

Lenovo ThinkSystem NE0152TO Gigabit Ethernet Switch

Product Guide (withdrawn product)

The Lenovo ThinkSystem NE0152TO RackSwitch is a 1U rack-mount Gigabit Ethernet switch that delivers low-latency, line-rate switching performance and high availability for cloud management environments.

The NE0152TO RackSwitch has 48x RJ-45 Gigabit Ethernet fixed ports and 4x SFP+ ports that support 1 GbE and 10 GbE optical transceivers, active optical cables (AOCs), and direct attach copper (DAC) cables. Featuring a small, 1U footprint, this switch is designed for management network and access-layer deployments in data center infrastructures.

The Lenovo ThinkSystem NE0152TO RackSwitch is shown in the following figure.



Figure 1. Lenovo ThinkSystem NE0152TO RackSwitch

Did you know?

The NE0152TO RackSwitch provides reliable management network connectivity for converged and hyperscale solutions and access-layer connectivity for traditional infrastructures.

The NE0152TO RackSwitch includes the Open Network Install Environment (ONIE), which is an open, standards-based boot code that provides a deployment environment for loading certified ONIE networking operating systems onto networking devices.

Key features

The NE0152TO RackSwitch is considered particularly suited for the following environments:

- Open networking architectures that are based on the certified ONIE networking operating systems, such as Cumulus Linux.
- Network connectivity for 1 GbE access layer deployments and management networks in data center infrastructures.
- 1 GbE server connectivity with additional 10 GbE SFP+ ports for server, storage, or switch connections.
- Cloud and virtualization solutions.
- Applications demanding improved 1 GbE performance while maintaining high levels of availability and security.

The NE0152TO RackSwitch offers the following features and benefits:

- High performance
The 1/10 GbE NE0152TO RackSwitch provides a combination of low latency and non-blocking, line-rate switching.
- Lower power and better cooling
The rear-to-front cooling design of the NE0152TO RackSwitch reduces data center air conditioning costs by having airflow match the servers in the rack cabinet. In addition, variable speed fans help reduce power consumption.
- Fault tolerance
The NE0152TO RackSwitch offers redundant hot-swap hardware components to provide availability for network communications across business-critical applications.
- Open Network Install Environment (ONIE)
The NE0152TO RackSwitch provides an open install environment for networking devices without operating systems. ONIE enables a network switch ecosystem for end users to choose among different Network Operating Systems by discovering NOS installer images and loading them onto the switch.
- Seamless interoperability
The NE0152TO RackSwitch performs seamlessly with other vendors' upstream switches.

Components and connectors

The following figure shows the front (port-side) panel of the NE0152TO RackSwitch.

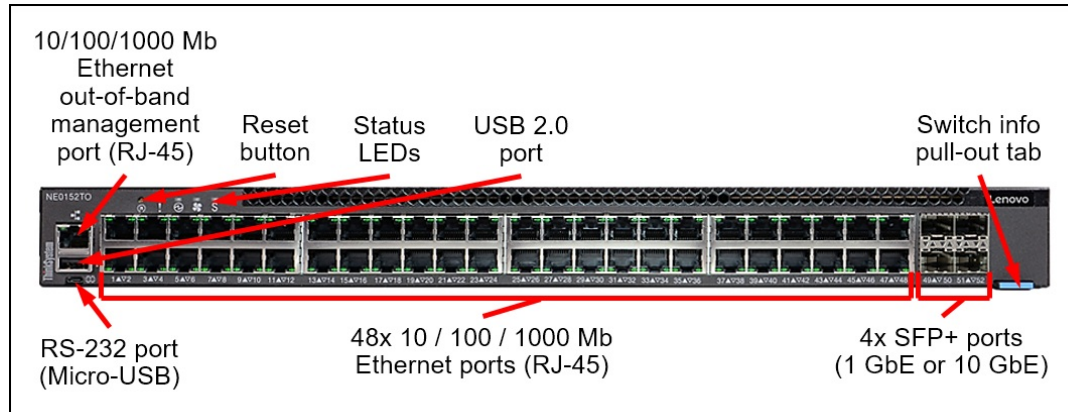


Figure 2. Front panel of the NE0152TO RackSwitch

The front panel of the NE0152TO RackSwitch includes the following components:

- 48x RJ-45 ports for 10 / 100 / 1000 Mb Ethernet connections over twisted pair.
- 4x SFP/SFP+ ports to attach SFP/SFP+ transceivers for 1 Gb or 10 Gb Ethernet connections or DAC cables and AOCs for 10 Gb Ethernet connections.
- One RJ-45 10/100/1000 Mb Ethernet port for out-of-band management.
- One Micro-USB RS-232 console port that provides another means to configure the switch.
- One USB port for mass storage devices.
- LEDs that display the status of the switch and the network.
- Reset button.
- Switch information pull-out tab.

The following figure shows the rear (non-port-side) panel of the NE0152TO RackSwitch.

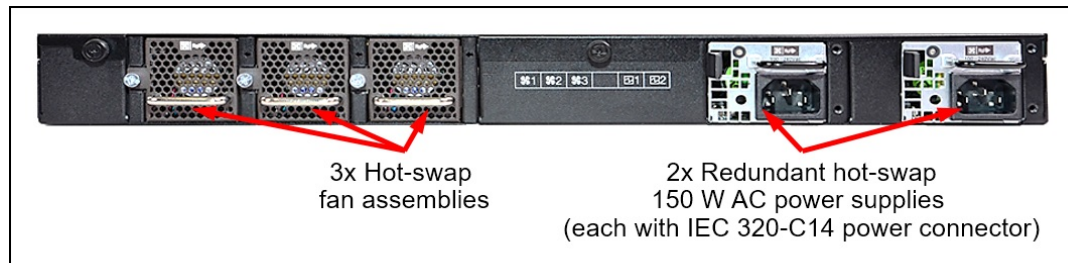


Figure 3. Rear panel of the NE0152TO RackSwitch

The rear panel of the NE0152TO RackSwitch includes the following components:

- Two redundant hot-swap 150 W AC power supplies (each with the IEC 320-C14 power connector).
- Three N+1 redundant hot-swap fan assemblies.

System specifications

The following table lists the NE0152TO RackSwitch system specifications.

Table 1. NE0152TO RackSwitch system specifications

| Attribute | Specification |
|--------------------------------|---|
| Form factor | 1U rack mount |
| Ports | <ul style="list-style-type: none"> • 48x 1 Gb Ethernet fixed ports (RJ-45) • 4x SFP/SFP+ ports |
| Media types | <p>1 Gb Ethernet fixed ports (1000BASE-T):</p> <ul style="list-style-type: none"> • RJ-45 UTP Category 5 or 5e <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 <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 • 10 GbE SFP+ DAC cables <p>1/10 Gb Ethernet SFP+: 1/10 GbE SX/SR SFP+ transceivers</p> |
| Port speeds | <ul style="list-style-type: none"> • 1 GbE fixed ports: 10 / 100 / 1000 Mbps auto-sensing • 1 GbE SFP transceivers: 1 Gbps • 10 GbE SFP+ transceivers, DAC cables, and AOCs: 10 Gbps • 1/10 GbE SFP+ transceivers: 1 Gbps or 10 Gbps |
| Performance | <p>Non-blocking architecture with wire-speed forwarding of traffic:</p> <ul style="list-style-type: none"> • 100% line-rate performance • Up to 176 Gbps switching throughput • As low as 3.3 μs port-to-port switching latency • Up to 130 Million packets per second (Mpps) (64-byte packets) |
| Cooling | Three N+1 redundant hot-swap fans. Rear (non-port side) to front (port side) airflow. |
| Power supply | Two load-sharing, redundant hot-swap 150 W AC (100 - 240 V) power supplies (each power supply has an IEC 320-C14 connector). |
| Hot-swap parts | SFP/SFP+ transceivers, SFP+ DAC cables and AOCs, power supplies, fans. |
| Management ports | 1x 10/100/1000 Mb Ethernet port (RJ-45); 1x RS-232 port (Micro-USB); 1x USB 2.0 port (for additional firmware, log, and configuration files storage). |
| Hardware warranty | Three-year Customer Replaceable Unit (CRU) limited warranty with 9x5 coverage and Next Business Day (NBD) parts delivered. |
| Warranty upgrades and services | Optional warranty service upgrades are available through Lenovo: 9x5 coverage with NBD onsite response, 24x7 coverage with 2-hour or 4-hour onsite response, 6-hour or 24-hour committed repair (select countries), 1-year or 2-year post-warranty extensions, Premier support, and Basic installation services. |
| Mean Time Between Failures | 188 432 hours MTBF at 40 °C (104 °F). |
| Dimensions | Height: 44 mm (1.7 in.); width: 438 mm (17.3 in.); depth: 442 mm (17.4 in.) |
| Weight | 10 kg (22.0 lb). |

Models

The following table lists the NE0152TO RackSwitch models.

Table 2. NE0152TO RackSwitch models

| Description | Part number | Machine Type/Model | Feature code |
|--|-------------|--------------------|--------------|
| Lenovo ThinkSystem NE0152TO RackSwitch (Rear to Front, ONIE) | 7Z320O11WW | 7Z32CTO1WW | B4T2 |

The NE0152TO RackSwitch models include the following items:

- One NE0152TO RackSwitch with two power supplies and three fan assemblies
- Generic Rack Mount Kit (2-post)
- Console Cable Kit that includes the following items:
 - Micro-USB (plug) to RJ-45 (jack) serial console cable
 - DB-9 (plug) to RJ-45 (plug) serial console cable
- *Electronic Publications Flyer*

Configuration notes:

- Power cables are not included and should be ordered for the switch (see [Power supplies and cables](#) for details).
- SFP/SFP+ transceivers and cables are not included and should be ordered for the switch (see [Transceivers and cables](#) for details).

Transceivers and cables

With the flexibility of the NE0152TO RackSwitch, customers can choose the following connectivity technologies:

- For 1 GbE links, customers can use RJ-45 fixed ports or SFP transceivers with RJ-45 UTP Category 5 or 5e cables for distances up to 100 meters.

For longer distances, the 1000BASE-SX transceiver supports distances up to 220 meters with 62.5 μ OM1 or up to 550 meters with 50 μ OM2 multimode fiber optic (MMF) cables, or the 1000BASE-LX transceiver supports distances up to 10 kilometers with single-mode fiber optic (SMF) cables.

- For 10 GbE in-rack or intra-rack cabling, 10 GbE SFP+ direct-attached copper (DAC) cables can be used for distances up to 7 meters, or 10 GbE SFP+ active optical cables (AOCs) can be used for distances up to 20 meters. The AOCs and DAC 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 supports distances up to 300 meters with OM3 or up to 400 meters with OM4 MMF cables. The 10GBASE-LR transceivers can support distances up to 10 kilometers with SMF cables. For extended distances, the 10GBASE-ER transceivers can support distances up to 40 kilometers with SMF cables.

The following table lists the supported cables and transceivers.

Table 3. Supported SFP/SFP+ transceivers and cables

| Description | Part number | Feature code | Maximum quantity |
|--|-------------|--------------|------------------|
| UTP Category 5e cables for 1 GbE RJ-45 fixed and management ports | | | |
| 0.6m Blue Cat5e Cable | 40K5679 | 3801 | 53 |
| 1.5m Blue Cat5e Cable | 40K8785 | 3802 | 53 |
| 3m Blue Cat5e Cable | 40K5581 | 3803 | 53 |
| 10m Blue Cat5e Cable | 40K8927 | 3804 | 53 |
| 25m Blue Cat5e Cable | 40K8930 | 3805 | 53 |
| SFP transceivers - 1 GbE | | | |
| Lenovo 1000BASE-T (RJ-45) SFP Transceiver (no 10/100 Mbps support) | 00FE333 | A5DL | 4 |
| Lenovo 1000BASE-SX SFP Transceiver | 81Y1622 | 3269 | 4 |
| Lenovo 1000BASE-LX SFP Transceiver | 90Y9424 | A1PN | 4 |
| SFP+ transceivers - 10 GbE | | | |
| Lenovo Dual Rate 1/10Gb SX/SR SFP+ Transceiver | 00MY034 | ATTJ | 4 |
| Lenovo 10Gb SFP+ SR Transceiver (10GBASE-SR) | 46C3447 | 5053 | 4 |
| Lenovo 10Gb SFP+ LR Transceiver (10GBASE-LR) | 90Y9412 | A1PM | 4 |
| Lenovo 10GBASE-LR SFP+ Transceiver | 00FE331 | B0RJ | 4 |
| Lenovo 10Gb SFP+ ER Transceiver (10GBASE-ER) | 90Y9415 | A1PP | 4 |
| Lenovo 10GBASE-T SFP+ Transceiver | 7G17A03130 | AVV1 | 4 |
| Optical cables for 1 GbE SX SFP and 10 GbE SR SFP+ transceivers | | | |
| Lenovo 0.5m LC-LC OM3 MMF Cable | 00MN499 | ASR5 | 4 |
| Lenovo 1m LC-LC OM3 MMF Cable | 00MN502 | ASR6 | 4 |
| Lenovo 3m LC-LC OM3 MMF Cable | 00MN505 | ASR7 | 4 |
| Lenovo 5m LC-LC OM3 MMF Cable | 00MN508 | ASR8 | 4 |
| Lenovo 10m LC-LC OM3 MMF Cable | 00MN511 | ASR9 | 4 |
| Lenovo 15m LC-LC OM3 MMF Cable | 00MN514 | ASRA | 4 |
| Lenovo 25m LC-LC OM3 MMF Cable | 00MN517 | ASRB | 4 |
| Lenovo 30m LC-LC OM3 MMF Cable | 00MN520 | ASRC | 4 |
| SFP+ active optical cables - 10 GbE | | | |
| Lenovo 1m SFP+ to SFP+ Active Optical Cable | 00YL634 | ATYX | 4 |
| Lenovo 3m SFP+ to SFP+ Active Optical Cable | 00YL637 | ATYY | 4 |
| Lenovo 5m SFP+ to SFP+ Active Optical Cable | 00YL640 | ATYZ | 4 |
| Lenovo 7m SFP+ to SFP+ Active Optical Cable | 00YL643 | ATZ0 | 4 |
| Lenovo 15m SFP+ to SFP+ Active Optical Cable | 00YL646 | ATZ1 | 4 |
| Lenovo 20m SFP+ to SFP+ Active Optical Cable | 00YL649 | ATZ2 | 4 |
| SFP+ passive direct-attach cables - 10 GbE | | | |
| Lenovo 0.5m Passive SFP+ DAC Cable | 00D6288 | A3RG | 4 |
| Lenovo 1m Passive SFP+ DAC Cable | 90Y9427 | A1PH | 4 |
| Lenovo 1.5m Passive SFP+ DAC Cable | 00AY764 | A51N | 4 |
| Lenovo 2m Passive SFP+ DAC Cable | 00AY765 | A51P | 4 |

| Description | Part number | Feature code | Maximum quantity |
|---|-------------|--------------|------------------|
| Lenovo 3m Passive SFP+ DAC Cable | 90Y9430 | A1PJ | 4 |
| Lenovo 5m Passive SFP+ DAC Cable | 90Y9433 | A1PK | 4 |
| Lenovo 7m Passive SFP+ DAC Cable | 00D6151 | A3RH | 4 |
| SFP+ active direct-attach cables - 10 GbE | | | |
| Lenovo 1m Active DAC SFP+ Cable | 00VX111 | AT2R | 4 |
| Lenovo 3m Active DAC SFP+ Cable | 00VX114 | AT2S | 4 |
| Lenovo 5m Active DAC SFP+ Cable | 00VX117 | AT2T | 4 |

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

Table 4. NE0152TO RackSwitch 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 MMF cables supplied by Lenovo (see Table 3); up to 300 m with OM3 or up to 400 m with OM4 MMF cables. | LC |
| 10Gb LR SFP+ (90Y9412, 00FE331) | 10GBASE-LR | Up to 10 km with 1310 nm SMF cables. | LC |
| 10Gb ER SFP+ (90Y9415) | 10GBASE-ER | Up to 40 km with 1310 nm SMF cables. | LC |
| 10Gb RJ-45 SFP+ (7G17A03130) | 10GBASE-T | Up to 30 m with UTP Category 6a or 7 cables. | RJ-45 |
| Active optical cables | 10GBASE-SR | Up to 20 m (see Table 3). | SFP+ |
| DAC cables | 10GSFP+Cu | Up to 7 m (see Table 3). | SFP+ |
| 1 Gb Ethernet | | | |
| Fixed 1 GbE ports | 1000BASE-T | Up to 25 m with UTP cables supplied by Lenovo (see Table 3); up to 100 m with UTP Category 5 or 5e cables. | RJ-45 |
| 1Gb RJ-45 SFP (00FE333) | 1000BASE-T | Up to 25 m with UTP cables supplied by Lenovo (see Table 3); up to 100 m with UTP Category 5 or 5e cables. | RJ-45 |
| 1Gb SX SFP (81Y1622) 1/10Gb SFP+ (00MY034) | 1000BASE-SX | Up to 30 m with MMF cables supplied by Lenovo (see Table 3); up to 550 m with 50 μ OM2 or 220 m with 62.5 μ OM1 MMF cables. | LC |
| 1Gb LX SFP (90Y9424) | 1000BASE-LX | Up to 10 km with 1310 nm SMF cables. | LC |
| Management ports | | | |
| 1 GbE port | 1000BASE-T | Up to 25 m with UTP cables supplied by Lenovo (see Table 3); up to 100 m with UTP Category 5 or 5e cables. | RJ-45 |
| Serial port | RS-232 | DB-9/RJ-45-to-Micro-USB (comes with the switch). | Micro-USB |

Software

The NE0152TO RackSwitch includes the Open Network Install Environment (ONIE) which is a small Linux-based operating system that provides an open install environment for networking devices without operating systems. ONIE enables a network switch ecosystem for end users to choose among different Network Operating Systems by discovering NOS installer images and loading them onto the switch.

The following operating systems are certified for the NE0152TO RackSwitch:

- Cumulus Linux

The following table lists ordering information for the Cumulus software license and support options for the NE0152TO RackSwitch.

Table 5. Cumulus software license and support options

| Description | Part number | Feature code |
|--|-------------|--------------|
| Cumulus Linux Perpetual License (1G) w/1Yr Cumulus Support | 7S0D000KWW | S0WN |
| Cumulus Linux Perpetual License (1G) w/3Yr Cumulus Support | 7S0D000LWW | S0WP |
| Cumulus Linux Perpetual License (1G) w/5Yr Cumulus Support | 7S0D000MWW | S0WQ |

Software support: Lenovo does not provide support for third-party software that is certified with the switch. Customers should contact a third-party software vendor directly to submit a software support request, and the software vendor will own the software-related problem resolution until closure.

Ethernet standards

The NE0152TO RackSwitch supports the following Ethernet standards:

- IEEE 802.1Q VLAN Tagging
- IEEE 802.3 10BASE-T copper twisted pair Ethernet (10 Mb)
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet
- 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 802.3an 10GBASE-T copper twisted pair 10 Gb Ethernet
- IEEE 802.3u 100BASE-TX copper twisted pair Fast Ethernet (100 Mb Ethernet)
- IEEE 802.3z 1000BASE-SX short range fiber optics Gigabit Ethernet
- IEEE 802.3z 1000BASE-LX long range fiber optics Gigabit Ethernet
- SFF-8431 10GSFP+Cu SFP+ Direct Attach Cable

Cooling

The NE0152TO RackSwitch ships with three variable speed, hot-swap fan assemblies that provide N+1 cooling redundancy.

Power supplies and cables

The NE0152TO RackSwitch ships with two load-sharing, redundant hot-swap 150 W AC power supplies.

The models of the NE0152TO RackSwitch listed in [Models](#) ships without power cables. The following table lists the power cables that can be ordered for the switch (two power cables are required per switch).

Table 6. 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 | 43V6034 | 6568 |
| 2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable | 4L67A08366 | 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 2.8m, 10A/250V, C13 to IRAM 2073 Line Cord | 39Y7930 | 6222 |
| Australia/New Zealand 2.8m, 10A/250V, C13 to AS/NZ 3112 Line Cord | 39Y7924 | 6211 |
| Brazil 2.8m, 10A/125V, C13 to NBR 6147 Line Cord | 39Y7929 | 6223 |
| China 2.8m, 10A/250V C13 to GB 2099.1 Line Cord | 39Y7928 | 6210 |
| Denmark 2.8m, 10A/250V, C13 to DK2-5a Line Cord | 39Y7918 | 6213 |
| European 2.8m, 10A/250V, C13 to CEE7-VII Line Cord | 39Y7917 | 6212 |
| India 2.8m, 10A/250V, C13 to IS 6538 Line Cord | 39Y7927 | 6269 |
| Israel 2.8m, 10A/250V, C13 to SI 32 Line Cord | 39Y7920 | 6218 |
| Italy 2.8m, 10A/250V, C13 to CEI 23-16 Line Cord | 39Y7921 | 6217 |
| Japan 2.8m, 12A/125V, C13 to JIS C-8303 Line Cord | 46M2593 | A1RE |
| Korea 2.8m, 12A/250V, C13 to KS C8305 Line Cord | 39Y7925 | 6219 |
| South Africa 2.8m, 10A/250V, C13 to SABS 164 Line Cord | 39Y7922 | 6214 |
| Switzerland 2.8m, 10A/250V, C13 to SEV 1011-S24507 Line Cord | 39Y7919 | 6216 |
| Taiwan 2.8m, 10A/250V, C13 to CNS 10917-3 Line Cord | 00CG265 | A53E |
| Taiwan 2.8m, 15A/125V, C13 to CNS 10917-3 Line Cord | 00CG267 | A53F |
| United Kingdom 2.8m, 10A/250V, C13 to BS 1363/A Line Cord | 39Y7923 | 6215 |
| United States 2.8m, 10A/250V, C13 to NEMA 6-15P Line Cord | 46M2592 | A1RF |
| United States 4.3m, 10A/125V, C13 to NEMA 5-15P Line Cord | 39Y7931 | 6207 |

Rack installation

The NE0152TO RackSwitch ships with the 2-post rack mount kit.

For 4-post rack installations, the NE0152TO RackSwitch supports the optional adjustable 19-inch, 4-post rail kit and the air inlet duct (optional for the 4-post rail kit).

The following table lists rack installation options for the NE0152TO RackSwitch switches with rear to front and front to rear airflow.

Table 7. Rack installation options

| Description | Part number | Feature code |
|--|-------------|--------------|
| Lenovo RackSwitch Adjustable 19" 4 Post Rail Kit | 00D6185 | A3KP |
| Air Inlet Duct for 442 mm RackSwitch | 00D6061 | A3KR |

Physical specifications

The NE0152TO RackSwitch features the following dimensions and weight (approximate):

- Height: 44 mm (1.7 in.)
- Width: 438 mm (17.3 in.)
- Depth: 442 mm (17.4 in.)
- Maximum weight: 10 kg (22 lb)

Operating environment

The NE0152TO RackSwitch is supported in the following operating environment:

- Temperature: 0 - 40 °C (32 - 104 °F).
- Relative humidity: 10 - 90% (Non-condensing)
- Altitude: Up to 2000 m (6,561 feet)
- Acoustic noise: Less than 65 dB
- Airflow: Front-to-rear or rear-to-front cooling with variable speed fans
- Electrical input: 50 / 60 Hz, 100 - 240 V AC auto-switching
- Power consumption
 - Typical: 71 W
 - Maximum: 77 W
- Heat dissipation
 - Typical: 242 BTU/hour
 - Maximum: 261 BTU/hour

Hardware warranty services and upgrades

The NE0152TO RackSwitch comes with a 3-year Customer Replaceable Unit (CRU) hardware limited warranty with 9x5 Next Business Day (NBD) Parts Delivered. The options that are installed in the switch assume the switch's base warranty and any Lenovo warranty service upgrade for the switch.

Software support: Lenovo does not provide support for third-party software that is certified with the switch. Customers should contact a third-party software vendor directly to submit a software support request, and the software vendor will own the software-related problem resolution until closure.

Some countries might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific country. Local service teams can assist in explaining country-specific terms when needed. Examples of country-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 country-specific. Not all warranty service upgrades are available in every country. For information about Lenovo warranty service upgrade offerings that are available in your country or area, refer to the following resources:

- Service part numbers in Lenovo Data Center Solutions Configurator (DCSC):
<http://dcsc.lenovo.com/#!/services>
- Lenovo Services Availability Locator
<https://lenovocator.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 countries)
 - Advanced Service: 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select countries)
- Premier Support
Premier Support service offers direct access to Lenovo's most advanced technicians for faster troubleshooting with single point of contact for end-to-end problem resolution and collaborative third-party software support.
- 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, country-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 NE0152TO RackSwitch conforms to the following regulations:

- United States FCC Part 15, Class A
- Canada ICES-003, Issue 4, Class A
- Argentina IEC60950-1
- Australia/New Zealand AS/NZS CISPR 32, Class A
- Japan VCCI, Class A
- China CCC GB4943.1, GB9254 Class A, GB17625.1, CECP
- Taiwan BSMI CNS13438, Class A; CNS14336-1; CNS15663
- Korea KN32, Class A; KN35
- CE Mark (EN55032 Class A, EN60950-1, EN55024, EN61000-3-2, and EN61000-3-3)
- Germany TUV-GS (IEC/EN 60950-1, EK1-ITB2000)
- CSA C22.2 No. 60950-1
- CISPR 32, Class A
- IEC/UL/EN 62368-1
- IEC/UL/EN 60950-1
- Reduction of Hazardous Substances (ROHS)

Network connectivity

The following table lists the network switches with rear-to-front airflow that are offered by Lenovo that can be used with the NE0152TO RackSwitch in network connectivity solutions for ThinkSystem, System x, ThinkServer, and Flex System hosts.

Table 8. 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 |
| Lenovo ThinkSystem NE0152T RackSwitch (Rear to Front) | 7Y810011WW |
| 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 G8272 (Rear to Front) | 7159CRW |
| Lenovo RackSwitch G8296 (Rear to Front) | 7159GR6 |
| 25 Gb Ethernet switches | |
| Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front) | 7159E1X |
| Lenovo ThinkSystem NE2572O RackSwitch (Rear to Front, ONIE) | 7Z210021WW |
| 100 Gb Ethernet switches | |
| Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front) | 7159D1X |
| Lenovo ThinkSystem NE10032O RackSwitch (Rear to Front, ONIE) | 7Z210011WW |

For more information, see the list of Product Guides in the Top-of-rack Switches category:

<http://lenovopress.com/servers/options/switches#rt=product-guide>

The following table lists currently available embedded Ethernet switches and pass-thru modules that can be used with the NE0152TO RackSwitch in network connectivity solutions for Flex System hosts.

Table 9. Embedded Ethernet switches for Flex System

| Description | Part number |
|---|-------------|
| 1 Gb Ethernet switches | |
| Lenovo Flex System EN2092 1Gb Ethernet Scalable Switch | 49Y4294 |
| 10 Gb Ethernet switches and modules | |
| Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch | 00FM514 |
| Lenovo Flex System SI4091 10Gb System Interconnect Module | 00FE327 |
| Lenovo Flex System Fabric SI4093 System Interconnect Module | 00FM518 |
| 25 Gb Ethernet switches | |
| Lenovo ThinkSystem NE2552E Flex Switch | 4SG7A08868 |
| Pass-thru modules (10 GbE pass-thru connectivity) | |
| Lenovo Flex System EN4091 10Gb Ethernet Pass-thru | 88Y6043 |

For more information, see the list of Product Guides in the Blade Network Modules category:
<http://lenovopress.com/servers/blades/networkmodule#rt=product-guide>

Storage connectivity

The following table lists the external storage systems that are currently offered by Lenovo that can be used with the NE0152TO RackSwitch for external NAS or iSCSI SAN storage connectivity.

Table 10. External storage systems: DE Series

| Description | Part number | |
|---|-------------|------------|
| | Worldwide | Japan |
| Lenovo ThinkSystem DE Series Storage (iSCSI connectivity) | | |
| Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array LFF | 7Y70A003WW | 7Y701001JP |
| Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array SFF | 7Y71A002WW | 7Y711005JP |
| Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array LFF | 7Y70A004WW | 7Y701000JP |
| Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array SFF | 7Y71A003WW | 7Y711006JP |
| Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array 4U60 | 7Y77A000WW | 7Y771002JP |
| Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array LFF | 7Y74A002WW | 7Y74A002JP |
| Lenovo ThinkSystem DE4000H iSCSI Hybrid Flash Array SFF | 7Y75A001WW | 7Y75A001JP |
| Lenovo ThinkSystem DE4000F iSCSI All Flash Array SFF | 7Y76A002WW | 7Y76A002JP |
| Lenovo ThinkSystem DE6000H iSCSI Hybrid Flash Array 4U60 | 7Y80A002WW | 7Y801000JP |
| Lenovo ThinkSystem DE6000H iSCSI Hybrid Flash Array SFF | 7Y78A002WW | 7Y781000JP |
| Lenovo ThinkSystem DE6000F iSCSI All Flash Array SFF | 7Y79A002WW | 7Y79A002JP |

Table 11. External storage systems: DM Series

| Description | Part number |
|---|-------------|
| Lenovo ThinkSystem DM Series Storage (NAS or iSCSI connectivity) | |
| Lenovo ThinkSystem DM3000H Hybrid Storage Array (2U12 LFF, CTO only) | 7Y42CTO1WW |
| Lenovo ThinkSystem DM3000H 48TB (12x 4TB HDDs) (Universal SFP+) | 7Y420001EA* |
| Lenovo ThinkSystem DM3000H 48TB (12x 4TB HDDs) (10GBASE-T) | 7Y420002EA* |
| Lenovo ThinkSystem DM5000H Hybrid Storage Array (2U24 SFF, CTO only) | 7Y57CTO1WW |
| Lenovo ThinkSystem DM5000H 11.5TB (12x 960GB SSDs) (Universal SFP+) | 7Y570001EA* |
| Lenovo ThinkSystem DM5000H 11.5TB (12x 960GB SSDs) (10GBASE-T) | 7Y570002EA* |
| Lenovo ThinkSystem DM5000H 29TB (24x 1.2TB 10K HDDs) (Universal SFP+) | 7Y570003EA* |
| Lenovo ThinkSystem DM5000H 29TB (24x 1.2TB 10K HDDs) (10GBASE-T) | 7Y570004EA* |
| 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 |

* Available only in EMEA.

Table 12. External storage systems: DS Series

| Description | Part number | | |
|---|-------------|---------|---------|
| | Worldwide | Japan | PRC |
| Lenovo ThinkSystem DS Series Storage (iSCSI connectivity) | | | |
| Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit | 4599A31 | 4599A3J | 4599A3C |
| Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit | 4599A11 | 4599A1J | 4599A1C |
| Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit | 4617A31 | 4617A3J | 4617A3C |
| Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit | 4617A11 | 4617A1J | 4617A1C |
| Lenovo ThinkSystem DS6200 SFF FC/iSCSI Dual Controller Unit | 4619A11 | 4619A1J | 4619A1C |
| DS6200F 12x 400GB 10DWD SSDs, 1x 8Gb FC SFP, 512 Snapshots, Replication | 4619A1F | 4619J1F | 4619C1F |
| DS6200F 12x 800GB 3DWD SSDs, 1x 8Gb FC SFP, 512 Snapshots, Replication | 4619A2F | 4619J2F | 4619C2F |
| DS6200F 12x 1.6TB 3DWD SSDs, 1x 8Gb FC SFP, 512 Snapshots, Replication | 4619A3F | 4619J3F | 4619C3F |
| DS6200F 12x 3.84TB 1DWD SSDs, 1x 8Gb FC SFP, 512 Snapshots, Replication | 4619A4F | 4619J4F | 4619C4F |

Table 13. External storage systems: V Series and Storwize for Lenovo

| Description | Part number |
|---|-------------|
| Lenovo Storage V Series (iSCSI connectivity) | |
| Lenovo Storage V3700 V2 LFF Control Enclosure | 6535C1D |
| Lenovo Storage V3700 V2 SFF Control Enclosure | 6535C2D |
| Lenovo Storage V3700 V2 XP LFF Control Enclosure | 6535C3D |
| Lenovo Storage V3700 V2 XP SFF Control Enclosure | 6535C4D |
| 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 |
| Lenovo Storage V7000 SFF Control Enclosure 3Yr S&S PRC | 6538R11^ |
| Lenovo Storage V7000 SFF Control Enclosure 5Yr S&S PRC | 6538R21^ |
| Lenovo Storage V7000F SFF Control Enclosure 3Yr S&S PRC | 6538R1G^ |
| Lenovo Storage V7000F SFF Control Enclosure 5Yr S&S PRC | 6538R2G^ |
| IBM Storwize for Lenovo (iSCSI connectivity) | |
| 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 only in PRC.

† 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 with the NE0152TO RackSwitch in IT 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#rt=product-guide>

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo that can be used with the NE0152TO RackSwitch in IT 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 a line cord) | 46M4002 |

| Description | Part number |
|---|-------------|
| 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 a 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 a 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) | |
| DPI C13 Enterprise PDU+ (without a line cord) | 39M2816 |
| DPI Single Phase C13 Enterprise PDU (without a line cord) | 39Y8941 |
| C19 Enterprise PDUs (6x IEC 320 C19 outlets) | |
| DPI Single Phase C19 Enterprise PDU (without a 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#rt=product-guide>

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo that can be used with the NE0152TO RackSwitch in IT 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

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 NE0152TO RackSwitch, see the following resources:

- Lenovo RackSwitch InfoCenter
http://systemx.lenovofiles.com/help/topic/com.lenovo.systemx.common.nav.doc/overview_rack_switches.html
 - *Lenovo ThinkSystem NE0152TO RackSwitch Installation Guide*
 - *Lenovo ThinkSystem NE0152TO ONIE User Guide*
- Lenovo Data Center Support:
<http://datacentersupport.lenovo.com>
- Cumulus Linux User Guide
<http://docs.cumulusnetworks.com/display/DOCS/Cumulus+Linux+User+Guide>

Related product families

Product families related to this document are the following:

- [1 Gb Ethernet Connectivity](#)
- [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.
8001 Development Drive
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 2024. All rights reserved.

This document, LP1029, was created or updated on March 15, 2019.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP1029>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP1029>.

Trademarks

Lenovo and the Lenovo logo 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 <https://www.lenovo.com/us/en/legal/copytrade/>.

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

Lenovo®
Flex System
Lenovo Services
RackSwitch
System x®
ThinkServer®
ThinkSystem®

The following terms are trademarks of other companies:

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

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