following are installed:
    - 3 or fewer low profile PCIe adapters
    - 8x 128GB DIMMs installed

    Note: If 4 low profile PCIe adapters are installed, there are no thermal restrictions and the server can operate up to 45°C ambient temperature.

Temperature and humidity

The server is supported in the following environment:

- Air temperature:

- Operating:
  - ASHRAE 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 A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft).
  - ASHRAE A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft).
- Server off: -5°C to 55°C (23°F to 131°F)
- Shipment/storage: -40°C to 70°C (-40°F to 158°F)

- Maximum altitude: 3,050 m (10,000 ft)

- Relative Humidity (non-condensing):
  - Operating
    - ASHRAE Class 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%

NEBS support

The server supports NEBS Level 3:

- Operating temperature: 5°C to 40°C.

- High altitude operating temperature (1829m to 3960m, 6000ft to 13,000ft): 5°C to 35°C

- Short term operating temp*: -5°C to 55°C

- Humidity: 5% to 85% RH, Non-condensing.

- Maximum rate of change(°C /hr) should ≤ 20 Humidity transition rate should ≤10%/hr.

* Short-term conditions: A period of no more than 96 consecutive hours and a total of not more than 15 days in 1 year. A total of 360 hours in any given year, but no more than 15 occurrences during a 1-year period.

NEBS configuration supported:

- Chassis: 300mm chassis

- Processor: 28-core 165W with standard 2U heat sink

- Memory: 8x 64GB 3200MHz RDIMMs

- M.2: Two 480GB M.2 drives with SATA-RAID M.2 adapter

- Internal storage: 4x 960GB SATA drives

- PCIe adapters: Intel E810-DA2 (Slot 5), Intel ACC100 (Slot 3, 4, 6)

- No OCP

- 2x 1100W -48VDC power supplies

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound pressure level (L_{pAm}):
  - Idling: 43.3 dBA (Minimal), 47.4 dBA (Typical), 47.4 dBA (GPU rich)
  - Operating: 55.3 dBA (Minimal), 55.3 dBA (Typical), 65.2 dBA (GPU rich)

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.

- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions
    - Minimal: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 4x 960G SATA SSD, 2x M.2 5300 480GB SATA, 2x Intel E810-DA2, 2 x 1100W PSU
    - Typical: 300mm Chassis, 185W/32 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 480GB SATA, 2x NVIDIA A2 16GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2x 1100W PSU
    - GPU rich: 360mm Chassis, 165W/28 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 480GB SATA, 2x NVIDIA A30 24GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2x 1800W PSU

Shock and vibration

The server has the following vibration and shock limits:

- Vibration:
    - Operating: 0.21 G rms at 5 Hz to 500 Hz for 15 minutes across 3 axes
    - Non-operating (in packaging): 1.04 G rms at 2 Hz to 200 Hz for 15 minutes across 6 surfaces
- Shock:
    - Operating: 15 G for 3 milliseconds in each direction (positive and negative X, Y, and Z axes)
    - Non-operating (12 kg to 23 kg, in packaging): 762mm drop height for 1 corner 3 edge 6 surface
- NEBS GR-63:
    - Office vibration: 0.21 G rms at 5 Hz to 100 Hz for 30 minutes across 3 axes
    - Earthquake test: GR63 earthquake zone 4

Regulatory compliance

The ThinkAgile MX450 Edge Integrated System conforms to the following standards:

Warranty and support

The ThinkAgile MX450 Edge Integrated System can be configured with a three year hardware warranty with 24x7 ThinkAgile Advantage Support while it is available and will have Premier Support Foundation once ThinkAgile Advantage is no longer available. ThinkAgile Advantage Support has various levels of coverage with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

For more information refer to the Lenovo Support Plan - ThinkAgile MX450 Edge Integrated System support plan https://support.lenovo.com/us/en/solutions/HT511522

Lenovo's additional support services provide a sophisticated, unified support structure for your data center, with an experience consistently ranked number one in customer satisfaction worldwide. Available offerings include:

- **Warranty Upgrade (Preconfigured Support)**

  Services are available to meet the on-site response time targets that match the criticality of your systems.

    - 3 years of service coverage
    - **Foundation Service**: 9x5 service coverage with next business day onsite response. YourDrive YourData is an optional extra (see below).
    - **Essential Service:** 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select countries). Bundled with YourDrive YourData.
    - **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select countries). Bundled with YourDrive YourData.

- **Managed Services**

  Lenovo Managed Services provides continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of your data center using state-of-the-art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

  Quarterly reviews check error logs, verify firmware & OS device driver levels, and software as needed. We'll also maintain records of the latest patches, critical updates, and firmware levels, to ensure your systems are providing business value through optimized performance.

- **Technical Account Management (TAM)**

  A Lenovo Technical Account Manager helps you optimize the operation of your data center based on a deep understanding of your business. You gain direct access to your Lenovo TAM, who serves as your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time. In addition, your TAM will help proactively make service recommendations and manage your service relationship with Lenovo to make certain your needs are met.

- **Enterprise Server Software Support**

  Enterprise Software Support is an additional support service providing customers with software support on Microsoft, Red Hat, SUSE, and VMware applications and systems. Around the clock availability for critical problems plus unlimited calls and incidents helps customers address challenges fast, without incremental costs. Support staff can answer troubleshooting and diagnostic questions, address product comparability and interoperability issues, isolate causes of problems, report defects to software vendors, and more.

- **YourDrive YourData**

  Lenovo's YourDrive YourData is a multi-drive retention offering that ensures your data is always under your control, regardless of the number of drives that are installed in your Lenovo server. In the unlikely event of a drive failure, you retain possession of your drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The YourDrive YourData service can be purchased in convenient bundles and is optional with Foundation Service. It is bundled with Essential Service and Advanced Service.

- **Health Check**

  Having a trusted partner who can perform regular and detailed health checks is central to maintaining efficiency and ensuring that your systems and business are always running at their best. Health Check supports Lenovo-branded server, storage, and networking devices, as well as select Lenovo-supported products from other vendors that are sold by Lenovo or a Lenovo-Authorized Reseller.

Examples of region-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at the customer's own cost and labor and defective parts must be returned following the instructions supplied with the spare parts.

Lenovo Service offerings are region-specific. Not all preconfigured support and upgrade options are available in every region. For information about Lenovo service upgrade offerings that are available in your region, refer to the following resources:

- Service part numbers in Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com/#/services
- Lenovo Services Availability Locator
  http://lenovolocator.com/

For service definitions, region-specific details, and service limitations, please refer to the following documents:

- Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) Servers and System Storage
  http://pcsupport.lenovo.com/us/en/solutions/ht503310
- Lenovo Data Center Services Agreement
  http://support.lenovo.com/us/en/solutions/ht116628

Deployment services

The MX systems can optionally include Lenovo deployment services to get customers up and running quickly.

The following Lenovo custom installation services are optional for both MX Integrated Systems and MX Certified Nodes:

- Unpacking and inspecting the systems
- Mounting the systems (rack cabinet, desktop, stack, bookshelf, wall or ceiling, or rack installation)
- Connecting the systems to electrical power and network
- Checking and updating firmware to the latest levels
- Verifying operations
- Disposal of the packaging materials (within the customer site)

The following Lenovo deployment services are optional for both MX Integrated Systems and MX Certified Nodes:

- Conducting remote preparation and planning
- Verifying firmware versions and performing firmware updates, if needed
- Configuring XCC management settings
- Configuring Storage Spaces Direct
- Configuring Microsoft System Center and discovering hosts and storage (if System Center is used)
- Configuring Lenovo XClarity network settings and performing discovery and inventory (if XClarity is selected)
- Transferring knowledge
- Developing post-installation documentation

The following table lists ThinkAgile Health Check & Deployment offerings are available for ThinkAgile MX customers. These offerings are performed by Lenovo Professional Services.

- **Onsite Deployment**: Install, configure, and validate solution on-site, and conduct knowledge transfer.
- **Remote Deployment**: Install, configure, and validate solution remotely, and conduct knowledge transfer.
- **Remote Health Check**: Report & remediation of hardware and cluster health issues, including firmware and software updates.

Table 18. ThinkAgile Health Check & Deployment offerings

Part number	Description
Onsite deployment services	
5MS7B09464	ThinkAgile MX Onsite Deployment (up to 2 nodes)
5MS7B09465	ThinkAgile MX Onsite Deployment (additional node)
Remote deployment services	
5MS7B09466	ThinkAgile MX Remote Deployment (up to 2 nodes)
5MS7B09467	ThinkAgile MX Remote Deployment (additional node)
Remote Health Check	
5MS7B00049	ThinkAgile MX 1X Remote Health Check (per 2-4 node cluster)
5MS7B00050	ThinkAgile MX 1X Remote Health Check (additional node)
5MS7B00051	ThinkAgile MX 1X Remote Health Check & Update (per 2-4 node cluster)
5MS7B00052	ThinkAgile MX 1X Remote Health Check & Update (additional node)

For more information, refer to the Data Center Implementation Services web page: https://www.lenovo.com/us/en/data-center/services/implementation-services/

Lenovo Financial Services

Lenovo Financial Services reinforces Lenovo's commitment to deliver pioneering products and services that are recognized for their quality, excellence, and trustworthiness. Lenovo Financial Services offers financing solutions and services that complement your technology solution anywhere in the world.

We are dedicated to delivering a positive finance experience for customers like you who want to maximize your purchase power by obtaining the technology you need today, protect against technology obsolescence, and preserve your capital for other uses.

We work with businesses, non-profit organizations, governments and educational institutions to finance their entire technology solution. We focus on making it easy to do business with us. Our highly experienced team of finance professionals operates in a work culture that emphasizes the importance of providing outstanding customer service. Our systems, processes and flexible policies support our goal of providing customers with a positive experience.

We finance your entire solution. Unlike others, we allow you to bundle everything you need from hardware and software to service contracts, installation costs, training fees, and sales tax. If you decide weeks or months later to add to your solution, we can consolidate everything into a single invoice.

Our Premier Client services provide large accounts with special handling services to ensure these complex transactions are serviced properly. As a premier client, you have a dedicated finance specialist who manages your account through its life, from first invoice through asset return or purchase. This specialist develops an in-depth understanding of your invoice and payment requirements. For you, this dedication provides a high-quality, easy, and positive financing experience.

For your region-specific offers, please ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/

Related publications and links

For more information, see these resources:

- Lenovo ThinkAgile MX Certified Node product page
  https://www.lenovo.com/us/en/data-center/software-defined-infrastructure/ThinkAgile-MX-Certified-Node/p/WMD00000377
- Lenovo Data Center Solution Configurator (DCSC):
  https://dcsc.lenovo.com
- Microsoft Azure Stack HCI documentation
  https://docs.microsoft.com/en-us/azure-stack/hci/overview
- Lenovo ThinkAgile MX Best Recipes
  https://datacentersupport.lenovo.com/us/en/solutions/ht507406
- Lenovo ThinkAgile MX Information Center
  https://thinkagile.lenovofiles.com/help/topic/com.lenovo.thinkagile.7Z20.doc/mx_appliances.html?cp=3
- Lenovo Certified Configurations for Microsoft Azure Stack HCI (S2D)
  https://lenovopress.com/lp0866
- Lenovo Data Center Support
  https://datacentersupport.lenovo.com

Related product families

Product families related to this document are the following:

- Edge Servers
- Hyperconverged Infrastructure
- Hyperconverged Infrastructure
- Microsoft Alliance
- ThinkAgile MX Series for Microsoft Azure Stack HCI

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  https://lenovopress.lenovo.com/LP1875
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