Lenovo Distributed Storage Solution for IBM Spectrum Scale (DSS-G) on ThinkSystem V2
Product Guide

Lenovo Distributed Storage Solution for IBM Spectrum Scale (DSS-G) is a software-defined storage (SDS) solution for dense scalable file and object storage suitable for high-performance and data-intensive environments. Enterprises or organizations running HPC, Big Data or cloud workloads will benefit the most from the DSS-G implementation.

DSS-G combines the performance of Lenovo ThinkSystem V2 servers running 3rd Gen Intel Xeon Scalable processors, Lenovo storage enclosures, and industry leading IBM Spectrum Scale software to offer a high performance, scalable building block approach to modern storage needs.

Lenovo DSS-G is delivered as a pre-integrated, easy-to-deploy rack-level engineered solution that dramatically reduces time-to-value and total cost of ownership (TCO).

There are two DSS-G solution types described in this product guide. The traditional storage enclosure-based solution is built on Lenovo ThinkSystem SR650 V2 servers, Lenovo Storage D1224 Drive Enclosures with high-performance 2.5-inch SAS SSDs, and Lenovo Storage D3284 High-Density Drive Enclosures with large capacity 3.5-inch NL SAS HDDs. The NVMe based solution is built on Lenovo ThinkSystem SR630 servers with internal 2.5-inch NVMe SSDs.

Combined with IBM Spectrum Scale (formerly General Parallel File System, GPFS), an industry leader in high-performance clustered file system, you have an ideal solution for the ultimate file/object storage solution for HPC & Big Data.

Figure 1. Lenovo DSS-G G260

Did you know?

DSS-G with ThinkSystem V2 is more than doubling the performance over the previous generation and supports up to 25% more capacity in a single building block.

Lenovo DSS-G can be licensed by the number of drives installed or alternatively the usable capacity, rather than the number of processor cores or the number of connected clients, so there are no added licenses for other servers or clients that mount and work with the file system.

Lenovo DSS-G with storage enclosures supports online enclosure expansion. This enables a customer to grow the number of enclosures in an existing DSS-G building block without bringing down the file system, maximizing flexibility to scale storage capacity based on need.

With available Lenovo Premier Support Services, Lenovo provides a single point of entry for supporting the entire DSS-G solution, including the IBM Spectrum Scale software, for quicker problem determination and minimized downtime.
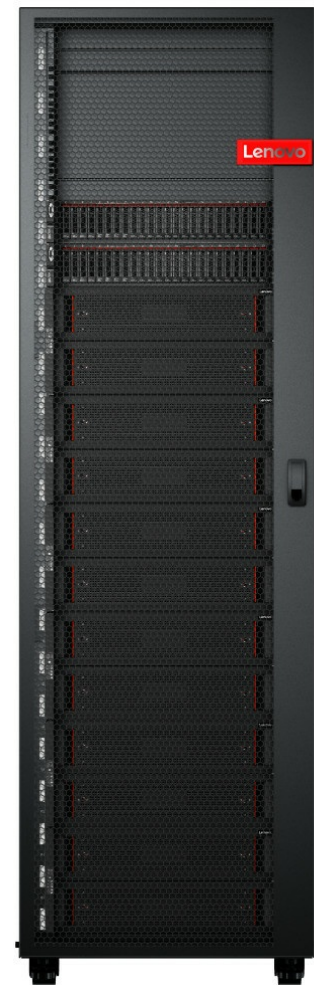
What's New

DSS-G with ThinkSystem V2 servers has the following differences as compared to DSS-G with ThinkSystem V1 servers:

- Servers are SR650 V2 and SR630 V2 - Hardware features section
- New DSS-G models - Models section:
    - G272 with 2x SR650 V2 servers, 7x D3284 drive enclosures and 2x D1224 drive enclosures
    - G281 with 2x SR650 V2 servers, 8x D3284 drive enclosures and 1x D1224 drive enclosure
    - G282 with 2x SR650 V2 servers, 8x D3284 drive enclosures and 2x D1224 drive enclosures
    - G291 with 2x SR650 V2 servers, 9x D3284 drive enclosures and 1x D1224 drive enclosure
    - G290 with 2x SR650 V2 servers, 9x D3284 drive enclosures
    - G2A0 with 2x SR650 V2 servers, 10x D3284 drive enclosures
- Additional drives and network adapters
- Removed support for OPA for cluster traffic - Cluster network section
- New warranty upgrade part numbers for the servers - Warranty section

Software features

DSS-G has the following key software features:

- IBM Spectrum Scale
- Spectrum Scale RAID on Data Access and Data Management Edition
- Spectrum Scale Erasure Code Edition
- DSS-G Call Home

IBM Spectrum Scale

IBM Spectrum Scale, based on IBM General Parallel File System (GPFS) technology, is a high-performance and highly scalable parallel file system with an extensive suite of enterprise class data management features.

Lenovo is a strategic alliance partner of IBM, and combines IBM Spectrum Scale software with Lenovo servers, storage and networking components for integrated and customized solutions.

IBM Spectrum Scale offers access to a single file system or set of filesystems from multiple nodes that can be SAN-attached, network attached or a mix of both or even in a shared nothing cluster configuration. It provides a global namespace, shared file system access among IBM Spectrum Scale clusters, simultaneous file access from multiple nodes, high recoverability and data availability through replication, the ability to make changes while a file system is mounted, and simplified administration even in large environments.

Lenovo DSS-G supports three editions of IBM Spectrum Scale:

- IBM Spectrum Scale Data Access Edition (DAE) provides base GPFS functions including Information Lifecycle Management (ILM), Active File Management (AFM), and Clustered NFS (CNFS) in Linux environments.

- IBM Spectrum Scale Data Management Edition (DME) provides all the features of the Data Access Edition plus advanced features like asynchronous multi-site disaster recovery, native encryption support, Transparent Cloud Tiering.

- IBM Spectrum Scale Erasure Code Edition (ECE) provides all the features of the Data Management Edition plus support for storage rich servers with network-dispersed erasure coding, distributing data and metadata across the internal disks of a cluster of servers.

Table 1. IBM Spectrum Scale feature comparison

Feature	Data Access	Data Management	Erasure Code Edition
Multi-protocol scalable file service with simultaneous access to a common set of data	Yes	Yes	Yes
Facilitate data access with a global namespace, massively scalable file system, quotas and snapshots, data integrity and availability, and filesets	Yes	Yes	Yes
Simplify management with GUI	Yes	Yes	Yes
Improved efficiency with QoS and compression	Yes	Yes	Yes
Create optimized tiered storage pools based on performance, locality, or cost	Yes	Yes	Yes
Simplify data management with Information Lifecycle Management (ILM) tools that include policy based data placement and migration	Yes	Yes	Yes
Enable worldwide data access using AFM asynchronous replication	Yes	Yes	Yes
Asynchronous multi-site Disaster Recovery	No	Yes	Yes
Transparent Cloud Tiering (TCT)	No	Yes	Yes
Protect data with native software encryption and secure erase, NIST compliant and FIPS certified	No	Yes*	Yes*
File audit logging	No	Yes	Yes
Watch folder	No	Yes	Yes
Erasure coding	DSS only	DSS only	Yes
Network-disperses erasure coding	No	No	Yes
Licensing	Per Disk Drive/Flash Device or per Capacity	Per Disk Drive/Flash Device or per Capacity	Per Capacity

* Requires additional key management software to enable

Information about licensing is in the IBM Spectrum Scale licensing section.

For more information about IBM Spectrum Scale, see the following web pages:

- IBM Spectrum Scale product page:
  https://www.ibm.com/products/scale-out-file-and-object-storage
- IBM Spectrum Scale FAQ:
  https://www.ibm.com/support/knowledgecenter/en/STXKQY/gpfsclustersfaq.html

Spectrum Scale RAID on Data Access and Data Management Edition

IBM Spectrum Scale RAID integrates the functionality of an advanced storage controller into the GPFS NSD server. Unlike an external storage controller, where configuration, LUN definition, and maintenance are beyond the control of IBM Spectrum Scale, IBM Spectrum Scale RAID itself takes on the role of controlling, managing, and maintaining physical disks - hard disk drives (HDDs) and solid-state drives (SSDs).

Sophisticated data placement and error correction algorithms deliver high levels of storage reliability, availability, serviceability, and performance. IBM Spectrum Scale RAID provides a variation of the GPFS network shared disk (NSD) called a virtual disk, or vdisk. Standard NSD clients transparently access the vdisk NSDs of a file system using the conventional NSD protocol.

The features of IBM Spectrum Scale RAID include:

- **Software RAID**

  IBM Spectrum Scale RAID, which runs on standard Serial Attached SCSI (SAS) disks in a dual-ported JBOD array, does not require external RAID storage controllers or other custom hardware RAID acceleration.

- **Declustering**

  IBM Spectrum Scale RAID distributes client data, redundancy information, and spare space uniformly across all disks of a JBOD. This approach reduces the rebuild (disk failure recovery process) overhead and improves application performance compared to conventional RAID.

- **Pdisk-group fault tolerance**

  In addition to declustering data across disks, IBM Spectrum Scale RAID can place data and parity information to protect against groups of disks that, based on characteristics of a disk enclosure and system, could possibly fail together due to a common fault. The data placement algorithm ensures that even if all members of a disk group fail, the error correction codes will still be capable of recovering erased data.

- **Checksum**

  An end-to-end data integrity check, using checksums and version numbers, is maintained between the disk surface and NSD clients. The checksum algorithm uses version numbers to detect silent data corruption and lost disk writes.

- **Data redundancy**

  IBM Spectrum Scale RAID supports highly reliable 2-fault-tolerant and 3-fault-tolerant Reed-Solomon-based parity codes and 3-way and 4-way replication.

- **Large cache**

  A large cache improves read and write performance, particularly for small I/O operations.

- **Arbitrarily-sized disk arrays**

  The number of disks is not restricted to a multiple of the RAID redundancy code width, which allows flexibility in the number of disks in the RAID array.

- **Multiple redundancy schemes**

  One disk array can support vdisks with different redundancy schemes, for example Reed-Solomon and replication codes.

- **Disk hospital**

  A disk hospital asynchronously diagnoses faulty disks and paths, and requests replacement of disks by using past health records.

- **Automatic recovery**

  Seamlessly and automatically recovers from primary server failure.

- **Disk scrubbing**

  A disk scrubber automatically detects and repairs latent sector errors in the background.

- **Familiar interface**

  Standard IBM Spectrum Scale command syntax is used for all configuration commands, including maintaining and replacing failed disks.

- **Flexible hardware configuration**

  Support of JBOD enclosures with multiple disks physically mounted together on removable carriers.

- **Journaling**

  For improved performance and recovery after a node failure, internal configuration and small-write data are journaled to solid-state disks (SSDs) in the JBOD or to non-volatile random-access memory (NVRAM) that is internal to the IBM Spectrum Scale RAID servers.

For more information about IBM Spectrum Scale RAID see the following documents:

- IBM Spectrum Scale RAID: Administration
- Lenovo DSS-G Declustered RAID Technology and Rebuild Performance

Spectrum Scale Erasure Code Edition

Spectrum Scale Erasure Code Edition brings the IBM Spectrum Scale RAID functionality to the next level, supporting the creation of scale-out network-dispersed Spectrum Scale clusters on storage rich servers. You get the same benefits of IBM Spectrum Scale and IBM Spectrum Scale RAID without the need for storage enclosures:

- Reed-Solomon highly fault tolerant declustered RAID, protecting against drive and node failures.
- Disk Hospital to identify abnormal behavior and mitigate issues preventively.
- End-to-end checksum to identify and correct errors from the client over the network down to the block on the device.

DSS-G G100 models with IBM Spectrum Scale Erasure Code Edition use the same software and most of the same concepts that are used in DSS-G G2xx models with IBM Spectrum Scale Data Access or Data Management Edition. The G2xx models are a solution that consists of two I/O (storage) servers and between one and several JBOD disk enclosures, with each storage device (pdisk) attached to both servers. The G2xx models have two recovery groups (RGs). Each RG takes half of each enclosure among all enclosures. Under normal conditions, each I/O server supports one of the two RGs. If either I/O server fails, the remaining I/O server takes over and supports both RGs.

IBM Spectrum Scale Erasure Code Edition, in contrast, can have one or more recovery groups, but each RG is associated with 6 - 32 storage servers, and each storage server belongs to only one RG. All of the storage servers in a recovery group must have a matching configuration, including identical CPU, memory, network, and storage device configurations. The storage devices (pdisks) are directly attached to only one storage server. Each storage server typically serves 2 log groups and each log group manages one half of the virtual disks (vdisk NSDs) assigned to a server. If a storage server fails, the log groups (and vdisk NSDs) it was serving are distributed to the remaining storage servers; any storage server failure causes the remaining storage servers to serve at most one more log group.

In both G2xx models and G100 ECE models, the placement of data is topology aware using a failure domain hierarchy of rack, node, enclosure, and storage device (pdisk). The RAID code makes placement decisions to maximize fault tolerance, depending on the RAID level you choose. IBM Spectrum Scale Erasure Code Edition supports the following erasure codes and replication levels: 8+2p, 8+3p, 4+2p, 4+3p, 3WayReplication, and 4WayReplication.

With IBM Spectrum Scale Erasure Code Edition it is possible for either IBM Spectrum Scale Cluster Export Services with protocol software or customer applications to run directly on the storage servers if sufficient hardware resources are available. Customer applications must run in a constrained environment by using Linux cgroups or Docker containers. For protocol workloads with high-performance requirements, the Cluster Export Services must run on separate nodes.

In both G2xx models and G100 ECE models the IBM Spectrum Scale file system, and file system features are independent of the storage configuration. A file system can be composed of NSDs provided by more than one recovery group, and the recovery groups can be from G2xx models or G100 ECE models or a combination of both. All of the IBM Spectrum Scale file system features can be used in a cluster with IBM Spectrum Scale Erasure Code Edition storage servers, but there are strict guidelines as to where the various components might run.

For more information about IBM Spectrum Scale Erase Code Edition please visit the IBM Spectrum Scale Erasure Code Edition documentation.

> **DSS-G Model G100**: As of the current release (DSS-G 4.0a), G100 with ECE is now offered as a fully enabled configuration including the ECE software. The G100 solution stack (or "tarball") contains all the software needed for G100, including the ECE software.

DSS-G Call Home

Call Home provides DSS-G customers with functionality to simplify and accelerate the resolution of support tickets related to hardware issues at no additional charge. Call Home leverages the mmhealth command from Spectrum Scale to provide status when hardware components are recognized as "degraded": disk drives, SAS cables, IOMs, and more. Another script packages this data in a bundle fully ready for support triage (either IBM L1 support, or Lenovo L1 support for customers leveraging Premier Support for DSS-G). As an optional add-on, Call Home can then be enabled to automatically route the ticket to support without any administrator intervention.

The DSS-G call home feature is currently enabled as a Technology Preview. Contact the HPC Storage team at HPCstorage@lenovo.com for further information, or contact Lenovo Managed Services and open a support ticket.

Hardware features

Lenovo DSS-G is fulfilled through Lenovo Scalable Infrastructure (LeSI), which offers a flexible framework for the development, configuration, build, delivery and support of engineered and integrated data center solutions. Lenovo thoroughly tests and optimizes all LeSI components for reliability, interoperability and maximum performance, so clients can quickly deploy the system and get to work achieving their business goals.

The major hardware components of a DSS-G solution are:

- DSS-G G2xx models
    - 2x ThinkSystem SR650 V2 servers
    - Choice of direct-attach storage enclosures - D1224 and D3284 enclosures
        - 1x-4x Lenovo Storage D1224 Drive Enclosures each holding 24x 2.5-inch SSDs (small form factor configuration DSS-G20x)
        - 1x-8x Lenovo Storage D3284 External High Density Drive Expansion Enclosure, each holding 84x 3.5-inch HDDs (large form factor configuration DSS-G2x0)
        - 1x-2x D1224 Enclosure plus 1x-7x D3284 Enclosure (max 8x enclosures total, hybrid configuration DSS-G2xx)
- DSS-G G100 models
    - 1x ThinkSystem SR630 V2 server (minimum 6 per configuration for Erasure Code Edition)
    - 4x-10x 2.5-inch U.2 NVMe drives
    - Installed and cabled in the factory in a 42U or 48U rack cabinet, or shipped with the Client Site Integration Kit that provides Lenovo installation into the customer's choice of rack
    - Optional management node and management network, for example a ThinkSystem SR630 V2 server and Mellanox AS4610 Gigabit Ethernet switch

Topics in this section:

- Lenovo ThinkSystem SR650 V2 servers
- Lenovo ThinkSystem SR630 servers
- Lenovo Storage D1224 Drive Enclosures
- Lenovo Storage D3284 External High Density Drive Expansion Enclosure
- Infrastructure and rack installation

Lenovo ThinkSystem SR650 V2 servers

Figure 2. Lenovo ThinkSystem SR650 V2

Lenovo System SR650 V2 servers have the following key features:

- Supports one or two third-generation Intel Xeon Processor Scalable processors
  - Up to 40 cores and 80 threads
  - Core speeds of up to 3.6 GHz
  - TDP ratings of up to 270W
- Support for up to 32 TruDDR4 memory DIMMs operating at up to 3200 MHz means you have the fastest available memory subsystem.
- Supports configurations of 2 DIMMs per channel to operate at the 3200 MHz rated speed of the memory DIMMs.
- Using 128GB 3DS RDIMMs, the server supports up to 4TB of system memory.
- Supports the new Intel Optane Persistent Memory 200 Series for advanced in-memory database applications, dense-virtualization; up to 16 PMem Modules can be installed in conjunction with regular system memory.
- Supports up to eight single-width GPUs or three double-wide GPUs, for substantial processing power in a 2U system.
- Supports up to 40x 2.5-inch hot-swap drive bays, by using combinations of front-accessible (up to 24 bays), mid bays (8 bays) and rear-accessible (8 bays).
- Supports 20x 3.5-inch drive bays for lower-cost high-capacity HDD storage. 2.5-inch and 3.5-inch drive bays can be mixed if desired.
- Supports 16x NVMe drives without oversubscription of PCIe lanes (1:1 connectivity), or up to 32 NVMe drives with a 1:2 oversubscription. The use of NVMe drives maximizes drive I/O performance, in terms of throughput and latency.
- Supports 12x SATA drives using the onboard SATA controller (no additional adapter needed), enabling lower cost, high capacity storage solution for cold or archival storage workloads.
- Supports high-speed RAID controllers from Broadcom providing 12 Gb SAS connectivity to the drive backplanes. A variety of PCIe 3.0 and PCIe 4.0 RAID adapters are available.
- Supports up to two externally accessible 7mm hot-swap drives with RAID functionality for operating system boot functions.
- Supports M.2 drives for convenient operating system boot functions. Available M.2 adapters support either one M.2 drive or two M.2 drives in a RAID 1 configuration for performance and reliability.
- The server has a dedicated industry-standard OCP 3.0 small form factor (SFF) slot, with a PCIe 4.0 x16 interface, supporting a variety of Ethernet network adapters. A simple-swap mechanism with a thumbscrew and pull-tab enables tool-less installation and removal of the adapter. The adapter supports shared BMC network sideband connectivity to enable out-of-band systems management.
- The server offers PCI Express 4.0 I/O expansion capabilities that doubles the theoretical maximum bandwidth of PCIe 3.0 (16GT/s in each direction for PCIe 4.0, compared to 8 GT/s with PCIe 3.0). A PCIe 4.0 x16 slot provides 64 GB/s bandwidth, enough to support a 200GbE network connection.

- The server offers up to eight PCIe 4.0 slots, all with rear access, plus an internal bay for a cabled RAID adapter or HBA, plus a slot dedicated to the OCP adapter.

For more information about the SR650 V2, see the SR650 V2 Product Guide:
https://lenovopress.com/lp1392-thinksystem-sr650-v2-server

Lenovo ThinkSystem SR630 servers

Figure 3. Lenovo ThinkSystem SR630 V2

Lenovo ThinkSystem SR630 V2 servers have the following key features:

- Supports one or two third-generation Intel Xeon Processor Scalable processors
    - Up to 40 cores and 80 threads
    - Core speeds of up to 3.6 GHz
    - TDP ratings of up to 270W
- Support for up to 32 TruDDR4 memory DIMMs operating at up to 3200 MHz means you have the fastest available memory subsystem.
- Supports configurations of 2 DIMMs per channel to operate at the 3200 MHz rated speed of the memory DIMMs.
- Using 128GB 3DS RDIMMs, the server supports up to 4TB of system memory.
- Supports the new Intel Optane Persistent Memory 200 Series for advanced in-memory database applications, dense-virtualization; up to 16 PMem Modules can be installed in conjunction with regular system memory.
- Supports up to three single-width GPUs, each up to 75W for substantial processing power in a 1U system.
- Supports up to 12x 2.5-inch hot-swap drive bays, by using combinations of front-accessible (up to 10 bays) and rear-accessible (2 bays).
- Supports four 3.5-inch drive bays for lower-cost high-capacity HDD storage.
- Supports 16x EDSFF NVMe drives, a new form factor for high-density and high-performance storage.
- Supports up to 12x NVMe drives without oversubscription of PCIe lanes (1:1 connectivity) and without the need for additional NVMe adapters. The use of NVMe drives maximizes drive I/O performance, in terms of throughput and latency.
- Supports 12x SATA drives using the onboard SATA controller (no additional adapter needed), enabling lower cost, high capacity storage solution.
- Supports 12x SAS drives using a variety of 12Gb RAID controllers and SAS HBAs.
- Supports high-speed RAID controllers from Broadcom providing 12 Gb SAS connectivity to the drive backplanes. A variety of PCIe 3.0 and PCIe 4.0 RAID adapters are available.
- Supports up to two externally accessible 7mm hot-swap drives with RAID functionality for operating system boot functions.
- Supports M.2 drives for convenient operating system boot functions. Available M.2 adapters support either one M.2 drive or two M.2 drives in a RAID 1 configuration for performance and reliability.
- The server has a dedicated industry-standard OCP 3.0 small form factor (SFF) slot, with a PCIe 4.0

x16 interface, supporting a variety of Ethernet network adapters. A simple-swap mechanism with a thumbscrew and pull-tab enables tool-less installation and removal of the adapter. The adapter supports shared BMC network sideband connectivity to enable out-of-band systems management.

- The server offers PCI Express 4.0 I/O expansion capabilities that doubles the theoretical maximum bandwidth of PCIe 3.0 (16GT/s in each direction for PCIe 4.0, compared to 8 GT/s with PCIe 3.0). A PCIe 4.0 x16 slot provides 64 GB/s bandwidth, enough to support a 200GbE network connection.
- The server offers up to three PCIe 4.0 slots, all with rear access, plus an internal bay for a cabled RAID adapter or HBA, plus a slot dedicated to the OCP adapter.

For more information about the SR630 V2, see the SR630 V2 Product Guide:
https://lenovopress.com/lp1391-thinksystem-sr630-v2-server

Lenovo Storage D1224 Drive Enclosures

Figure 4. Lenovo Storage D1224 Drive Enclosure

Lenovo Storage D1224 Drive Enclosures have the following key features:

- 2U rack mount enclosure with 12 Gbps SAS direct-attached storage connectivity, designed to provide simplicity, speed, scalability, security, and high availability
- Holds 24x 2.5-inch small form factor (SFF) drives
- Dual Environmental Service Module (ESM) configurations for high availability and performance
- Flexibility in storing data on high performance SAS SSDs, performance-optimized enterprise SAS HDDs, or capacity-optimized enterprise NL SAS HDDs; mixing and matching drive types and form factors on a single RAID adapter or HBA to perfectly meet performance and capacity requirements for various workloads
- Support multiple host attachments and SAS zoning for storage partitioning

For more information about the Lenovo Storage D1224 Drive Enclosure, see the Lenovo Press product guide:
https://lenovopress.com/lp0512

Lenovo Storage D3284 External High Density Drive Expansion Enclosure

Figure 5. Lenovo Storage D3284 External High Density Drive Expansion Enclosure

Lenovo Storage D3284 Drive Enclosures have the following key features:

- 5U rack mount enclosure with 12 Gbps SAS direct-attached storage connectivity, designed for high performance and maximum storage density.
- Holds 84x 3.5-inch hot-swap drive bays in two drawers. Each drawer has three rows of drives, and each row has 14 drives.
- Supports high-capacity, archival-class nearline disk drives
- Dual Environmental Service Module (ESM) configurations for high availability and performance
- 12 Gb SAS HBA connectivity for maximum JBOD performance
- Flexibility in storing data on high performance SAS SSDs or capacity-optimized enterprise NL SAS HDDs; mixing and matching drive types on a single HBA to perfectly meet performance and capacity requirements for various workloads

The following figure show the D3284 drive expansion enclosure with the lower drawer open.
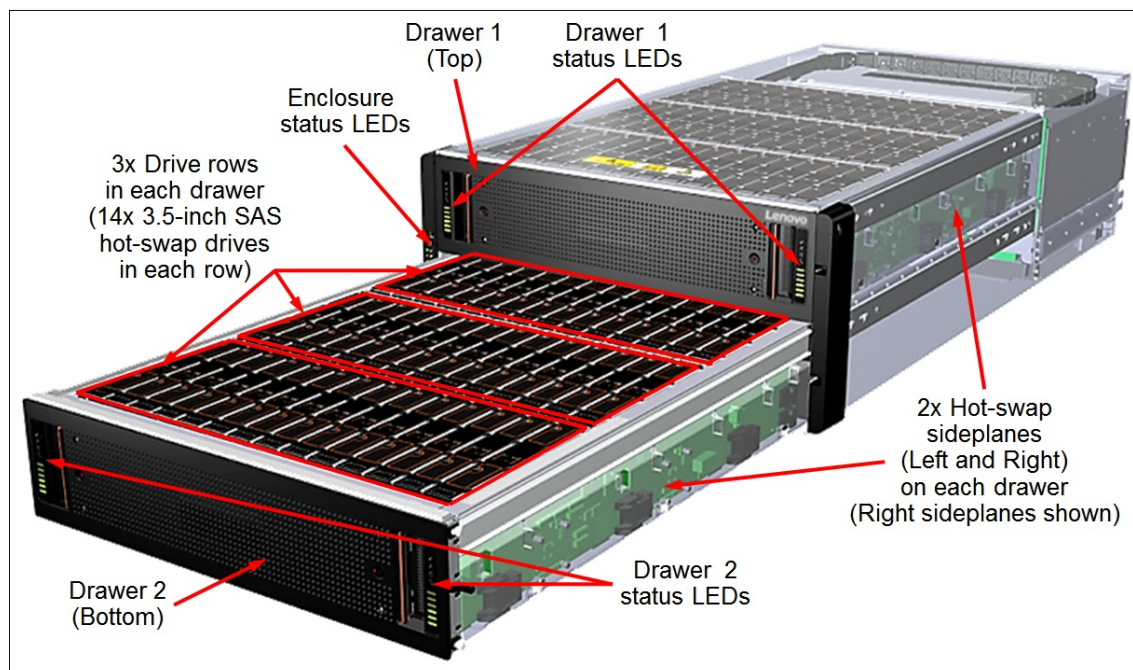

Figure 6. Front view of the D3284 drive enclosure

For more information about the Lenovo Storage Drive Expansion Enclosure, see the Lenovo Press product guide: https://lenovopress.com/lp0513

Infrastructure and rack installation

The solution arrives at the customer location installed in the Lenovo 1410 Rack, tested, components and cables labeled and ready to deploy for quick productivity.

- Factory-integrated, pre-configured ready-to-go solution that is delivered in a rack with all the hardware you need for your workloads: servers, storage, and network switches, plus essential software tools.
- IBM Spectrum Scale software is preinstalled on all servers.
- Optional ThinkSystem SR630 server and Mellanox AS4610 Gigabit Ethernet switch for Confluent cluster administration software and to act as the Spectrum Scale quorum.
- Designed for effortless integration into existing infrastructures, thereby reducing deployment time and saving money.

- Lenovo deployment services are available with the solution help get customers up and running quickly by allowing to begin deploying workloads in hours — not weeks — and realize substantial savings.
- Available NVIDIA Ethernet switches for a management network deliver exceptional performance and low latency, along with cost savings, and are designed to perform seamlessly with other vendors' upstream switches.
- All the components of the solution are available through Lenovo, which provides a single point of entry for all support issues that you might encounter with the server, networking, storage, and software used in the solution, for quicker problem determination and minimized downtime.

Components

The following figure shows two of the configurations available, the G204 (2x SR650 V2 and 4x D1224) and the G260 (2x SR650 V2 and 6x D3284). See the Models section for all available configurations.
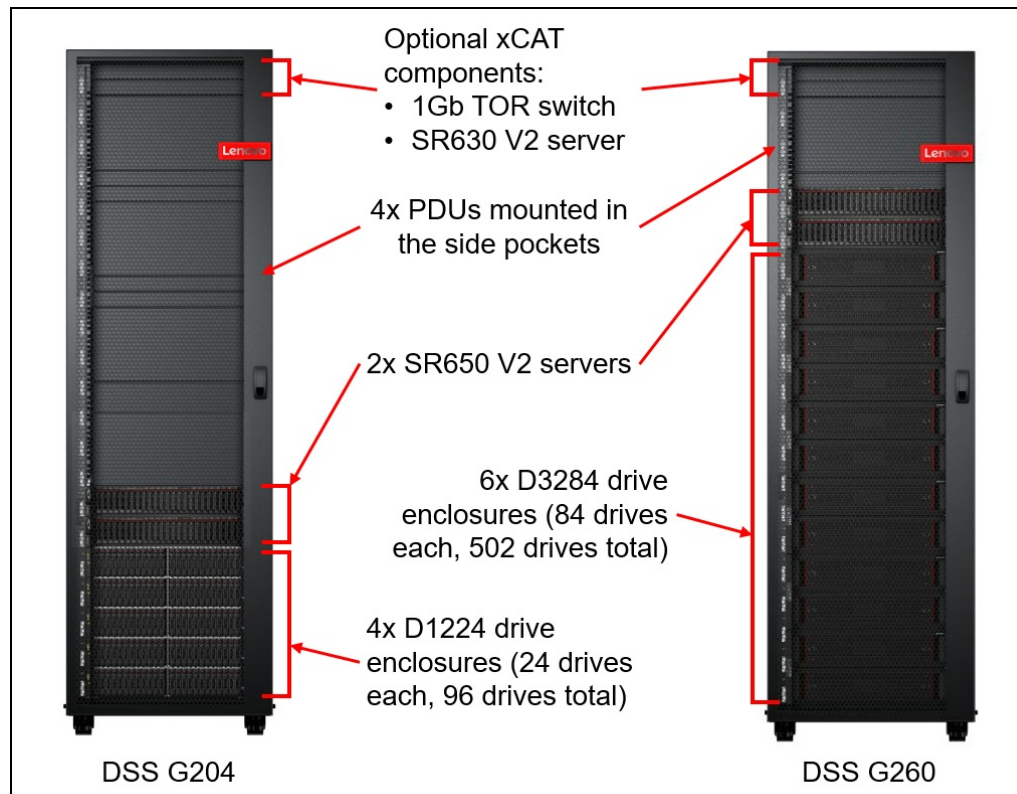
Figure 7. DSS-G components

Specifications

This section lists the system specifications of the components used in the Lenovo DSS-G offerings.

- SR650 V2 server specifications
- SR630 V2 server specifications
- D1224 External Enclosure specifications
- D3284 External Enclosure specifications
- Rack cabinet specifications
- Optional management components

SR650 V2 server specifications

The following table lists the system specifications of the SR650 V2 servers.

Table 2. SR650 system specifications

Components	Specification
Form factor	2U rack
Processor	2x Intel Xeon Gold 6354 18C 205W 3.0GHz Processors
Chipset	Intel C621A "Lewisburg" chipset, part of the platform codenamed "Whitley"
Memory	Varies - see the SR650 V2 configuration section
Memory capacity	Up to 2 TB with 16x 128 GB 3DS DIMM and 2 Processors
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	8x 2.5-inch hot-swap drive bays at the front of the server
Drives	2x 2.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD for boot drives, configured as a RAID-1 array
Storage controllers	1x ThinkSystem RAID 940-16i with 8GB flash-backed cache for boot drives 5x ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
Network interfaces	- ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port OCP Ethernet Adapter - ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port OCP Ethernet Adapter - ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP Ethernet Adapter - ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter
I/O Expansion slots	- Slot 1: PCIe 4.0 x16; full-height, half-length - Slot 2: PCIe 4.0 x8; full-height, half-length - Slot 3: PCIe 4.0 x8; full-height, half-length - Slot 4: PCIe 4.0 x16; full-height, half-length - Slot 5: PCIe 4.0 x8; full-height, half-length - Slot 6: PCIe 4.0 x8; full-height, half-length - Slot 7: PCIe 4.0 x16; full-height, half-length - Slot 8: PCIe 4.0 x16; full-height, half-length
Ports	Front: 1x USB 3.1 G1 (5 Gb/s) port, 1x USB 2.0 port (also for XCC local management), External diagnostics port, optional VGA port. Rear: 3x USB 3.1 G1 (5 Gb/s) ports, 1x VGA video port, 1x RJ-45 1GbE systems management port for XCC remote management. Optional 1x DB-9 COM serial port.
Cooling	Six hot-swap system fans with N+1 redundancy
Power supply	Two redundant hot-swap 1100W (230/115V) Platinum Power Supply
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.
Hot-swap	Drives, power supplies, and fans.
Systems management	Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. Models with 8x or 16x 2.5-inch front drive bays can optionally support an Integrated Diagnostics Panel. XClarity Controller (XCC) embedded management, 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.
Security features	Chassis intrusion switch, Power-on password, administrator's password, Trusted Platform Module (TPM), supporting TPM 2.0. In China only, optional Nationz TPM 2.0. Optional lockable front security bezel.
Operating systems supported	Lenovo DSS-G uses Red Hat Enterprise Linux.

Components	Specification
Limited warranty	Three-year customer-replaceable unit (CRU) and onsite limited warranty with 9x5 next business day parts delivered (NBD).
Service and support	Optional service upgrades are available through Lenovo Services: 4-hour or 2-hour response time, 6-hour fix time, 1-year or 2-year warranty extension, software support for Lenovo hardware and some third-party applications.
Dimensions	Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 764 mm (30.1 in.)
Weight	Maximum: 38.8 kg (85.5 lb)

SR630 V2 server specifications

The following table lists the system specifications for the SR630 V2 server.

Table 3. SR630 system specifications

Components	Specification
Form factor	1U rack
Processor	2X Intel Xeon Gold 6326 16C 185W 2.9GHz Processor
Chipset	Intel C621A "Lewisburg" chipset, part of the platform codenamed "Whitley"
Memory	Varies - see the SR630 V2 configuration section
Memory capacity	Up to 2 TB with 16x 128 GB 3DS DIMM and 2 Processors
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Platinum or Gold processors), and memory mirroring.
Disk drive bays	Model G100: • 10x 2.5-inch hot-swap: All NVMe • Internal M.2 module supporting up to two M.2 drives, for OS boot and drive storage support
Drives	Model G100: • 2x ThinkSystem M.2 PM983 960GB NVMe PCIe 3.0 x4 Non-Hot Swap SSD, configured as a RAID-1 array
Network interfaces	Mellanox ConnectX-6 HDR100/100GbE QSFP56 2-port PCIe VPI Adapter for cluster connectivity – see the SR630 V2 configuration section
PCI Expansion slots	Model G100: • Slot 1: PCIe 4.0 x16; low profile • Slot 2: PCIe 4.0 x16; low-profile • Slot 3: PCIe 4.0 x16; low-profile
Ports	Front: 1x USB 3.1 G1 (5 Gb/s) port, 1x USB 2.0 port (also for XCC local management), External diagnostics port, optional VGA port. Rear: 3x USB 3.1 G1 (5 Gb/s) ports, 1x VGA video port, 1x RJ-45 1GbE systems management port for XCC remote management. Optional 1x DB-9 COM serial port
Cooling	Six hot-swap system fans with N+1 redundancy
Power supply	2x 1100W (230V/115V) v2 Platinum Hot-Swap Power Supply
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.
Hot-swap parts	Drives, power supplies, and fans.

Components	Specification
Systems management	Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. Models with 8x 2.5-inch front drive bays can optionally support an Integrated Diagnostics Panel. XClarity Controller (XCC) embedded management, 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.
Security features	Chassis intrusion switch, Power-on password, administrator's password, Trusted Platform Module (TPM), supporting TPM 2.0. In China only, optional Nationz TPM 2.0. Optional lockable front security bezel.
Operating systems supported	Lenovo DSS-G uses Red Hat Enterprise Linux.
Limited warranty	Three-year customer-replaceable unit (CRU) and onsite limited warranty with 9x5 next business day parts delivered (NBD).
Service and support	Optional service upgrades are available through Lenovo Services: 4-hour or 2-hour response time, 6-hour fix time, 1-year or 2-year warranty extension, software support for Lenovo hardware and some third-party applications.
Dimensions	Width: 440 mm (17.3 in.), height: 43 mm (1.7 in.), depth: 773 mm (30.4 in.).
Weight	Maximum: 26.3 kg (58 lb)

D1224 External Enclosure specifications

The following table lists the D1224 system specifications.

Table 4. System specifications

Components	Specification
Machine type	4587-LC2
Form factor	2U rack mount
Number of ESMs	Two Environmental Service Modules (ESMs)
Expansion ports	3x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) ports (A, B, C) per ESM
Drive bays	24x SFF hot-swap drive bays
Drive technologies	SAS and NL SAS HDDs and SEDs; SAS SSDs. Intermix of HDDs, SEDs, and SSDs is supported within an enclosure, but not within a RAID array.
Drive connectivity	Dual-ported 12 Gb SAS drive attachment infrastructure.
Drives	SAS SSDs up to 15.36 TB - see the Drive Enclosure configuration section
Storage capacity	Up to 184 TB (24x 7.68 TB 2.5" SSDs)
Cooling	Redundant cooling with two fans built into power and cooling modules (PCMs).
Power supply	Two redundant hot-swap 580 W AC power supplies built into PCMs.
Hot-swap parts	ESMs, drives, PCMs.
Management interfaces	SAS Enclosure Services, 10/100 Mb Ethernet for external management.
Security features	SAS zoning, self-encrypting drives (SEDs).
Warranty	Three-year customer-replaceable unit, parts delivered limited warranty with 9x5 next business day response.

Components	Specification
Service and support	Optional warranty service upgrades are available through Lenovo: Technician installed parts, 24x7 coverage, 2-hour or 4-hour response time, 6-hour or 24-hour committed repair, 1-year or 2-year warranty extensions, YourDrive YourData, remote technical support, hardware installation.
Dimensions	Height: 88 mm (3.5 in), width: 443 mm (17.4 in), depth: 630 mm (24.8 in)
Maximum weight	24 kg (52.9) lb
Power cords	2x 16A/100-240V, C19 to IEC 320-C20 Rack Power Cable

For more information about the Lenovo Storage D1224 Drive Enclosure, see the Lenovo Press product guide: https://lenovopress.com/lp0512

D3284 External Enclosure specifications

The following table lists the D3284 specifications.

Table 5. D3284 External Enclosure specifications

Components	Specification
Machine type	6413-LC1
Form factor	5U rack mount
Number of ESMs	Two Environmental Service Modules (ESMs)
Expansion ports	3x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) ports (A, B, C) per ESM
Drive bays	84 3.5-inch (large form factor) hot-swap drive bays in two drawers. Each drawer has three drive rows, and each row has 14 drives.
Drive technologies	NL SAS HDDs and SAS SSDs. Intermix of HDDs and SSDs is supported within an enclosure/drawer, but not within a row.
Drive connectivity	Dual-ported 12 Gb SAS drive attachment infrastructure.
Drives	Choose 1 of the following drive capacities - see the Drive Enclosure configuration section: • 4TB, 6TB, 8TB, 10TB, 12TB, 14TB, 16TB, 18TB, or 20TB 7.2K rpm NL SAS HDDs
Storage capacity	Up to 1,640 TB (82x 20 TB LFF NL SAS HDDs)
Cooling	N+1 redundant cooling with five hot-swap fans.
Power supply	Two redundant hot-swap 2214 W AC power supplies.
Hot-swap parts	ESMs, drives, sideplanes, power supplies, and fans.
Management interfaces	SAS Enclosure Services, 10/100 Mb Ethernet for external management.
Warranty	Three-year customer-replaceable unit, parts delivered limited warranty with 9x5 next business day response.
Service and support	Optional warranty service upgrades are available through Lenovo: Technician installed parts, 24x7 coverage, 2-hour or 4-hour response time, 6-hour or 24-hour committed repair, 1-year or 2-year warranty extensions, YourDrive YourData, hardware installation.
Dimensions	Height: 221 mm (8.7 in), width: 447 mm (17.6 in), depth: 933 mm (36.7 in)
Maximum weight	131 kg (288.8 lb)

Components	Specification
Power cords	2x 16A/100-240V, C19 to IEC 320-C20 Rack Power Cable

For more information about the D3284 External Enclosure, see the Lenovo Press product guide: https://lenovopress.com/lp0513

Rack cabinet specifications

The DSS-G can be pre-installed and shipped in a 42U or 48U Lenovo EveryScale Heavy Duty Rack Cabinet. The specifications of the rack are in the following table.

Table 6. Rack cabinet specifications

Component	42U EveryScale Heavy Duty Rack Cabinet	48U EveryScale Heavy Duty Rack Cabinet
Model	1410-O42 (42U Black) 1410-P42 (42U White)	1410-O48 (48U Black) 1410-P48 (48U White)
Rack U Height	42U	48U
Dimensions	Height: 2011 mm / 79.2 inches Width: 600 mm / 23.6 inches Depth: 1200 mm / 47.2 inches	Height: 2277 mm / 89.6 inches Width: 600 mm / 23.6 inches Depth: 1200 mm / 47.2 inches
Front & Rear Doors	Lockable, perforated, full doors (rear door is not split) Optional water-cooled Rear Door Heat Exchanger (RDHX)	
Side Panels	Removable and lockable side doors	
Side Pockets	6 side pockets	8 side pockets
Cable exits	Top cable exits (front & rear); Bottom cable exit (rear only)	
Stabilizers	Front & side stabilizers	
Ship Loadable	Yes	
Load Capacity for Shipping	1600 kg / 3500 lb	1800kg / 4000 lb
Maximum Loaded Weight	1600 kg / 3500 lb	1800kg / 4000 lb

For more information about the EveryScale Heavy Duty Rack Cabinets, see the Lenovo Heavy Duty Rack Cabinets product guide, https://lenovopress.com/lp1498

Besides shipping fully integrated into the Lenovo 1410 rack cabinet, DSS-G solution gives clients the choice of shipping with the Lenovo Client Site Integration Kit (7X74) which allows clients to have Lenovo or a business partner install the solution in a rack of their own choosing.

Optional management components

Optionally, the configuration can include a management node and Gigabit Ethernet switch. The management node will run the Confluent cluster administration software. If this node and switch are not selected as part of the DSS-G configuration, an equivalent customer-supplied management environment needs to be available.

A management network and Confluent management server are required and can be either configured as part of the DSS-G solution, or can be provided by the customer. The following server and network switch are configurations that are added by default in x-config but can be removed or replaced if an alternative management system is provided:

- Management node - Lenovo ThinkSystem SR630 V2 (7Z71):
    - 1U rack server
    - 2x Intel Xeon ICX Silver 4314 16C 135W 2.4GHz Processor
    - 256GB of RAM
    - 2x ThinkSystem 2.5" 300GB 10K SAS 12Gb Hot Swap 512n HDD
    - 2x 750W(230V/115V) Platinum Hot-Swap Power Supply

  For more information about the server see the Lenovo Press product guide:
  http://lenovopress.com/lp1391

- Gigabit Ethernet switch - Mellanox AS4610:
    - 1U top-of-rack switch
    - 48x 10/100/1000BASE-T RJ-45 ports
    - 4x 10 Gigabit Ethernet SFP+ uplink ports
    - 2x fixed 150W AC (100-240V) power supplies

Models

Lenovo DSS-G is available in the configurations listed in the following table. Each configuration is installed in a 42U rack, although multiple DSS-G configurations can share the same rack.

Naming convention: The three numbers in the **G*xyz*** configuration number represent the following:

- **x** = Number of servers (SR650 or SR630)
- **y** = Number of D3284 drive enclosures
- **z** = Number of D1224 drive enclosures

Table 7. Lenovo DSS-G configurations

Configuration	SR630 V2 servers	SR650 V2 servers	D3284 drive enclosures	D1224 drive enclosures	Number of drives (max total capacity)	PDUs	SR630 (Mgmt)	AS4610 switch (for Confluent)
DSS G201	0	2	0	1	24x 2.5" (368TB)*	2	1 (optional)	1 (optional)
DSS G202	0	2	0	2	48x 2.5" (737TB)*	2	1 (optional)	1 (optional)
DSS G203	0	2	0	3	72x 2.5" (1105TB)*	2	1 (optional)	1 (optional)
DSS G204	0	2	0	4	96x 2.5" (1474TB)*	2	1 (optional)	1 (optional)
DSS G211	0	2	1	1	24x 2.5" + 82x 3.5" (368TB + 1640TB)†	2	1 (optional)	1 (optional)
DSS G212	0	2	1	2	48x 2.5" + 82x 3.5" (737TB + 1640TB)†	2	1 (optional)	1 (optional)
DSS G221	0	2	2	1	24x 2.5" 166 x 3.5" 368TB + 3320TB)†	2	1 (optional)	1 (optional)
DSS G222	0	2	2	2	48x 2.5" + 166x 3.5" (737TB + 3320TB)†	2	1 (optional)	1 (optional)
DSS G231	0	2	3	1	24x 2.5" + 250x 3.5" (368TB + 5000TB)†	2	1 (optional)	1 (optional)
DSS G232	0	2	3	2	48x 2.5" + 250 x 3.5" (737TB + 5000TB)†	2	1 (optional)	1 (optional)
DSS G241	0	2	4	1	24x 2.5" + 334x 3.5" (368TB + 6680TB)†	2	1 (optional)	1 (optional)
DSS G242	0	2	4	2	48x 2.5" + 334x 3.5" (737TB + 6680TB)†	2	1 (optional)	1 (optional)
DSS G251	0	2	5	1	24x 2.5" + 418x 3.5" (368TB + 8360TB)†	2	1 (optional)	1 (optional)
DSS G252	0	2	5	2	48x 2.5" + 418x 3.5" (737TB + 8360TB)†	2	1 (optional)	1 (optional)
DSS G261	0	2	6	1	24x 2.5" + 502x 3.5" (368TB + 10040TB)†	2	1 (optional)	1 (optional)
DSS G262	0	2	6	2	48x 2.5" + 502x 3.5" (737TB + 10040TB)†	2	1 (optional)	1 (optional)
DSS G271	0	2	7	1	24x 2.5" + 586x 3.5" (737TB + 117208TB)†	2	1 (optional)	1 (optional)
DSS G272	0	2	7	2	48x 2.5" + 586x 3.5" (737TB + 11720TB)†	2	1 (optional)	1 (optional)
DSS G281	0	2	8	1	24x 2.5" + 670x 3.5" (368TB + 13400TB)†	2	1 (optional)	1 (optional)
DSS G282	0	2	8	2	48x 2.5" + 670x 3.5" (737TB + 13400TB)†	2	1 (optional)	1 (optional)

Configuration	SR630 V2 servers	SR650 V2 servers	D3284 drive enclosures	D1224 drive enclosures	Number of drives (max total capacity)	PDUs	SR630 (Mgmt)	AS4610 switch (for Confluent)
DSS G291	0	2	9	1	24x 2.5" + 754x 3.5" (368TB + 10080TB)†	2	1 (optional)	1 (optional)
DSS G210	0	2	1	0	82x 3.5" (1640TB)**	2	1 (optional)	1 (optional)
DSS G220	0	2	2	0	166x 3.5" (3320TB)**	2	1 (optional)	1 (optional)
DSS G230	0	2	3	0	250x 3.5" (5000TB)**	2	1 (optional)	1 (optional)
DSS G240	0	2	4	0	334x 3.5" (6680TB)**	2	1 (optional)	1 (optional)
DSS G250	0	2	5	0	418x 3.5" (8360TB)**	2	1 (optional)	1 (optional)
DSS G260	0	2	6	0	502x 3.5" (10040TB)**	2	1 (optional)	1 (optional)
DSS G270	0	2	7	0	586x 3.5" (11720TB)**	2	1 (optional)	1 (optional)
DSS G280	0	2	8	0	670x 3.5" (13400TB)**	2	1 (optional)	1 (optional)
DSS G290	0	2	9	0	754x 3.5" (15080TB)**	2	1 (optional)	1 (optional)
DSS G2A0	0	2	10	0	838x 3.5" (16760TB)**	2	1 (optional)	1 (optional)

* Capacity is based on using 15.36TB 2.5-inch SSDs.
** Capacity is based on using 20TB 3.5-inch HDDs in all but 2 of the drive bays in the first drive enclosure; the remaining 2 bays must have 2x SSDs for Spectrum Scale internal use.
† These models are a hybrid configuration that combines HDDs and SSDs in one building block. The number of drives and capacities are given in terms of HDD and SSD count.

Configurations are built using the x-config configurator tool:
https://lesc.lenovo.com/products/hardware/configurator/worldwide/bhui/asit/index.html

The configuration process includes the following steps:

- Select the drive and drive enclosure, as listed in the previous table.
- Node configuration, as described in the next subsections:
    - Memory
    - Network adapter
    - Red Hat Enterprise Linux (RHEL) subscription
    - Enterprise Software Support (ESS) subscription
- Confluent (xCAT) management network selection
- IBM Spectrum Scale license selection
- Power distribution infrastructure selection
- Professional Services selection

The following sections provide information about these configuration steps.

Drive Enclosure configuration

All drives used in all the enclosures in a DSS-G configuration are identical. The only exception to this is a pair of 800 GB SSDs that are required in the *first* drive enclosure for any configuration using HDDs. These SSDs are for *logtip* use by the IBM Spectrum Scale software and are not for user data.

DSS-G100 configuration: The G100 does not include external drive enclosures. Instead, NVMe drives are installed locally into the server as described in the SR630 V2 configuration section.

The drive requirement are as follows:

- For configurations that use HDDs (D3284 only), two 800GB logtip SSDs must also be selected in the *first* drive enclosure in the DSS-G configuration.
- All subsequent enclosures in HDD-based DSS-G configuration do not require these logtip SSDs.
- Configurations using SSDs do not require the pair of logtip SSDs.
- Only one drive size & type is selectable per DSS-G configuration.
- All drive enclosures must be fully populated with drives. Partially filled enclosures are not supported.

The following table lists the drives available for selection in a D1224 enclosure. D1224 configurations are all SSDs and do not require separate logtip drives.

Table 8. SSD selections for the D1224 enclosures

Feature code	Description
AU1U	Lenovo Storage 800GB 3DWD SSD 2.5" SAS
AUDH	Lenovo Storage 800GB 10DWD 2.5" SAS SSD
AU1T	Lenovo Storage 1.6TB 3DWD SSD 2.5" SAS
AUDG	Lenovo Storage 1.6TB 10DWD 2.5" SAS SSD
AVPA	Lenovo Storage 3.84TB 1DWD 2.5" SAS SSD
AVP9	Lenovo Storage 7.68TB 1DWD 2.5" SAS SSD
BV2T	Lenovo Storage 15TB SSD Drive for D1212/D1224

The following table lists the drives available for selection in a D3284 enclosure.

Table 9. Drive selections for the D3284 enclosures

Feature code	Description
D3284 External Enclosure HDDs	
AUDS	Lenovo Storage 3.5" 4TB 7.2K NL-SAS HDD (14 pack)
AUK2	Lenovo Storage 3.5" 4TB 7.2K NL-SAS HDD
AUDT	Lenovo Storage 3.5" 6TB 7.2K NL-SAS HDD (14 pack)
AUK1	Lenovo Storage 3.5" 6TB 7.2K NL-SAS HDD
AUDU	Lenovo Storage 3.5" 8TB 7.2K NL-SAS HDD (14 pack)
AUK0	Lenovo Storage 3.5" 8TB 7.2K NL-SAS HDD
AUE4	Lenovo Storage 3.5" 10TB 7.2K NL-SAS HDD (14 pack)
AUJZ	Lenovo Storage 3.5" 10TB 7.2K NL-SAS HDD
B106	Lenovo Storage 3.5" 12TB 7.2K NL-SAS HDD (14 pack)
B107	Lenovo Storage 3.5" 12TB 7.2K NL-SAS HDD
B4T6	Lenovo Storage 3.5" 14TB 7.2K NL-SAS HDD (14 pack)
B4DU	Lenovo Storage 3.5" 14TB 7.2K NL-SAS HDD
BAVN	Lenovo Storage 3.5" 16TB 7.2K NL-SAS HDD (14 pack)
BAVM	Lenovo Storage 3.5" 16TB 7.2K NL-SAS HDD
BKCX	Lenovo Storage 3.5" 18TB 7.2K NL-SAS HDD (14 pack)
BKCY	Lenovo Storage 3.5" 18TB 7.2K NL-SAS HDD
BQUQ	Lenovo Storage 3.5" 20TB 7.2K NL-SAS HDD (14 pack) HDD
BQUR	Lenovo Storage 3.5" 20TB 7.2k NL-SAS HDDs
D3284 External Enclosure SSDs	
BAVK	Lenovo Storage 800GB 2.5" 3DWD Hybrid Tray SSD (logtip drive)

D3284 configurations are all HDDs, as follows:

- First D3284 enclosure in a configuration: 82 HDDs + 2x 800GB SSDs (BAVK)
- Subsequent D3284 enclosures in a configuration: 84x HDDs

Guaranteed Quality: Lenovo DSS-G is working exclusively with Enterprise grade drives. Where common drives are only rated at up to 180 TB/year, the Lenovo Enterprise drives are always warranted to up to 550TB/year.

SR650 V2 configuration

The Lenovo DSS-G configurations described in this product guide use the ThinkSystem SR650 V2 server, which features the 3rd Gen Intel Xeon Scalable Family processors. Details about the configurations are in the Specifications section.

In this section:

- SR650 V2 memory
- SR650 V2 internal storage
- SR650 V2 network adapters

SR650 V2 memory

The DSS-G offerings allow four different memory configurations for the SR650 servers

- 256 GB using 16x 16 GB TruDDR4 RDIMMs (8 DIMMs per CPU, 1 DIMM per memory channel)
- 512 GB using 16x 32 GB TruDDR4 RDIMMs (8 DIMMs per CPU, 1 DIMM per memory channel)
- 1024 GB using 16x 64 GB TruDDR4 RDIMMs (16 DIMMs per CPU, 2 DIMMs per memory channel)
- 2048 GB using 16x 128 GB TruDDR4 RDIMMs (16 DIMMs per CPU, 2 DIMMs per memory channel)

The following tables indicates memory requirements on the DSS-G configurations containing D3284 enclosures for different drive capacities. This table assumes a 1MB block size and RAID level of 8+2P. If your use configuration deviates from these parameters, please check with your Lenovo sales representative for the required memory.

Table 10. G210, G211, G212, G220

NL-SAS Drive Size	Required Memory
4 TB	256 GB
6 TB	256 GB
8 TB	256 GB
10 TB	256 GB
12 TB	256 GB
14 TB	256 GB
16 TB	256 GB
18 TB	256 GB
20 TB	512 GB

Table 11. G221, G222, G230, G231, G232, G240

NL-SAS Drive Size	Required Memory
4 TB	256 GB
6 TB	256 GB
8 TB	256 GB
10 TB	512 GB
12 TB	512 GB
14 TB	512 GB
16 TB	512 GB
18 TB	512 GB
20 TB	1024 GB

Table 12. G241, G242, G250, G251, G252, G260 and G261, G262, G270, G271, G280

NL-SAS Drive Size	Required Memory
4 TB	256 GB
6 TB	512 GB
8 TB	512 GB
10 TB	1024 GB
12 TB	1024 GB
14 TB	1024 GB
16 TB	1024 GB
18 TB	1024 GB
20 TB	1024 GB

Table 13. G281, G282, G290, G291, G2A0

NL-SAS Drive Size	Required Memory
4 TB	512 GB
6 TB	512 GB
8 TB	1024 GB
10 TB	1024 GB
12 TB	1024 GB
14 TB	1024 GB
16 TB	1024 GB
18 TB	2048 GB
20 TB	2048 GB

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

Table 14. Memory selection

Memory selection	Quantity	Feature code	Description
256 GB	16	B963	ThinkSystem 16GB TruDDR4 3200 MHz (2Rx8 1.2V) RDIMM
512GB	16	B966	ThinkSystem 32GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM
1024GB	16	B966	ThinkSystem 64GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM
2048 GB	16	BA62	ThinkSystem 128GB TruDDR4 3200 MHz (4Rx4 1.2V) 3DS RDIMM

SR650 V2 internal storage

The SR650 V2 servers have two internal hot-swap drives, configured as a RAID-1 pair and connected to a RAID 930-8i adapter with 2GB of flash-backed cache.

Table 15. Internal drive bay configurations

Feature code	Description	Quantity
B9VS	ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter for SAS/SATA	1
AULV	ThinkSystem 2.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD	2

SR650 V2 network adapters

The following table lists the adapters that are available for use for cluster fabric.

Table 16. Network adapter options

Part number	Feature code	Port count and speed	Description
4XC7A80289	BQ1N	1x400	ThinkSystem NVIDIA ConnectX-7 NDR OSFP400 1-Port PCIe Gen5 x16 InfiniBand Adapter
4XC7A81883	BQBN	2x200	ThinkSystem NVIDIA ConnectX-7 NDR200/HDR QSFP112 2-Port PCIe Gen5 x16 InfiniBand Adapter
4C57A14178	B4RA	2x 100 GbE	ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 2-port PCIe VPI Adapter
4C57A15326	B4RC	1x 200 GbE	ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe 4 VPI Adapter

For details about these adapters, see the Mellanox ConnectX-6 Adapter product guide, https://lenovopress.com/lp1170

The transceivers and optical cables, or the DAC cables needed to connect the adapters to the customer-supplied network switches can be configured together with the system in x-config. Consult the product guides for the adapters for details.

SR630 V2 configuration

The Lenovo DSS-G configurations described in this product guide use the ThinkSystem SR630 V2 server, which features the Intel Xeon Scalable Family processors. Details about the configurations are in the Specifications section.

In this section:

- SR630 V2 memory
- SR630 V2 internal storage
- SR630 V2 network adapters

SR630 V2 memory

The DSS-G offerings allow four different memory configurations for the SR630 servers

- 256 GB using 16x 16 GB TruDDR4 RDIMMs (8 DIMMs per CPU, 1 DIMM per memory channel)
- 512 GB using 16x 32 GB TruDDR4 RDIMMs (8 DIMMs per CPU, 1 DIMM per memory channel)
- 1024 GB using 16x 64 GB TruDDR4 RDIMMs (16 DIMMs per CPU, 2 DIMMs per memory channel)
- 2048 GB using 16x 128 GB TruDDR4 RDIMMs (16 DIMMs per CPU, 2 DIMMs per memory channel)

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

Table 17. Memory selection

Memory selection	Quantity	Feature code	Description
256GB	16	B963	16x ThinkSystem 16GB TruDDR4 3200 MHz (2Rx8 1.2V) RDIMM
512GB	16	B964	16x ThinkSystem 32GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM
1024GB	16	B966	16x ThinkSystem 64GB TruDDR4 3200 MHz (2Rx4 1.2V) RDIMM
2048GB	16	BA62	16x ThinkSystem 128GB TruDDR4 3200 MHz (4Rx4 1.2V) 3DS RDIMM

SR630 V2 internal storage

DSS-G base model G100 also supports up to eight NVMe drives for local storage. The following table lists the NVMe drives that are supported in the G100 configuration.

Table 18. Supported NVMe drives in the SR630 (Model G100)

Feature code	Description	Quantity supported
2.5-inch hot-swap SSDs - Mainstream U.2 NVMe PCIe		
BCFV	ThinkSystem U.2 Intel P5600 1.6TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BCFR	ThinkSystem U.2 Intel P5600 3.2TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BCFS	ThinkSystem U.2 Intel P5600 6.4TB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BE03	ThinkSystem U.3 Kioxia CM6-V 800GB Mainstream NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
B96Z	ThinkSystem U.3 Kioxia CM6-V 1.6TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4-10x
B96T	ThinkSystem U.3 Kioxia CM6-V 3.2TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4-10x
B96P	ThinkSystem U.3 Kioxia CM6-V 6.4TB Mainstream NVMe PCIe4.0 x4 Hot Swap SSD	4-10x
2.5-inch hot-swap SSDs - Entry U.2 NVMe PCIe		
BCFT	ThinkSystem U.2 Intel P5500 1.92TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BCFW	ThinkSystem U.2 Intel P5500 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BCFU	ThinkSystem U.2 Intel P5500 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BC4Y	ThinkSystem U.2 PM1733 1.92TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BC4Z	ThinkSystem U.2 PM1733 3.84TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BE2E	ThinkSystem U.2 PM1733 7.68TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
BE2F	ThinkSystem U.2 PM1733 15.36TB Entry NVMe PCIe 4.0 x4 Hot Swap SSD	4-10x
B34N	ThinkSystem U.2 PM983 1.92TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	4-10x
B34P	ThinkSystem U.2 PM983 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD	4-10x
B4D3	ThinkSystem U.2 PM983 7.68TB Entry NVMe PCIe3.0 x4 Hot Swap SSD	4-10x

SR630 V2 network adapters

The SR630 V2 server for the DSS-G100 configuration has the following choice of network interfaces for cluster traffic, deployed with a fixed quantity of 3:

- ThinkSystem NVIDIA ConnectX-7 NDR 200GbE InfiniBand 2 Port
- ThinkSystem NVIDIA ConnectX-7 NDR OSFP400 InfiniBand 1 Port
- ThinkSystem Mellanox ConnectX-6 HDR InfiniBand 1 Port
- ThinkSystem Mellanox ConnectX-6 HDR100 InfiniBand 2 Port
- ThinkSystem Mellanox ConnectX-6 200GbE Ethernet 1 Port
- ThinkSystem Mellanox ConnectX-6 100GbE Ethernet 2 Port

The transceivers and optical cables, or the DAC cables needed to connect the adapters to the customer-supplied network switches can be configured together with the system in x-config. Consult the see the adapter product guides for information

- ConnectX-6: https://lenovopress.lenovo.com/lp1170
- ConnectX-7: https://lenovopress.lenovo.com/lp1693

Cluster network

The Lenovo DSS-G offering connects as a storage block to the customer's Spectrum Scale cluster network using the high-speed network adapters installed in the servers. Each pair of servers has two or three network adapters, which are either Ethernet or InfiniBand. Each DSS-G storage block connects to the cluster network.

In concert with the cluster network is the Confluent (xCAT) management network. In lieu of a customer-supplied management network, the Lenovo DSS-G offering includes a ThinkSystem SR630 V2 server running Confluent and a Mellanox AS4610 48-port Gigabit Ethernet switch.

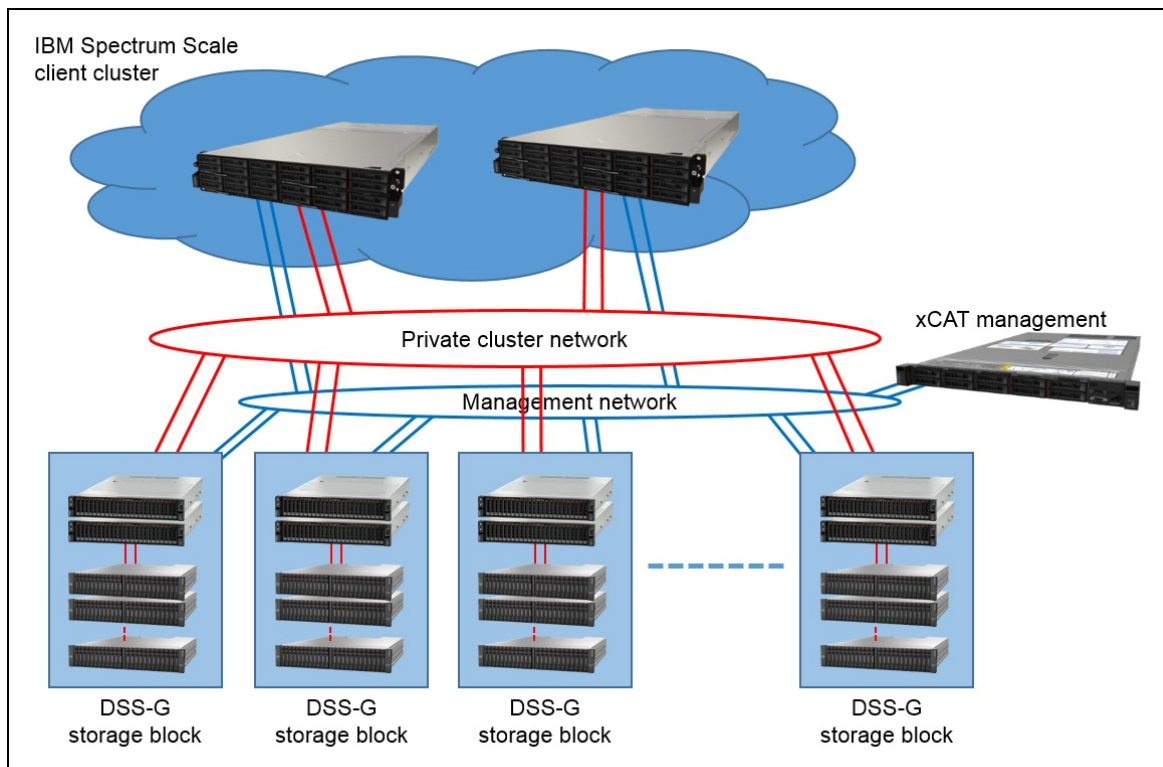These components are shown in the following figure.

Figure 8. Lenovo DSS-G storage blocks in a Spectrum Scale client network

Red Hat Enterprise Linux

The SR650 V2 and SR630 V2 servers run Red Hat Enterprise Linux which is preinstalled on the RAID-1 pair of 300 GB drives installed in the servers.

Each server requires a Lenovo RHEL Premium Support subscription. The subscription provides Level 1 and Level 2 support, with 24x7 for Severity 1 situations.

Table 19. Operating system licensing

Part number	Feature code	Description
7S0F0004WW	S0N8	RHEL Server Physical or Virtual Node, 2 Skt Premium Subscription w/Lenovo Support 1Yr
7S0F0005WW	S0N9	RHEL Server Physical or Virtual Node, 2 Skt Premium Subscription w/Lenovo Support 3Yr
7S0F0006WW	S0NA	RHEL Server Physical or Virtual Node, 2 Skt Premium Subscription w/Lenovo Support 5Yr

Lenovo recommended customers have EUS enabled which provides critical patches for the LTS release of RHEL installed on the DSS-G systems.

EUS is provided with x86-64 Red Hat Enterprise Linux Server Premium subscriptions and is available as an Add-on to Red Hat Enterprise Linux Server Standard subscription.

Table 20. RHEL Extended Update Support

Part number	Feature code	Description
7S0F001MWW	S0PR	RHEL Extended Update Support, 2 Skt Subscription w/Lenovo Support 1Yr
7S0F001NWW	S0PS	RHEL Extended Update Support, 2 Skt Subscription w/Lenovo Support 3Yr
7S0F001PWW	S0PT	RHEL Extended Update Support, 2 Skt Subscription w/Lenovo Support 5Yr

IBM Spectrum Scale licensing

DSS-G can be configured with two types of license models:

- Per Disk/Flash Drive

  The number of licenses needed is based on the total number of HDDs and SSDs in the drive enclosures (excluding the logTip SSDs) and will be derived automatically by the configurator.

  This License model is available for the Data Access Edition and the Data Management Edition.

- Per managed capacity

  The number of licenses needed is based on the storage capacity being managed in an IBM Spectrum Scale cluster and will also be derived automatically by the configurator based on the selection of parity level made. The storage capacity to be licensed is the capacity in Tebibytes (TiB) from all Network Shared Disk (NSDs) in the IBM Spectrum Scale cluster after applying IBM Spectrum Scale RAID. The capacity to be licensed is not affected by using functions such as replication or compression or by doing tasks such as creating or deleting files, file systems, or snapshots.

  This License model is available for the Data Access Edition, the Data Management Edition, and the Erasure Code Edition.

Each of these is offered in 1, 3, 4 and 5-year support periods. The total number of Spectrum Scale licenses needed will be split between the two DSS-G servers. Half will appear on one server and half will appear on the other server. The license however relates to the total solution and storage drives/capacity within.

Table 21. IBM Spectrum Scale licensing

Description	Part number	Feature code
IBM Spectrum Scale -- licensed per Disk/Flash Drive		
Spectrum Scale for Lenovo Storage Data Management Edition per Disk Drive w/1Yr S&S	None	AVZ7
Spectrum Scale for Lenovo Storage Data Management Edition per Disk Drive w/3Yr S&S	None	AVZ8
Spectrum Scale for Lenovo Storage Data Management Edition per Disk Drive w/4Yr S&S	None	AVZ9
Spectrum Scale for Lenovo Storage Data Management Edition per Disk Drive w/5Yr S&S	None	AVZA
Spectrum Scale for Lenovo Storage Data Management Edition per Flash Drive w/1Yr S&S	None	AVZB
Spectrum Scale for Lenovo Storage Data Management Edition per Flash Drive w/3Yr S&S	None	AVZC
Spectrum Scale for Lenovo Storage Data Management Edition per Flash Drive w/4Yr S&S	None	AVZD
Spectrum Scale for Lenovo Storage Data Management Edition per Flash Drive w/5Yr S&S	None	AVZE
Spectrum Scale for Lenovo Storage Data Access Edition per Disk Drive w/1Yr S&S	None	S189
Spectrum Scale for Lenovo Storage Data Access Edition per Disk Drive w/3Yr S&S	None	S18A
Spectrum Scale for Lenovo Storage Data Access Edition per Disk Drive w/4Yr S&S	None	S18B
Spectrum Scale for Lenovo Storage Data Access Edition per Disk Drive w/5Yr S&S	None	S18C
Spectrum Scale for Lenovo Storage Data Access Edition per Flash Drive w/1Yr S&S	None	S18D
Spectrum Scale for Lenovo Storage Data Access Edition per Flash Drive w/3Yr S&S	None	S18E
Spectrum Scale for Lenovo Storage Data Access Edition per Flash Drive w/4Yr S&S	None	S18F
Spectrum Scale for Lenovo Storage Data Access Edition per Flash Drive w/5Yr S&S	None	S18G
IBM Spectrum Scale -- licensed per managed capacity		
Spectrum Scale Data Management Edition per TiB w/1Yr S&S	None	AVZ3
Spectrum Scale Data Management Edition per TiB w/3Yr S&S	None	AVZ4
Spectrum Scale Data Management Edition per TiB w/4Yr S&S	None	AVZ5
Spectrum Scale Data Management Edition per TiB w/5Yr S&S	None	AVZ6
Spectrum Scale Data Access Edition per TiB w/1Yr S&S	None	S185
Spectrum Scale Data Access Edition per TiB w/3Yr S&S	None	S186
Spectrum Scale Data Access Edition per TiB w/4Yr S&S	None	S187
Spectrum Scale Data Access Edition per TiB w/5Yr S&S	None	S188
Spectrum Scale Erasure Code Edition per TiB w/1Yr S&S	None	S2D0
Spectrum Scale Erasure Code Edition per TiB w/3Yr S&S	None	S2D1
Spectrum Scale Erasure Code Edition per TiB w/4Yr S&S	None	S2D2
Spectrum Scale Erasure Code Edition per TiB w/5Yr S&S	None	S2D3

Additional licensing information:

- No additional licenses (for example, client or server) are needed for Spectrum Scale for DSS. Only licenses based on the number of drives (non-logtip) or capacity in TebiBytes (TiB) after applying IBM

Spectrum Scale RAID are needed.

- Capacity licensing is measured on Binary format (1 TiB = 2^40 Bytes), which means that you must multiply the nominal Decimal format (1TB = 10^12 Bytes) chosen by drive vendors with 0.9185 to get to the actual capacity to be licensed. For DSS-G the Lenovo configurator will take care of that for you.

- For non-DSS Lenovo storage in the same Cluster (for example, separated metadata on traditional controller-based storage), you have the same options of capacity-based per Disk/Flash drive or per TiB licenses.

- It is not supported to mix Data Access Edition and Data Management Edition licensing within a cluster.

- You can expand a Data Access Edition or a Data Management Edition cluster with Erasure Code Edition systems. The limitations of Data Access Edition features apply if expanding a Data Access Edition cluster.

- Disk/Flash drive-based Spectrum Scale licenses can only be transferred from the existing Lenovo storage solution that is being decommissioned and re-used on its equivalent future or replacement Lenovo storage solution.

- Existing capacity licenses through for example an Enterprise License Agreement with IBM can be applied to Lenovo DSS-G after providing Proof of Entitlement. While Lenovo provides the solution level support, software support needs to be requested from IBM directly in such a case.

LeSI factory integration for DSS-G

Lenovo manufacturing implements a robust testing and integration program to insure LeSI components are fully operational when shipped out of the factory. In addition to the standard component level validation performed on all hardware components produced by Lenovo, LeSI performs rack level testing to verify that the LeSI cluster operates as a solution. The rack level testing and validation includes the following:

- Performing a power on test. Assure device power is present, with no error indicators
- Set up RAID (when required)
- Set up storage devices and verify functionality
- Validate network connectivity and functionality
- Verify functionality of server hardware, network infrastructure, and server configuration correctness. Verify health of components
- Configure all devices per Best Recipe software settings
- Perform stress testing of server CPU and memory via software and power cycling
- Data collection for quality records and test results

LeSI onsite installation for DSS-G

Lenovo experts will manage the physical installation of your pre-integrated Racks so you can quickly benefit from your investment. Working at a time convenient to you, the technician will unpack and inspect the systems at your site, finalize the cabling, verify operation, and dispose of the packaging at the on-site location.

Any racked EveryScale solution comes with this basic Lenovo Hardware Installation services included, automatically sized and configured based on the solution scope detailed in the Lenovo EveryScale Hardware Installation Statement of Work.

Table 22. Lenovo EveryScale onsite installation

Part number	Description	Purpose
5AS7B07693	Lenovo EveryScale Rack Setup Services	Base service per rack
5AS7B07694	Lenovo EveryScale Basic Networking Services	Service per device cabled out of the rack with 12 or less cables
5AS7B07695	Lenovo EveryScale Advanced Networking Services	Service per device cabled out of the rack with more than 12 cables

Customized installation services beyond the basic Lenovo Hardware Installation services are also available to meet the specific needs of the client and for solutions with Client Site Integration Kit.

Before installation, the client should complete the following steps to ensure the hardware will be successfully installed:

- Backing up the data being migrated to the new hardware
- Ensuring the new hardware is available and in place
- Assign a technical lead to act as liaison with Lenovo, who can coordinate access to other resources if required
- Designated data center location has the required power and cooling in place to support purchased solution
- Providing a safe workspace and appropriate access for the technician

Once the client is ready, an expert technician will perform the basic Lenovo Hardware Installation services. This process will include the following:

- Verify receipt and condition of all rack(s) and components
- Verify the client environment is ready for consequent installation
- Unpack and visually inspect hardware for damage
- Place rack(s) and complete installation and inter-rack cabling as specified by the solution configuration
- Connect the equipment to customer-supplied power
- Ensure the equipment is operational: Power on equipment, check for green lights and obvious issues
- Remove packaging and other waste materials to the customer designated dumpster
- Provide completion form for customer to authorize
- If a hardware failure occurs during the installation, service call will be opened.

Additional client requirements beyond the basic Lenovo Hardware Installation services scope, can be offered with customized installation services sized specifically to the client's needs.

To get operational a final onsite software installation and configuration for the specific environment is required. Lenovo can also provide comprehensive onsite configuration of software, including integration and validation for operating systems and software, virtualization and high-availability configurations.

For additional information, see the Services section.

Client Site Integration Kit onsite installation

Besides shipping fully integrated into the Lenovo 1410 rack cabinet, DSS-G solution gives clients the choice of shipping with the Lenovo Client Site Integration Kit (7X74) which allows clients to have Lenovo or a business partner install the solution in a rack of their own choosing. The Lenovo Client Site Integration Kit enables clients to gain the interoperability warranty benefit of an integrated DSS-G solution while also providing them flexibility in custom-fitting into the client datacenter.

With the Lenovo Client Site Integration Kit, the DSS-G solution is built and tested at the racklevel in Lenovo manufacturing just like described for factory integration above. Afterwards it is disassembled again, and Servers, switches and other items are packaged in individual boxes with a ship group box for cables, publications, labeling, and other rack documentation. Clients are required to purchase installation services from Lenovo or a business partner for the physical setup. The installation team will install the solution at the customer site into the customer provided rack per racking diagrams and point-to-point instructions.

To get operational a final onsite software installation and configuration for the specific environment is required. Lenovo can also provide comprehensive onsite configuration of software, including integration and validation for operating systems and software, virtualization and high-availability configurations.

For additional information, see the Services section.

Operating environment

Lenovo Distributed Storage Solution for Spectrum Scale does fully comply with ASHRAE class A2 specifications for the air-cooled data center. Please find more details in the product guides of the individual components.

- Air temperature:
  - Operating:
    - ASHRAE Class A2: 10 °C - 35 °C (50 °F - 95 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 300-m (984-ft) increase in altitude
  - Non-operating: 5 °C - 45 °C (41 °F - 113 °F)
  - Storage: -40 °C - +60 °C (-40 °F - 140 °F)
- Maximum altitude: 3,050 m (10,000 ft)
- Humidity:
  - Operating:
    - ASHRAE Class A2: 8% - 80% (non-condensing); maximum dew point: 21 °C (70 °F)
  - Storage: 8% - 90% (non-condensing)
- Electrical:
  - 100 - 127 (nominal) V AC; 50 Hz / 60 Hz
  - 200 - 240 (nominal) V AC; 50 Hz / 60 Hz

Regulatory compliance

Lenovo Distributed Storage Solution for Spectrum Scale adopts the conformity of its individual components to international standards, which for the server and storage enclosures are listed below:

The SR650 V2 conforms to the following standards:

- ANSI/UL 62368-1
- IEC 62368-1 (CB Certificate and CB Test Report)
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 7, Class A
- CSA C22.2 No. 62368-1
- CISPR 32, Class A, CISPR 35
- Japan VCCI, Class A
- Taiwan BSMI CNS13438, Class A; CNS14336-1; Section 5 of CNS15663
- CE, UKCA Mark (EN55032 Class A, EN62368-1, EN55024, EN55035, EN61000-3-2, EN61000-3-3, (EU) 2019/424, and EN50581-1 (RoHS))
- Korea KN32, Class A, KN35
- Russia, Belorussia and Kazakhstan, TP EAC 037/2016 (for RoHS)
- Russia, Belorussia and Kazakhstan, EAC: TP TC 004/2011 (for Safety); TP TC 020/2011 (for EMC)
- Australia/New Zealand AS/NZS CISPR 32, Class A; AS/NZS 62368.1
- UL Green Guard, UL2819
- Energy Star 4.0
- EPEAT (NSF/ ANSI 426) Bronze
- China CCC certificate, GB17625.1; GB4943.1; GB/T9254
- China CECP certificate, CQC3135
- China CELP certificate, HJ 2507-2011
- Japanese Energy-Saving Act
- Mexico NOM-019
- TUV-GS (EN62368-1, and EK1-ITB2000)
- India BIS 13252 (Part 1)
- Germany GS

The D1224 / D3284 conform to the following standards:

- BSMI CNS 13438, Class A; CNS 14336 (Taiwan)
- CCC GB 4943.1, GB 17625.1, GB 9254 Class A (China)
- CE Mark (European Union)
- CISPR 22, Class A
- EAC (Russia)
- EN55022, Class A
- EN55024
- FCC Part 15, Class A (United States)
- ICES-003/NMB-03, Class A (Canada)
- IEC/EN60950-1
- D1224: KC Mark (Korea); D3284: MSIP (Korea)
- NOM-019 (Mexico)
- D3284: RCM (Australia)
- Reduction of Hazardous Substances (ROHS)
- UL/CSA IEC 60950-1
- D1224: VCCI, Class A (Japan); D3284: VCCI, Class B (Japan)

Find more details on the regulatory compliance for the individual components in their respective product guides.

Warranty

LeSI exclusive components (Machine Types 1410, 7X74, 0724, 0449, 7D5F; for the other Hardware and Software components configured within LeSI their respective warranty terms apply) have a three-year customer replaceable unit (CRU) and onsite limited (for field-replaceable units (FRUs) only) warranty with standard call center support during normal business hours and 9x5 Next Business Day Parts Delivered.

Some markets might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific market. Local service teams can assist in explaining market-specific terms when needed. Examples of market-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 customer's own cost and labor and defective parts must be returned following the instructions supplied with the spares parts.

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 Enhanced Storage Support 24x7 4-Hour Response** – Best choice for storage systems where maximum uptime is critical.

For more information, consult the brochure Lenovo Operational Support Services for Data Centers Services.

The following tables list the warranty upgrade part numbers for each DSS-G component:

- DSS-G NSD Server (7Z73)
- DSS-G 100 and DSS-G Management Server (7Z71)
- D3284 Enclosure (6413)
- D1224 Enclosure (4587)
- 1410 Rack (1410)
- Client Site Integration Kit (7X74)
- DSS-G Ethernet Management Switch (7D5F)

Table 23. Warranty Upgrade Part Numbers – DSS-G NSD Server (7Z73)

Description	Option Part Number	
	Standard Support	Premier Support
DSS-G NSD Server (7Z73)		
Foundation Service w/Next Business Day Response, 3Yr + YourDriveYourData	5PS7A67897	5PS7A67906
Foundation Service w/Next Business Day Response, 4Yr + YourDriveYourData	5PS7A67939	5PS7A67947
Foundation Service w/Next Business Day Response, 5Yr + YourDriveYourData	5PS7A67980	5PS7A67988
Essential Service w/24x7 4Hr Response, 3Yr + YourDriveYourData	5PS7A67910	5PS7A67915
Essential Service w/24x7 4Hr Response, 4Yr + YourDriveYourData	5PS7A67951	5PS7A67956
Essential Service w/24x7 4Hr Response, 5Yr + YourDriveYourData	5PS7A67992	5PS7A67997
Advanced Service w/24x7 2Hr Response, 3Yr + YourDriveYourData	5PS7A67922	5PS7A67927
Advanced Service w/24x7 2Hr Response, 4Yr + YourDriveYourData	5PS7A67963	5PS7A67968
Advanced Service w/24x7 2Hr Response, 5Yr + YourDriveYourData	5PS7A68004	5PS7A68009

Table 24. Warranty Upgrade Part Numbers – DSS-G G100 and DSS-G Management Server (7Z71)

Description	Option Part Number	
	Standard Support	Premier Support
DSS-G G100 NSD Server and DSS-G Management Server (7Z71)		
Foundation Service w/Next Business Day Response, 3Yr	5WS7A67519	5WS7A67528
Foundation Service w/Next Business Day Response, 4Yr	5WS7A67561	5WS7A67569
Foundation Service w/Next Business Day Response, 5Yr	5WS7A67602	5WS7A67610
Essential Service w/24x7 4Hr Response, 3Yr + YourDriveYourData	5PS7A67536	5PS7A67541
Essential Service w/24x7 4Hr Response, 4Yr + YourDriveYourData	5PS7A67577	5PS7A67582
Essential Service w/24x7 4Hr Response, 5Yr + YourDriveYourData	5PS7A67618	5PS7A67623
Advanced Service w/24x7 2Hr Response, 3Yr + YourDriveYourData	5PS7A67548	5PS7A67553
Advanced Service w/24x7 2Hr Response, 4Yr + YourDriveYourData	5PS7A67589	5PS7A67594
Advanced Service w/24x7 2Hr Response, 5Yr + YourDriveYourData	5PS7A67630	5PS7A67635

Table 25. Warranty Upgrade Part Numbers – D3284 Enclosure (6413)

Description	Option Part Number	
	Standard Support	Premier Support
DSS-G D3284 Enclosure (6413)		
Foundation Service w/Next Business Day Response, 3Yr + YourDriveYourData	01JY529	5PS7A07844
Foundation Service w/Next Business Day Response, 4Yr + YourDriveYourData	01JY537	5PS7A07907
Foundation Service w/Next Business Day Response, 5Yr + YourDriveYourData	01JY545	5PS7A07974
Essential Service w/24x7 4Hr Response, 3Yr + YourDriveYourData	01JY533	5PS7A06966
Essential Service w/24x7 4Hr Response, 4Yr + YourDriveYourData	01JY541	5PS7A07054
Essential Service w/24x7 4Hr Response, 5Yr + YourDriveYourData	01JY549	5PS7A07151
Advanced Service w/24x7 2Hr Response, 3Yr + YourDriveYourData	01JY531	5PS7A06607
Advanced Service w/24x7 2Hr Response, 4Yr + YourDriveYourData	01JY539	5PS7A06651
Advanced Service w/24x7 2Hr Response, 5Yr + YourDriveYourData	01JY547	5PS7A06698

Table 26. Warranty Upgrade Part Numbers – D1224 Enclosure (4587)

Description	Option Part Number	
	Standard Support	Premier Support
D1224 Enclosure (4587)		
Foundation Service w/Next Business Day Response, 3Yr + YourDriveYourData	01JY572	5PS7A07837
Foundation Service w/Next Business Day Response, 4Yr + YourDriveYourData	01JY582	5PS7A07900
Foundation Service w/Next Business Day Response, 5Yr + YourDriveYourData	01JY592	5PS7A07967
Essential Service w/24x7 4Hr Response, 3Yr + YourDriveYourData	01JR78	5PS7A06959
Essential Service w/24x7 4Hr Response, 4Yr + YourDriveYourData	01JR88	5PS7A07047
Essential Service w/24x7 4Hr Response, 5Yr + YourDriveYourData	01JR98	5PS7A07144
Advanced Service w/24x7 2Hr Response, 3Yr + YourDriveYourData	01JR76	5PS7A06603
Advanced Service w/24x7 2Hr Response, 4Yr + YourDriveYourData	01JR86	5PS7A06647
Advanced Service w/24x7 2Hr Response, 5Yr + YourDriveYourData	01JR96	5PS7A06694

Table 27. Warranty Upgrade Part Numbers – 1410 Rack (1410)

Description	Option Part Number	
	Standard Support	Premier Support
Scalable Infrastructure Rack Cabinets (1410-O42, -P42)		
Foundation Service w/Next Business Day Response, 3Yr	5WS7A92764	5WS7A92814
Foundation Service w/Next Business Day Response, 4Yr	5WS7A92766	5WS7A92816
Foundation Service w/Next Business Day Response, 5Yr	5WS7A92768	5WS7A92818
Essential Service w/24x7 4Hr Response, 3Yr	5WS7A92779	5WS7A92829
Essential Service w/24x7 4Hr Response, 4Yr	5WS7A92781	5WS7A92831
Essential Service w/24x7 4Hr Response, 5Yr	5WS7A92783	5WS7A92833
Advanced Service w/24x7 2Hr Response, 3Yr	5WS7A92794	5WS7A92844
Advanced Service w/24x7 2Hr Response, 4Yr	5WS7A92796	5WS7A92846
Advanced Service w/24x7 2Hr Response, 5Yr	5WS7A92798	5WS7A92848
Scalable Infrastructure Rack Cabinets (1410-O48, -P48)		
Foundation Service w/Next Business Day Response, 3Yr	5WS7A92864	5WS7A92914
Foundation Service w/Next Business Day Response, 4Yr	5WS7A92866	5WS7A92916
Foundation Service w/Next Business Day Response, 5Yr	5WS7A92868	5WS7A92918
Essential Service w/24x7 4Hr Response, 3Yr	5WS7A92879	5WS7A92929
Essential Service w/24x7 4Hr Response, 4Yr	5WS7A92881	5WS7A92931
Essential Service w/24x7 4Hr Response, 5Yr	5WS7A92883	5WS7A92933
Advanced Service w/24x7 2Hr Response, 3Yr	5WS7A92894	5WS7A92944
Advanced Service w/24x7 2Hr Response, 4Yr	5WS7A92896	5WS7A92946
Advanced Service w/24x7 2Hr Response, 5Yr	5WS7A92898	5WS7A92948

Table 28. Warranty Upgrade Part Numbers – Client Site Integration Kit (7X74)

Description	Option Part Number	
	Standard Support	Premier Support
Client Site Integration Kit (7X74)		
Premier Support Service - 3Yr Integration Kit (DSS-G)	Not available	5WS7A35451
Premier Support Service - 4Yr Integration Kit (DSS-G)	Not available	5WS7A35452
Premier Support Service - 5Yr Integration Kit (DSS-G)	Not available	5WS7A35453

Table 29. Warranty Upgrade Part Numbers – DSS-G Ethernet Management Switch (7D5FCTO1WW)

Description	Option Part Number	
	Standard Support	Premier Support
Mellanox AS4610 1GbE Managed Switch (7D5F-CTO1WW, -CTO2WW)		
Foundation Service w/Next Business Day Response, 3Yr	5WS7A87780	5WS7A87830
Foundation Service w/Next Business Day Response, 4Yr	5WS7A87782	5WS7A87832
Foundation Service w/Next Business Day Response, 5Yr	5WS7A87784	5WS7A87834
Essential Service w/24x7 4Hr Response, 3Yr	5WS7A87795	5WS7A87845
Essential Service w/24x7 4Hr Response, 4Yr	5WS7A87797	5WS7A87847
Essential Service w/24x7 4Hr Response, 5Yr	5WS7A87799	5WS7A87849
Advanced Service w/24x7 2Hr Response, 3Yr	5WS7A87810	5WS7A87860
Advanced Service w/24x7 2Hr Response, 4Yr	5WS7A87812	5WS7A87862
Advanced Service w/24x7 2Hr Response, 5Yr	5WS7A87814	5WS7A87864

LeSI Interoperability Support for DSS-G

On top of their individual warranty and maintenance scope or support entitlement, LeSI offers solution-level interoperability support for HPC and AI configurations based on the above selection of Lenovo ThinkSystem portfolio and OEM components.

The extensive testing results in a "Best Recipe" release of software and firmware levels Lenovo warrants to work seamlessly together as a fully integrated data center solution instead of a collection of individual components at the time of implementation.

To see the latest Best Recipe for Scalable Infrastructure at Lenovo, see the following link: https://support.lenovo.com/us/en/solutions/HT505184#5

The Solution Support is engaged by opening a hardware ticket based on the LeSI Rack (Model 1410) or LeSI Client Site Integration Kit (Model 7X74). The LeSI Support team then will triage the issue and recommend next steps for you, including potentially to open tickets with other components of the solution.

For issues that require debugging beyond hardware and firmware (Driver, UEFI, IMM/XCC) an additional ticket will have to be opened with the software vendor (e.g. Lenovo SW Support or 3rd party SW vendor) to assist working towards a fix. The LeSI Support team will then work with the SW Support team in isolating root cause and fixing the defect.

For more information about opening tickets, as well as the scope of support for different LeSI components, see the Lenovo Scalable Infrastructure Support Plan information page .

When a cluster ships the most recent Best Recipe is its compliant version, which is always defined exactly for that specific Scalable Infrastructure release and the cluster is delivered as a solution of that specific release. Using a Support call clients can request a review if their solution is also compatible with a newer Best Recipe release and if it is, are able to upgrade to that while maintaining solution interoperability support.

As long as a cluster (Model 1410, 7X74) is under Lenovo warranty or maintenance entitlement, full solution interoperability support will be provided for the original Best Recipes. Even when newer Best Recipes are available the previous Recipe will remain valid and supported.

Of course, any client is free to choose to not adhere to the Best Recipe and instead deploy different software and firmware versions or integrate other components that were not tested for interoperability. While Lenovo cannot warrant interoperability with those deviations from the tested scope, a client continues to receive full break & fix support for the components based on the individual warranty and maintenance entitlement of the components. This is comparable to the level of support clients will receive when not buying it as a LeSI solution, but building the solution from individual components – so-called "roll your own" (RYO).

In those cases, to minimize risk we suggest still staying as close as possible to the Best Recipe even when deviating. We also suggest when deviating first to test it on a small portion of the cluster and only roll it out completely if this test was stable.

For clients who need to upgrade the firmware or software of a component – for example due to OS entitlement support issues or Common Vulnerabilities and Exposures (CVE) fixes – that is part of the best recipe, a support call should be placed on the 1410/7X74 rack and serial number. Lenovo product engineering will review the proposed changes, and advise the client on the viability of an upgrade path. If an upgrade can be supported and is performed, LeSI will note the change in the support records for the solution.

Services

Lenovo Data Center Services empower you at every stage of your IT lifecycle. From expert advisory and strategic planning to seamless deployment and ongoing support, we ensure your infrastructure is built for success. Our comprehensive services accelerate time to value, minimize downtime, and free your IT staff to focus on driving innovation and business growth.

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

In this section:

- Lenovo Advisory Services
- Lenovo Plan & Design Services
- Lenovo Deployment, Migration, and Configuration Services
- Lenovo Support Services
- Lenovo Managed Services
- Lenovo Sustainability Services
- Installation Services

Lenovo Advisory Services

Lenovo Advisory Services simplify the planning process, enabling customers to build future-proofed strategies in as little as six weeks. Consultants provide guidance on projects including VM migration, storage, backup and recovery, and cost management to accelerate time to value, improve cost efficiency, and build a flexibly scalable foundation.

- **Assessment Services**

  An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

  Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

Lenovo Plan & Design Services

Unlock faster time to market with our tailored, strategic design workshops to align solution approaches with your business goals and technical requirements. Leverage our deep solution expertise and end-to-end delivery partnership to meet your goals efficiently and effectively.

Lenovo Deployment, Migration, and Configuration Services

Optimize your IT operations by shifting labor-intensive functions to Lenovo's skilled technicians for seamless on-site or remote deployment, configuration, and migration. Enjoy peace of mind, faster time to value, and comprehensive knowledge sharing with your IT staff, backed by our best-practice methodology.

- **Deployment Services for Storage and ThinkAgile**

  A comprehensive range of remote and onsite options tailored specifically for your business needs to ensure your storage and ThinkAgile hardware are fully operational from the start.

- **Hardware Installation Services**

  A full-range, comprehensive setup for your hardware, including unpacking, inspecting, and positioning components to ensure your equipment is operational and error-free for the most seamless and efficient installation experience, so you can quickly benefit from your investments.

- **DM/DG File Migration Services**

  Take the burden of file migration from your IT's shoulders. Our experts will align your requirements and business objectives to the migration plans while coordinating with your team to plan and safely execute the data migration to your storage platforms.

- **DM/DG/DE Health Check Services**

  Our experts perform proactive checks of your Firmware and system health to ensure your machines are operating at peak and optimal efficiency to maximize up-time, avoid system failures, ensure the security of IT solutions and simplify maintenance.

- **Factory Integrated Services**

  A suite of value-added offerings provided during the manufacturing phase of a server or storage system that reduces time to value. These services aim at improving your hardware deployment experience and enhance the quality of a standard configuration before it arrives at your facility.

Lenovo Support Services

In addition to response time options for hardware parts, repairs, and labor, Lenovo offers a wide array of additional support services to ensure your business is positioned for success and longevity. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

- **Premier Support for Data Centers**

  Your direct line to the solution that promises the best, most comprehensive level of support to help you fully unlock the potential of your data center.

- **Premier Enhanced Storage Support (PESS)**

  Gain all the benefits of Premier Support for Data Centers, adding dedicated storage specialists and resources to elevate your storage support experience to the next level.

- **Committed Service Repair (CSR)**

  Our commitment to ensuring the fastest, most seamless resolution times for mission-critical systems that require immediate attention to ensure minimal downtime and risk for your business. This service is only available for machines under the Premier 4-Hour Response SLA.

- **Multivendor Support Services (MVS)**

  Your single point of accountability for resolution support across vast range of leading Server, Storage, and Networking OEMs, allowing you to manage all your supported infrastructure devices seamlessly from a single source.

- **Keep Your Drive (KYD)**

  Protect sensitive data and maintain compliance with corporate retention and disposal policies to ensure your data is always under your control, regardless of the number of drives that are installed in your Lenovo server.

- **Technical Account Manager (TAM)**

  Your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time, ensuring smooth operations and optimized performance as your business grows.

- **Enterprise Software Support (ESS)**

  Gain comprehensive, single-source, and global support for a wide range of server operating systems and Microsoft server applications.

For more information, consult the brochure Lenovo Operational Support Services for Data Centers.

Lenovo Managed Services

Achieve peak efficiency, high security, and minimal disruption with Lenovo's always-on Managed Services. Our real-time monitoring, 24x7 incident response, and problem resolution ensure your infrastructure operates seamlessly. With quarterly health checks for ongoing optimization and innovation, Lenovo's remote active monitoring boosts end-user experience and productivity by keeping your data center's hardware performing at its best.

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 latest patches, critical updates, and firmware levels, to ensure you systems are providing business value through optimized performance.

Lenovo Sustainability Services

- **Asset Recovery Services**

  Lenovo Asset Recovery Services (ARS) provides a secure, seamless solution for managing end-of-life IT assets, ensuring data is safely sanitized while contributing to a more circular IT lifecycle. By maximizing the reuse or responsible recycling of devices, ARS helps businesses meet sustainability goals while recovering potential value from their retired equipment. For more information, see the Asset Recovery Services offering page.

- **CO2 Offset Services**

  Lenovo's CO2 Offset Services offer a simple and transparent way for businesses to take tangible action on their IT footprint. By integrating CO2 offsets directly into device purchases, customers can easily support verified climate projects and track their contributions, making meaningful progress toward their sustainability goals without added complexity.

- **Lenovo Certified Refurbished**

  Lenovo Certified Refurbished offers a cost-effective way to support IT circularity without compromising on quality and performance. Each device undergoes rigorous testing and certification, ensuring reliable performance and extending its lifecycle. With Lenovo's trusted certification, you gain peace of mind while making a more sustainable IT choice.

- **Data Center Power and Cooling Services**

  The Data Center Infrastructure team will provide solution design and implementation services to support the power and cooling needs of the multi-node chassis and multi-rack solutions. This includes designing for various levels of power redundancy and integration into the customer power infrastructure. The Infrastructure team will work with site engineers to design an effective cooling strategy based on facility constraints or customer goals and optimize a cooling solution to ensure high efficiency and availability. The Infrastructure team will provide the detailed solution design and complete integration of the cooling solution into the customer data center. In addition, the Infrastructure team will provide rack and chassis level commissioning and stand-up of the water-cooled solution which includes setting and tuning of the flow rates based on water temperature and heat recovery targets. Lastly, the Infrastructure team will provide cooling solution optimization and performance validation to ensure the highest overall operational efficiency of the solution.

Installation Services

To get operational a final onsite software installation and configuration for the specific environment is required. Five days of Lenovo Professional Services are included by default with the DSS-G solutions to get customers up and running quickly. This selection can be removed if so desired when for example an experienced channel partner of Lenovo will provide those services.

Services are tailored to the customer need and typically include:

- Conduct a preparation and planning call
- Configure Confluent on the SR630 V2 quorum/management server
- Verify, and update if needed, firmware and software versions to implement the DSS-G
- Configure the network settings specific to the customer environment for
  - XClarity Controller (XCC) service processors on the SR650 V2 and SR630 V2 servers
  - Red Hat Enterprise Linux on the SR650 V2 and SR630 V2 servers
- Configure IBM Spectrum Scale on the DSS-G servers
- Create file and exporting systems from the DSS-G storage
- Provide skills transfer to customer personnel
- Develop post-installation documentation describing the specifics of the firmware/software versions and network and file system configuration work that was done

Table 30. HPC Professional Services Part Numbers

Part number	Description
Lenovo Professional Services	
5MS7A85671	HPC Technical Consultant Hourly Unit (Remote)
5MS7A85672	HPC Technical Consultant Labor Unit (Remote)
5MS7A85673	HPC Technical Consultant Hourly Unit (Onsite)
5MS7A85674	HPC Technical Consultant Labor Unit (Onsite)
5MS7A85675	HPC Principal Consultant Hourly Unit (Remote)
5MS7A85676	HPC Principal Consultant Labor Unit (Remote)
5MS7A85677	HPC Principal Consultant Hourly Unit (Onsite)
5MS7A85678	HPC Principal Consultant Labor Unit (Onsite)
5MS7A85679	HPC Technical Consultant Services Bundle (Small)
5MS7A85680	HPC Technical Consultant Services Bundle (Medium)
5MS7A85681	HPC Technical Consultant Services Bundle (Large)
5MS7A85682	HPC Technical Consultant Services Bundle (Extra Large)

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 DSS-G product page
  https://www.lenovo.com/us/en/data-center/servers/high-density/Distributed-Storage-Solution-for-IBM-Spectrum-Scale/p/WMD00000275
- Lenovo high-density offerings page
  https://www.lenovo.com/us/en/c/data-center/servers/high-density
- Paper, "DSS-G Declustered RAID Technology and Rebuild Performance"
  https://lenovopress.com/lp1227-dss-g-declustered-raid-technology-and-rebuild-performance
- ThinkSystem SR650 V2 Product Guide
  https://lenovopress.com/lp1392-thinksystem-sr650-v2-server
- Thinksystem SR630 V2 Product Guide
  https://lenovopress.com/lp1391-thinksystem-sr630-v2-server
- x-config configurator:
  https://lesc.lenovo.com/products/hardware/configurator/worldwide/bhui/asit/index.html
- Lenovo DSS-G datasheet:
  https://lenovopress.com/DS0026

Related product families

Product families related to this document are the following:

- 2-Socket Rack Servers
- Direct-Attached Storage
- High Performance Computing
- IBM Alliance
- Software-Defined Storage

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This document, LP1538, was created or updated on August 20, 2023.

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