Lenovo RackSwitch G8332
Product Guide (withdrawn product)

The Lenovo RackSwitch™ G8332 provides low latency, lossless performance and a feature-rich design with key virtualization features, such as Converged Enhanced Ethernet (CEE)/Data Center Bridging (DCB), high availability, and enterprise class Layer 2 and Layer 3 functions. The RackSwitch G8332 also delivers excellent cost savings as you consider acquisition costs, energy costs, operational expenses, and ease of use and management for a 40 Gbps class switch. The RackSwitch G8332 has 32 QSFP+ ports and is suitable for clients who use 10 Gigabit Ethernet or 40 Gigabit Ethernet connectivity (or both).

With latency below 600 nanoseconds, the RackSwitch G8332 is among industry leaders. This low latency and the 2.56 Tbps throughput makes the RackSwitch G8332 an ideal offering for latency-sensitive applications, such as high-performance computing, financial applications, hosting environments, and cloud designs in Enterprise, Web 2.0, and virtual machine (VM) Centric data centers. In addition, the G8332 supports VMready® with NMotion™, which enables the network to be virtual machine (VM) aware, and provides the capability to have a virtualization environment that is simpler and less expensive with exceptional performance.

The RackSwitch G8332 is shown in the following figure.

Figure 1. Lenovo RackSwitch G8332

Did you know?

The RackSwitch G8332 supports 10 Gigabit Ethernet, 40 Gigabit Ethernet, Converged Enhanced Ethernet (CEE/DCB), and iSCSI configurations.

With exceptional port density and flexibility with break-out cables, the RackSwitch G8332 can support up to 96x 10 Gigabit Ethernet connections and still have 8x 40 Gigabit Ethernet uplinks.

The RackSwitch G8332 offers a choice of the Networking Operating Systems (NOS):

- The Cloud NOS provides a simple, open and programmable network infrastructure with cloud-scale performance. It delivers a software-defined Ethernet solution that is simple to manage and easy to deploy using common management tools, and it enables support of automation and orchestration applications for tight integration into the data center ecosystem.

- The Enterprise NOS is a data center-class NOS progressively developed over the past decade to deliver highly reliable, high-performance Ethernet and converged switching and interoperability with existing network infrastructures. ENOS has a feature-rich design with virtualization, high availability, and enterprise class Layer 2 and Layer 3 functionality. ENOS supports OpenFlow which helps easily create software defined virtual networks (SDN) and enables a remote controller to modify the behavior of network devices.

Key features

The RackSwitch G8332 enables customers to easily build an end-to-end, flat two-tier network that is based on industry standards by using Lenovo switches and Lenovo System x® and ThinkServer® servers.

For example, the RackSwitch G8332 is an ideal tier two switch to use when several RackSwitch switches are connected, such as the RackSwitch G8272, or embedded Ethernet offerings for Flex System™ (SI4093, EN4093R, or CN4093) with 40 Gigabit Ethernet uplink ports at the access layer.

Other customers prefer the RackSwitch G8332 for the investment protection. These customers can use this switch with their 10 Gigabit Ethernet environments today, but also use it in the future as they move to 40 Gigabit Ethernet.

The RackSwitch G8332 is considered particularly suited for the following environments:

- Customers who are deploying 10 GbE on servers or blade chassis and require 40 GbE upstream aggregation to build a POD or cluster:
  - Flex System embedded switches: SI4093, EN4093R, and CN4093
  - Also ideal for second tier networking when used with the RackSwitch G8272 or G8296
- Customers who are deploying 40 GbE server connectivity
- Customers who want to converge their SAN and LAN on to one network via NAS or iSCSI
- Customers looking for ways to reduce I/O cost (CAPEX); adapters, cables, transceivers, and upstream network
- Customers looking to reduce complexity (OPEX); less to manage and lower energy cost
- Customers looking to accelerate communications with lower latency across clustered applications and storage arrays with RDMA over Converged Ethernet (RoCE)
- Customers who want investment protection; 40 Gb Ethernet, Cloud and SDN

The RackSwitch G8332 offers the following features and benefits:

- High performance
  This 40 Gigabit Ethernet low latency switch with 2.56 Tbps throughput provides the best combination of low latency, non-blocking switching, and ease of management. The RackSwitch G8332 is also a single ASIC design, which promises consistent lower port-to-port latency.

- Lower power and better cooling
  The RackSwitch G8332 uses as little as 270 W of power, and the front-to-rear or rear-to-front cooling design reduces data center air conditioning costs by having airflow match the servers in the rack. In addition, variable speed fans help automatically reduce power consumption.

- Fault tolerance
  The RackSwitch G8332 offers redundant hot-swap hardware components, learns alternate routes automatically, and performs faster convergence if there is a link, switch, or power failure.

- Layer 3 functionality
  The switch includes Layer 3 functionality, which provides security and performance benefits, as inter-VLAN traffic stays within the switch. This switch also provides the full range of Layer 3 protocols from static routes for technologies, such as Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP) for enterprise customers.

- Network virtualization
  The RackSwitch G8332 switch supports VXLAN Gateway for VMware NSX integration. VMware NSX is a virtualized network software platform that offers a full set of networking services, such as logical switching, routing, firewall, load balancing, VPN, quality of service (QoS), and monitoring.

- Converged fabric
  The RackSwitch G8332 switch supports Converged Enhanced Ethernet (CEE) which helps enable customers to combine storage, messaging traffic, VoIP, video, and other data on a common data center lossless Ethernet infrastructure. As a result, clients can deploy a single server interface for multiple data types, which can simplify the deployment and management of server network connectivity while maintaining the high availability and robustness required for storage transactions.

- Seamless interoperability
  The G8332 switch interoperates seamlessly with other vendors' upstream switches.

The RackSwitch G8332 supports the following networking operating systems:

- Lenovo Cloud Networking Operating System (CNOS)
  The new Cloud NOS provides a simple, open and programmable network infrastructure designed to scale for your business needs. Its intelligent, cloud-scale performance delivers a software-defined Ethernet solution that is simple to manage and easy to deploy using common management tools. Cloud NOS is based on open, industry standards for better data center interoperability, and it enables support of automation and orchestration applications for tight integration into the data center ecosystem.

  With its high-performance architecture and support for an extensive set of routing protocols, Cloud NOS provides reliable, high-performance fabric for traditional, converged and hyperscale solutions. Cloud NOS can help you consolidate server and storage networks into a single fabric. Converged Enhanced Ethernet delivers value for your iSCSI and NAS enterprise storage environments.

- Lenovo Enterprise Networking Operating System (ENOS)
  The Lenovo ENOS is a data center-class network operating system progressively developed over the past decade to deliver highly reliable, high-performance Ethernet and converged switching and interoperability with existing network infrastructures.

  ENOS has a feature-rich design with virtualization, high availability, and enterprise class Layer 2 and Layer 3 functionality. ENOS supports OpenFlow which helps easily create software defined virtual networks (SDN) and enables a remote controller to modify the behavior of network devices.

  ENOS can help you consolidate server and storage networks into a single fabric. Converged Enhanced Ethernet delivers value for your iSCSI, NAS and FCoE enterprise storage environments.

The RackSwitch G8332 with Cloud NOS offers the following additional features:

- Automated VM-aware network provisioning
  The Lenovo CNOS Network Policy Agent, a ThinkAgile Network Orchestrator feature, gives increased visibility of the Nutanix (AOS version 5.0.2 or higher [excluding 5.1.2]) and VMware vSphere virtual infrastructure, including VM and virtual network information. It provides automated VM-aware provisioning by automatically configuring VLANs in the physical network based on the auto-discovered virtual network topology. The agent also performs ongoing dynamic updates to the physical network configuration in response to new VMs, updated VMs, and deleted VMs and virtual networks, eliminating errors with manual configuration.

- Proactive congestion monitoring
  Telemetry enables continuous monitoring of networking devices to detect potential congestion problems, such as packets dropped by the switch when ports are being used close to their line rate or switch buffers are being temporarily overflown (for example, in case of microbursts).

- Zero Touch Provisioning
  Zero Touch Provisioning (ZTP) enables a switch to automatically provision itself using the resources available on the network, without manual intervention. ZTP automatically handles the process of upgrading the switch software image and installing configuration files.

- Python Scripting
  You can create and execute local Python scripts on switches to make small programs that allow a switch to automatically provision itself, perform fault monitoring, upgrade the image files, or auto-generate configuration files. You can implement version control systems, automatically generate alerts, create custom logging tools, and automate the management of network devices.

- REST API Programming
  The Lenovo REpresentational State Transfer (REST) Application Program Interface (API) enables you to remotely configure and manage a Lenovo switch using REST and HyperText Transfer Protocol (HTTP). It also allows integration into management applications, such as Lenovo XClarity.

The RackSwitch G8332 with Enterprise NOS offers the following additional features:

- Transparent networking capability
  With a simple configuration change to Easy Connect Mode, the RackSwitch G8332 becomes a transparent network device that is invisible to the core and eliminates network administration concerns of Spanning Tree Protocol configuration and interoperability and VLAN assignments and avoids any possible loops. By emulating a host NIC to the data center core, it accelerates the provisioning of VMs by eliminating the need to configure the typical access switch parameters.

- OpenFlow enabled
  The RackSwitch G8332 offers the benefits of OpenFlow. OpenFlow is an open application programming interface (API) with which the network administrator easily configures and manages virtual networks that control traffic on a "per-flow" basis. It also creates multiple independent virtual networks and related policies without dealing with the complexities of the underlying physical network and protocols. The RackSwitch G8332 is also the ideal switch to use with industry compliant OpenFlow controllers.

- Network address translation
  Network Address Translation (NAT) allows a single device, such as a router, to act as an agent between the Internet (or "public network") and a local (or "private") network. Therefore, only a single, unique IP address is required to represent an entire group of local IP addresses to the external network. In addition to reducing the number of public IP addresses that are required, NAT provides security by acting as a firewall between internal and external networks.

The following table compares high level features of the CNOS and ENOS.

Table 1. CNOS and ENOS high level feature comparison

Feature	CNOS	ENOS
Layer 2 switching	Yes	Yes
Layer 3 switching	Yes	Yes
EasyConnect mode	Yes	Yes
IP routing	Yes	Yes
Comprehensive IP v6 support	Yes	No*
Converged Enhanced Ethernet	Yes	Yes
OpenFlow SDN	No	Yes
Automated VM-aware network provisioning**	Yes	No
Real-time congestion monitoring with telemetry	Yes	No
Zero touch provisioning	Yes	No
REST API programming	Yes	No
Python scripting	Yes	Yes

* Not all ENOS features support IP v6 addressing, including DHCP, BGP, VRRP, and TACACS+/RADIUS/LDAP.
** Supported with the Nutanix AOS version 5.0.2 or higher (excluding 5.1.2) or VMware vSphere.

Components and connectors

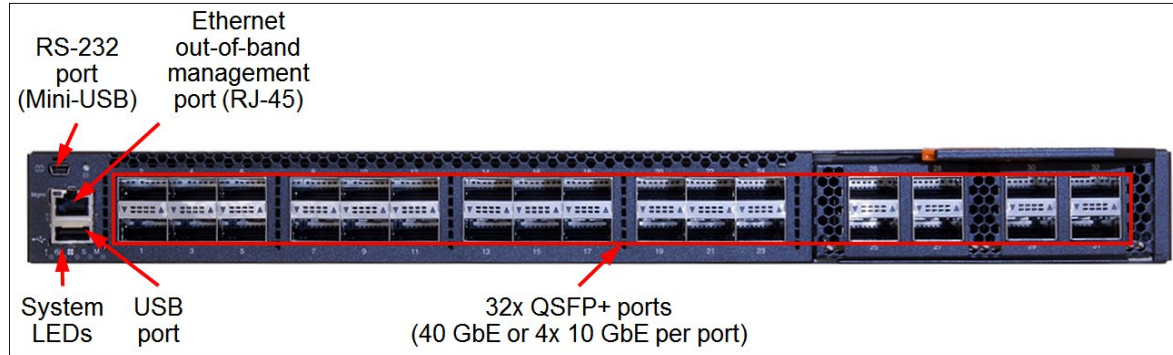The front panel of the RackSwitch G8332 is shown in the following figure.

Figure 2. Front panel of the RackSwitch G8332

The front panel of the G8332 includes the following components:

- LEDs that display the status of the switch and the network.
- One Mini-USB RS-232 console port that provides another means to configure the switch.
- One USB port for mass storage devices.
- 32x QSFP+ ports to attach QSFP+ transceivers or DAC cables for 40 Gb or 4x 10 Gb Ethernet connections. Breakout cables (both QSFP+ DAC cables and MPO-4xLC optical cables) are supported in ports 2 - 25 only. Ports 1 and 26 - 32 are for 40 Gb connectivity only.
- One RJ-45 10/100/1000 Mb Ethernet port for out-of-band management.

The rear panel of the RackSwitch G8332 is shown in the following figure.
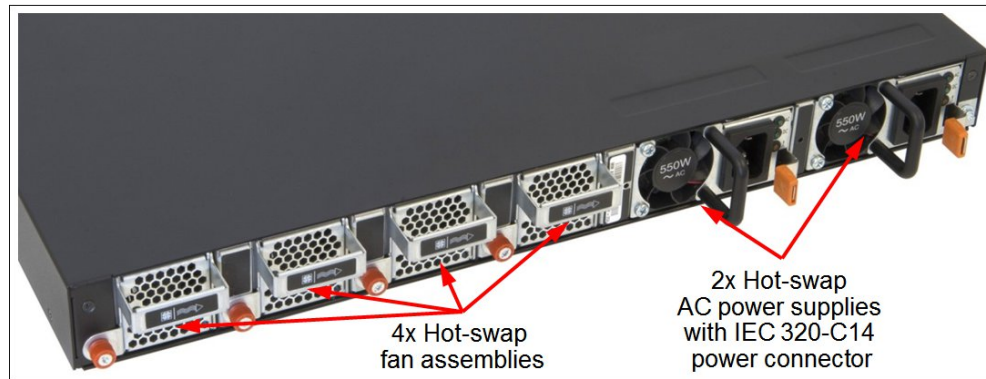

Figure 3. Rear panel of the RackSwitch G8332

The rear panel of the G8332 includes the following components:

- Two redundant, load-sharing hot-swap AC power supplies (IEC 320-C14 power connector)
- Four 3+1 redundant hot-swap fan assemblies

System specifications

The following table lists the RackSwitch G8332 system specifications.

Note: The supported hardware options and software features listed in this product guide are based on the Lenovo Cloud Networking Operating System (CNOS) version 10.8 or Lenovo Enterprise Networking Operating System (ENOS) version 8.4.4. For details about specific software releases that introduced support for certain hardware options and software features, refer to the Release Notes for the particular software release that can be found at:
http://systemx.lenovofiles.com/help/topic/com.lenovo.rackswitch.g8332.doc/rs_g8332.html

Table 2. System specifications

Attribute	Specification
Form factor	1U rack mount
Ports	32x QSFP+ ports (24x 40 GbE ports, each with 4x 10 GbE support; 8x 40 GbE ports)
Media types	40 Gb Ethernet QSFP+: • 40 GbE short-range (SR) QSFP+ bi-directional (BiDi) transceivers • 40 GbE short-range (SR4/iSR4/eSR4) QSFP+ transceivers • 40 GbE long-range (LR4) QSFP+ transceivers • 40 GbE QSFP+ to QSFP+ active optical cables (AOCs) • 40 GbE QSFP+ to 4x 10 GbE SFP+ active optical breakout cables (ports 2 - 25 only) • 40 GbE QSFP+ to QSFP+ direct attach copper (DAC) cables • 40 GbE QSFP+ to 4x 10 GbE SFP+ DAC breakout cables (ports 2 - 25 only)
Port speeds	• 40 GbE QSFP+ SR BiDi/SR4/LR4 transceivers: 40 GbE • 40 GbE QSFP+ iSR4/eSR4 transceivers, DAC cables and AOCs: 40 GbE (all ports) or 4x 10 GbE (ports 2 - 25 only)
Switching method	Cut-through.
Data traffic types	Unicast, multicast, broadcast.
Software features	• Lenovo Enterprise Networking OS: Layer 2 switching, Layer 3 switching, virtual local area networks (VLANs), VLAN tagging, spanning tree protocol (STP), link aggregation (trunk) groups (LAGs), virtual LAGs (vLAGs), Hot Links, Layer 2 failover, quality of service (QoS), Edge Virtual Bridging (EVB), VMready, OpenFlow, IPv4/IPv6 management, IPv4/IPv6 routing, equal cost multiple paths (ECMP), IPv4 virtual router redundancy protocol (VRRP), IPv4 policy-based routing (PBR), Converged Enhanced Ethernet, Fibre Channel over Ethernet (FCoE) full fabric and transit switch operations, VXLAN gateway. • Lenovo Cloud Networking OS (CNOS): Layer 2 switching, Layer 3 switching, virtual local area networks (VLANs), VLAN tagging, spanning tree protocol (STP), link aggregation (trunk) groups (LAGs), virtual LAGs (vLAGs), Layer 2 failover, quality of service (QoS), IPv4/IPv6 management, IPv4/IPv6 routing, equal cost multiple paths (ECMP), IPv4/IPv6 virtual router redundancy protocol (VRRP), Converged Enhanced Ethernet, Network Policy Agent, VXLAN gateway, Python scripting, REST API programming.
Performance	Non-blocking architecture with wire-speed forwarding of traffic: • 100% line-rate performance • Up to 2.56 Tbps aggregated throughput • As low as 600 nanoseconds switching latency • Up to 9,216-byte jumbo frames • Receive buffer size: 12.2 MB

Attribute	Specification

Scalability	• MAC address forwarding database entries: 128,000
	• VLANs: 4,095 (3,999 user-configurable; 96 reserved)
	• Per VLAN Rapid Spanning Tree (PVRST) instances: 256
	• Multiple STP (MSTP) instances: 32
	• Link aggregation groups: 104
	• Active ports in a link aggregation group: 32
	• Static routes (IPv4 / IPv6):
	   ○ ENOS: 128 / 128
	   ○ CNOS: 256 / 256
	• Dynamic routes (IPv4 / IPv6):
	   ○ ENOS: 15,498 / 600
	   ○ CNOS: 15,870 / 6,143

Cooling	Four 3+1 redundant hot-swap fans. Rear (non-port side) to front (port side) or front to rear airflow.
Power supply	Two load-sharing, redundant hot-swap 750 W (rear to front) or 550 W (front to rear) AC (100 - 240 V) Platinum power supplies (1x IEC 320-C14 connector on each power supply).
Hot-swap parts	QSFP+ transceivers, QSFP+ DAC cables, power supplies, fans.
Management ports	1x 10/100/1000 Mb Ethernet port (RJ-45); 1x RS-232 port (Mini-USB); 1x USB port (for additional firmware, log, and configuration files storage).
Management interfaces	Industry standard command line interface (isCLI); SNMP v1 and v3; Netconf (XML) (ENOS only); REST API (CNOS only). Optional Lenovo XClarity for discovery, inventory, monitoring and events. Optional Lenovo Networking Content Pack for VMware vRealize Log Insight.
Security features	Secure Shell (SSH); Secure Copy (SCP); Secure FTP (sFTP); user level security; Role-based Access Control (RBAC); LDAP/LDAPS, RADIUS, and TACACS+ authentication; access control lists (ACLs); port-based network access control (IEEE 802.1x; ENOS only); secure mode.
Hardware warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day terms. Optional warranty service upgrades are available through Lenovo: onsite service, 24x7 coverage, 2-hour or 4-hour response time, 1-year or 2-year warranty extensions, basic installation services.
Software maintenance	Three-year software support and subscription is included in the base warranty. Optional 1-year and 2-year warranty extensions include software support and subscription.
Mean Time Between Failures	178,868 hours MTBF with ambient operating temperature of 40° C.
Dimensions	Height: 44 mm (1.7 in.); width: 439 mm (17.3 in.); depth: 513 mm (20.2 in.)
Weight	11.5 kg (25.3 lb).

Models

The following table lists the G8332 switch models.

Table 3. G8332 switch models

Description	Part number	Machine Type-Model	Feature code
Lenovo RackSwitch G8332 (Rear to Front)	7159BRX	7159-HDE	ASY4
Lenovo RackSwitch G8332 (Front to Rear)	7159BFX	7159-HCE	ASY3

The part numbers for the RackSwitch G8332 include the following items:

- One Lenovo RackSwitch G8332 with two power supplies and four fan assemblies
- Generic Rack Mount Kit (2-post)
- Console Cable Kit:
    - RJ-45 (plug) to RJ-45 (plug) serial cable (1 m)
    - Mini-USB to RJ-45 (jack) adapter cable (0.2 m) with retention clip
    - DB-9 to RJ-45 (jack) adapter
- Documentation package

Configuration notes:

- Power cables are not included and must be ordered together with the switch (see "Power supplies and cables" for details).

- QSFP+ transceivers and cables are not included and should be ordered together with the switch (see "Transceivers and cables" for details).

The RackSwitch G8332 supports Features on Demand (FoD) license keys to enable additional features. The Advanced Instrumentation Tools FoD option enables access to low-level switch diagnostics for advanced troubleshooting. The following table lists the FoD upgrade options for the RackSwitch G8332.

Table 4. FoD upgrade options

Description	Part number	Feature code
Lenovo RackSwitch G8332 Advanced Instrumentation Tools	01GV959*	AVUG*

* Supported only for Cloud NOS.

Transceivers and cables

With the flexibility of the RackSwitch G8332, customers can choose the following connectivity technologies:

- For 10 GbE links (supported on ports 2 - 25 only), customers can split out four 10 GbE ports for a 40 GbE port by using QSFP+ to 4x SFP+ DAC or active optical breakout cables for distances up to 5 meters. For distances up to 100 meters, the 40GBASE-iSR4 QSFP+ transceivers can be used with OM3 optical MPO-to-LC breakout cables or up to 150 meters with OM4 optical MPO-to-LC breakout cables. For longer distances, the 40GBASE-eSR4 transceivers can be used with OM3 optical MPO-to-LC breakout cables for distances up to 300 meters or OM4 optical MPO-to-LC breakout cables for distances up to 400 meters.
Note: Break-out cables are supported on ports 2 - 25 only.

- For 40 GbE to 40 GbE connectivity, customers can use the affordable QSFP+ to QSFP+ DAC cables for distances up to 7 meters or QSFP+ to QSFP+ active optical cables for distances up to 20 meters. These DAC cables and AOCs have QSFP+ connectors on each end, and they do not need separate transceivers.

    With multimode fiber LC cables, customers can use the 40GBASE QSFP+ bi-directional transceivers for distances up to 100 meters with OM3 or up to 150 meters with OM4 MMF LC cables.

    With multimode fiber MPO cables, customers can use the 40GBASE-SR4/iSR4 QSFP+ transceivers for distances up to 100 meters with OM3 or up to 150 meters with OM4 MMF MPO cables. For distances up to 300 meters, the 40GBASE-eSR4 QSFP+ transceiver can be used with OM3 or up to 400 meters with OM4 MMF MPO cables.

    For distances up to 10 kilometers, the 40GBASE-LR4 QSFP+ transceiver can be used with single mode fiber LC cables.

The following table lists the supported cables and transceivers.

Table 5. Supported SFP/SFP+ transceivers and DAC cables

Description	Part number	Feature code	Maximum quantity supported
QSFP+ transceivers - 40 GbE			
Lenovo 40GBase QSFP+ Bi-Directional Transceiver	00YL631	ATYW	4 / 8^
Lenovo 40GBASE-SR4 QSFP+ Transceiver	49Y7884	A1DR	32
Lenovo 40GBASE-iSR4 QSFP+ Transceiver	00D9865	ASTM	32
Lenovo 40GBASE-eSR4 QSFP+ Transceiver	00FE325	A5U9	32
Lenovo 40GBASE-LR4 QSFP+ Transceiver	00D6222	A3NY	32
Optical cables for 40 GbE SR QSFP+ BiDi transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN499	ASR5	8
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	8
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	8
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	8
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	8
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	8
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	8
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	8
Optical cables for 40 GbE QSFP+ SR4/iSR4/eSR4 transceivers			
Lenovo 10m QSFP+ MPO-MPO OM3 MMF Cable	00VX003	AT2U	32
Lenovo 30m QSFP+ MPO-MPO OM3 MMF Cable	00VX005	AT2V	32
Optical breakout cables for 40 GbE QSFP+ iSR4/eSR4 transceivers*			
Lenovo 1m MPO-4xLC OM3 MMF Breakout Cable	00FM412	A5UA	24
Lenovo 3m MPO-4xLC OM3 MMF Breakout Cable	00FM413	A5UB	24
Lenovo 5m MPO-4xLC OM3 MMF Breakout Cable	00FM414	A5UC	24
QSFP+ active optical cables - 40 GbE			
Lenovo 1m QSFP+ to QSFP+ Active Optical Cable	7Z57A04256	AX42	32
Lenovo 3m QSFP+ to QSFP+ Active Optical Cable	00YL652	ATZ3	32
Lenovo 5m QSFP+ to QSFP+ Active Optical Cable	00YL655	ATZ4	32
Lenovo 7m QSFP+ to QSFP+ Active Optical Cable	00YL658	ATZ5	32
Lenovo 15m QSFP+ to QSFP+ Active Optical Cable	00YL661	ATZ6	32
Lenovo 20m QSFP+ to QSFP+ Active Optical Cable	00YL664	ATZ7	32
QSFP+ active optical breakout cables - 40 GbE to 4x10 GbE*			
Lenovo 1M QSFP+ to 4xSFP+ Active Optical Cable	00YL667	ATZ8	24
Lenovo 3M QSFP+ to 4xSFP+ Active Optical Cable	00YL670	ATZ9	24
Lenovo 5M QSFP+ to 4xSFP+ Active Optical Cable	00YL673	ATZA	24
QSFP+ direct-attach cables - 40 GbE			
Lenovo 1m Passive QSFP+ DAC Cable	49Y7890	A1DP	32
Lenovo 3m Passive QSFP+ DAC Cable	49Y7891	A1DQ	32
Lenovo 5m Passive QSFP+ DAC Cable	00D5810	A2X8	32
Lenovo 7m Passive QSFP+ DAC Cable	00D5813	A2X9	32

Description	Part number	Feature code	Maximum quantity supported
QSFP+ breakout cables - 40 GbE to 4x 10 GbE*			
Lenovo 1m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7886	A1DL	24
Lenovo 3m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7887	A1DM	24
Lenovo 5m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7888	A1DN	24
Spare console cables			
Console Cable Kit Spare (RJ-45/DB9)	90Y9462	A2MG	1

^ For CNOS / ENOS. 40 GbE QSFP+ Bi-Directional transceivers are supported in ports 25 - 32 only.
* Break-out cables are supported on ports 2 - 25 only.

The network cables that can be used with the switch are listed in the following table.

Table 6. G8332 network cabling requirements

Transceiver	Standard	Cable	Connector
40 Gb Ethernet			
40Gb SR QSFP+ BiDi (00YL631)	40GBASE-SR BiDi	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 3); up to 100 m with OM3 multimode fiber or up to 150 m with OM4 multimode fiber	LC
40Gb SR4 QSFP+ (49Y7884)	40GBASE-SR4	10 m or 30 m MPO fiber optic cables supplied by Lenovo (see Table 3); support for up to 100 m with OM3 multimode fiber or up to 150 m with OM4 multimode fiber	MPO
40Gb iSR4 QSFP+ (00D9865)	40GBASE-SR4	10 m or 30 m MPO fiber optic cables or MPO-4xLC breakout cables up to 5 m supplied by Lenovo (see Table 3); support for up to 100 m with OM3 multimode fiber or up to 150 m with OM4 multimode fiber	MPO
40Gb eSR4 QSFP+ (00FE325)	40GBASE-SR4	10 m or 30 m MPO fiber optic cables or MPO-4xLC breakout cables up to 5 m supplied by Lenovo (see Table 3); support for up to 300 m with OM3 multimode fiber or up to 400 m with OM4 multimode fiber	MPO
40Gb LR4 QSFP+ (00D6222)	40GBASE-LR4	1310 nm single-mode fiber cable up to 10 km	LC
Active optical cable	40GBASE-SR4	QSFP+ to QSFP+ active optical cables up to 20 m; QSFP+ to 4x SFP+ active optical break-out cables up to 5 m for 4x 10 GbE SFP+ connections out of a 40 GbE port (see Table 3)	QSFP+
Direct attach copper cable	40GBASE-CR4	QSFP+ to QSFP+ DAC cables up to 7 m; QSFP+ to 4x SFP+ DAC break-out cables up to 5 m for 4x 10 GbE SFP+ connections out of a 40 GbE port (see Table 3)	QSFP+
Management ports			
1 GbE management port	1000BASE-T	UTP Category 5, 5E, and 6 up to 100 meters	RJ-45
RS-232 management port	RS-232	DB-9/RJ-45-to-Mini-USB (comes with the switch)	Mini-USB

Cloud NOS software features

The RackSwitch G8332 with Cloud NOS has the following software features and specifications:

- Scalability and performance:
    - Media access control (MAC) address learning with automatic updates
    - Static and LACP (IEEE 802.3ad) link aggregation
    - Broadcast and multicast storm control
    - IGMP snooping to limit flooding of IP multicast traffic
    - IGMP filtering to control multicast traffic for hosts participating in multicast groups
    - Configurable traffic distribution schemes over trunk links based on source or destination IP or MAC addresses, or both
    - Fast port forwarding and fast uplink convergence for rapid STP convergence

- Availability and redundancy:
    - IEEE 802.1D STP for providing L2 redundancy
    - IEEE 802.1s Multiple STP (MSTP) for topology optimization
    - IEEE 802.1w Rapid STP (RSTP) provides rapid STP convergence for critical delay-sensitive traffic, such as voice or video
    - Per-VLAN Rapid STP (PVRST) enhancements
    - Layer 2 Failover to support active/standby configurations of NIC teaming on servers

- VLAN support:
    - Up to 4095 VLANs:
        - VLAN 1 is the default VLAN
        - VLAN numbers 2 - 3999 are user-configurable
        - VLAN numbers 4000 - 4095 are reserved for the use by the switch
    - Port-based VLANs
    - Private VLANs
    - 802.1Q VLAN tagging
    - 802.1Q encapsulation on Layer 3 routed ports
    - Ingress VLAN tagging to tunnel packets through a public domain without altering the original 802.1Q tagging information (also known as an Easy Connect or transparent mode)

- Security:
    - VLAN-based, MAC-based, and IP-based access control lists (ACLs)
    - Multiple user IDs and passwords
    - User access control
    - Radius, TACACS+, and LDAP/LDAPS authentication and authorization
    - Secure mode: Only secure communication protocols are allowed to be enabled

- Quality of Service (QoS):
    - Support for IEEE 802.1p, IP ToS/DSCP, and ACL-based (MAC/IP source and destination addresses and VLANs) traffic classification and processing
    - Traffic shaping and re-marking that is based on defined policies
    - Eight output Class of Service (COS) queues per port for processing qualified traffic
    - Weighted Random Early Detection (WRED) with Explicit Congestion Notification (ECN) to avoid congestion
    - Control Plane Protection (CoPP)
    - IPv4 ACL metering

- IP v4 Layer 3 functions:
    - Host management
    - Routed ports (Switch ports as Layer 3 interfaces)
    - IP forwarding
    - IP filtering with ACLs
    - Virtual Router Redundancy Protocol (VRRP) for router redundancy
    - Static routes
    - Equal Cost Multiple Paths (ECMP)
    - Routing protocols (OSPF v2 and BGP-4)
    - DHCP Relay and DHCP Snooping
    - IGMP snooping

- DNS client
- IPv6 Layer 3 functions:
    - IPv6 host management
    - Routed ports (Switch ports as Layer 3 interfaces)
    - IPv6 forwarding
    - Virtual Router Redundancy Protocol (VRRP) for router redundancy
    - Static routes
    - Equal Cost Multiple Paths (ECMP)
    - Routing protocols (BGP-4)
    - DHCP Relay
    - DNS client
- Virtualization:
    - Virtual link aggregation groups (vLAGs)
        - Two switches (vLAG peers) act as a single virtual entity for a multi-port aggregation
        - vLAG Peer Gateway for improved usage of the link between the vLAG peers
        - Two-tier vLAGs with VRRP enables active/active VRRP to reduce routing latency
    - Data Center Interconnect (DCI) enables bridging of Layer 2 services across multiple locations over existing Layer 3 IP networks by using VXLAN high availability framework.
    - Virtual Routing and Forwarding (VRF) allows multiple instances (up to eight for data traffic and one for management traffic) of a routing table to coexist and to work simultaneously on the switch to segment network paths.
    - Network Policy Agent gives increased visibility of the virtual infrastructure and automates VM-aware network provisioning and configuration updates for VLANs, virtual NICs, virtual networks, ACLs, and QoS based on the VM associations in a Nutanix (requires the AOS version 5.0.2 or higher [excluding 5.1.2]) or VMware vSphere environment.
    - VXLAN Gateway enables the communication between physical and virtual devices using the VXLAN protocol for VMware NSX integration.
- Converged Enhanced Ethernet:
    - Priority-Based Flow Control (PFC) (IEEE 802.1Qbb) extends 802.3x flow control to allow the switch to pause traffic that is based on the 802.1p priority value in each packet's VLAN tag.
    - Enhanced Transmission Selection (ETS) (IEEE 802.1Qaz) provides a method for allocating link bandwidth that is based on the 802.1p priority value in each packet's VLAN tag.
    - Data Center Bridging Capability Exchange Protocol (DCBX) (IEEE 802.1AB) allows neighboring network devices to exchange information about their capabilities.
- Monitoring:
    - Switch LEDs for port status and switch status indication
    - Port mirroring for analyzing network traffic passing through switch
    - Change tracking and remote logging with syslog feature
    - Telemetry agent for real-time analytics: Buffer statistics and congestion drop counters
    - sFLOW agent for monitoring traffic in data networks (separate sFLOW analyzer required elsewhere)

- Manageability:
  - Industry-standard command line interface (isCLI)
  - Simple Network Management Protocol (SNMP V1, V2, and V3)
  - Telnet interface for CLI
  - Secure Shell (SSH) v1 and v2 for CLI
  - Secure Copy (SCP) for uploading and downloading the configuration file via secure channels
  - Service Location Protocol (SLP)
  - Link Layer Discovery Protocol (LLDP) for discovering network devices
  - Serial interface for CLI
  - Scriptable CLI
  - Dual software images
  - Firmware image update via TFTP, FTP, Secure FTP (sFTP), or USB storage
  - Network Time Protocol (NTP) for switch clock synchronization
  - Lenovo XClarity (optional) for discovery, inventory, monitoring and events
  - Lenovo Intelligent Network Controller (LINC) (optional) for Software-Defined Networking (SDN)
  - Third-party tools integration
    - Lenovo Networking Content Pack for VMware vRealize Log Insight (optional download) for automated log management
    - Integration with Nutanix Prism and VMware vCenter management via Network Policy Agent
    - Lenovo Networking Neutron Plugin to automate VLAN provisioning and configuration updates for OpenStack-based cloud environments
    - Integration with Ansible management
    - Ganglia plug-in for telemetry data analytics

Enterprise NOS software features

The RackSwitch G8332 includes the following features and specifications:

- Scalability and performance:
  - Media access control (MAC) address learning with automatic updates
  - Up to 128 IP interfaces per switch (IP interface 128 is reserved for out-of-band management)
  - Static and LACP (IEEE 802.3ad) link aggregation
  - Broadcast/multicast storm control
  - IGMP snooping to limit flooding of IP multicast traffic
  - IGMP filtering to control multicast traffic for hosts participating in multicast groups
  - Configurable traffic distribution schemes over trunk links that are based on source or destination IP or MAC addresses, or both
  - Fast port forwarding and fast uplink convergence for rapid STP convergence
- Availability and redundancy:
  - IEEE 802.1D STP for providing L2 redundancy
  - IEEE 802.1s Multiple STP (MSTP) for topology optimization
  - IEEE 802.1w Rapid STP (RSTP) provides rapid STP convergence for critical delay-sensitive traffic, such as voice or video
  - Per-VLAN Rapid STP (PVRST) enhancements
  - Layer 2 Failover to support active/standby configurations of NIC teaming on servers
  - Hot Links provides basic link redundancy with fast recovery for network topologies that require Spanning Tree to be turned off
- VLAN support:
  - Port-based and protocol-based VLANs
  - Up to 4095 VLANs supported per switch, with VLAN numbers ranging from 1 to 4095 (VLAN 4095 is used by the management network.)
  - 802.1Q VLAN tagging support
  - Ingress VLAN tagging support to tunnel packets through a public domain without altering the original 802.1Q tagging information
  - Private VLANs support

- Security:
  - VLAN-based, MAC-based, and IP-based access control lists (ACLs)
  - 802.1x port-based authentication
  - Multiple user IDs and passwords
  - User access control
  - Radius, TACACS+, and LDAP/LDAPS authentication and authorization
  - NIST 800-131A Encryption
  - Selectable encryption protocol
  - Secure Input/Output Module (SIOM) policy: Secure and Legacy modes
- Quality of Service (QoS):
  - Support for IEEE 802.1p, IP ToS/DSCP, and ACL-based (MAC/IP source and destination addresses, VLANs) traffic classification and processing
  - Traffic shaping and re-marking based on defined policies
  - Eight output Class of Service (COS) queues per port for processing qualified traffic
  - Weighted Random Early Detection (WRED) with Explicit Congestion Notification (ECN) to help avoid congestion
  - Control plane protection (CoPP)
  - IPv4/IPv6 ACL metering
- IP v4 Layer 3 functions:
  - Host management
  - IP forwarding
  - Network Address Translation (NAT)
  - IP filtering with ACLs; up to 256 IPv4 ACLs supported
  - Virtual Router Redundancy Protocol (VRRP) for router redundancy
  - Support for up to 128 static routes
  - Equal Cost Multiple Paths (ECMP)
  - Routing protocol support (RIP v1, RIP v2, OSPF v2, and BGP)
  - Support for policy-based routing (PBR)
  - Support for DHCP Relay
  - Support for IGMP snooping and IGMP relay
  - Support for Protocol Independent Multicast (PIM) in Sparse Mode (PIM-SM) and Dense Mode (PIM-DM).
- IPv6 Layer 3 functions:
  - IPv6 host management
  - IPv6 forwarding
  - Support for static routes
  - Equal Cost Multiple Paths (ECMP)
  - Support for OSPF v3 routing protocol
  - IPv6 filtering with ACLs, up to 128 IPv6 ACLs supported
- OpenFlow 1.0 and 1.3.1 support

- Virtualization:
  - Virtual link aggregation groups (vLAGs)
    - Two switches (vLAG peers) act as a single virtual entity for a multi-port aggregation
    - vLAG Peer Gateway for improved usage of the inter-switch link between the peers
    - Two-tier vLAGs with VRRP enable active/active VRRP to reduce routing latency
  - 802.1Qbg Edge Virtual Bridging (EVB) is an emerging IEEE standard for allowing networks to become virtual machine (VM)-aware:
    - Virtual Ethernet Bridging (VEB) and Virtual Ethernet Port Aggregator (VEPA) are mechanisms for switching between VMs on the same hypervisor.
    - Edge Control Protocol (ECP) is a transport protocol that operates between two peers over an IEEE 802 LAN providing reliable, in-order delivery of upper layer protocol data units.
    - Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP) allows centralized configuration of network policies that persist with the VM, independent of its location.
    - EVB Type-Length-Value (TLV) is used to discover and configure VEPA, ECP, and VDP.
  - VMready support:
    - Up to 4,096 virtual entities (VEs)
    - Automatic VE discovery
    - Up to 4,093 local or distributed VM groups for VEs
    - NMotion® feature for automatic network configuration migration
  - VXLAN Gateway enables the communication between physical and virtual devices using the VXLAN protocol for VMware NSX integration
- Converged Enhanced Ethernet:
  - Priority-Based Flow Control (PFC) (IEEE 802.1Qbb) extends 802.3x standard flow control to allow the switch to pause traffic that is based on the 802.1p priority value in each packet's VLAN tag.
  - Enhanced Transmission Selection (ETS) (IEEE 802.1Qaz) provides a method for allocating link bandwidth that is based on the 802.1p priority value in each packet's VLAN tag.
  - Data Center Bridging Capability Exchange Protocol (DCBX) (IEEE 802.1AB) allows neighboring network devices to exchange information about their capabilities.
- Fibre Channel over Ethernet (FCoE):
  - FC-BB-5 FCoE specification compliant
  - FCoE transit switch or Native FC Forwarder (FCF) switch operations
  - End-to-end FCoE support (initiator to target)
  - FCoE Initialization Protocol (FIP) support for automatic ACL configuration
  - FCoE Link Aggregation Group (LAG) support
  - Supports 2,048 FCoE login sessions per VLAN (up to 4,096 login sessions in total for up to 12 FCF VLANs) with FIP Snooping by using Class ID ACLs
  - Fibre Channel services:
    - Name Server
    - Fabric Controller for State Change Notifications (SCNs)
    - Fabric login services
    - Fabric Configuration Server (FCS)
    - Fabric-Device Management Interface (FDMI)
    - Zoning

- Manageability:
  - Industry-standard command line interface (isCLI)
  - Simple Network Management Protocol (SNMP V1 and V3)
  - Telnet interface for CLI
  - Secure Shell (SSH) v1 and v2 for CLI
  - Secure Copy (SCP) for uploading and downloading the switch configuration via secure channels
  - Link Layer Discovery Protocol (LLDP) for discovering network devices
  - Serial interface for CLI
  - Scriptable CLI
  - Dual software images
  - Firmware image update via TFTP, FTP, Secure FTP (sFTP), and USB storage
  - Network Time Protocol (NTP) and Precision Time Protocol (PTP) for switch clock synchronization
  - Netconf (XML)
  - Lenovo XClarity (optional) for discovery, inventory, monitoring and events
  - Lenovo Networking Content Pack for VMware vRealize Log Insight (optional download) for automated log management
- Monitoring:
  - Switch LEDs for port status and switch status indication
  - Remote Monitoring (RMON) agent to collect statistics and proactively monitor switch performance
  - Port mirroring for analyzing network traffic passing through switch
  - Change tracking and remote logging with syslog feature
  - Support for sFLOW agent for monitoring traffic in data networks (separate sFLOW analyzer required elsewhere)

The following features are not supported with IPv6:

- Bootstrap Protocol (BOOTP) and DHCP
- RADIUS, TACACS+ and LDAP
- VMware Virtual Center (vCenter) for VMready
- Routing Information Protocol (RIP)
- Border Gateway Protocol (BGP)
- Protocol Independent Multicast (PIM)
- Virtual Router Redundancy Protocol (VRRP)
- sFLOW

Ethernet standards

The switch supports the following Ethernet standards:

- IEEE 802.1AB Data Center Bridging Capability Exchange Protocol (DCBX)
- IEEE 802.1D Spanning Tree Protocol (STP)
- IEEE 802.1p Class of Service (CoS) prioritization
- IEEE 802.1s Multiple STP (MSTP)
- IEEE 802.1Q Tagged VLAN
- IEEE 802.1Qbg Edge Virtual Bridging
- IEEE 802.1Qbb Priority-Based Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.1x port-based authentication
- IEEE 802.1w Rapid STP (RSTP)
- IEEE 802.3 10BASE-T Ethernet (management port only)
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet (management port only)
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3ba 40GBASE-SR4 short range fiber optics 40 Gb Ethernet
- IEEE 802.3ba 40GBASE-LR4 long range fiber optics 40 Gb Ethernet
- IEEE 802.3ba 40GBASE-CR4 copper 40 Gb Ethernet
- IEEE 802.3u 100BASE-TX Fast Ethernet (management port only)
- IEEE 802.3x Full-duplex Flow Control
- FC-BB-5 for FCoE

Cooling

The RackSwitch G8332 supports four variable speed, hot-swap fan assemblies that come standard with the switch, and they provide 3+1 redundancy). Spare fan assemblies can be ordered, if required (see the following table). Each option contains one hot-swap fan assembly (rear-to front or front-to-rear).

Table 7. Fan assembly spare options

Description	Part number	Feature code
Rear to front airflow (7159-HDE)		
Lenovo RackSwitch Hot-Swap, Rear-to-Front Fan Assembly	00D6071	A54K
Front to rear airflow (7159-HCE)		
Lenovo RackSwitch Hot-Swap, Front-to-Rear Fan Assembly	00D6073	A54J

Power supplies and cables

The RackSwitch G8332 supports up to two load-sharing, hot-swap 750 W (rear to front airflow) of 550 W (front to rear airflow) AC Platinum power supplies (two power supplies come standard with the switch). Spare power supplies can be ordered, if required (see the following table). Each option contains one hot-swap power supply (rear-to-front or front-to-rear).

Table 8. Power supply spare options

Description	Part number	Feature code
Rear to front airflow (7159-HDE)		
Lenovo RackSwitch Hot-Swap, Rear-to-Front 750W CFF Power Supply	00D5858	A2X7
Front to rear airflow (7159-HCE)		
Lenovo RackSwitch Hot-Swap, Front-to-Rear 550W CFF Power Supply	00D5961	A3FN

The RackSwitch G8332 ships standard without any AC power cables. The part numbers and feature codes to order the power cables (two power cables are required per switch) are listed in the following table.

Table 9. AC power cable options

Description	Part number	Feature code
Rack power cables		
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7937	6201
1.8m, 10A/100-250V, 2xC13PM to IEC 320-C14 Rack Power Cable	None*	6568
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	None*	6311
2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable	39Y7938	6204
4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7932	6263
Line cords		
Argentina 10A/250V C13 to IRAM 2073 2.8m line cord	39Y7930	6222
Australia/NZ 10A/250V C13 to AS/NZ 3112 2.8m line cord	39Y7924	6211
Brazil 10A/125V C13 to NBR 6147 2.8m line cord	39Y7929	6223
China 10A/250V C13 to GB 2099.1 2.8m line cord	39Y7928	6210
Denmark 10A/250V C13 to DK2-5a 2.8m line cord	39Y7918	6213

Description	Part number	Feature code
European 10A/230V C13 to CEE7-VII 2.8m line cord	39Y7917	6212
India 10A/250V C13 to IS 6538 2.8m line cord	39Y7927	6269
Israel 10A/250V C13 to SI 32 2.8m line cord	39Y7920	6218
Italy 10A/250V C13 to CEI 23-16 2.8m line cord	39Y7921	6217
Japan 12A/125V C13 to JIS C-8303 2.8m line cord	46M2593	A1RE
Korea 12A/250V C13 to KETI 2.8m line cord	39Y7925	6219
South Africa 10A/250V C13 to SABS 164 2.8m line cord	39Y7922	6214
Switzerland 10A/250V C13 to SEV 1011-S24507 2.8m line cord	39Y7919	6216
Taiwan 10A/250V C13 to CNS 10917-3 2.8m line cord	00CG265	A53E
Taiwan 15A/125V C13 to CNS 10917-3 2.8m line cord	00CG267	A53F
United Kingdom 10A/250V C13 to BS 1363/A 2.8m line cord	39Y7923	6215
United States 10A/125V C13 to NEMA 5-15P 4.3m line cord	39Y7931	6207
United States 10A/250V C13 to NEMA 6-15P 2.8m line cord	46M2592	A1RF

* Available for factory-built custom configurations and solutions only.

Rack installation

The RackSwitch G8332 includes a 2-post rack mount kit.

For 4-post rack installations, the RackSwitch G8332 supports the optional adjustable 19-inch, 4-post rail kit and the air inlet duct (optional for the 4-post rail kit; supported only with the models with rear to front airflow).

When the RackSwitch G8332 switch (front to rear airflow) is installed in the Intelligent Cluster Rack (Machine Type 1410) or Enterprise Rack (Machine Type 9363) as a part of a NeXtScale System solution, the recessed 19-inch 4-post rail kit is required.

The following table lists rack installation options for the RackSwitch G8332 with rear to front and front to rear airflow.

Table 10. Rack installation options

Description	Part number	Feature code
Rear to front airflow (7159-HDE)		
Lenovo RackSwitch Adjustable 19" 4 Post Rail Kit	00D6185	A3KP
Air Inlet Duct for 483 mm RackSwitch	00D6060	A3KQ
Front to rear airflow (7159-HCE)		
Lenovo RackSwitch Adjustable 19" 4 Post Rail Kit	00D6185	A3KP
Lenovo RackSwitch Recessed 19" 4 Post Rail Kit	00CG089	A51M

Physical specifications

The RackSwitch G8332 features the following approximate dimensions and weight:

- Height: 44 mm (1.7 in.)
- Width: 439 mm (17.3 in.)
- Depth: 513 mm (20.2 in.)
- Weight: 11.5 kg (25.3 lb)

Operating environment

The RackSwitch G8332 is supported in the following operating environment:

- Temperature: 0 - 40 °C (32 - 104 °F).
- Relative humidity: Non-condensing, 10 - 90%
- Altitude: up to 1,800 m (6,000 feet)
- Acoustic noise: Less than 65 dB
- Airflow: Front-to-rear or rear-to-front cooling
- Electrical input: 50 - 60 Hz, 100 - 240 V AC auto-switching
- Electrical power
    - Typical: 270 W
    - Maximum: 500 W
- Heat dissipation
    - Typical: 920 BTU/hour
    - Maximum: 1,710 BTU/hour

Warranty and maintenance

The RackSwitch G8332 comes with a limited 3-year hardware warranty with Next Business Day (NBD), 9x5, Customer Replaceable Unit (CRU) warranty service and includes a 3-year software license, which provides entitlement to upgrades over that period. The options that are installed in the switch assume the switch's base warranty and any Lenovo warranty service upgrade for the switch. Lenovo also allows one no-charge support call within 90 days of purchase to get assistance and help resolve problems with the configuration of recently purchased Lenovo network switches.

Some regions might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific region. Local service teams can assist in explaining region-specific terms when needed. Examples of region-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

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

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

Also available are Lenovo Services warranty maintenance upgrades and post-warranty maintenance agreements, with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are region-specific. Not all warranty service upgrades are available in every region. For information about Lenovo warranty service upgrade offerings that are available in your region, refer to the following resources:

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

In general, the following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
    - 3, 4, or 5 years of warranty service coverage
    - 1-year or 2-year post-warranty extensions
    - Foundation Service: 9x5 service coverage with next business day onsite response
    - Essential Service: 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select regions)
    - Advanced Service: 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select regions)
- Basic Hardware Installation Services
  Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

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

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

Regulatory compliance

The switch conforms to the following regulations:

- Safety certifications:
    - UL60950-1
    - CAN/CSA 22.2 No.60950-1
    - TUV GS to EN 60950-1
    - IEC60950-1, all country deviations
    - CNS 14336-1
    - Argentina Smark to IEC60950-1
    - GB4943.1-2011
    - EAC
    - NOM-019
- Electromagnetic compatibility certifications:
    - FCC 47CFR Part 15 Class A
    - EN 55022 Class A
    - ICES-003 Class A
    - VCCI Class A
    - AS/NZS CISPR 22 Class A
    - CISPR 22 Class A
    - EN 55024
    - KC Class A
    - CE
- Environmental: Reduction of Hazardous Substances (ROHS) Directive 2011/65/EU

Network connectivity

The following table lists the network switches with rear-to-front airflow that are offered by Lenovo that can be used in RackSwitch G8332 network connectivity solutions for System x, ThinkServer, and Flex System hosts.

Table 11. Network switches (rear-to-front airflow)

Description	Part number
1 Gb Ethernet switches	
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet switches	
Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)	7159A1X
Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)	7159B1X
Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)	7159C1X
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6
10 Gb Converged switches	
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
25 Gb Ethernet switches	
Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)	7159E1X
100 Gb Ethernet switches	
Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)	7159D1X

The following table lists the network switches with front-to-rear airflow that are offered by Lenovo that can be used in RackSwitch G8332 network connectivity solutions for NeXtScale System hosts.

Table 12. Network switches (front-to-rear airflow)

Description	Part number
1 Gb Ethernet switches	
Lenovo RackSwitch G8052 (Front to Rear)	715952F
10 Gb Ethernet switches	
Lenovo ThinkSystem NE1032 RackSwitch (Front to Rear)	7159A2X
Lenovo ThinkSystem NE1032T RackSwitch (Front to Rear)	7159B2X
Lenovo ThinkSystem NE1072T RackSwitch (Front to Rear)	7159C2X
Lenovo RackSwitch G8124E (Front to Rear)	7159BF7
Lenovo RackSwitch G8264 (Front to Rear)	715964F
Lenovo RackSwitch G8272 (Front to Rear)	7159CFV
Lenovo RackSwitch G8296 (Front to Rear)	7159GF5
10 Gb Converged switches	
Lenovo RackSwitch G8264CS (Front to Rear)	7159DFX
25 Gb Ethernet switches	
Lenovo ThinkSystem NE2572 RackSwitch (Front to Rear)	7159E2X
100 Gb Ethernet switches	
Lenovo ThinkSystem NE10032 RackSwitch (Front to Rear)	7159D2X

For more information, see the list of Product Guides in the Top-of-rack Switches category:
http://lenovopress.com/servers/options/switches

Storage connectivity

The following table lists the external storage systems that are currently offered by Lenovo that can be used with the RackSwitch G8332 for external NAS or iSCSI SAN storage connectivity.

Table 13. External storage systems

Description	Part number
Lenovo ThinkSystem DE Series Storage (iSCSI host connectivity)	
Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array LFF	7Y70A003WW
Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array SFF	7Y71A002WW
Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array LFF	7Y70A004WW
Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array SFF	7Y71A003WW
Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array 4U60	7Y77A000WW
Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array LFF	7Y74A002WW
Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array SFF	7Y75A001WW
Lenovo ThinkSystem DE4000F iSCSI All Flash Array SFF	7Y76A002WW
Lenovo ThinkSystem DE6000H iSCSI Hybrid Flash Array 4U60	7Y80A002WW
Lenovo ThinkSystem DE6000H iSCSI Hybrid Flash Array SFF	7Y78A002WW
Lenovo ThinkSystem DE6000F iSCSI All Flash Array SFF	7Y79A002WW
Lenovo ThinkSystem DM Series Storage (iSCSI host connectivity)	
Lenovo ThinkSystem DM3000H Hybrid Storage Array (2U12 LFF, CTO only)	7Y42CTO1WW
Lenovo ThinkSystem DM5000H Hybrid Storage Array (2U24 SFF, CTO only)	7Y57CTO1WW
Lenovo ThinkSystem DM5000F Flash Storage Array (2U24 SFF, CTO only)	7Y41CTO1WW
Lenovo ThinkSystem DM7000H Hybrid Storage Array (3U, CTO only)	7Y56CTO1WW
Lenovo ThinkSystem DM7000F Flash Storage Array (3U, CTO only)	7Y40CTO1WW
Lenovo ThinkSystem DS Series Storage (iSCSI host connectivity)	
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A31*
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A3C^
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A3J**
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A11*
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A1C^
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A1J**
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (US English documentation)	4617A31*
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4617A3C^
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4617A3J**
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4617A11*
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4617A1C^
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4617A1J**
Lenovo ThinkSystem DS6200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4619A11*
Lenovo ThinkSystem DS6200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4619A1C^
Lenovo Storage V Series (iSCSI host connectivity)	
Lenovo Storage V3700 V2 LFF Control Enclosure	6535C1D
Lenovo Storage V3700 V2 LFF Control Enclosure (TopSeller)	6535EC1
Lenovo Storage V3700 V2 SFF Control Enclosure	6535C2D
Lenovo Storage V3700 V2 SFF Control Enclosure (TopSeller)	6535EC2

Description	Part number
Lenovo Storage V3700 V2 XP LFF Control Enclosure	6535C3D
Lenovo Storage V3700 V2 XP LFF Control Enclosure (TopSeller)	6535EC3
Lenovo Storage V3700 V2 XP SFF Control Enclosure	6535C4D
Lenovo Storage V3700 V2 XP SFF Control Enclosure (TopSeller)	6535EC4
Lenovo Storage V5030 LFF Control Enclosure 3Yr S&S	6536C12
Lenovo Storage V5030 LFF Control Enclosure 5Yr S&S	6536C32
Lenovo Storage V5030 SFF Control Enclosure 3Yr S&S	6536C22
Lenovo Storage V5030 SFF Control Enclosure 5Yr S&S	6536C42
Lenovo Storage V5030F SFF Control Enclosure 3Yr S&S	6536B1F
Lenovo Storage V5030F SFF Control Enclosure 5Yr S&S	6536B2F
IBM Storwize for Lenovo (iSCSI host connectivity)	
IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit	6096CU2^
IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit	6096CU3^
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA	6195C32†
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA, LA	6195C3L‡
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA	6195C52†
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA, LA	6195C5L‡

* Available worldwide (except China and Japan).
^ Available only in China.
** Available only in Japan.
† Available worldwide except Latin America.
‡ Available only in Latin America.

For more information, see the list of Product Guides in the following categories:

- Lenovo DE Series, DM Series, DS Series, and V Series storage:
  http://lenovopress.com/storage/san/lenovo#rt=product-guide

- IBM Storwize for Lenovo storage:
  http://lenovopress.com/storage/san/ibm#rt=product-guide

Rack cabinets

The following table lists the rack cabinets that are offered by Lenovo that can be used in RackSwitch G8332 solutions.

Table 14. Rack cabinets

Description	Part number
25U S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072RX
25U Static S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072PX
42U S2 Standard Rack (1000 mm deep; 6 sidewall compartments)	93074RX
42U 1100mm Enterprise V2 Dynamic Rack (6 sidewall compartments)	93634PX
42U 1100mm Enterprise V2 Dynamic Expansion Rack (6 sidewall compartments)	93634EX
42U 1200mm Deep Dynamic Rack (6 sidewall compartments)	93604PX
42U 1200mm Deep Static Rack (6 sidewall compartments)	93614PX
42U Enterprise Rack (1105 mm deep; 4 sidewall compartments)	93084PX
42U Enterprise Expansion Rack (1105 mm deep; 4 sidewall compartments)	93084EX

For more information, see the list of Product Guides in the Rack cabinets category:
http://lenovopress.com/servers/options/racks

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo that can be used in RackSwitch G8332 solutions.

Table 15. Power distribution units

Description	Part number
0U Basic PDUs	
0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord	00YJ776
0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord	00YJ777
0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord	00YJ778
0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord	00YJ779
Switched and Monitored PDUs	
0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord	00YJ781
0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord	00YJ780
0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord	00YJ782
0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord	00YJ783
1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)	46M4002
1U 9 C19/3 C13 Switched and Monitored 60A 3Ph PDU with IEC 309 3P+Gnd cord	46M4003
1U 12 C13 Switched and Monitored DPI PDU (without line cord)	46M4004
1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4005
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
Ultra Density Enterprise C19/C13 PDU Module (without line cord)	71762NX
Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord	71763NU
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	

Description	Part number
DPI C13 Enterprise PDU+ (without line cord)	39M2816
DPI Single Phase C13 Enterprise PDU (without line cord)	39Y8941
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
DPI Single Phase C19 Enterprise PDU (without line cord)	39Y8948
DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord	39Y8923
Front-end PDUs (3x IEC 320 C19 outlets)	
DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord	39Y8938
DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord	39Y8939
DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8934
DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8940
DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8935
Universal PDUs (7x IEC 320 C13 outlets)	
DPI Universal 7 C13 PDU (with 2 m IEC 320-C19 to C20 rack power cord)	00YE443
NEMA PDUs (6x NEMA 5-15R outlets)	
DPI 100-127V PDU with fixed NEMA L5-15P line cord	39Y8905
Line cords for PDUs that ship without a line cord	
DPI 30a Line Cord (NEMA L6-30P)	40K9614
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI Australian/NZ 3112 Line Cord (32A)	40K9617
DPI Korean 8305 Line Cord (30A)	40K9618

For more information, see the list of Product Guides in the Power Distribution Units category:
http://lenovopress.com/servers/options/pdu

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo that can be used in RackSwitch G8332 solutions.

Table 16. Uninterruptible power supply units

Description	Part number
Worldwide models	
RT1.5kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-15R 12A outlets)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A outlets)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-20R 16A outlets)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC) (6x NEMA 5-20R 16A, 1x NEMA L5-30R 24A outlets)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55949PX
ASEAN, HTK, INDIA, and PRC models	
ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)	55943KT
ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)	55943LT
ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	55946KT
ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	5594XKT

For more information, see the list of Product Guides in the Uninterruptible Power Supply Units category:
http://lenovopress.com/servers/options/ups#rt=product-guide

Lenovo Financial Services

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

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

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

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

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

Related publications and links

For more information about the RackSwitch G8332, see the following publications that are available at the RackSwitch G8332 InfoCenter:
http://systemx.lenovofiles.com/help/topic/com.lenovo.rackswitch.g8332.doc/rs_g8332.html

- *Lenovo RackSwitch G8332 Installation Guide*
- *Lenovo RackSwitch G8332 Application Guide*
- *Lenovo RackSwitch G8332 Industry Standard CLI Command Reference*
- *Lenovo RackSwitch G8332 REST API Guide (CNOS only)*
- *Lenovo RackSwitch G8332 Python Programming Guide (CNOS only)*

The software for the RackSwitch G8332 can be downloaded from Lenovo Data Center Support:
http://datacentersupport.lenovo.com/us/en/products/networking/rackswitch/switch-g8332/downloads

For more information about the following management plug-ins for the RackSwitch G8332, see Network Management:
http://www3.lenovo.com/us/en/data-center/networking/networking-software/network-management

- ThinkAgile Network Orchestrator
- Lenovo Networking Plug-In for VMware vRealize Orchestrator
- Lenovo Networking Content Pack for VMware vRealize Log Insight
- Lenovo Networking Bundle for VMware vRealize
- Lenovo Networking Plug-In for OpenStack Neutron
- Integration with Ansible
- Lenovo Telemetry Analytics Tool: Ganglia Plugins

Related product families

Product families related to this document are the following:

- 40 Gb Ethernet Connectivity
- Top-of-Rack Switches

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This document, TIPS1274, was created or updated on October 8, 2018.

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