

Lenovo ThinkSystem NE1064TO RackSwitch

ONIE User Guide

for Network Operating System

LenovoTM

Note: Before using this information and the product it supports, read the general information in the *Safety information and Environmental Notices* and *User Guide* documents on the *Lenovo Documentation CD*, and the *Warranty Information* document that comes with the product.

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Overview

The Open Network Install Environment (ONIE) is a small Linux-based operating system that provides an open install environment for network switches without operating systems.

ONIE enables a network switch ecosystem where end-users can choose among different Network Operating Systems (NOS). Practically, ONIE boots on a switch, discovers NOS installer images available on the local network or on a USB drive, copies the chosen image to the switch, and provides an environment where the installer can load the NOS onto the switch.

ONIE is classified as free software, meaning it can be redistributed and/or modified under the terms of version 2 of the GNU General Public License as published by the Free Software Foundation. To read the license, visit the following link:

<https://github.com/opencomputeproject/onie/blob/master/COPYING>

For more details about ONIE, go to onie.org.

Lenovo ONIE Image

To download the Lenovo ONIE image, visit the following website:

<http://support.lenovo.com/>

The ONIE images for the NE1064TO have the [ONIE] tag in their name, as follows:

Lenovo ThinkSystem NE1064T RackSwitch [ONIE] Firmware Update

Open-Source ONIE Image

To download an open-source ONIE image, go to the following link:

https://github.com/lenovo/networking-onie/tree/master/lenovo_ne1064t

The image `onie-recovery-x86_64-lenovo_ne1064t-r0.iso` can be used to install ONIE on a switch that does not already have ONIE installed.

The image `onie-updater-x86_64-lenovo_ne1064t-r0` can be used to update previously installed ONIE images on a switch.

Connecting to the NE1064TO

This section describes how to connect to the Lenovo ThinkSystem NE1064TO RackSwitch. For more details about the switch and on how to install the switch hardware, consult the *Lenovo ThinkSystem NE1064TO RackSwitch Installation Guide*.

Switch Unit

The NE1064TO is a 1U GbE switch and it can be rack-mounted in a horizontal position. The following illustrations show the features on the front and rear panels of the switch:

Figure 1. NE1064TO front panel

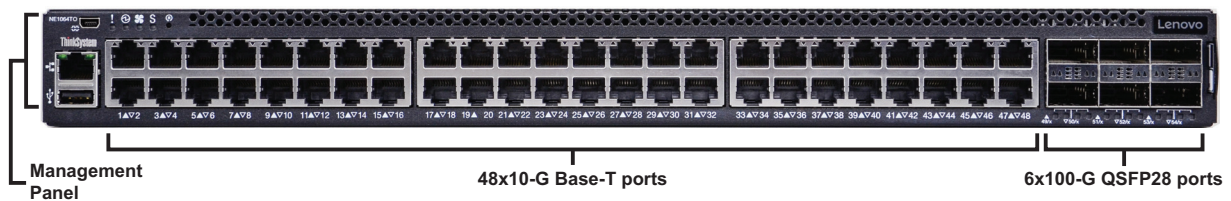


Figure 2. NE1064TO management panel detail

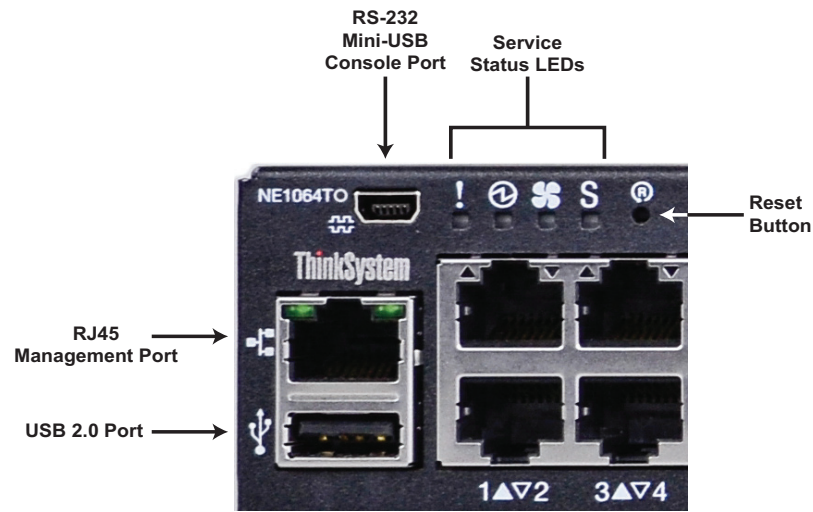
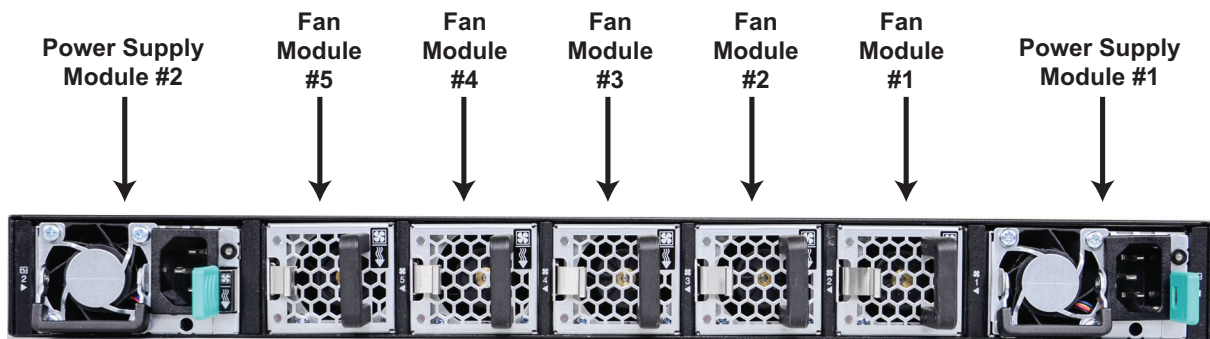


Figure 3. NE1064TO rear panel

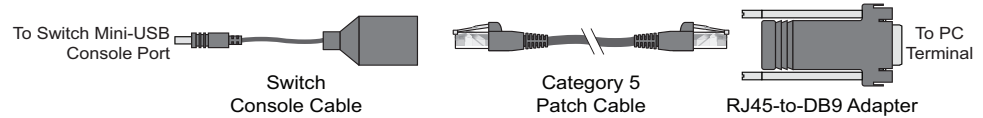


Mini-USB Serial Console Port

The mini-USB serial console port on the front management panel is available for switch console management. The port operates using RS-232 serial communications. A compatible console cable kit is included with the switch.

To connect a computer or terminal to the switch using the included kit, first connect the console cable to the mini-USB serial console port on the front panel. Connect one end of the mini-USB adapter to the RJ45 port on the console cable and the other end of the adapter to the computer or terminal (see the following illustration).

Figure 4. *Mini-USB console cable connections*



ONIE on the NE1064TO

The Lenovo ThinkSystem NE1064TO RackSwitch comes out of the box with ONIE installed on the switch.

If disabled, to enable ONIE on the switch, see [“ONIE Activation” on page 9](#).

ONIE Activation

The ThinkSystem NE1064TO RackSwitch comes out of the box with ONIE pre-installed.

If your switch runs with secure boot enabled, make sure to disable it before activating ONIE on the switch. To do so, use the following steps:

1. Connect to the device as shown in “Connecting to the NE1064TO” on page 6 and then boot up the switch.
2. During the startup procedure, press either the **Delete** or the **Esc** key to enter the Basic Input/Output System (BIOS) menu.

```
Version 2.19.1269. Copyright (C) 2019 American Megatrends, Inc.
BIOS Date: 11/26/2019 13:35:34 Ver: 0ACFK032
Press <DEL> or <ESC> to enter setup.
Entering Setup...
```

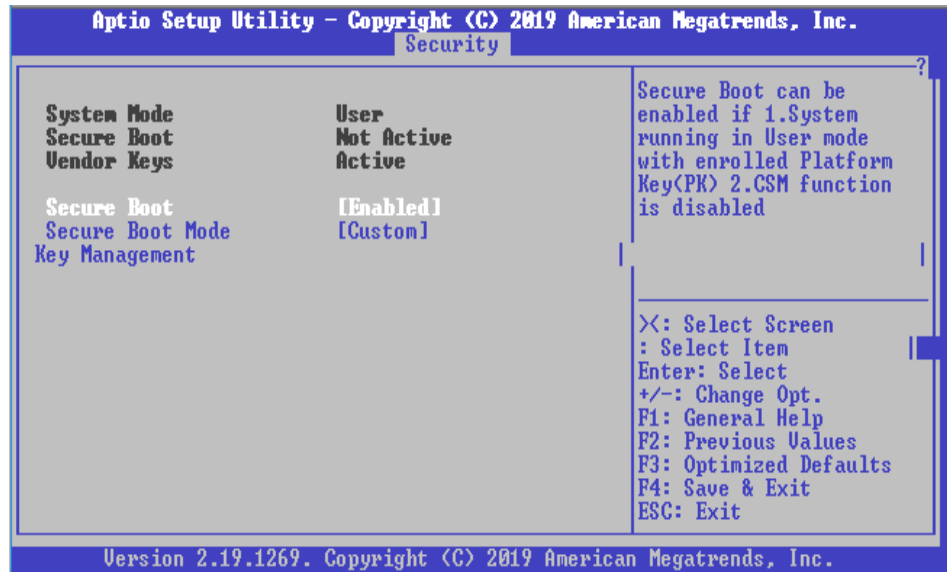
The BIOS menu appears on screen.



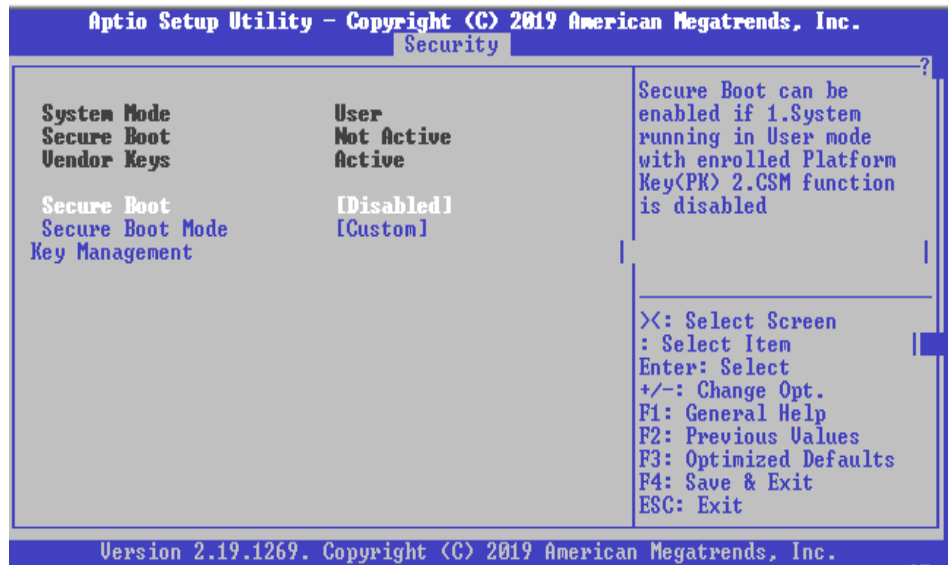
3. After entering the BIOS menu, navigate to the "Security" tab.



4. Select "Secure Boot menu".



5. Select the "Secure Boot" setting and change it from [Enabled] to [Disabled].



6. Press **F4** to save or discard the changes and exit the BIOS menu. The switch reloads and then runs with secure boot disabled.

Installing ONIE

The ThinkSystem NE1064TO RackSwitch comes out of the box with ONIE pre-installed.

If you have removed ONIE from the switch, you can use the following steps to reinstall it:

1. Download the ONIE image for the NE1064TO from the following link:

<http://support.lenovo.com/>

The ONIE image for the NE1064TO is called:

`onie-recovery-x86_64-lenovo_ne1064t-r0.iso`

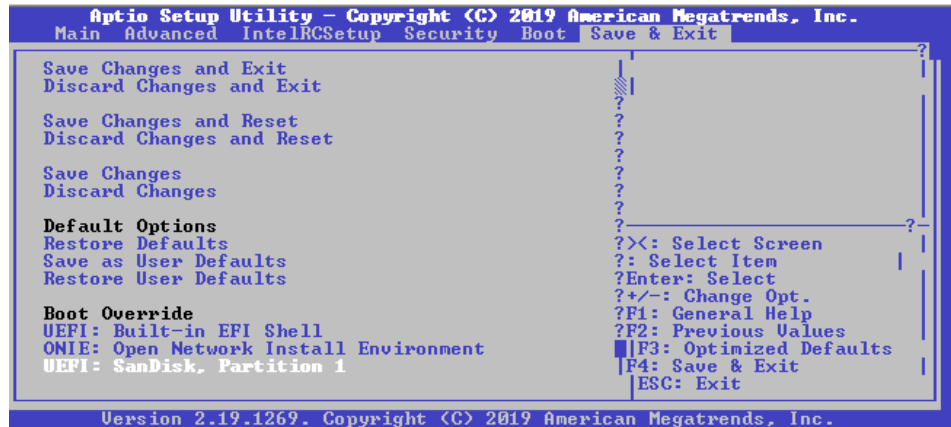
2. Create a bootable USB flash drive using the downloaded ONIE image by following these steps:

- Download and install an utility that allows you to create a bootable USB flash drive. For example, you can use Rufus:
https://rufus.ie/en_IE.html
- Launch Rufus and navigate to the “Device” setting. Select your USB drive from the drop down list.
- Navigate to “Boot Selection” and select “Disk or ISO image” from the drop down list.
- Click the “Select” button and choose the previously downloaded ONIE image.
- Click the “Start” button and accept the “Write in DD Image mode” prompt when the message appears.

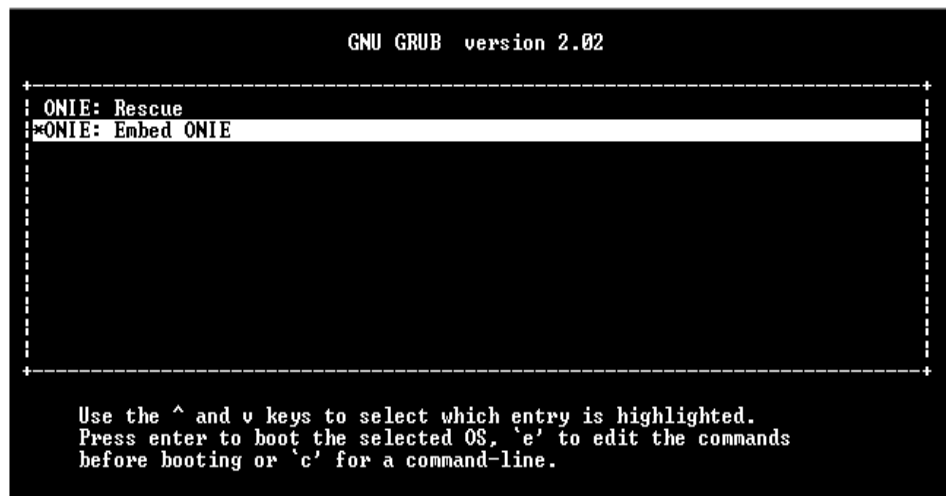
Your USB flash drive is now ready to boot ONIE.

3. Plug in the bootable USB device into the switch.
4. Connect to the switch using the mini-USB serial console port and disable “Secure Boot” as shown in [“ONIE Activation” on page 9](#), steps 1 through 6.
5. Enter the BIOS menu again, as described in [“ONIE Activation” - Step 2](#).

6. Navigate to the "Save & Exit" tab.



7. Select the "Boot Override" setting and change it by selecting your USB flash drive.
8. A menu appears presenting two ONIE install options. Select the second option, "ONIE: Embed ONIE".



ONIE boots from the USB flash drive, installs itself on the switch, and then reloads the NE1064TO.

The Grub Menu

The Grub menu is another way to access ONIE and configure the switch to boot into different ONIE modes. If the ONIE environment was successfully installed, the Grub menu will appear on the screen automatically during the switch startup process.

ONIE can be configured to run on the switch by using the arrow keys and selecting the “ONIE” option from the menu by pressing **Enter**.

After this step, select an ONIE mode from the list.

```
GNU GRUB version 2.02
+-----+
| ONIE: Install OS |
| ONIE: Rescue     |
| ONIE: Uninstall OS |
| ONIE: Update ONIE |
| ONIE: Embed ONIE  |
+-----+

Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.
The highlighted entry will be executed automatically in 3s.
```

To successfully boot into an ONIE mode from the Grub menu, you must reload the switch with Secure Boot disabled. For details on how to disable Secure Boot, see [“ONIE Activation” on page 9](#).

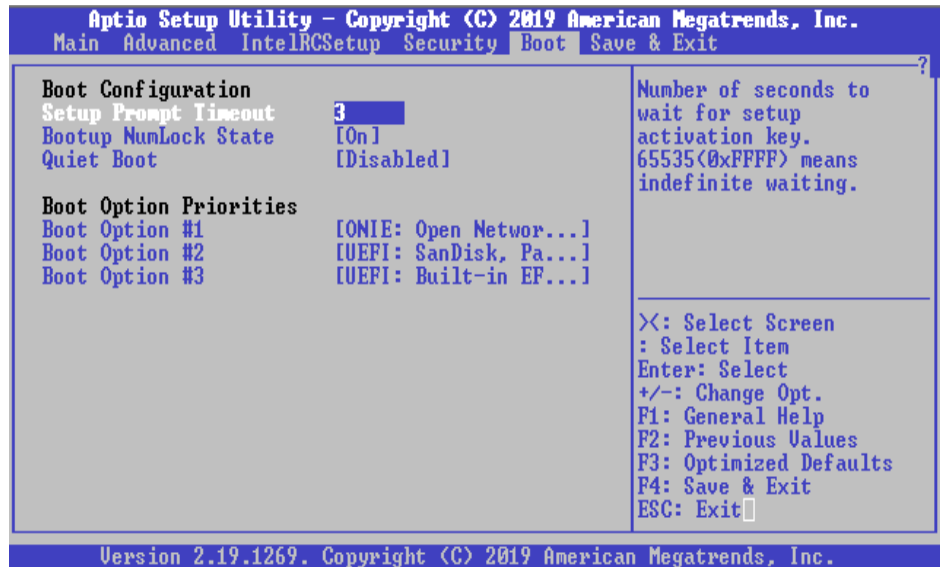
After selecting an ONIE mode, the switch automatically enters that mode.

The BIOS Menu

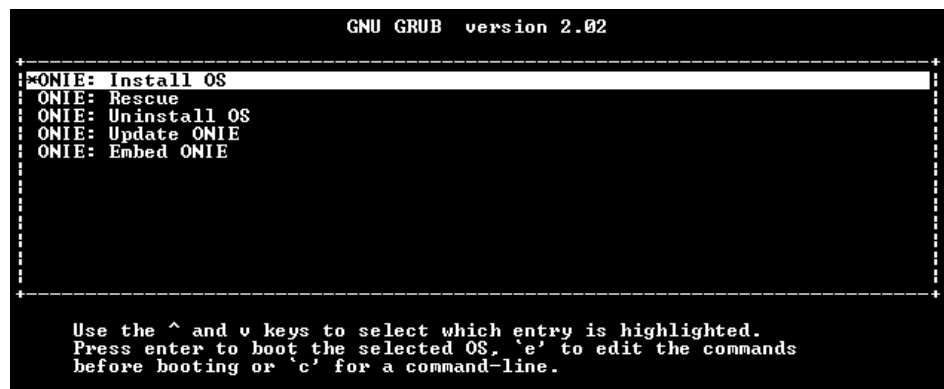
The Basic Input/Output System (BIOS) menu is another way to access ONIE and configure the switch to boot into different ONIE modes.

Use the following steps to select an ONIE mode:

1. Disable “Secure Boot” as shown in “[ONIE Activation](#)”, steps 1 through 5.
2. Press **Esc**, navigate to the “Boot” tab and select the “Boot Option #1” setting and change it to [ONIE: Open Network Install Environment].



3. Press **F4** to save or discard the changes and exit the BIOS menu. The switch reloads and then runs with secure boot disabled and boots ONIE.
4. A menu appears from which you can select an ONIE mode.



The switch automatically enters the selected ONIE mode.

Uninstalling the Network OS

If you wish to run another network operating system (NOS), you can uninstall the current *Network OS* by using the ONIE Uninstall mode.

Notes:

- If ONIE is not installed on the switch, you must first set it up on the networking device. For more details, see [“Installing ONIE” on page 12](#).

After entering ONIE Uninstall mode, the following is displayed:

```
ONIE: OS Uninstall Mode ...
Platform  : x86_64-lenovo_ne1064t-r0
Version   : master-201912190043.0.1
Build Date: 2019-12-19T00:43-0800
Info: Mounting kernel filesystems... done.
Info: Mounting ONIE-BOOT on /mnt/onie-boot ...
Info: Mounting EFI System on /boot/efi ...
Info: BIOS mode: UEFI
Info: Using eth0 MAC address: 7c:d3:0a:6e:5b:00
Info: eth0: Checking link... up.
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: 33.0.0.1 / 255.255.255.0
Starting: klogd... done.
Starting: dropbear ssh daemon... done.
Starting: telnetd... done.

discover: Uninstall mode detected. Running uninstaller.
Erasing internal mass storage device: /dev/sda3 (128MB)
  Percent complete: 100%
Erase complete.

Deleting partition 3 from /dev/sda
Erasing internal mass storage device: /dev/sda4 (3072MB)
  Percent complete: 100%
Erase complete.

Deleting partition 4 from /dev/sda
Erasing internal mass storage device: /dev/sda5 (3072MB)
  Percent complete: 100%
Erase complete.

Deleting partition 5 from /dev/sda
Erasing internal mass storage device: /dev/sda6 (8192MB)
  Percent complete: 20%
```

Once the NOS uninstall process is complete, the switch is reloaded and configured to boot in ONIE Install mode.

Appendix A. Getting Help and Technical Assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

Use this information to obtain additional information about Lenovo and Lenovo products, and determine what to do if you experience a problem with your Lenovo system or optional device.

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for the System x, Flex System, and NeXtScale System products.

Before you call, make sure that you have taken these steps to try to solve the problem yourself.

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call.

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check the [Lenovo Support portal](#) to make sure that the hardware and software is supported by your product., and where you can check for information to help you solve the problem.
- Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
 - Hardware and Software Maintenance agreement contract numbers, if applicable
 - Machine type number (if applicable—Lenovo 4-digit machine identifier)
 - Model number
 - Serial number
 - Current system UEFI and firmware levels
 - Other pertinent information such as error messages and logs
- Start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Appendix B. Notices

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Linux is a registered trademark of Linus Torvalds.

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You may obtain the corresponding machine- readable copy for any such open source software licensed under the General Public License and/or the Lesser General Public License (or any other license requiring us to make a written offer to provide corresponding source code to you) from Lenovo for a period of three years without charge except for the cost of media, shipping, and handling, upon written request to Lenovo. This offer is valid to anyone in receipt of this Lenovo Switch. You may send your request in writing to the address below accompanied by a check or money order for \$5 to:

Lenovo Legal Department
Attn: Open Source Team / Source Code Requests
8001 Development Dr.
Morrisville, NC 27560

Please include both a “ONIE” Release version and model number or Machine Type (MT) of your Lenovo Switch as part of your request. Be sure to provide a return address.

The open source software is distributed in hope it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See for example the GNU General Public License and/or the Lesser General Public License for more information.

Visit <https://datacentersupport.lenovo.com/us/en/> and enter the model number or MT for your switch to view additional information regarding licenses, acknowledgments and required copyright notices for the open source software used on your switch.

Important Notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1,024 bytes, MB stands for 1,048,576 bytes and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

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Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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<http://www.lenovo.com/recycling>

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Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility..

Contaminant	Limits
Particulate	<ul style="list-style-type: none"> The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹. Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. The deliquescent relative humidity of the particulate contamination must be more than 60%². The room must be free of conductive contamination such as zinc whiskers.
Gaseous	<ul style="list-style-type: none"> Copper: Class G1 as per ANSI/ISA 71.04-1985³ Silver: Corrosion rate of less than 300 Å in 30 days

¹ ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

² The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

³ ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Telecommunication Regulatory Statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic Emission Notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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Industry Canada Class A Emission Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de Conformité à la Réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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European Union - Compliance to the Electromagnetic Compatibility Directive

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This product has been tested and found to comply with the limits for Class A equipment according to European Standards harmonized in the Directives in compliance. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.



Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: „Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.“

Nach dem EMVG: „Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.“ (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japan VCCI Class A Statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) Statement

高調波ガイドライン適合品

Japan Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guidelines (products less than or equal to 20 A per phase)

高調波ガイドライン準用品

Japan Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guidelines with Modifications (products greater than 20 A per phase).

Korea Communications Commission (KCC) Statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

