ThinkAgile MX3520 Appliances and MX 2U Certified Nodes (Intel Xeon SP Gen 2)

Product Guide (withdrawn product)

The Lenovo ThinkAgile MX3520 Appliances and MX Certified Nodes are 2-socket 2U systems that are designed for deploying highly available, highly scalable hyper-converged infrastructure (HCI) and software-defined storage (SDS) from Microsoft on Lenovo enterprise platforms that feature the 2nd Gen Intel Xeon Scalable processors. The MX systems are available in two storage configurations: either Hybrid (HDDs and SSDs) or All Flash (SSDs only). The MX systems deliver fully validated and integrated Lenovo hardware and firmware that is certified for Microsoft Azure Local solutions.

The MX systems are available either as an Appliance or Certified Node:

- MX3520-H and ThinkAgile MX Certified Node with hybrid storage (HDDs + SSDs)
- MX3520-F and ThinkAgile MX Certified Node with all-flash storage (SSDs only)

MX Appliances deliver fully validated and integrated Lenovo hardware and firmware, certified and preloaded with licensed Microsoft Azure software. They also include ThinkAgile Advantage support with one single point of contact for support of the hardware and software.

MX Certified Nodes deliver fully validated Lenovo hardware and firmware, certified and can be preloaded with Microsoft Azure software. Certified Nodes do not include licenses to Microsoft Azure software and enhanced software support.

Figure 1. ThinkAgile MX3520 Appliances and MX Certified Nodes with hybrid storage

Did you know?

The MX3520 Appliances and MX Certified Nodes are built on industry-leading Lenovo ThinkSystem servers that feature enterprise-class reliability, management, and security. They deliver fully validated and integrated hardware and firmware that is certified for Microsoft Azure Local solutions.

The MX3520-F and MX3520-H appliances offer ThinkAgile Advantage Single Point of Support for quick 24/7 problem reporting and resolution.

Key features

Combining performance and flexibility, the MX systems systems are a great choice for enterprises of all sizes. The systems offer a broad selection of processors, memory and drives, and offers high performance features that industries such as finance, healthcare and telco need. Outstanding reliability, availability, and serviceability (RAS) and high-efficiency design can improve your business environment and can help save operational costs.

ThinkAgile MX Series platforms offer the choice of Azure Local Appliance (Integrated System) or Azure Local Certified Node. These validated platforms help modernize on-premises infrastructure with pre-tested, pre-configured, and easy-to-order configurations, with seamless Azure integration. 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 appliances include the Azure Local operating system, which is delivered as an Azure subscription service via the Microsoft CSP program. It also includes ThinkAgile Advantage support with one single point of contact for support of the hardware and warm-case transfer for software. 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 administrators. Azure hybrid by design, native integration with Azure services makes it easy for customers to adopt a hybrid cloud strategy for their workloads and use cases.
- The certified nodes deliver fully validated and integrated Lenovo hardware and firmware that is certified for Microsoft Azure Local solutions. These HCI Certified Nodes have the option of Windows Server 2019 Datacenter Edition for HCI functionality, and guest licenses are included.

Appliance features

The ThinkAgile MX Appliances offers the following key features:

- Quick and convenient path to implement a hyperconverged solution powered by the new Azure Local 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 Local with unified single-pane-of-glass for creating and managing VMs, S2D volumes, and virtual networks through Windows Admin Center.
- 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 ThinkSystem 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 Local solutions.
- Ready for out-of-box deployment with the mandatory Azure Local OS preloaded, with the option to purchase a Windows Server 2019 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.

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

Certified Node features

The ThinkAgile MX Certified Nodes offer the following key features:

- Quick and convenient path to implement a hyperconverged solution powered by Windows Server 2019 Datacenter with Hyper-V virtualization, Microsoft Storage Spaces Direct (S2D), Software Defined Storage (SDS), and Software Defined Networking (SDN) network virtualization.
- Streamlined management of Azure Local with unified single-pane-of-glass for creating and managing VMs, S2D volumes, and virtual networks through Windows Admin Center.
- 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 ThinkSystem 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.
- Delivers fully validated and integrated hardware and firmware that is certified for Microsoft Azure Local solutions.
- Ready for out-of-box deployment with the optional Windows Server 2019 Datacenter, or Azure Local OS preload.
- Provide flexibility in using the existing Microsoft Windows Server 2019 enterprise license agreements or purchasing new software licenses from Microsoft or Lenovo.
- Optional Lenovo deployment services to get customers up and running quickly.

Hardware features

The MX systems are based on the SR650 and have the following hardware features:

Scalability and performance

The MX systems offer numerous features to boost performance, improve scalability, and reduce costs:

- Support one or two second-generation Intel Xeon Scalable processors:
  - Up to 28 cores and 56 threads per processor
  - Core speeds of up to 3.6 GHz
  - TDP ratings of up to 205 W
- Helps maximize system performance for data intensive applications with up to 2933 MHz memory speeds and up to 3 TB of memory capacity with 3DS RDIMMs.
- Offers flexible and scalable internal storage in a 2U rack form factor with up to 24x 2.5-inch and 2x 3.5-inch drives for performance-optimized configurations or up to 14x 3.5-inch drives for capacity-optimized configurations
- Provides flexibility to use SAS, SATA, or NVMe drives in the same drive bays with an AnyBay design.
- Provides I/O scalability with a LOM slot, PCIe 3.0 slot for an internal storage controller, and up to six PCI Express (PCIe) 3.0 I/O expansion slots in a 2U rack form factor.

Availability and serviceability

The MX systems provide many features to simplify serviceability and increase system uptime:

- Offers protection in the event of a non-correctable memory failure with Single Device Data Correction (SDDC, also known as Chipkill, requires x4-based DIMMs), Adaptive Double Device Data Correction (ADDDC, also known as Redundant Bit Steering [RBS], requires x4-based DIMMs and Intel Xeon Gold or Platinum processors), memory mirroring, and memory rank sparing.
- Provides easy access to upgrades and serviceable parts (such as processors, memory DIMMs, and adapter cards) with tool-less cover removal.
- Offers data protection and greater system uptime with hot-swap drives supporting basic or advanced RAID redundancy.
- Provides availability for business-critical applications with redundant hot-swap power supplies and redundant hot-swap system fans.
- Simplifies servicing, speeds up problem resolution, and helps improve system availability with light path diagnostics.
- Allows preventive actions in advance of possible failure, thereby increasing server uptime and application availability with Proactive Platform Alerts (including PFA and SMART alerts) for processors, voltage regulators, memory, internal storage (SAS/SATA HDDs and SSDs, NVMe SSDs, M.2 storage, flash storage adapters), fans, power supplies, and server ambient and sub-component temperatures.
- Continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failure to minimize downtime with Built-in XClarity Controller (XCC).
- Provides quick access to system status, firmware, network, health, and alerts information via Virtual Operator Panel 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.
- Speeds up troubleshooting tasks to reduce service time with diagnostics built into the XClarity Provisioning Manager.

Manageability and security

Powerful systems management features simplify local and remote management of the MX systems and deliver enterprise-class data protection:

- Provides advanced service processor control, monitoring, and alerting functions with XClarity Controller, a next generation service processor.
- Improves Unified Extensible Firmware Interface (UEFI) system setup, configuration, updates, simplified error handling, and operating system deployment with the embedded XClarity Provisioning Manager.
- Offers XClarity Essentials software tools that can help you set up, use, and maintain the server.
- Increases uptime, reduces costs, and improves productivity through advanced server management capabilities with Lenovo XClarity Administrator that provides comprehensive hardware management.
- Provides on-the-go monitoring and management of devices in XClarity Administrator from anywhere with the Lenovo XClarity mobile app, which can help improve efficiency and reduce downtime risks.
- Centralizes infrastructure resource management with Lenovo XClarity Integrators for VMware vCenter and Microsoft System Center, extending XClarity Administrator features to virtualization management software tools and enabling users to deploy and manage infrastructure end-to-end.
- Offers advanced cryptographic functionality (such as digital signatures and remote attestation) with an integrated Trusted Platform Module (TPM)

- Provides faster, stronger encryption with industry-standard AES NI support.
- Helps prevent certain classes of malicious buffer overflow attacks with Intel Execute Disable Bit functionality, when combined with a supporting operating system.
- Enhances security through hardware-based resistance to malicious software attacks with Intel Trusted Execution Technology, allowing an application to run in its own isolated space, protected from all other software running on a system.

Energy efficiency

The MX systems offer the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Delivers impressive compute power per watt, featuring 80 PLUS Titanium and Platinum redundant power supplies.
- Enables customers to lower energy costs with design to meet ASHRAE A4 standards in select configurations.
- Reduces power drawn with Intel Intelligent Power Capability that powers individual processor elements on and off as needed.
- Helps reduce power consumption with variable speed fans.
- Helps achieve lower heat output and reduced cooling needs with Lenovo XClarity Energy Manager that provides advanced data center power notification, analysis, and policy-based management.

Components and connectors

The following figure shows the front view of the MX systems for hybrid storage.

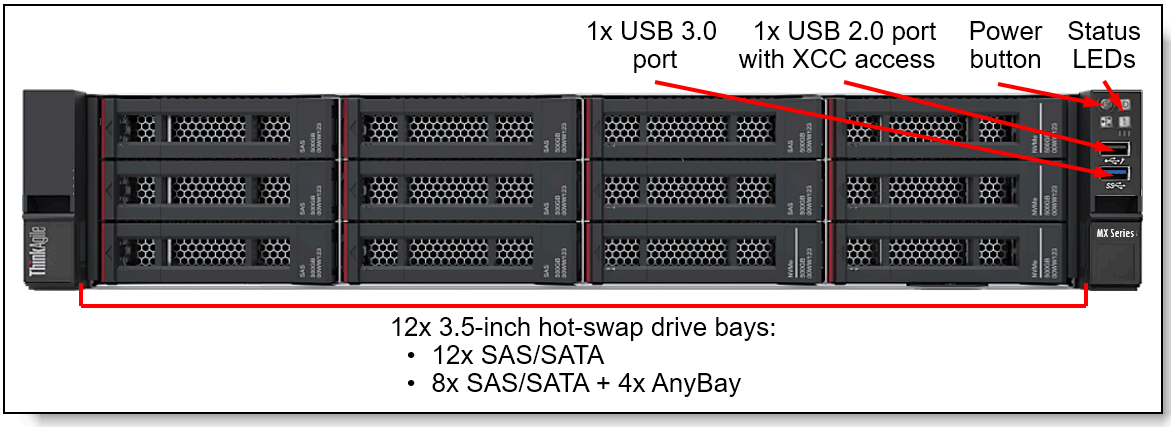

Figure 2. Front view - ThinkAgile MX3520 Appliances and MX Certified Nodes for Hybrid Storage with 3.5-inch drives

The following figure shows the front view of the MX3520 Appliances and MX Certified Nodes for All Flash Storage.

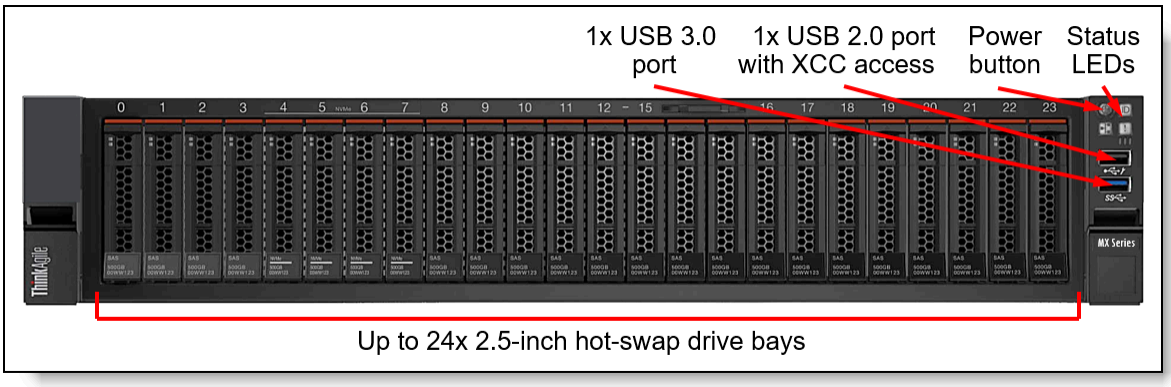

Figure 3. Front view - ThinkAgile MX3520 Appliances and MX Certified Nodes for All Flash Storage with 2.5-inch drives

The front of the MX systems includes the following components:

- 12x LFF hot-swap drive bays or 24x SFF hot-swap drive bays
- One USB 2.0 port with XClarity Controller access
- One USB 3.0 port
- A Power button
- Status LEDs

The following figure shows the rear view of the MX systems.

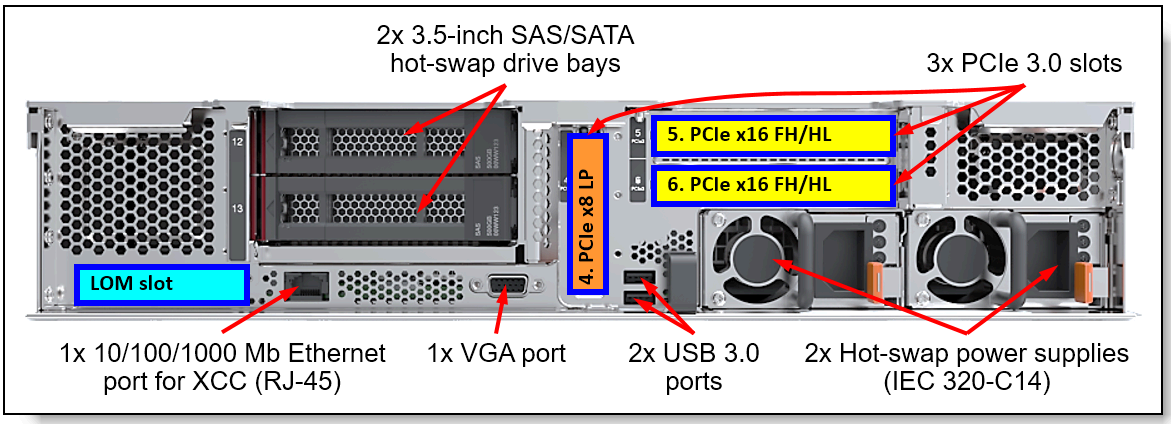

Figure 4. Rear view - ThinkAgile MX systems for Hybrid storage

The following figure shows the rear view of the MX systems.

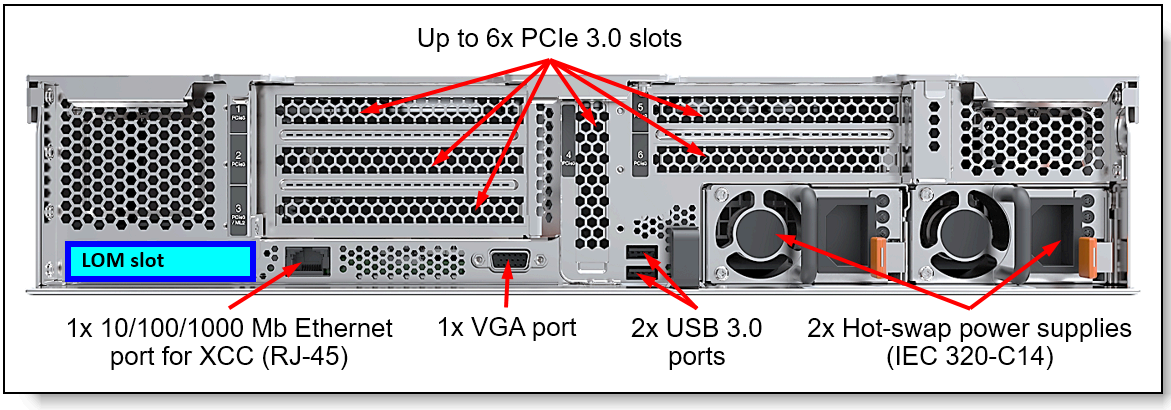

Figure 5. Rear view - ThinkAgile MX3520 Appliances and MX Certified Nodes for All Flash Storage

The rear of the MX systems includes the following components:

- 2x LFF hot-swap drive bays (Hybrid storage)
- PCIe 3.0 expansion slots
  - 3 slots in systems for Hybrid storage
  - 6 slots in systems for All Flash storage
- One LOM slot
- One 1 GbE port for XClarity Controller
- One VGA port
- Two USB 3.0 ports
- Two hot-swap power supplies

System specifications

The following table lists the system specifications of the MX3520 Appliances and MX Certified Nodes.

Table 1. Specifications of the MX3520 Appliances and MX Certified Nodes

Attribute	Specification
Machine types	MX3520-H Appliance: 7D5R MX3520-F Appliance: 7D5R MX Certified Nodes: 7Z20
Form factor	2U rack-mount
Processor	Two 2nd Gen Intel Xeon scalable processors
Chipset	Intel C624
Memory	24 DIMM slots for TruDDR4 RDIMMs (up to 12 DIMMs per processor; six memory channels per processor with two DIMMs per channel) with support for the following RDIMM capacities: • 32 GB Performance+ 2933 MHz • 8 GB, 16 GB, 32 GB, and 64 GB 2933 MHz • 16 GB and 32 GB 2666 MHz
Persistent memory	Up to 12x 128 GB or 256 GB TruDDR4 2666 MHz PMem modules in the DIMM slots.
Memory capacity	• Memory DIMMs only: Up to 1.5 TB with 24x 64GB RDIMMs • Memory DIMMs and DCPMMs: Up to 3.75 TB with 12x 64GB RDIMMs + 12x 256GB PMem
Memory protection	Error correction code (ECC), Single Device Data Correction (SDDC; for x4-based memory DIMMs), Adaptive Double Device Data Correction (ADDDC; for x4-based memory DIMMs, requires Intel Xeon Gold or Platinum processors), patrol scrubbing, and demand scrubbing.

Drive bays	Systems with All Flash storage:
	• 24 SFF hot-swap drive bays:
	  ◦ 20x 2.5" SAS/SATA (capacity drives) + 4x 2.5" AnyBay (cache or capacity)
	  ◦ 12x 2.5" SAS/SATA (not used) + 12x 2.5" AnyBay (for NVMe PCIe drives)
	• 16 SFF hot-swap drive bays:
	  ◦ 12x 2.5" SAS/SATA (capacity drives) + 4x 2.5" AnyBay (cache or capacity)
	  ◦ 8x 2.5" SAS/SATA (not used) + 8x 2.5" AnyBay (for NVMe PCIe drives)
	Systems with Hybrid storage:
	• 14 LFF hot-swap drive bays:
	  ◦ 12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)
	  ◦ 8x 3.5" SAS/SATA & 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)

Storage controller	• 12 Gb SAS/SATA non-RAID:
	  ◦ 430-8i HBA
	  ◦ 430-16i HBA
	• NVMe controllers (All Flash systems only):
	  ◦ Onboard NVMe (non-RAID)
	  ◦ 1610-4P NVMe Switch Adapter (non-RAID)

Network interfaces	• PCIe adapter ports (required):
	  ◦ 2x or 4x 10/25 GbE SFP28 ports; or
	  ◦ 1x or 2x 10/40 GbE SFP28 ports; or
	  ◦ 2x or 4x 100 GbE SFP28 ports
	• LOM ports (optional): 2x or 4x 1 GbE RJ-45, or 1/10 GbE RJ-45, or 10 GbE SFP+ ports.

Attribute	Specification
Boot drive	2x M.2 non-hot-swap SSDs (RAID-1).

I/O expansion slots	Systems with All Flash storage: Up to seven slots:
	• Configurations with 10/25 GbE network adapters and from 1 to 4 NVMe PCIe SSDs, or configurations with 100 GbE network adapters:
	  ◦ Slot 1 (Riser Card 1): PCIe 3.0 x16 (for the second 100 GbE network adapter or NVMe Switch Adapter)
	  ◦ Slot 3 (Riser Card 1): PCIe 3.0 x8 (for the second 10/25 GbE network adapter)
	• Configurations with 10/25 GbE network adapters and from 5 to 12 NVMe PCIe SSDs:
	  ◦ Slot 1 (Riser Card 1): PCIe 3.0 x8 (not used)
	  ◦ Slot 2 (Riser Card 1): PCIe 3.0 x8 (for the second 10/25 GbE network adapter)
	  ◦ Slot 3 (Riser Card 1): PCIe 3.0 x8 (not used)
	• Slot 4 (Onboard): PCIe 3.0 x8 (for an internal storage controller)
	• Slot 5 (Riser Card 2): PCIe 3.0 x16 (for an internal storage controller or NVMe Switch Adapter)
	• Slot 6 (Riser Card 2): PCIe 3.0 x16 (for the first 10/25 GbE or 100 GbE network adapter)
	• Slot 7 (Onboard): PCIe 3.0 x8 (for an internal storage controller)
	Systems with Hybrid storage: Four slots:
	• Slot 4 (Onboard): PCIe 3.0 x8 (for the second 10/25 GbE network adapter)
	• Slot 5 (Riser Card 2): PCIe 3.0 x16 (for the second 100 GbE network adapter)
	• Slot 6 (Riser Card 2): PCIe 3.0 x16 (for the first 10/25 GbE or 100 GbE network adapter)
	• Slot 7 (Onboard): PCIe 3.0 x8 (for an internal storage controller)

Ports	• Front: 1x USB 2.0 port with XClarity Controller access, 1x USB 3.0 port. • Rear: 2x USB 3.0 ports, 1x VGA port, 1x RJ-45 10/100/1000 Mb Ethernet port for systems management.
Cooling	Six hot-swap system fans with N+1 redundancy.
Power supply	Two redundant hot-swap 1100 W (100-240 V) or 1600 W (200-240 V) High Efficiency Platinum power supplies.
Video	Matrox G200 with 16 MB memory integrated into the XClarity Controller. Maximum resolution is 1920x1200 at 60 Hz with 32 bits per pixel.
Hot-swap parts	SSDs, HDDs, power supplies, and fans.
Systems management	Lenovo XClarity Controller (XCC) Enterprise (Pilot 4 chip), proactive platform alerts, light path diagnostics, Lenovo XClarity Administrator (optional), Lenovo XClarity Integrator for Microsoft System Center (optional), Lenovo XClarity Integrator for Microsoft Admin Center (optional), Lenovo XClarity Energy Manager (optional).
Security features	Power-on password, administrator's password, secure firmware updates, Trusted Platform Module (TPM) 1.2 or 2.0 (configurable UEFI setting).
Software	Appliances: Microsoft Azure Local operating system is preloaded, with an option to purchase a Windows Server 2019 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. Certified Nodes: Microsoft Windows Server 2019 Datacenter edition can be optionally preloaded. Having the Azure Local operating system preloaded is not currently an option for a Certified Node.

Attribute	Specification
Warranty and support	Appliances: Three-, four-, or five-year customer-replaceable unit and onsite limited hardware warranty with ThinkAgile Advantage Support and selectable service levels: 9x5 next business day (NBD) parts delivered, 9x5 NBD onsite response, 24x7 coverage with 2-hour or 4-hour onsite response, or 6-hour or 24-hour committed repair (select areas). Also available are YourDrive YourData, Premier Support, and Enterprise Software Support. Certified Nodes:Three-, four-, or five-year customer-replaceable unit and onsite limited warranty with selectable service levels: 9x5 coverage with next business day (NBD) parts delivered (base warranty), 9x5 coverage with NBD onsite response (Foundation Service), 24x7 coverage with 4-hour onsite response or 24-hour committed repair (select areas) (Essential Service), or 24x7 coverage with 2-hour onsite response or 6-hour committed repair (select areas) (Advanced Service). Also available are 1-year and 2-year post-warranty extensions, YourDrive YourData, and Enterprise Software Support.
Dimensions	Height: 87 mm (3.4 in.), width: 445 mm (17.5 in.), depth: 720 mm (28.3 in.).
Weight	Maximum configuration: 32 kg (70.5 lb).

Models

Factory-integrated models of the MX3520 Appliances and MX Certified Nodes are configured by using the Lenovo Data Center Solution Configurator (DCSC):
http://dcsc.lenovo.com

During the configuration process, you are selecting the base Configure-to-Order (CTO) model first, and then you are selecting components (processors, memory, drives, network adapters, and software) for that model.

The following table lists the base CTO models:

Table 2. Base CTO models

Machine Type/Model	Description
7D5RCTO1WW	ThinkAgile MX3520-H Hybrid Appliance
7Z20CTO1WW	ThinkAgile MX 2U Certified Node - Hybrid (MX Hybrid)
7D5RCTO2WW	ThinkAgile MX3520-F All Flash Appliance
7Z20CTO2WW	ThinkAgile MX 2U Certified Node - All Flash (MX All Flash)

Models of the MX systems are defined based on whether the systems have 16x 2.5-inch, 24x 2.5-inch or 12x 3.5-inch drive bays at the front. For models, the feature codes for these chassis bases are as listed in the following table.

Table 3. Chassis base feature codes

Feature	Description	Maximum supported			
		MX3520-H	MX Hybrid	MX3520-F	MX All Flash
B4E2	ThinkAgile MX 2U 3.5" Chassis with 8 or 12 Bays	1	1	No	No
B4E3	ThinkAgile MX 2U 2.5" Chassis with 8, 16 or 24 Bays	No	No	1	1

Processors

The MX3520 Appliances and MX Certified Nodes ship with two processors. The following table lists the processor options that are available for selection.

For details about these options, including configuration rules, see the SR650 product guide: https://lenovopress.com/lp1050-thinksystem-sr650-server#processors

Table 4. Processors

Feature	Description	Maximum supported			
		MX3520-H	MX Hybrid	MX3520-F	MX All Flash
Intel Xeon Silver processors					
B4HT	Intel Xeon Silver 4208 8C 85W 2.1GHz Processor	2	2	2	2
B4HS	Intel Xeon Silver 4210 10C 85W 2.2GHz Processor	2	2	2	2
B7N5	Intel Xeon Silver 4210R 10C 100W 2.4GHz Processor	2	2	2	2
B4HR	Intel Xeon Silver 4214 12C 85W 2.2GHz Processor	2	2	2	2
B7N6	Intel Xeon Silver 4214R 12C 100W 2.4GHz Processor	2	2	2	2
B4HQ	Intel Xeon Silver 4215 8C 85W 2.5GHz Processor	2	2	2	2
BAZU	Intel Xeon Silver 4215R 8C 130W 3.2GHz Processor	2	2	2	2
B4HP	Intel Xeon Silver 4216 16C 100W 2.1GHz Processor	2	2	2	2
Intel Xeon Gold processors					
B4HN	Intel Xeon Gold 5215 10C 85W 2.5GHz Processor	2	2	2	2
B4P9	Intel Xeon Gold 5215L 10C 85W 2.5GHz Processor	2	2	2	2
B4HM	Intel Xeon Gold 5217 8C 115W 3.0GHz Processor	2	2	2	2
B4HL	Intel Xeon Gold 5218 16C 125W 2.3GHz Processor	2	2	2	2
BAZS	Intel Xeon Gold 5218R 20C 125W 2.1GHz Processor	2	2	2	2
B5S0	Intel Xeon Gold 5218N 16C 110W 2.3GHz Processor	2	2	2	2
B4HK	Intel Xeon Gold 5220 18C 125W 2.2GHz Processor	2	2	2	2
B7N9	Intel Xeon Gold 5220R 24C 150W 2.2GHz Processor	2	2	2	2
B6CV	Intel Xeon Gold 6222V 20C 115W 1.8GHz Processor	2	2	2	2
B6CL	Intel Xeon Gold 6226 12C 125W 2.7GHz Processor	2	2	2	2
BAZW	Intel Xeon Gold 6226R 16C 150W 2.9GHz Processor	2	2	2	2
B4HJ	Intel Xeon Gold 6230 20C 125W 2.1GHz Processor	2	2	2	2
BAZX	Intel Xeon Gold 6230R 26C 150W 2.1GHz Processor	2	2	2	2
B6CK	Intel Xeon Gold 6234 8C 130W 3.3GHz Processor	2	2	2	2
B6CJ	Intel Xeon Gold 6238 22C 140W 2.1GHz Processor	2	2	2	2
B6CR	Intel Xeon Gold 6238L 22C 140W 2.1GHz Processor	2	2	2	2

Feature	Description	Maximum supported			
		MX3520-H	MX Hybrid	MX3520-F	MX All Flash
BAZL	Intel Xeon Gold 6238R 28C 165W 2.2GHz Processor	2	2	2	2
B4HH	Intel Xeon Gold 6240 18C 150W 2.6GHz Processor	2	2	2	2
B6CS	Intel Xeon Gold 6240L 18C 150W 2.6GHz Processor	2	2	2	2
BAZM	Intel Xeon Gold 6240R 24C 165W 2.4GHz Processor	2	2	2	2
B4HG	Intel Xeon Gold 6242 16C 150W 2.8GHz Processor	2	2	2	2
B4HF	Intel Xeon Gold 6244 8C 150W 3.6GHz Processor	No	No	2	2
B4HE	Intel Xeon Gold 6248 20C 150W 2.5GHz Processor	2	2	2	2
B4HC	Intel Xeon Gold 6252 24C 150W 2.1GHz Processor	2	2	2	2
B4HD	Intel Xeon Gold 6254 18C 200W 3.1GHz Processor	No	No	No	2
B6CU	Intel Xeon Gold 6262V 24C 135W 1.9GHz Processor	2	2	2	2
Intel Xeon Platinum processors					
B5RZ	Intel Xeon Platinum 8253 16C 125W 2.2GHz Processor	2	2	2	2
B4HB	Intel Xeon Platinum 8260 24C 165W 2.4GHz Processor	2	2	2	2
B4P7	Intel Xeon Platinum 8260L 24C 165W 2.4GHz Processor	2	2	2	2
B4HA	Intel Xeon Platinum 8268 24C 205W 2.9GHz Processor	No	No	2	2
B4H9	Intel Xeon Platinum 8270 26C 205W 2.7GHz Processor	No	No	2	2
B4H8	Intel Xeon Platinum 8276 28C 165W 2.2GHz Processor	2	2	2	2
B4P6	Intel Xeon Platinum 8276L 28C 165W 2.2GHz Processor	2	2	2	2
B4H7	Intel Xeon Platinum 8280 28C 205W 2.7GHz Processor	No	No	2	2
B4P5	Intel Xeon Platinum 8280L 28C 205W 2.7GHz Processor	No	No	2	2

Memory

The MX systems systems support the following memory options.

For details about these options, including configuration rules, see the SR650 product guide: https://lenovopress.com/lp1050-thinksystem-sr650-server#processors

Table 5. Memory

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
RDIMMs - 2933 MHz Performance+						
4X77A12185	B5N7	ThinkSystem 32GB TruDDR4 Performance+ 2933MHz (2Rx4 1.2V) RDIMM	24	24	24	24
RDIMMs - 2933 MHz						
4ZC7A08706	B4H1	ThinkSystem 8GB TruDDR4 2933MHz (1Rx8 1.2V) RDIMM	24	24	24	24
4ZC7A08707	B4LY	ThinkSystem 16GB TruDDR4 2933 MHz (1Rx4 1.2V) RDIMM	24	24	24	24
4ZC7A08708	B4H2	ThinkSystem 16GB TruDDR4 2933MHz (2Rx8 1.2V) RDIMM	24	24	24	24
4ZC7A08709	B4H3	ThinkSystem 32GB TruDDR4 2933MHz (2Rx4 1.2V) RDIMM	24	24	24	24
4ZC7A08710	B4H4	ThinkSystem 64GB TruDDR4 2933MHz (2Rx4 1.2V) RDIMM	24	24	24	24
RDIMMs - 2666 MHz						
7X77A01303	AUNC	ThinkSystem 16GB TruDDR4 2666 MHz (2Rx8 1.2V) RDIMM	24	24	24	24
7X77A01304	AUND	ThinkSystem 32GB TruDDR4 2666 MHz (2Rx4 1.2V) RDIMM	24	24	24	24

Persistent memory

The MX systems systems support the following Persistent Memory options.

For details about these options, including configuration rules, see the SR650 product guide:
https://lenovopress.com/lp1050-thinksystem-sr650-server#persistent-memory

For more information about Persistent memory, see the Intel Optane Persistent Memory 100 Series product guide:
https://lenovopress.com/lp1066-intel-optane-persistent-memory-100-series

Table 6. Persistent memory

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
4ZC7A15110	B4LV	ThinkSystem 128GB TruDDR4 2666MHz (1.2V) Intel Optane DC Persistent Memory	12	12	12	12
4ZC7A15111	B4LW	ThinkSystem 256GB TruDDR4 2666MHz (1.2V) Intel Optane DC Persistent Memory	12	12	12	12

Configuration rules:

- Persistent memory is only supported in Memory mode
- Only certain combinations of DIMMs and PMem is supported - see the Intel Optane Persistent Memory 100 Series product guide:
  https://lenovopress.com/lp1066-intel-optane-persistent-memory-100-series

Internal storage

Internal storage configurations of the MX systems are as follows.

In this section:

- Hybrid storage systems
- All Flash storage systems
- Backplanes
- Boot drive enablement

Hybrid storage systems

The MX systems for Hybrid Storage support the following drive bay configurations:

- 14 hot-swap drive bays:
  - 12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)
  - 8x 3.5" SAS/SATA & 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)

The following figure shows the internal drive bay configurations for Hybrid storage.

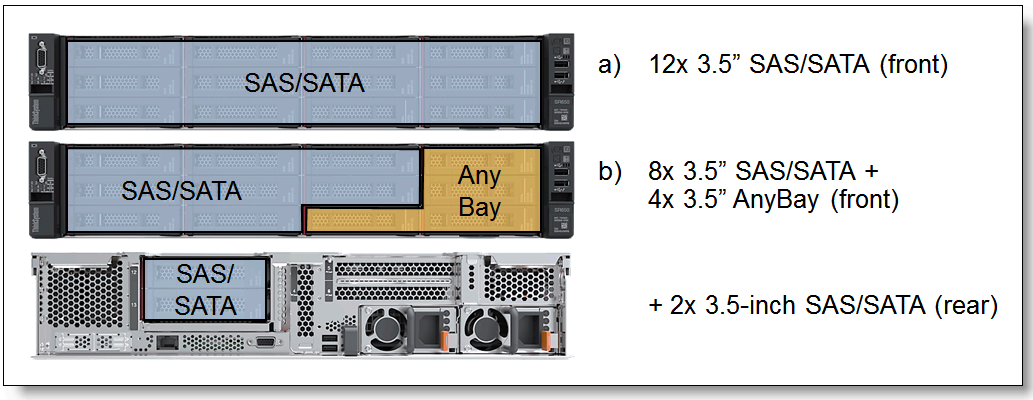

Figure 6. Drive bay configurations for Hybrid storage

Configuration notes for systems with Hybrid storage:

- The AnyBay 12-Bay Backplane (AUR8) is required for selection if the NVMe PCIe SSDs are used as cache drives. If the NVMe PCIe SSDs are not used, the SATA/SAS 12-Bay Backplane (AUR9) must be selected.
- The Rear HDD Kit (AURZ) is pre-selected, and it cannot be removed from the configuration.

The following table lists internal storage configurations with the SAS/SATA and AnyBay backplanes.

Table 7. Internal storage configurations: 12 LFF front and 2 LFF rear drive bays

Hot-swap drive bay configuration	Backplane kit type and quantity			Storage controller type and quantity*
	12x3.5" SATA/ SAS	12x3.5" Any Bay	2x3.5" Rear HDD	
12x 3.5" SAS/SATA (front) + 2x 3.5" SAS/SATA (rear)	1	0	1	1x 430-16i HBA (14)
8x 3.5" SAS/SATA (front) + 4x 3.5" AnyBay (front) + 2x 3.5" SAS/SATA (rear)	0	1	1	1x 430-16i HBA (14) + 1x Onboard NVMe (4)

* The number in brackets (x) specifies the quantity of drive bays connected to each of the controllers.

All Flash storage systems

The MX systems for All Flash Storage support the following drive bay configurations:

- 24 hot-swap drive bays:
  - 20x 2.5" SAS/SATA + 4x 2.5" AnyBay.
  - 12x 2.5" SAS/SATA + 12x 2.5" AnyBay.
- 16 hot-swap drive bays:
  - 8x 2.5" SAS/SATA + 8x 2.5" AnyBay.
  - 12x 2.5" SAS/SATA + 4x 2.5" AnyBay.

The following figure shows the internal drive bay configurations for All Flash storage.

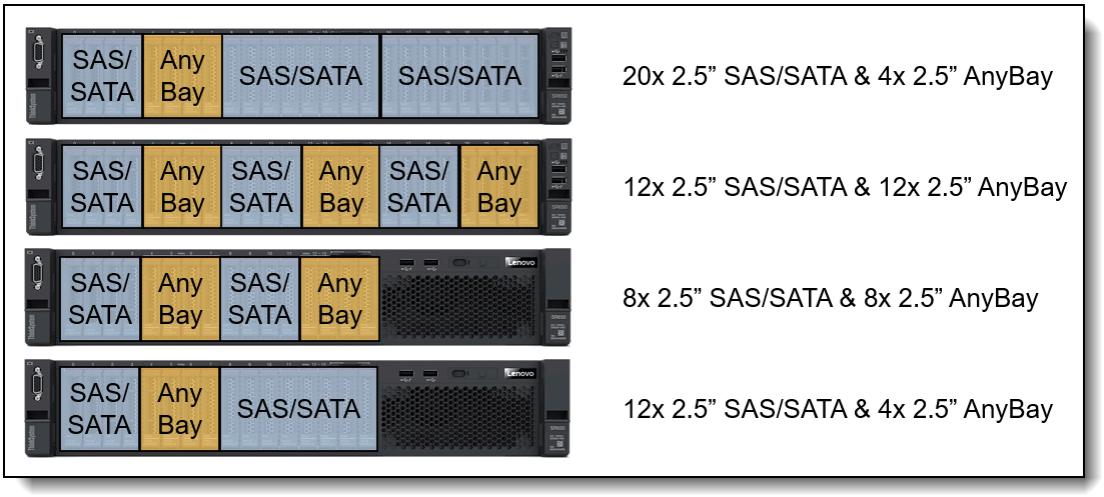

Figure 7. Drive bay configurations for All Flash storage

Configuration notes for systems with All Flash storage:

- Storage configurations with 16 drive bays are only available when processors of 200 W or 205 W TDP or Gold 6244 processors are selected.
- The onboard NVMe interface and the 1610-4P NVMe Switch Adapter provide 4x PCIe 3.0 x4 ports each for JBOD (non-RAID) connectivity to NVMe PCIe SSDs in the AnyBay drive bays.

The following table lists supported internal storage configurations.

Table 8. Internal storage configurations

Drive quantity (min / max)			**Backplane type and quantity**		
Cache	**Capacity**	**Hot-swap drive bay configuration**	**8x2.5" SATA/ SAS**	**8x2.5" Any Bay**	**Storage controller type and quantity^**
0 / 4*	0 / 16	12x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front)	1	1	1x 430-16i HBA (16) + 1x Onboard NVMe (4)
0 / 4**	0 / 24	20x 2.5" SAS/SATA (front) + 4x 2.5" AnyBay (front)	2	1	3x 430-8i HBA (8+8+8) + 1x Onboard NVMe (4)
5 / 8**	None	8x 2.5" SAS/SATA (front) + 8x 2.5" AnyBay (front)	0	2	2x 430-8i HBA (8+8) + 1x Onboard NVMe (4) + 1x 1610-4P NVMe (4)
9 / 12**	None	12x 2.5" SAS/SATA (front) + 12x 2.5" AnyBay (front)	0	3	3x 430-8i HBA (8+8+8) + 1x Onboard NVMe (4) + 2x 1610-4P NVMe (4+4)

^ The numbers in brackets (x or x+y or x+y+z) specify the quantity of drive bays connected to each of the controllers.
* Supported only in the configurations with processors of 200 W or 205 W TDP, or Gold 6244 processors.
** Not supported in the configurations with processors of 200 W or 205 W TDP, or Gold 6244 processors.

Backplanes

The choice of backplanes supported varies by system, as listed in the following table.

For details about these options, including configuration rules, see the SR650 product guide:

https://lenovopress.com/lp1050-thinksystem-sr650-server#internal-storage

Table 9. Backplanes

Feature	Description	Maximum supported			
		MX3520-H	MX Hybrid	MX3520-F	MX All Flash
Front drive bays					
AURA	ThinkSystem 2U/Twr 2.5" SATA/SAS 8-Bay Backplane	No	No	2	2
AUR5	ThinkSystem 2U/Twr 2.5" AnyBay 8-Bay Backplane	No	No	3	3
AUR6	ThinkSystem 2U 3.5" SATA/SAS 8-Bay Backplane	1	1	No	No
AUR9	ThinkSystem 2U 3.5" SATA/SAS 12-Bay Backplane	1	1	No	No
AUR8	ThinkSystem 2U 3.5" AnyBay 12-Bay Backplane	1	1	No	No
Rear drive bays					
AURZ	ThinkSystem SR590/SR650 Rear HDD/SSD Kit	1	1	No	No

Boot drive enablement

For OS boot functions, the systems also support one or two M.2 drives installed on an adapter internal to the server. The following table lists the supported controllers/enablement kits for M.2 boot drives.

The M.2 with Mirroring Enablement Kit (AUMV) is connected to the Intel PCH via the PCIe link, and the kit supports two M.2 SATA SSDs configured in a RAID-1 drive group for a boot volume.

For details about these options, including configuration rules, see the SR650 product guide:
https://lenovopress.com/lp1050-thinksystem-sr650-server#internal-storage

Table 10. Boot drive enablement

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
7Y37A01093	AUMV	ThinkSystem M.2 with Mirroring Enablement Kit	1	1	1	1

Controllers for internal storage

The MX systems support the following internal storage controllers.

Systems with All Flash storage:

- 24 SFF hot-swap drive bays:
  - Configurations with capacity drives:
    - 3x 430-8i or 440-8i HBAs (12 Gbps SAS/6 Gbps SATA non-RAID).
    - 1x Onboard NVMe (non-RAID).
  - Configurations with NVMe PCIe SSDs (no capacity drives):
    - 3x 430-8i or 440-8i HBAs (12 Gbps SAS/6 Gbps SATA non-RAID).
    - 1x Onboard NVMe (non-RAID).
    - 2x 1610-4P NVMe Switch Adapters (non-RAID).
- 16 SFF hot-swap drive bays:
  - Configurations with capacity drives:
    - 1x 430-16i or 440-16i HBAs (12 Gbps SAS/6 Gbps SATA non-RAID).
    - 1x Onboard NVMe (non-RAID).

    - Configurations with NVMe PCIe SSDs (no capacity drives):
        - 2x 430-8i or 440-16i HBAs (12 Gbps SAS/6 Gbps SATA non-RAID).
        - 1x Onboard NVMe (non-RAID).
        - 1x 1610-4P NVMe Switch Adapter (non-RAID).

Systems with Hybrid storage:

- 14 LFF hot-swap drive bays:
    - 1x 430-16i or 440-16i HBA (12 Gbps SAS/6 Gbps SATA non-RAID)
    - 1x Onboard NVMe (non-RAID)

For details about these options, including configuration rules, see the SR650 product guide:
https://lenovopress.com/lp1050-thinksystem-sr650-server#controllers-for-internal-storage

Table 11. Controllers for internal storage

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
12 Gb SAS/SATA non-RAID HBAs						
7Y37A01088	AUNL	ThinkSystem 430-8i SAS/SATA 12Gb HBA	1	1	3	3
4Y37A78601	BM51	ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA	1	1	3	3
4Y37A72480	BJHH	ThinkSystem 4350-8i SAS/SATA 12Gb HBA	1	1	4	4
7Y37A01089	AUNM	ThinkSystem 430-16i SAS/SATA 12Gb HBA	1	1	1	1
4Y37A78602	BM50	ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA	1	1	1	1
4Y37A72481	BJHJ	ThinkSystem 4350-16i SAS/SATA 12Gb HBA	2	2	1	1
NVMe PCIe interfaces						
7Y37A01081	AUV2	ThinkSystem 1610-4P NVMe Switch Adapter	No	No	2	2

Internal drive options

This section lists the supported drives:

- Boot drives
- Internal drives for MX3520-H
- Internal drives for MX Hybrid
- Internal drives for MX3520-F
- Internal drives for MX All Flash

This section lists the supported drives for internal storage.

Configurations with All Flash storage:

- In the configurations with capacity drives, from 4 to 24 capacity SSDs are required for selection, depending on the quantity of the NVMe PCIe cache drives:
  - No cache SSDs: From 4 to 24 capacity SSDs.
  - From 1 to 4 cache SSDs: From 4 to 20 capacity SSDs.
- In the configurations without capacity drives, from 4 to 12 PCIe NVMe SSDs are required for selection.
- All cache SSDs in the certified node must be of the same model and capacity. All capacity SSDs in the certified node must be of the same model and capacity.

Configurations with Hybrid storage:

- A minimum of four and a maximum of ten capacity HDDs must be selected. All HDDs must be of the same type and capacity.
- A minimum of two and a maximum of four cache SSDs must be selected. All SSDs must be of the same model and capacity.

Boot drives

The MX systems systems support the following drive for boot functions.

Table 12. Boot drives

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
4XB7A17073	B919	ThinkSystem M.2 5300 480GB SATA 6Gbps Non-Hot Swap SSD	2	2	2	2
4XB7A82287	BQ1Y	ThinkSystem M.2 5400 PRO 480GB Read Intensive SATA 6Gb NHS SSD	2	2	2	2

Internal drives for MX3520-H

The following table lists the drives support in the MX3520-H. The drives are classified as either Cache drives, Capacity drives, or both. The quantities listed in the table are the maximum supported for each drive option. For cache drives, a minimum of 2 and maximum of 4 drives is required.

Table 13. MX3520-H

Part number	Feature	Description	Hybrid Storage	
			Cache	Capacity
3.5-inch hot-swap 12 Gb SAS HDDs				

Part number	Feature	Description	Hybrid Storage	
			Cache	Capacity
7XB7A00043	AUU6	ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD	No	14
7XB7A00044	AUU7	ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	14
7XB7A00045	B0YR	ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	14
7XB7A00046	AUUG	ThinkSystem 3.5" 10TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	14
7XB7A00067	B117	ThinkSystem 3.5" 12TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	14
4XB7A13906	B496	ThinkSystem 3.5" 14TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	14
3.5-inch hot-swap 6 Gb SATA HDDs				
7XB7A00051	AUU8	ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD	No	10
7XB7A00052	AUUA	ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00053	AUU9	ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00054	AUUB	ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00068	B118	ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
4XB7A13907	B497	ThinkSystem 3.5" 14TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
3.5-inch hot-swap 24 Gb SAS SSDs				
4XB7A80344	BNW7	ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80345	BNWA	ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80346	BNWB	ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80347	BP3G	ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	4	No
3.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A17141	BNEK	ThinkSystem 3.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No
4XB7A17143	BNEM	ThinkSystem 3.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No
4XB7A17144	BNEN	ThinkSystem 3.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No

Internal drives for MX Hybrid

The following table lists the drives support in the MX Hybrid. The drives are classified as either Cache drives, Capacity drives, or both. The quantities listed in the table are the maximum supported for each drive option. For cache drives, a minimum of 2 and maximum of 4 drives is required.

Table 14. MX Hybrid

Part number	Feature	Description	Hybrid Storage	
			Cache	Capacity
3.5-inch hot-swap 12 Gb SAS HDDs				
7XB7A00043	AUU6	ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD	No	10
7XB7A00044	AUU7	ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	10
7XB7A00045	B0YR	ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	10
7XB7A00046	AUUG	ThinkSystem 3.5" 10TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	10
7XB7A00067	B117	ThinkSystem 3.5" 12TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	10
4XB7A13906	B496	ThinkSystem 3.5" 14TB 7.2K SAS 12Gb Hot Swap 512e HDD	No	10
3.5-inch hot-swap 6 Gb SATA HDDs				

Part number	Feature	Description	Hybrid Storage	
			Cache	Capacity
7XB7A00051	AUU8	ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD	No	10
7XB7A00052	AUUA	ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00053	AUU9	ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00054	AUUB	ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
7XB7A00068	B118	ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
4XB7A13907	B497	ThinkSystem 3.5" 14TB 7.2K SATA 6Gb Hot Swap 512e HDD	No	10
3.5-inch hot-swap 24 Gb SAS SSDs				
4XB7A80344	BNW7	ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80345	BNWA	ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80346	BNWB	ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	4	No
4XB7A80347	BP3G	ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	4	No
3.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A17141	BNEK	ThinkSystem 3.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No
4XB7A17143	BNEM	ThinkSystem 3.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No
4XB7A17144	BNEN	ThinkSystem 3.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	4	No

Internal drives for MX3520-F

The following table lists the drives support in the MX3520-F. The drives are classified as either Cache drives, Capacity drives, or both. The quantities listed in the table are the maximum supported for each drive option. For cache drives, a minimum of 2 and maximum of 4 drives is required.

Table 15. MX3520-F

Part number	Feature	Description	All Flash Storage	
			Cache	Capacity
2.5-inch hot-swap 24 Gb SAS SSDs				
4XB7A80318	BNWC	ThinkSystem 2.5" PM1653 960GB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80319	BNWE	ThinkSystem 2.5" PM1653 1.92TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80320	BNWF	ThinkSystem 2.5" PM1653 3.84TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80321	BP3E	ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80322	BP3J	ThinkSystem 2.5" PM1653 15.36TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80323	BP3D	ThinkSystem 2.5" PM1653 30.72TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80340	BNW8	ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80341	BNW9	ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80342	BNW6	ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80343	BP3K	ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	24	24
2.5-inch hot-swap 6 Gb SATA SSDs				
4XB7A17125	BA7Q	ThinkSystem 2.5" S4620 480GB Mixed Use SATA 6Gb HS SSD	No	24

Part number	Feature	Description	All Flash Storage	
			Cache	Capacity
4XB7A17126	BA4T	ThinkSystem 2.5" S4620 960GB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17127	BA4U	ThinkSystem 2.5" S4620 1.92TB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17128	BK7L	ThinkSystem 2.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17090	B8JE	ThinkSystem 2.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD	No	24
4XB7A17101	BA7G	ThinkSystem 2.5" S4520 480GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17102	BA7H	ThinkSystem 2.5" S4520 960GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17103	BA7J	ThinkSystem 2.5" S4520 1.92TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17104	BK77	ThinkSystem 2.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17105	BK78	ThinkSystem 2.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82259	BQ1P	ThinkSystem 2.5" 5400 PRO 480GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82260	BQ1R	ThinkSystem 2.5" 5400 PRO 960GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82261	BQ1X	ThinkSystem 2.5" 5400 PRO 1.92TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82262	BQ1S	ThinkSystem 2.5" 5400 PRO 3.84TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82263	BQ1T	ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17080	B8J2	ThinkSystem 2.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD	No	24
2.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A17129	BNEG	ThinkSystem 2.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12
4XB7A17130	BNEH	ThinkSystem 2.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12
4XB7A17133	BNEZ	ThinkSystem 2.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12
4XB7A13941	BMGD	ThinkSystem 2.5" U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13942	BMGE	ThinkSystem 2.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13943	BNEF	ThinkSystem 2.5" U.2 P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13631	BNEQ	ThinkSystem 2.5" U.2 P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12

Internal drives for MX All Flash

The following table lists the drives support in the MX All Flash. The drives are classified as either Cache drives, Capacity drives, or both. The quantities listed in the table are the maximum supported for each drive option. For cache drives, a minimum of 2 and maximum of 4 drives is required.

Table 16. MX All Flash

Part number	Feature	Description	All Flash Storage	
			Cache	Capacity
2.5-inch hot-swap 24 Gb SAS SSDs				
4XB7A80318	BNWC	ThinkSystem 2.5" PM1653 960GB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80319	BNWE	ThinkSystem 2.5" PM1653 1.92TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80320	BNWF	ThinkSystem 2.5" PM1653 3.84TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80321	BP3E	ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80322	BP3J	ThinkSystem 2.5" PM1653 15.36TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80323	BP3D	ThinkSystem 2.5" PM1653 30.72TB Read Intensive SAS 24Gb HS SSD	No	24
4XB7A80340	BNW8	ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80341	BNW9	ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80342	BNW6	ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD	24	24
4XB7A80343	BP3K	ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD	24	24
2.5-inch hot-swap 6 Gb SATA SSDs				
4XB7A17125	BA7Q	ThinkSystem 2.5" S4620 480GB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17126	BA4T	ThinkSystem 2.5" S4620 960GB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17127	BA4U	ThinkSystem 2.5" S4620 1.92TB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17128	BK7L	ThinkSystem 2.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD	No	24
4XB7A17090	B8JE	ThinkSystem 2.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD	No	24
4XB7A17101	BA7G	ThinkSystem 2.5" S4520 480GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17102	BA7H	ThinkSystem 2.5" S4520 960GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17103	BA7J	ThinkSystem 2.5" S4520 1.92TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17104	BK77	ThinkSystem 2.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17105	BK78	ThinkSystem 2.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82259	BQ1P	ThinkSystem 2.5" 5400 PRO 480GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82260	BQ1R	ThinkSystem 2.5" 5400 PRO 960GB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82261	BQ1X	ThinkSystem 2.5" 5400 PRO 1.92TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82262	BQ1S	ThinkSystem 2.5" 5400 PRO 3.84TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A82263	BQ1T	ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD	No	24
4XB7A17080	B8J2	ThinkSystem 2.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD	No	24
2.5-inch hot-swap PCIe 4.0 NVMe SSDs				
4XB7A17129	BNEG	ThinkSystem 2.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12
4XB7A17130	BNEH	ThinkSystem 2.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12

Part number	Feature	Description	All Flash Storage	
			Cache	Capacity
4XB7A17133	BNEZ	ThinkSystem 2.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	12	12
4XB7A13941	BMGD	ThinkSystem 2.5" U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13942	BMGE	ThinkSystem 2.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13943	BNEF	ThinkSystem 2.5" U.2 P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12
4XB7A13631	BNEQ	ThinkSystem 2.5" U.2 P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No	12

I/O expansion

The MX3520 Appliances and MX Certified Nodes provide up to four (Hybrid systems) or seven (All Flash) PCIe slots:

- 3x PCIe 3.0 slots on the Riser Card 1 (only available in All Flash systems)
- 1x PCIe 3.0 slot on the system planar
- 2x PCIe 3.0 slots on the Riser Card 2
- 1x internal PCIe 3.0 slot on the system planar that is dedicated to an internal storage controller
- 1x LOM slot for networking

On systems with Hybrid storage, Riser Card 1 is replaced with two 3.5-inch hot-swap drive bays. The locations of the PCIe slots are shown in the Components and connectors.

The following table lists the PCIe Riser Card options.

Table 17. PCIe Riser selections

Feature	Description	Maximum supported			
		MX3520-H	MX Hybrid	MX3520-F	MX All Flash
Riser Card 1 options (slots 1, 2, and 3)					
AUR4	ThinkSystem 2U x8/x8/x8 PCIE FH Riser 1	No	No	1	1
AUR3	ThinkSystem SR550/SR650 x16/x8 PCIe FH Riser 1 Kit	No	No	1	1
Riser Card 2 option (slots 5 and 6)					
AURC	ThinkSystem SR550/SR590/SR650 x16/x8(or x16) PCIe FH Riser 2 Kit	1	1	1	1

Network adapters

The MX systems systems support the following networking options.

For details about these options, including configuration rules, see the SR650 product guide:
https://lenovopress.com/lp1050-thinksystem-sr650-server#i-o-expansion
https://lenovopress.com/lp1050-thinksystem-sr650-server#network-adapters

Table 18. LOM network adapters

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
LOM cards - 1 Gb Ethernet						
7ZT7A00544	AUKG	ThinkSystem 1Gb 2-port RJ45 LOM	1	1	1	1
7ZT7A00545	AUKH	ThinkSystem 1Gb 4-port RJ45 LOM	1	1	1	1
LOM cards - 10 Gb Ethernet						
7ZT7A00548	AUKL	ThinkSystem 10Gb 2-port Base-T LOM	1	1	1	1
7ZT7A00546	AUKJ	ThinkSystem 10Gb 2-port SFP+ LOM	1	1	1	1
7ZT7A00549	AUKM	ThinkSystem 10Gb 4-port Base-T LOM	1	1	1	1
7ZT7A00547	AUKK	ThinkSystem 10Gb 4-port SFP+ LOM	1	1	1	1

Table 19. PCIe network adapters

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
25 Gb Ethernet						
01GR250	AUAJ	Mellanox ConnectX-4 Lx 10/25GbE SFP28 2-port PCIe Ethernet Adapter	2	2	2	2
4XC7A62580	BE4U	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	2	2	2	2
4XC7A08295	BCD6	ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	2	2	2	2
100 Gb Ethernet						
00MM960	ATRP	Mellanox ConnectX-4 2x100GbE/EDR IB QSFP28 VPI Adapter	2	2	2	2
4XC7A08248	B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	2	2	2	2
4C57A14177	B4R9	ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 1-port PCIe VPI Adapter	2	2	2	2

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
4C57A14178	B4RA	ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 2-port PCIe VPI Adapter	2	2	2	2

Configuration notes:

- A minimum of one and a maximum of two PCIe network adapters can be selected. If two PCIe network adapters are used, they must be of the same model.
- The selection of a LOM card is optional (a LOM card is not supported for RDMA storage traffic and can be used only for the external network connectivity to the cluster).
- A two-node cluster supports direct node-to-node (no external switch is needed) or switched (an external switch is needed) network connectivity with the network ports on the PCIe network adapters. For three or more nodes, an external switch is required.

GPU adapters

The MX3520 Appliances and MX Certified Nodes support graphics processing units (GPUs) listed in the following table.

Refer to the ThinkSystem SR650 product guide for the configuration rules for GPU adapters: https://lenovopress.com/lp1050-thinksystem-sr650-server#gpu-adapters

Table 20. GPU adapters

Part number	Feature	Description	Maximum supported			
			MX3520-H	MX Hybrid	MX3520-F	MX All Flash
Double-wide PCIe x16 GPU adapters						
4X67A13135	BEL5	ThinkSystem NVIDIA A100 40GB PCIe Gen4 Passive GPU	2	2	2	2
4X67A76581	BJHG	ThinkSystem NVIDIA A30 24GB PCIe Gen4 Passive GPU	2	2	2	2
CTO Only	BQZU	ThinkSystem NVIDIA A16 64GB Gen4 PCIe Passive GPU w/o CEC	2	2	2	2
CTO Only	BQZT	ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC	3	3	3	3
Single-wide PCIe x16 GPU adapters						
4X67A14926	B4YB	ThinkSystem NVIDIA T4 16GB PCIe Passive GPU	5	5	5	5
CTO Only	BQZS	ThinkSystem NVIDIA A10 24GB PCIe Gen4 Passive GPU w/o CEC	4	4	4	4

Software

The ThinkAgile MX Integrated Systems include the preloaded Azure Local operating system only and requires activation via a CSP such as Lenovo Cloud Marketplace, with the option to purchase a Windows Server 2022 Datacenter license if unlimited guest OS VMs are desired.

The ThinkAgile MX Certified Nodes can optionally have Windows Server 2022 Datacenter, or Azure Local OS preinstalled. Customers can use existing Windows Server Datacenter software licenses, or they can purchase new software licenses from Lenovo or Microsoft. If the licenses are purchased from Lenovo, Windows Server can be factory-installed or shipped in the box with the Certified Node for the installation at the customer site.

The following table lists the Windows Server Datacenter software options that are available for selection from Lenovo for Certified Nodes.

Table 21. Windows Server Datacenter software selection options (Certified Nodes only)

Feature code	Description
Windows Server 2022 Datacenter (Factory installed)	
BPA7	Windows Server Datacenter 2022 for Microsoft Azure Stack HCI - English (factory installed)
Windows Server 2022 Datacenter (Not preinstalled)	
BPA3	Windows Server Datacenter 2022 for Microsoft Azure Stack HCI - Multilanguage (not pre-installed)
BPA4	Windows Server Datacenter 2022 for Microsoft Azure Stack HCI - Simplified Chinese (not pre-installed)
BPA5	Windows Server Datacenter 2022 for Microsoft Azure Stack HCI - Traditional Chinese (not pre-installed)
BPA6	Windows Server Datacenter 2022 for Microsoft Azure Stack HCI - Japanese (not pre-installed)
Windows Server 2019 Datacenter (Factory installed)	
B6P2	Windows Server Datacenter 2019 for Microsoft Azure Stack HCI - English (factory installed)
Windows Server 2019 Datacenter (Not preinstalled)	
B6NY	Windows Server Datacenter 2019 for Microsoft Azure Stack HCI - Multilanguage (not pre-installed)
B6P0	Windows Server Datacenter 2019 for Microsoft Azure Stack HCI - Simplified Chinese (not pre-installed)
B6P1	Windows Server Datacenter 2019 for Microsoft Azure Stack HCI - Traditional Chinese (not pre-installed)
B6NZ	Windows Server Datacenter 2019 for Microsoft Azure Stack HCI - Japanese (not pre-installed)

Configuration notes:

- The selection of Windows Server software licenses is optional.
- The quantity of core-based licenses should be sufficient to cover all processor cores in the system.
- Current supported version of Azure Local OS is 23H2

Warranty upgrades and post-warranty support

The ThinkAgile MX Appliances can be configured with a three-, four, or five-year hardware warranty with 24x7 ThinkAgile Advantage Single Point of Support (Lenovo appliance hardware and Microsoft software) and various levels of coverage with a 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 - MX Appliance support plan, available from https://support.lenovo.com/us/en/solutions/HT511522.

The ThinkAgile MX Certified Nodes can be configured with a three-, four-, or five-year hardware warranty and various levels of service coverage with a defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

The MX3520 Appliances and MX Certified Nodes have a 3-year base warranty:

- 7D5R - 2U Appliance - 3 year warranty
- 7Z20 - 2U Certified Node - 3 year warranty

Our global network of regional support centers offers consistent, local-language support enabling you to vary response times and level of service to match the criticality of your support needs:

- **Standard Next Business Day** – Best choice for non-essential systems requiring simple maintenance.
- **Premier Next Business Day** – Best choice for essential systems requiring technical expertise from senior-level Lenovo Engineers.
- **Premier 24x7 4-Hour Response** – Best choice for systems where maximum uptime is critical.
- **Premier Support Plus 24x7 4-Hour Response** – Best choice for systems where maximum uptime is critical.

For more information, consult our Lenovo Operational Support Services for Data Centers Services Brochure.

Note: Some warranty upgrades may not be available in all markets or regions. For more information, go to https://lenovolocator.com/. For information about Lenovo warranty upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

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 Premier Solutions 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 Premier Solutions and MX Certified Nodes:

- Conducting remote preparation and planning
- Verifying firmware versions and performing firmware updates, if needed
- Configuring XClarity Controller management settings
- Configuring Storage Spaces Direct
- Configuring Microsoft System Center and discovering hosts and storage (if System Center is used)
- Configuring Lenovo XClarity Administrator 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 22. 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 TruScale

Lenovo TruScale XaaS is your set of flexible IT services that makes everything easier. Streamline IT procurement, simplify infrastructure and device management, and pay only for what you use – so your business is free to grow and go anywhere.

Lenovo TruScale is the unified solution that gives you simplified access to:

- The industry's broadest portfolio – from pocket to cloud – all delivered as a service
- A single-contract framework for full visibility and accountability
- The global scale to rapidly and securely build teams from anywhere
- Flexible fixed and metered pay-as-you-go models with minimal upfront cost
- The growth-driving combination of hardware, software, infrastructure, and solutions – all from one single provider with one point of accountability.

For information about Lenovo TruScale offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Lenovo Financial Services

Why wait to obtain the technology you need now? No payments for 90 days and predictable, low monthly payments make it easy to budget for your Lenovo solution.

- **Flexible**

  Our in-depth knowledge of the products, services and various market segments allows us to offer greater flexibility in structures, documentation and end of lease options.

- **100% Solution Financing**

  Financing your entire solution including hardware, software, and services, ensures more predictability in your project planning with fixed, manageable payments and low monthly payments.

- **Device as a Service (DaaS)**

  Leverage latest technology to advance your business. Customized solutions aligned to your needs. Flexibility to add equipment to support growth. Protect your technology with Lenovo's Premier Support service.

- **24/7 Asset management**

  Manage your financed solutions with electronic access to your lease documents, payment histories, invoices and asset information.

- **Fair Market Value (FMV) and $1 Purchase Option Leases**

  Maximize your purchasing power with our lowest cost option. An FMV lease offers lower monthly payments than loans or lease-to-own financing. Think of an FMV lease as a rental. You have the flexibility at the end of the lease term to return the equipment, continue leasing it, or purchase it for the fair market value. In a $1 Out Purchase Option lease, you own the equipment. It is a good option when you are confident you will use the equipment for an extended period beyond the finance term. Both lease types have merits depending on your needs. We can help you determine which option will best meet your technological and budgetary goals.

Ask your Lenovo Financial Services representative about this promotion and how to submit a credit application. For the majority of credit applicants, we have enough information to deliver an instant decision and send a notification within minutes.

Related publications and links

For more information, see these resources:

- Lenovo ThinkAgile MX Series product page
  https://www.lenovo.com/us/en/data-center/software-defined-infrastructure/ThinkAgile-MX-Certified-Node/p/WMD00000377
- Microsoft Azure Local documentation
  https://docs.microsoft.com/en-us/azure-stack/hci/overview
- Lenovo Data Center Solution Configurator (DCSC):
  https://dcsc.lenovo.com
- Lenovo ThinkAgile MX for Microsoft Azure Stack HCI Best Recipes
  https://datacentersupport.lenovo.com/us/en/solutions/ht507406

Related product families

Product families related to this document are the following:

- Hyperconverged Infrastructure
- Microsoft Alliance
- ThinkAgile MX Series for Microsoft Azure Local

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