



Lenovo RackSwitch G8124E Product Guide

The Lenovo RackSwitch™ G8124E (as shown in the following figure) delivers exceptional performance that is lossless and low latency. In addition, the G8124E delivers excellent cost savings as you consider acquisition costs, energy costs, plus its feature-rich design with when it comes to virtualization, CEE/FCoE, high availability, and its enterprise class Layer 2 and Layer 3 functionality.

With support for 1 Gb Ethernet or 10 Gb Ethernet, the G8124E switch is designed for those clients that use 10 GbE today or plan to in the future. This switch is the first top of rack (TOR) 10 GbE switch that supports Lenovo Virtual Fabric, which helps clients significantly reduce cost and complexity when it comes to the I/O requirements of most virtualization deployments. Virtual Fabric can help clients reduce the number of multiple I/O adapters down to a single dual-port 10 GbE adapter and reduce the required number of cables and upstream switch ports.



Figure 1. Lenovo RackSwitch G8124E

Did you know?

The G8124E switch is designed to support several types of configurations from a server or downstream switches: 1 Gb, 10 Gb, virtual NIC, Converged Enhanced Ethernet (CEE/FCoE), and iSCSI. This single switch can handle all of these workloads and can connect to an upstream 1 Gb or 10 Gb infrastructure, or both.

The G8124E supports data center bridging (DCB), which is the IEEE's group of protocols that provide Lossless Ethernet and allows for clients to reduce the costs of implementing FCoE by using port aggregation before connecting to more costly upstream gateway devices.

The G8124E can be configured in "easy connect" mode to allow for transparent and simple connectivity to the upstream network, which enables easy connectivity to upstream Cisco, Juniper, or other networks without changing those networks.

Virtual Fabric helps clients reduce costs and complexity in environments where they need four or more NICs per server. A perfect example is virtualization, where clients often need as many as eight NICs per dual-port 10 GbE adapter installed in a server.

The G8124E can help clients reduce the complexity of managing VMs and VM migration with VMready® feature that makes the network VM-aware.

Key features

The RackSwitch G8124E switch is considered particularly suited for the following customers:

- Customers who need ultra-low latency 10 GbE networking
- Customers who need to converge their SAN and LAN and need a FCoE transit switch
- Customers who need ways to reduce cost (CAPEX):
 - Converge LAN and SAN traffic
 - Purchase fewer adapters, transceivers, and cables per server
 - Reduce upstream switching costs; fewer ports
- Customers who need to reduce complexity (OPEX):
 - Fewer adapters to manage
 - Manage fewer cables, which helps reduce potential points of failure
 - Ability to standardize on Ethernet from all servers; Ethernet for all connectivity in a rack
 - Ability to push out FC split to the end of the row

The RackSwitch G8124E offers the following features and benefits:

- High performance
The 10 GbE low latency (as low as 570 nanoseconds) switch provides the best combination of extremely low latency, non-blocking line-rate switching, and ease of management.
- Lower power and better cooling
The G8124E uses as little power as two 60 W light bulbs, which is a fraction of the power consumption of most competitive offerings. The G8124E 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 assist in automatically reducing power consumption.
- Virtual Fabric
Virtual Fabric can help customers address I/O requirements for multiple NICs while also helping reduce cost and complexity. Virtual Fabric allows for the carving up of a physical NIC into multiple virtual NICs (up to 4 vNICs per 10 Gb physical port) and creates a virtual pipe between the adapter and the switch for improved performance, availability, and security while reducing cost and complexity.
- VM-aware networking
VMready software on the switch helps reduce configuration complexity while significantly improving security levels in virtualized environments. VMready automatically detects virtual machine movement from one physical server to another and instantly reconfigures each VM's network policies across VLANs to keep the network up and running without interrupting traffic or impacting performance. VMready works with all leading VM providers, such as VMware, Citrix Xen, and Microsoft Hyper-V.
- Layer 3 functionality
The switch includes Layer 3 functionality, which provides security and performance benefits as inter-VLAN traffic stays within the chassis. 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.
- Seamless interoperability
RackSwitch switches interoperate seamlessly with other vendors' upstream switches.
- Fault tolerance
These switches learn alternative routes automatically and perform faster convergence if there is a link, switch, or power failure. The switch uses proven technologies, such as L2 trunk failover, advanced VLAN-based failover, VRRP, Hot Links, IGMP V3 snooping, and OSPF.

- **Converged fabric**
The switch supports CEE/DCB and connectivity to FCoE gateways. CEE helps enable clients to combine storage, messaging traffic, VoIP, video, and other data on a common data center Ethernet infrastructure. FCoE helps enable highly efficient block storage over Ethernet for consolidating server network connectivity. As a result, clients can deploy a single server interface for multiple data types, which can simplify deployment and management of server network connectivity while maintaining the high availability and robustness that is required for storage transactions.
- **Transparent networking capability**
With a simple configuration change to Easy Connect mode, the RackSwitch G8124E becomes a transparent network device that is invisible to the core, which 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.

Components and connectors

The front panel of the RackSwitch G8124E is shown in the following figure.

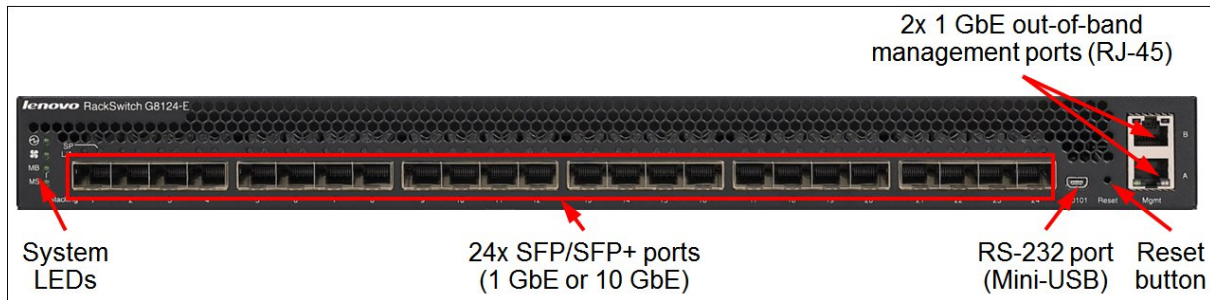


Figure 2. Front panel of the RackSwitch G8124E

The front panel of the G8124E features 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.
- 24x SFP/SFP+ ports to attach SFP/SFP+ transceivers for 1 Gb or 10 Gb Ethernet connections or DAC cables for 10 Gb Ethernet connections.
- Two RJ-45 10/100/1000 Mb Ethernet ports for out-of-band management.

The rear panel of the RackSwitch G8124E is shown in the following figure.

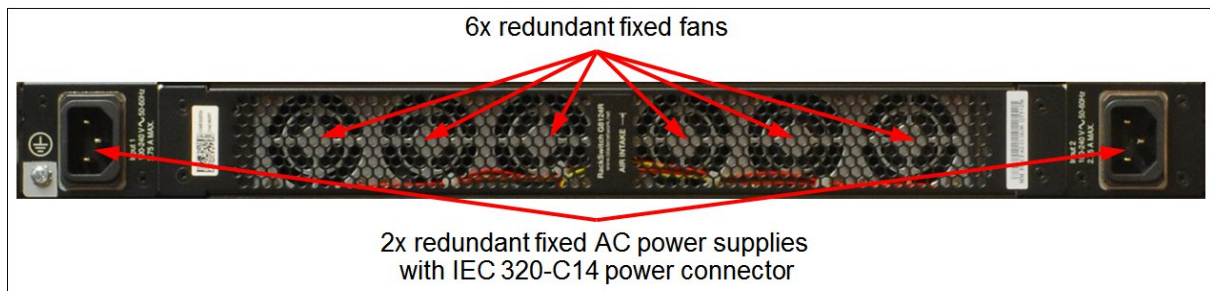


Figure 3. Rear panel of the RackSwitch G8124E

The rear panel of the G8124E features the following components:

- Two redundant fixed 275 W AC (100 - 240 V) power supplies (IEC 320-C14 power connector)
- Six fixed fans that provide N+1 redundancy

System specifications

The following table lists the RackSwitch G8124E system specifications.

Table 1. System specifications

Component	Specification
Form factor	1U rack mount
Ports	24x SFP/SFP+ ports
SFP/SFP+ media types	<p>10 Gb Ethernet SFP+:</p> <ul style="list-style-type: none"> • 10 GbE short-range (SR) SFP+ transceivers • 10 GbE long-range (LR) SFP+ transceivers • 10 GbE extended-range (ER) SFP+ transceivers • 10 GbE RJ-45 SFP+ transceivers • 10 GbE SFP+ active optical cables (AOCs) • 10 GbE SFP+ direct attach copper (DAC) cables <p>1/10 Gb Ethernet SFP+:</p> <ul style="list-style-type: none"> • 1/10 GbE SX/SR SFP+ transceivers <p>1 Gb Ethernet SFP:</p> <ul style="list-style-type: none"> • 1 GbE short-wavelength (SX) SFP transceivers • 1 GbE long-wavelength (LX) SFP transceivers • 1 GbE RJ-45 SFP transceivers
Port speeds	<ul style="list-style-type: none"> • 10 GbE SFP+ transceivers, DAC cables and AOCs: 10 Gbps • 1/10 GbE SFP+ transceivers: 1 Gbps or 10 Gbps • 1 GbE SFP transceivers: 1 Gbps
Switching method	Cut-through.
Data traffic types	Unicast, multicast, broadcast.
Software features	<p>Lenovo Networking OS:</p> <p>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), VMready, IPv4/IPv6 management, IPv4/IPv6 routing, IPv4 virtual router redundancy protocol (VRRP), virtual NICs, Converged Enhanced Ethernet, Fibre Channel over Ethernet (FCoE) transit switch operations.</p>
Performance	<p>Non-blocking architecture with wire-speed forwarding of traffic:</p> <ul style="list-style-type: none"> • 100% line-rate performance • Up to 480 Gbps aggregated throughput • As low as 570 nanoseconds switching latency • Up to 9,216-byte jumbo frames • Receive buffer size: 2 MB
Scalability	<ul style="list-style-type: none"> • MAC address forwarding database entries: 16,000 • VLANs: 4,095 • Per VLAN Rapid Spanning Tree (PVRST) instances: 128 • Multiple STP (MSTP) instances: 32 • Link aggregation groups: 16 • Ports in a link aggregation group: 12
Cooling	Six 5+1 redundant fixed fans. Rear (non-port side) to front (port side) or front to rear airflow.
Power supply	Two load-sharing, redundant fixed 275 W AC (100 - 240 V) power supplies (1x IEC 320-C14 connector on each power supply).
Hot-swap parts	SFP/SFP+ transceivers, SFP+ DAC cables.

Component	Specification
Management ports	2x 10/100/1000 Mb Ethernet ports (RJ-45); 1x RS-232 port (Mini-USB).
Management interfaces	Industry standard command line interface (isCLI); SNMP v1 and v3; Netconf (XML). Optional Lenovo Switch Center. Optional Lenovo XClarity for discovery, inventory, monitoring and events.
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).
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: 24x7 coverage, 2-hour or 4-hour response time, 1-year or 2-year warranty extensions, 1-year or 3-year Remote Technical Support (RTS).
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	189,060 hours with ambient operating temperature of 40° C.
Dimensions	Height: 44 mm (1.7 in.); width: 439 mm (17.3 in.); depth: 381 mm (15.0 in.)
Weight	6.4 kg (14.1 lb).

Models

The following table lists the G8124E switch models.

Table 2. G8124E switch models

Description	Part number	Machine Type-Model	Feature code
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6	7159-HC9	AT0B
Lenovo RackSwitch G8124E (Front to Rear)	7159BF7	7159-HC7	AT0C

The part numbers for the G8124E switches include the following items:

- One Lenovo RackSwitch G8124E switch
- 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
- Warranty Flyer
- Important Notices Flyer
- Documentation CD-ROM

Configuration notes:

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

Transceivers and cables

With the flexibility of the G8124E switch, customers can choose the following connectivity technologies:

- For 1 GbE links, customers can use RJ-45 SFP transceivers with UTP cables up to 100 meters. For longer distances, the 1000BASE-SX transceiver can support distances up to 220 meters with 62.5 μ (OM1) or up to 550 meters on 50 μ (OM2) multi-mode fiber optic cables, or the 1000BASE-LX transceiver can support distances up to 10 kilometers on single-mode fiber optic cables (1310 nm).
- For 10 GbE links, customers can use direct-attached copper (DAC) SFP+ cables for in-rack cabling for distances up to 7 meters or SFP+ active optical cables (AOCs) for distances up to 20 meters. These cables have SFP+ connectors on each end, and they do not need separate transceivers. For distances up to 30 meters, the 10GBASE-T SFP+ transceiver can be used with Category 6a or 7 RJ-45 UTP cables.

For longer distances, the 10GBASE-SR transceiver can support distances up to 300 meters on OM3 or up to 400 meters on OM4 multimode fiber optic cables. The 10GBASE-LR transceivers can support distances up to 10 kilometers on single mode fiber optic cables.

For extended distances, the 10GBASE-ER transceivers can support distances up to 40 kilometers on single mode fiber optic cables.

The supported cables and transceivers are listed in the following table.

Table 3. Supported SFP/SFP+ transceivers and DAC cables

Description	Part number	Feature code	Maximum quantity supported
SFP transceivers - 1 GbE			
Lenovo 1000BASE-T (RJ-45) SFP Transceiver (no 10/100 Mbps support)	00FE333	A5DL	24
Lenovo 1000BASE-SX SFP Transceiver	81Y1622	3269	24
Lenovo 1000BASE-LX SFP Transceiver	90Y9424	A1PN	24
SFP+ transceivers - 10 GbE			
Lenovo Dual Rate 1/10Gb SX/SR SFP+ Transceiver	00MY034	ATTJ	24
Lenovo 10GBASE-SR SFP+ Transceiver	46C3447	5053	24
Lenovo 10GBASE-LR SFP+ Transceiver	90Y9412	A1PM	24
Lenovo 10GBASE-ER SFP+ Transceiver	90Y9415	A1PP	24
Lenovo 10GBASE-T SFP+ Transceiver	7G17A03130	AVV1	24
Optical cables for 1 GbE SFP SX and 10 GbE SFP+ SR transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN499	ASR5	24
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	24
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	24
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	24
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	24
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	24
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	24
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	24
SFP+ active optical cables - 10 GbE			
Lenovo 1m SFP+ to SFP+ Active Optical Cable	00YL634	ATYX	24
Lenovo 3m SFP+ to SFP+ Active Optical Cable	00YL637	ATYY	24
Lenovo 5m SFP+ to SFP+ Active Optical Cable	00YL640	ATYZ	24

Description	Part number	Feature code	Maximum quantity supported
Lenovo 7m SFP+ to SFP+ Active Optical Cable	00YL643	ATZ0	24
Lenovo 15m SFP+ to SFP+ Active Optical Cable	00YL646	ATZ1	24
Lenovo 20m SFP+ to SFP+ Active Optical Cable	00YL649	ATZ2	24
SFP+ passive direct-attach cables - 10 GbE			
Lenovo 0.5m Passive DAC SFP+ Cable	00D6288	A3RG	24
Lenovo 1m Passive DAC SFP+ Cable	90Y9427	A1PH	24
Lenovo 1.5m Passive DAC SFP+ Cable	00AY764	A51N	24
Lenovo 2m Passive DAC SFP+ Cable	00AY765	A51P	24
Lenovo 3m Passive DAC SFP+ Cable	90Y9430	A1PJ	24
Lenovo 5m Passive DAC SFP+ Cable	90Y9433	A1PK	24
Lenovo 7m Passive DAC SFP+ Cable	00D6151	A3RH	24
SFP+ active direct-attach cables - 10 GbE			
Lenovo 1m Active DAC SFP+ Cable	00VX111	AT2R	24
Lenovo 3m Active DAC SFP+ Cable	00VX114	AT2S	24
Lenovo 5m Active DAC SFP+ Cable	00VX117	AT2T	24
Spare console cables			
Console Cable Kit Spare (RJ-45/DB9)	90Y9462	A2MG	1

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

Table 4. G8124E network cabling requirements

Transceiver	Standard	Cable	Connector
10 Gb Ethernet			
10Gb SR SFP+ (46C3447) 1/10Gb SFP+ (00MY034)	10GBASE-SR	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 3); up to 300 m with OM3 multimode fiber or up to 400 m with OM4 multimode fiber	LC
10Gb LR SFP+ (90Y9412)	10GBASE-LR	1310 nm single-mode fiber cable up to 10 km	LC
10Gb ER SFP+ (90Y9415)	10GBASE-ER	1310 nm single-mode fiber cable up to 40 km	LC
10Gb RJ-45 SFP+ (7G17A03130)	10GBASE-T	UTP Category 6a or 7 up to 30 meters	RJ-45
Active optical cable	10GBASE-SR	SFP+ active optical cables up to 20 m (see Table 3)	SFP+
Direct attach copper cable	10GSFP+Cu	SFP+ DAC cables up to 7 m (see Table 3)	SFP+
1 Gb Ethernet			
1Gb RJ-45 SFP (00FE333)	1000BASE-T	UTP Category 5, 5E, and 6 up to 100 meters	RJ-45
1Gb SX SFP (81Y1622) 1/10Gb SFP+ (00MY034)	1000BASE-SX	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 3); 850 nm multimode fiber cable 50 μ (OM2) up to 550 m or 62.5 μ (OM1) up to 220 m	LC
1Gb LX SFP (90Y9424)	1000BASE-LX	1310 nm single-mode fiber cable up to 10 km	LC
Management ports			
1 GbE management ports	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 console cable (comes with the switch)	Mini-USB

Software features

Note: The software features that are listed in this section are based on Networking OS 8.4.

The RackSwitch G8124E has the following software features:

- Scalability and performance:
 - Media access control (MAC) address learning with automatic updates
 - Up to 128 IP interfaces per switch (interfaces 127 and 128 are reserved for switch 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 that are participating in multicast groups
 - Configurable traffic distribution schemes over trunk links that are based on source and 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 Trunk Failover to support active/standby configurations of network adapter teaming on compute nodes
 - Hot Links provides basic link redundancy with fast recovery for network topologies that require Spanning Tree to be turned off
- VLAN support:
 - Up to 4095 VLANs supported per switch, with VLAN numbers 1 - 4095 (VLAN 4095 is used by the management network.)
 - Port-based VLANs
 - 802.1Q VLAN tagging
 - Private VLANs
- 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 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
 - IPv4/IPv6 ACL metering
- IP v4 Layer 3 functions:
 - Host management
 - IP forwarding
 - IP filtering with ACLs, up to 127 IPv4 ACLs supported
 - VRRP for router redundancy
 - Support for up to 128 static routes
 - Routing protocol support (RIP v1, RIP v2, OSPF v2, BGP)

- Support for DHCP Relay
 - Support for IGMP snooping
 - 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 OSPF v3 routing protocol
 - IPv6 filtering with ACLs, up to 128 IPv6 ACLs supported
- Virtualization:
 - Virtual NICs (vNICs) with Ethernet, iSCSI, or FCoE traffic on vNICs
 - 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 vLAG peers
 - Two-tier vLAGs with VRRP enables active/active VRRP support to reduce routing latency
 - VMready support:
 - Up to 2,048 virtual entities (VEs)
 - Automatic VE discovery
 - Up to 1,024 local or distributed VM groups for VEs
 - NMotion® feature for automatic network configuration migration
- 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-BB5 FCoE specification compliant
 - FCoE transit switch operations
 - FCoE Initialization Protocol (FIP) support for automatic ACL configuration
 - Link Aggregation Group (LAG) support for FCoE traffic
 - Supports 2,048 FCoE sessions with FIP Snooping by using Class ID ACLs
- 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, and Secure FTP (sFTP)
 - Network Time Protocol (NTP) for switch clock synchronization
 - Netconf (XML)
 - Lenovo Switch Center management application (optional; sold separately)
 - Lenovo XClarity (optional; sold separately) for discovery, inventory, monitoring and events

- 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 802.1Qbb 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
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- IEEE 802.3ae 10GBASE-LR long range fiber optics 10 Gb Ethernet
- IEEE 802.3ae 10GBASE-ER extended range fiber optics 10 Gb Ethernet
- IEEE 802.3u 100BASE-TX Fast Ethernet
- IEEE 802.3x Full-duplex Flow Control
- IEEE 802.3z 1000BASE-SX short range fiber optics Gigabit Ethernet
- IEEE 802.3z 1000BASE-LX long range fiber optics Gigabit Ethernet

Power supplies and cables

The G8124E switch has two load-sharing, 275 W AC (100 - 240 V) redundant fixed power supplies. Each power supply has an individual IEC 320-C14 connector.

The G8124E switch 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 5. 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
Country-specific 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
European 10A/230V C13 to GEE7-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
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
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 G8124E switch includes a 2-post rack mount kit.

For 4-post rack installations, the G8124E switch 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 G8124E 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 G8124E switches with rear to front and front to rear airflow.

Table 6. Rack installation options

Description	Part number	Feature code
Rear to front airflow (7159-HC9)		
Lenovo RackSwitch Adjustable 19" 4 Post Rail Kit	00D6185	A3KP
Air Inlet Duct for 382 mm RackSwitch	00D6062	A3HG
Front to rear airflow (7159-HC7)		
Lenovo RackSwitch Adjustable 19" 4 Post Rail Kit	00D6185	A3KP
Lenovo RackSwitch Recessed 19" 4 Post Rail Kit	00CG089	A51M

Physical specifications

The G8124E switch features the following approximate dimensions and weight:

- Height: 44 mm (1.7 in.)
- Width: 439 mm (17.3 in.)
- Depth: 381 mm (15.0 in.)
- Weight: 6.4 kg (14.1 lb)

Operating environment

The G8124E switch is supported in the following operating environment:

- Temperature: 0 - 40 °C (32 - 104 °F).
- Relative humidity: Non-condensing, 10 - 90%
- Altitude: up to 3,050 m (10,000 feet)
- Acoustic noise: Less than 65 dB
- Airflow: Front-to-rear or rear-to-front cooling with variable speed fans for reduced power draw
- Electrical input: 50-60 Hz, 100-240 V AC auto-switching
- Electrical power: 200 W (typical)
- Heat dissipation: 1,100 BTU/hour (maximum)

Warranty and maintenance

The RackSwitch G8124E 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 following optional warranty and maintenance upgrades are available for the RackSwitch G8124E through Lenovo service upgrade offerings:

- Warranty service upgrades (3, 4, or 5 years):
 - 24x7 onsite repair with 2-hour target response time
 - 24x7 onsite repair with 4-hour target response time
 - 9x5 onsite repair with 4-hour target response time
- Maintenance (post-warranty) service offerings (1 or 2 years):
 - 24x7 onsite repair with 2-hour target response time
 - 24x7 onsite repair with 4-hour target response time
 - 9x5 onsite repair with 4-hour target response time
 - 9x5 onsite repair with next business day target response time
- Remote Technical Support (RTS) services (1 or 3 years)
RTS provides comprehensive technical call center support. RTS can reduce problem resolution time, which decreases the cost to address technical problems and increases uptime.

Lenovo warranty service upgrade offerings are country-specific. Not all warranty service upgrades are available in every country. For more information about Lenovo warranty service upgrade offerings that are available in your country, go to the Data Center Advisor and Configurator Tool (DCACT; formerly known as LESC):

<http://lesc.lenovo.com>

The options that are installed in the switch assume the switch's base warranty and any Lenovo warranty service upgrade for the switch.

Regulatory compliance

The switch conforms to the following regulations:

- Safety certifications:
 - UL60950-1
 - CAN/CSA 22.2 No.60950-1
 - EN 60950-1
 - IEC60950-1
 - NOM NYCE 019
 - GOST R MEK 60950-1
 - GB4943-2001
- 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
 - EN 300386
 - CE
- Environmental: Reduction of Hazardous Substances (ROHS) 6

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 G8124E network connectivity solutions for System x, ThinkServer, and Flex System hosts.

Table 7. 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 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
40 Gb Ethernet switches	
Lenovo RackSwitch G8332 (Rear to Front)	7159BRX

* The RackSwitch G8124E supports FCoE transit switch operations when connected to the RackSwitch G8264CS.

The following table lists the network switches with front-to-rear airflow that are offered by Lenovo that can be used in RackSwitch G8124E network connectivity solutions for NeXtScale System hosts.

Table 8. 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 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
40 Gb Ethernet switches	
Lenovo RackSwitch G8332 (Front to Rear)	7159BFX

* The RackSwitch G8124E supports FCoE transit switch operations when connected to the RackSwitch G8264CS.

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 G8124E for external NAS, iSCSI, or FCoE SAN storage connectivity.

Table 9. External storage systems

Description	Part number
Lenovo Storage DX8200 Series (NAS, iSCSI connectivity)	
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 3yr SW S&S	5135D2x#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 4yr SW S&S	5135N2x#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 5yr SW S&S	51354Vx#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 3yr SW S&S	5135F2x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 4yr SW S&S	5135P2x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 5yr SW S&S	51355Vx#
Lenovo Storage DX8200D ServerSAN High, 32TB, 3yr SW S&S	5135G2x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 4yr SW S&S	5135Q2x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 5yr SW S&S	51356Vx#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 3yr SW S&S	5135A2x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 4yr SW S&S	5135J2x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 5yr SW S&S	51351Vx#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 3yr SW S&S	5135B2x#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 5yr SW S&S	51352Vx#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 4yr SW S&S	5135L2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 3yr SW S&S	5135C2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 4yr SW S&S	5135M2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 5yr SW S&S	51353Vx#
Lenovo Storage DX8200N with 1x N2226 HBA (Requires a supported external drive enclosure)	5128A1x#
Lenovo Storage DX8200N with 2x N2226 HBAs (Requires a supported external drive enclosure)	5128A2x#
Lenovo Storage S Series (iSCSI connectivity)	
Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B1
Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B2
Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B3
Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B4
Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B1
Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B2
Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B3
Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B4
Lenovo Storage V Series (iSCSI connectivity, end-to-end FCoE connectivity, FCoE/FC gateway connectivity)	
Lenovo Storage V3700 V2 LFF Control Enclosure	6535C1D
Lenovo Storage V3700 V2 LFF Control Enclosure (Top Seller)	6535EC1
Lenovo Storage V3700 V2 SFF Control Enclosure	6535C2D
Lenovo Storage V3700 V2 SFF Control Enclosure (Top Seller)	6535EC2
Lenovo Storage V3700 V2 XP LFF Control Enclosure	6535C3D

Description	Part number
Lenovo Storage V3700 V2 XP LFF Control Enclosure (Top Seller)	6535EC3
Lenovo Storage V3700 V2 XP SFF Control Enclosure	6535C4D
Lenovo Storage V3700 V2 XP SFF Control Enclosure (Top Seller)	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 connectivity, end-to-end FCoE connectivity, FCoE/FC gateway 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 V3700 3.5-inch Storage Controller Unit	6099L2C
IBM Storwize V3700 2.5-inch Storage Controller Unit	6099S2C
IBM Storwize V3700 2.5-inch DC Storage Controller Unit	6099T2C
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S (Model 524)	6195SC5†
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S (LA) (Model 524)	6195SCL‡
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S (Model 524)	61951F1†
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S (LA) (Model 524)	61951FL‡
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA (Model HC1 [Gen2+])	6195C32†
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA, LA (Model HC1 [Gen2+])	6195C3L‡
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA (Model HC1 [Gen2+])	6195C52†
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA, LA (Model HC1 [Gen2+])	6195C5L‡

* Available worldwide (except China and Japan).

^ Available only in China.

** Available only in Japan.

x represents a geo-specific letter (for example: U = North America, G = EMEA). Ask a Lenovo representative for specifics.

† Available worldwide except Latin America.

‡ Available only in Latin America.

For FCoE storage connectivity, the RackSwitch G8124E operates as an FCoE transit switch by transporting encapsulated FCoE packets to the Fibre Channel Forwarder (FCF), which provides end-to-end 10 Gb FCoE connectivity for storage systems with native FCoE ports or FCoE/FC gateway connectivity for storage systems with native FC ports.

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

- Lenovo NAS storage:
<http://lenovopress.com/storage/nas?rt=product-guide>
- Lenovo S 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 G8124E solutions.

Table 10. Rack cabinets

Description	Part number
25U S2 Standard Rack	93072RX
25U Static S2 Standard Rack	93072PX
42U S2 Standard Rack	93074RX
42U 1100mm Enterprise V2 Dynamic Rack	93634PX
42U 1100mm Enterprise V2 Dynamic Expansion Rack	93634EX
42U 1200mm Deep Dynamic Rack	93604PX
42U 1200mm Deep Static Rack	93614PX
42U Enterprise Rack	93084PX
42U Enterprise Expansion Rack	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 G8124E solutions.

Table 11. 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

Description	Part number
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
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 G8124E solutions.

Table 12. Uninterruptible power supply units

Description	Part number
RT1.5kVA 2U Rack or Tower UPS (100-125VAC)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55949PX

For more information, see the list of Product Guides in the Uninterruptible Power Supply Units category: <http://lenovopress.com/servers/options/ups>

Lenovo Financial Services

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

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

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

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

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

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

Related publications and links

For more information about the RackSwitch G8124E, see the following publications that are available at the RackSwitch G8124E InfoCenter:

http://systemx.lenovofiles.com/help/topic/com.lenovo.rackswitch.g8124e.doc/rs_g8124e.html

- *RackSwitch G8124E Installation Guide*
- *RackSwitch G8124E Application Guide*
- *RackSwitch G8124E Industry Standard CLI Command Reference*

Related product families

Product families related to this document are the following:

- [10 Gb Ethernet Switches](#)
- [Top-of-Rack Switches](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2017. All rights reserved.

This document, TIPS1271, was created or updated on May 2, 2017.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<http://lenovopress.com/TIPS1271>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <http://lenovopress.com/TIPS1271>.

Trademarks

Lenovo, the Lenovo logo, and For Those Who Do are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <http://www3.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Flex System
Intelligent Cluster
Lenovo XClarity
Lenovo®
NMotion®
NeXtScale
NeXtScale System®
RackSwitch
System x®
ThinkServer®
VMready®

The following terms are trademarks of other companies:

Access®, Hyper-V®, and Microsoft® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.