



# Lenovo Converged System for Infrastructure Installation and User's Guide



## **Note**

Before using this information and the product it supports, read the general information in Appendix B “Notices” on page 69, the *Warranty Information* document, and the *Safety Information* and the *Environmental Notices and User Guide* documents on the *Documentation CD*.

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

**在安装本产品之前，请仔细阅读 Safety Information (安全信息)。**

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

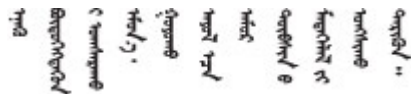
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཇུས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་  
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen  
canjbinj soengq cungj vahgangj ancien siusik.

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## Safety statements

These statements provide the caution and danger information that is used in this documentation.

**Important:** Each caution and danger statement in this documentation is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled Statement 1, translations for that caution statement are in the *Safety Information* document under Statement 1.

Be sure to read all caution and danger statements in this documentation before you perform the procedures. Read any additional safety information that comes with your system or optional device before you install the device.

### Statement 1





**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

**To Connect:**

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

**To Disconnect:**

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

### **Rack Safety Information, Statement 2**



- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Always install the heaviest devices in the bottom of the rack cabinet.**





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# Chapter 1. Lenovo Converged System for Infrastructure

The Lenovo Converged System for Infrastructure offerings combine storage, networking, virtualization, and management into a single infrastructure.

The Lenovo Converged System offerings are provided in several configurations and vary over time as technology and offerings are increased. Each configuration is composed of hardware and software options. Hardware includes compute nodes, management nodes, network, storage, and all necessary small form-factor pluggable (SFP) devices and cables that are installed before delivery. Software includes management software, operating systems, and virtualization software on non-ITE nodes. Optionally, onsite services provides initial configuration. In addition, all Ethernet, Fibre Channel, and converged networking switches are pre-configured from the factory, along with zoning when Storwize V7000 storage is included in the order. The following list shows configurations that are available.

- Lenovo Converged System configuration 5V: Dual CN4093 10 Gb converged scalable switches with the Storwize V7000 Control Enclosure (single chassis)
- Lenovo Converged System configuration 7V: Dual EN4093R 10 Gb Ethernet scalable switches and dual FC5022 16 Gb SAN Fibre Channel Switches with the Storwize V7000 Control Enclosure (single chassis)

Each system consists of consists of one or more Flex System Enterprise Chassis configured with Flex System x86 compute nodes, select Flex System switches and, if selected, Storwize V7000 storage. Included services provide some initial system configuration assistance. Services also can include skills transfer to the client personnel.

**Note:** The Lenovo Converged System is fully configured in the factory when Storwize V7000 storage is included in the order. Lenovo services provides further integration during system installation. To ensure configuration success, the default shipped configuration must not be changed until these services are completed by Lenovo.

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## Lenovo Converged System configurations

The Lenovo Converged System configurations are optimized for scalable cloud deployments and provide built-in redundancy to support your critical applications and cloud services.

### Overview of the Lenovo Converged System

The Lenovo Converged System configurations are optimized for scalable cloud deployments. These configurations have built-in redundancy for high-reliability and operation to support critical applications and cloud services. For the Lenovo Converged System offerings, the Ethernet and SAN networks are fully redundant. Converged networking is available in some configurations.

The Lenovo Converged System consists of the following components:

- Flex System Enterprise Chassis
- Flex System 42U 1100 mm dynamic rack (may be omitted for systems ordered without rack storage)
- Flex System Manager management software, preinstalled with management software and licenses for software activation
- Networking and I/O switches
- Available IBMStorwize V7000 Control Enclosure
- Compute nodes with Intel Xeon processors
- Minimum of one compute node

- Three-phase power or optional 30/32 Amp single phase power
- Choice of the following software:
  - Operating system: MicrosoftWindows, Red Hat Enterprise Linux, or SUSE Linux Enterprise Server
  - Virtualization software: kernel virtual machine (KVM), VMware ESX, or Microsoft Hyper-V
- Complete preintegrated software and hardware
- One-year service and support agreement
- Lab services at your site

## Identify your Lenovo Converged System configuration

Learn how to identify which configuration you have.

Table 1. Identify your Lenovo Converged System configuration

Example configuration	You have the following configuration	See the following information
5V	Storwize V7000 and dual 10 Gb converged scalable switches (single chassis) <b>Note:</b> There are no top-of-rack switches with this configuration.	“Example configuration 5V: Dual CN4093 10 Gb converged scalable switches with a Storwize V7000 Control Enclosure (single chassis)” on page 2
7V	Storwize V7000, dual 10 Gb Ethernet scalable switches, and dual 16 Gb SAN Fibre Channel Switches (single chassis) <b>Note:</b> There are no top-of-rack switches with this configuration.	“Example configuration 7V: Dual 10 Gb Ethernet scalable switches and dual 16 Gb SAN Fibre Channel Switches with a Storwize V7000 Control Enclosure (single chassis)” on page 5

### Example configuration 5V: Dual CN4093 10 Gb converged scalable switches with a Storwize V7000 Control Enclosure (single chassis)

The Lenovo Converged System example configuration 5V consists of the Storwize V7000 and dual Flex System 10 Gb Converged Scalable Switches. This configuration is also known as configuration 5V.

**Note:** There are no top-of-rack switches with this configuration.

The following figure shows the front and rear view of example configuration 5V for the Lenovo Converged System single chassis configuration.

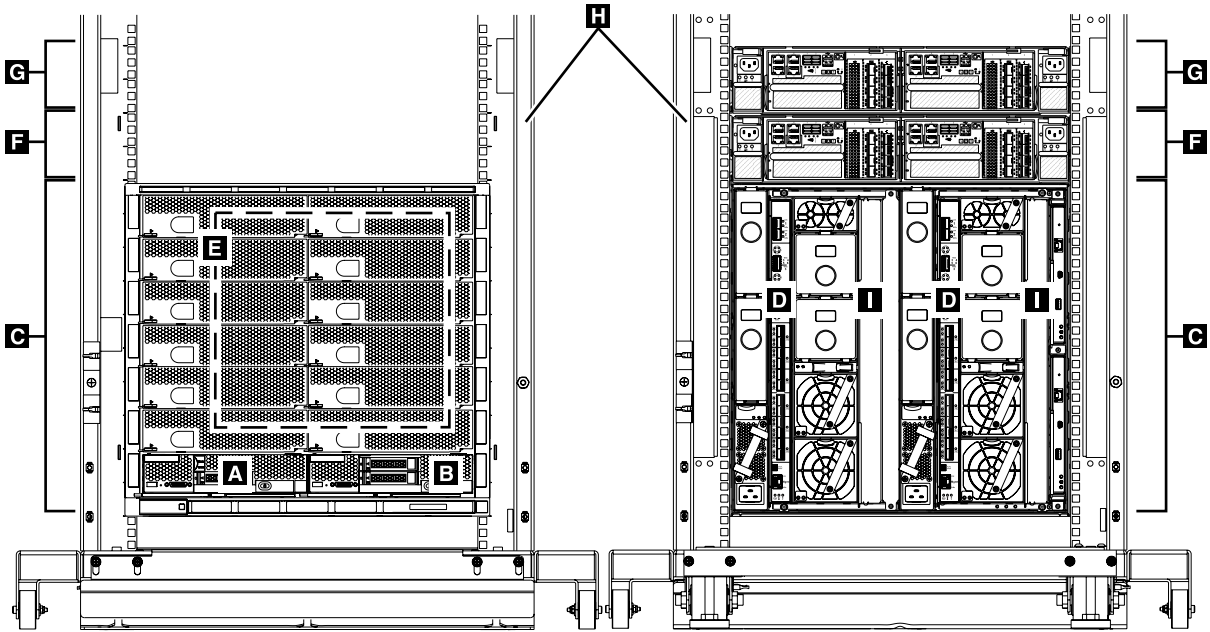


Figure 1. Front and rear view of example configuration 5V for the Lenovo Converged System single chassis configuration

Table 2. Hardware for the Lenovo Converged System example configuration 5V

Index letter	Machine type, model, or feature code	Description	Quantity
A	8731-AC1	Flex System Manager	1
B	x220 Type 7906, x222 Type 7916, x240 Type 8737, x240 M5 Type 9532, x440 Type 7167, x480 or x880 Type 7903	Compute nodes	Minimum 1 per chassis, then add until node bays are full
C	8721-HC1	Flex System chassis	1
D	CN4093	Flex System 10 Gb Converged Scalable Switch  See Table 3 “Mezzanine cards for the Lenovo Converged System example configuration 5V” on page 4 for mezzanine card options.	2
E	-	Node bay fillers	1 in each unused node bay
F	6195-524	Storwize V7000 Control Enclosure	Minimum 0, maximum 2
G	6195-24F	Storwize V7000 Expansion Enclosure	Optional *. Up to 20. expansion enclosures per control enclosure.

Table 2. Hardware for the Lenovo Converged System example configuration 5V (continued)

Index letter	Machine type, model, or feature code	Description	Quantity
H	9363-RC4	Lenovo Converged System 42U Rack	0 or 1*
	9363-RC4	Lenovo Converged System (overflow 42U rack)	Optional**
<p>* A Lenovo Converged System 42U rack is mandatory when the Storwize V7000 Control Enclosure is included but can be deleted from systems ordered without rack storage.</p> <p>** When you add Storwize V7000 Expansion Enclosures to your configuration, a Lenovo Converged System 42U rack will be added to your order when a 2nd (overflow) rack is required.</p>			

Table 3. Mezzanine cards for the Lenovo Converged System example configuration 5V

Machine type, model, or feature code	Description	Quantity
The following mezzanine cards can be ordered with the Flex System 10 Gb Converged Scalable Switch:		
A4K2	Flex System CN4054 10 Gb Virtual Fabric Adapter. <b>Note:</b> This mezzanine card is used for an LOM-less system board, or when extra NIC ports are needed. These include: x220 (7906-AC1), x240 (8737-AC1), and x440 (7917-AC1).	1 or 2
A1R0	Flex System Virtual Fabric Adapter Upgrade to include iSCSI and FCoE. <b>Note:</b> A1R0 is pre-applied to each server that contains A1R1.	1 or 2
A2TD	Flex System Embedded 10 Gb Virtual Fabric Upgrade (Feature on Demand to provide FCoE and iSCSI support). <b>Note:</b> A2TD for LOM is applicable to x222 (7916-AC1) and x240 (8737-AC1).	1 or 2
<b>Note:</b> You can have two mezzanine cards per full wide compute node. Or, you can have one mezzanine card per half wide compute node.		

Table 4. Storwize V7000 storage software for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
5641-CBC	X		Storwize V7000 Software, v6.4.0, or later (1)	5639-SM3 - 1-year base software maintenance agreement (SWMA). Optional 3-year SWMA.
5641-XBC		X	Real-time Compression (RTC) Software, v6.4.0, or later (1)	5639-XXX - 3-year RTC SWMA
1. See the documentation that comes with the Storwize V7000 storage system for more information.				

Table 5. Integrated Management software for Flex System Manager for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
5641-F01	X		<p>Flex System Manager management software Advanced, 1-year Software Maintenance Agreement</p> <p>EB31 (Platform Manager software bundle indicator) is required with every Flex System Manager, and EB32 (virtualization manager software bundle indicator) requires EB31 in the same quantities.</p> <ul style="list-style-type: none"> <li>If SCE is ordered on X architecture compute nodes, then the EB31 is required and defaults to EB32.</li> </ul>	5641-F02 - 3-year SWMA (optional)

Table 6. Integrated Virtualization software for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
AB0B		X	ESXi USB Hypervisor Key (VMware version 5, update 1) (for X architecture compute nodes)	

Table 7. Service and support for the Lenovo Converged System

Feature code	Description
	Software maintenance (SWMA):
	3-years, 9 a.m. x 5 p.m.
	Hardware maintenance (HWMA):
	3-years, 9 a.m. x 5 p.m., next business day service
	Maintenance and Technical Support (MTS) offering:
	3-years with 24x7 same business day
	3-years with two microcode analysis per year
	3-years with 24x7 account advocate

**Example configuration 7V: Dual 10 Gb Ethernet scalable switches and dual 16 Gb SAN Fibre Channel Switches with a Storwize V7000 Control Enclosure (single chassis)**

The example configuration 7V consists of an IBM Storwize V7000 Control enclosure, dual Flex System EN4093R 10 Gb Ethernet Scalable Switches and dual FC5022 16 Gb SAN Fibre Channel Scalable Switches. This configuration is also known as configuration 7V.

**Note:** There are no top-of-rack switches with this configuration.

The following figure shows the front and rear view of example configuration 7V for the Lenovo Converged System single chassis configuration.

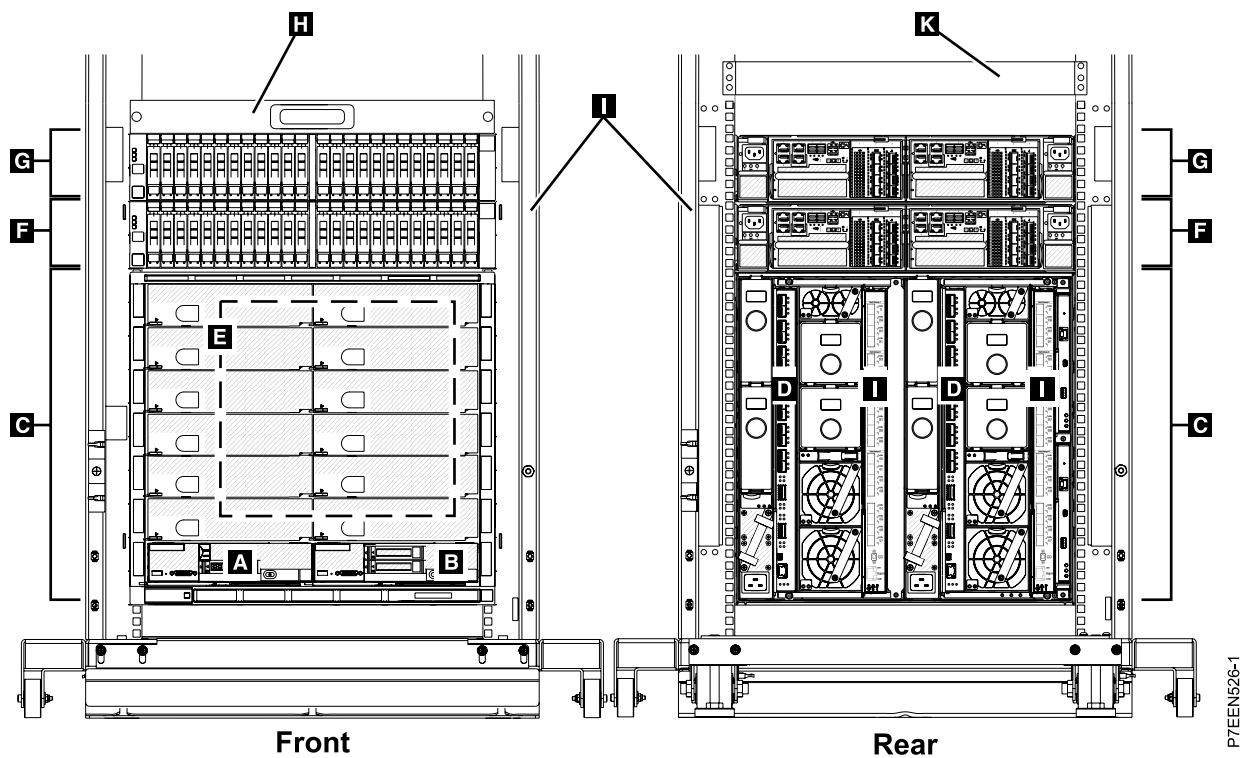


Figure 2. Front and rear view of example configuration 7V for the Lenovo Converged System single chassis configuration

Table 8. Hardware for the Lenovo Converged System example configuration 7V

Index letter	Machine type, model, or feature code	Description	Quantity
A	8731-AC1	Flex System Manager	1
B	x220 Type 7906, x222 Type 7916, x240 Type 8737, x240 M5 Type 9532, x440 Type 7167, x480 or x880 Type 7903	Compute nodes	Minimum 1 per chassis, then add until node bays are full
C	8721-HC1	Flex System chassis	1
D	EN4093R	Flex System EN4093R 10 Gb Ethernet Scalable Switch  See Table 9 “Mezzanine cards for the Lenovo Converged System example configuration 7V” on page 7 for mezzanine card options.	2
E	-	Node bay fillers	1 in each unused node bay
F	6195-524	Storwize V7000 Control Enclosure	0, 1 or 2
G	6195-24F	Storwize V7000 Expansion Enclosure	Optional *. Up to 20. expansion enclosures per control enclosure.

Table 8. Hardware for the Lenovo Converged System example configuration 7V (continued)

Index letter	Machine type, model, or feature code	Description	Quantity
H	FC5022	Flex System FC5022 16 Gb SAN Fibre Channel Scalable Switch  See Table 9 “Mezzanine cards for the Lenovo Converged System example configuration 7V” on page 7 for mezzanine card options.	2
I	9363-RC4	Lenovo Converged System 42U Rack	0 or 1*
	9363-RC4	Lenovo Converged System (overflow 42U rack)	Optional**
<p>* A Lenovo Converged System 42U rack is mandatory when the Storwize V7000 Control Enclosure is included but can be deleted from systems ordered without rack storage.</p> <p>** When you add Storwize V7000 Expansion Enclosures to your configuration, a Lenovo Converged System 42U rack will be added to your order when a 2nd (overflow) rack is required.</p>			

Table 9. Mezzanine cards for the Lenovo Converged System example configuration 7V

Machine type, model, or feature code	Description	Quantity
The following mezzanine cards can be ordered with the Flex System EN4093R 10 Gb Ethernet Scalable Switch:		
A4K2	Flex System CN4054 10 Gb Virtual Fabric Adapter. <b>Note:</b> This mezzanine card is used for an LOM-less system board, or when extra NIC ports are needed. These include: x220 (7906-AC1), x240 (8737-AC1), and x440 (7917-AC1).	1 or 2
The following mezzanine cards can be ordered with the Flex System FC5022 16 Gb SAN Fibre Channel Scalable Switch:		
A3HU	x222 compute node: Flex System FC5024D 4-port 16 Gb FC Adapter	1
A45R	Flex System FC 5052 2-port 16 Gb FC Adapter	1 for x240, x480, and x880 or 2 for x440
A2N5	x240 and x440 compute nodes: Flex System FC3052 2-port 8 Gb FC Adapter	1 for x240 or 2 for x440
<b>Note:</b> You can have two mezzanine cards per full wide compute node. Or, you can have one mezzanine card per half wide compute node.		

Table 10. Storwize V7000 storage software for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
5641-CBC	X		Storwize V7000 Software, v6.4.0, or later (1)	5639-SM3 - 1-year base software maintenance agreement (SWMA). Optional 3-year SWMA.
5641-XBC		X	Real-time Compression (RTC) Software, v6.4.0, or later (1)	5639-XXX - 3-year RTC SWMA
1. See the documentation that comes with the Storwize V7000 storage system for more information.				

Table 11. Integrated Management software for Flex System Manager for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
5641-F01	X		<p>Flex System Manager management software Advanced, 1-year Software Maintenance Agreement</p> <p>EB31 (Platform Manager software bundle indicator) is required with every Flex System Manager, and EB32 (virtualization manager software bundle indicator) requires EB31 in the same quantities.</p> <ul style="list-style-type: none"> <li>If SCE is ordered on X architecture compute nodes, then the EB31 is required and defaults to EB32.</li> </ul>	5641-F02 - 3-year SWMA (optional)

Table 12. Integrated Virtualization software for the Lenovo Converged System

Feature code	Base	Expansion	Description	Feature code - Service agreement
AB0B		X	ESXi USB Hypervisor Key (VMware version 5, update 1) (for X architecture compute nodes)	



Table 13. Service and support for the Lenovo Converged System

Feature code	Description
Software maintenance (SWMA):	
	3-years, 9 a.m. x 5 p.m.
Hardware maintenance (HWMA):	
	3-years, 9 a.m. x 5 p.m., next business day service
Maintenance and Technical Support (MTS) offering:	
	3-years with 24x7 same business day
	3-years with two microcode analysis per year
	3-years with 24x7 account advocate



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## **Chapter 2. Installing and configuring your Lenovo Converged System**

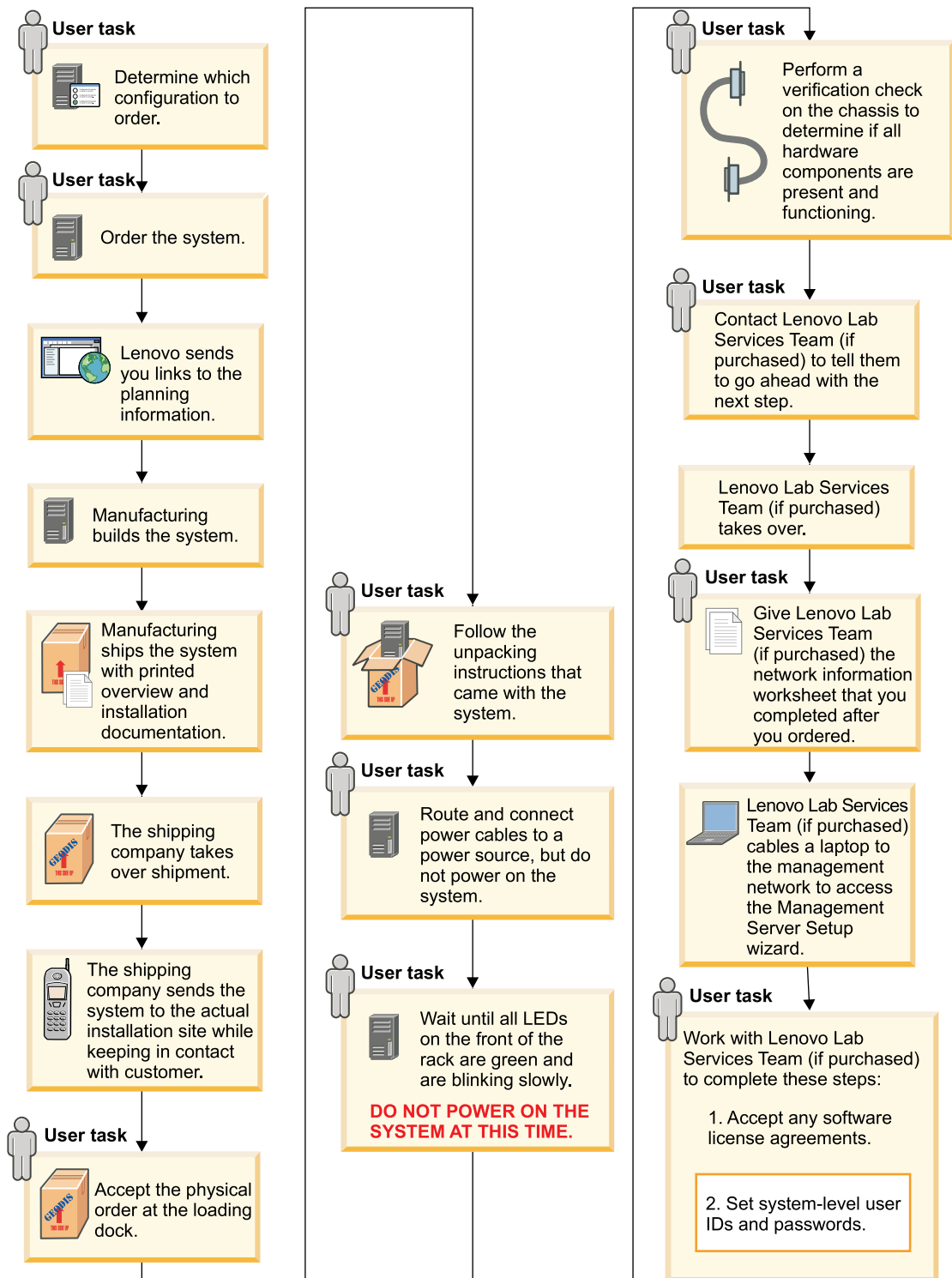
Use this information to install and configure the Lenovo Converged System. Please note that the latest version of this document is maintained online.

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### **Scenario: Installing the Lenovo Converged System**

After you order a Lenovo Converged System, multiple groups ship, install, and configure your system.

The following figure shows the flow of events in a typical installation of the Lenovo Converged System.



P7EEL582-0

Figure 3. Order and installation sequence

A typical installation scenario follows these steps:

1. You determine which configuration to order and then order the system.
2. Lenovo sends you links to the planning information.
3. Lenovo builds and ships your system.

4. A third party takes over shipment.
  5. The shipping company sends the system to your installation site and maintains contact with you.
  6. You accept the shipment.
  7. You follow the unpacking instructions that came with the system.
  8. You route and connect power cables to a power source, but do not power on the system.
  9. You wait until all LEDs on the front of the rack are green and are blinking slowly.
  10. You perform a verification check on the chassis to determine if all hardware components are present and functioning.
  11. You contact a Services Team representative to request that they go ahead with the next step.
  12. You meet with a Services Team representative to complete the system configuration.
  13. A Services Team representative cables a laptop to the management network to access the Management Server Setup wizard.
  14. You work with a Services Team representative to complete the following tasks:
    - Accept software license agreements
    - Set system-level user IDs and passwords
  15. A Services Team representative helps you learn more about configuring and using your system.
- 

## **Performing tasks associated with the 9363-RC4 rack**

You must remove the 9363-RC4 rack outriggers, position the rack, install the system covers, and install the rack stabilizer bracket before you install the system.

- Step 1. Remove both outriggers (also known as rack side stabilizing brackets) from the sides of the rack by removing the four bolts on each side with the 6 mm hex wrench that is provided. If you plan to move the rack cabinet to another location, save the outriggers for use in the future.

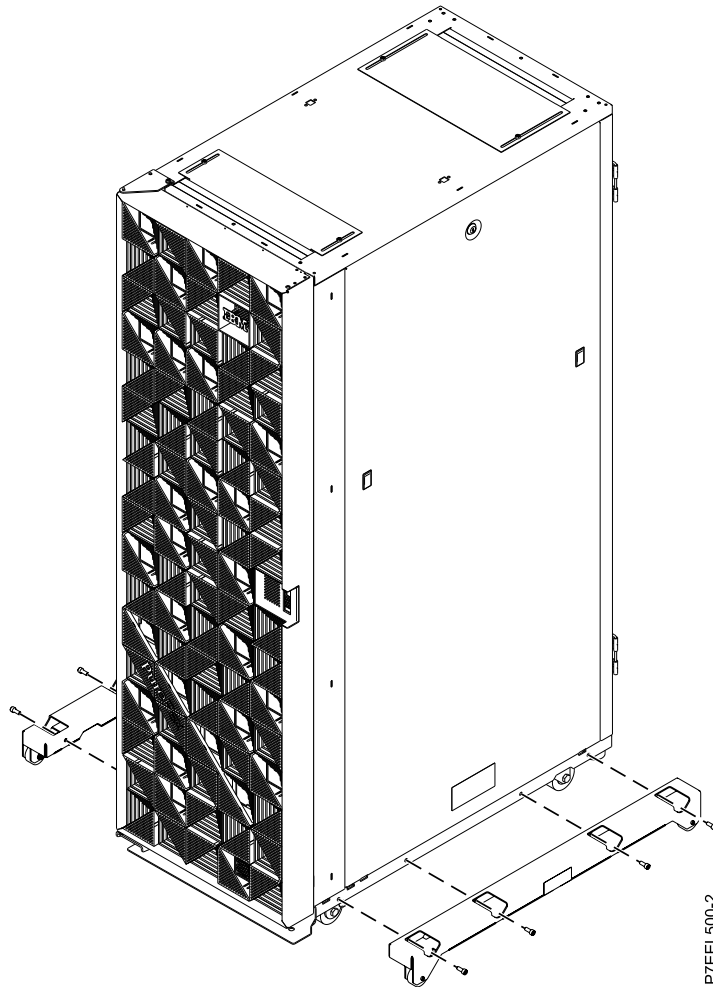


Figure 4. Removing the outriggers

- Step 2. Position the rack where you want it to be installed.
- Step 3. Use the open-end wrench that comes with the hardware kit to lower each of the four leveling pads just enough so that they touch the floor. The rack casters support the weight of the rack cabinet. The pads prevent the rack from rolling.
- Step 4. Ensure that the power cords are securely attached to each power distribution unit (PDU).
- Step 5. Install the front, back, and side covers onto the system.
- Step 6. Install the recirculation prevention plate and the front stabilizer bracket on the front of the rack cabinet. The recirculation prevention plate uses the same four screws and holes in the rack as the front stabilizer bracket.
  - a. Align the four holes in the recirculation prevention plate with the four holes in the rack cabinet.
  - b. Position the front stabilizer bracket in front of the recirculation prevention plate and align the screw holes.
  - c. Use the four screws and the hex wrench that come in the hardware kit to secure the front stabilizer bracket and recirculation prevention plate (also referred to as the *air baffle*) to the rack cabinet.

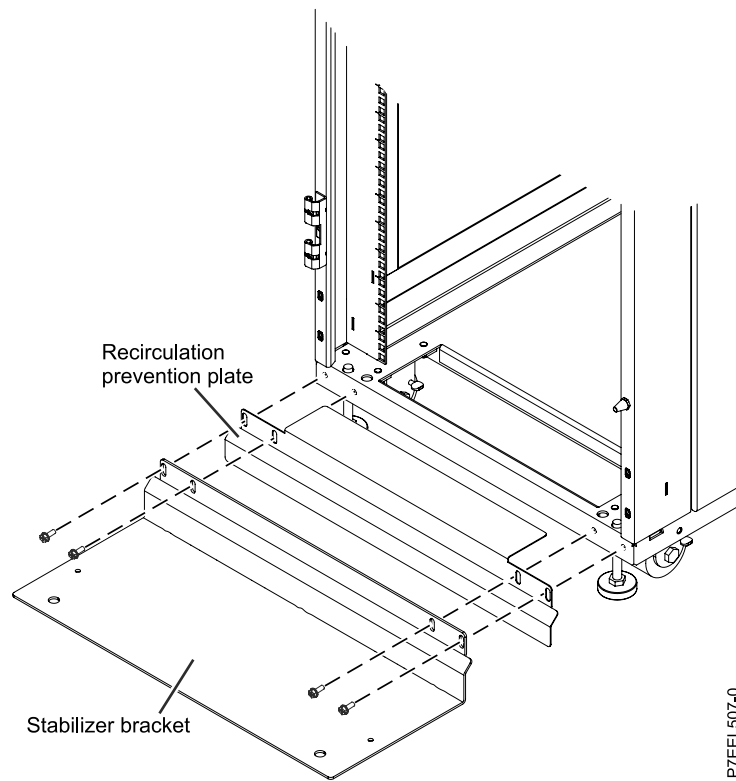


Figure 5. Installing the recirculation plate and front stabilizer bracket

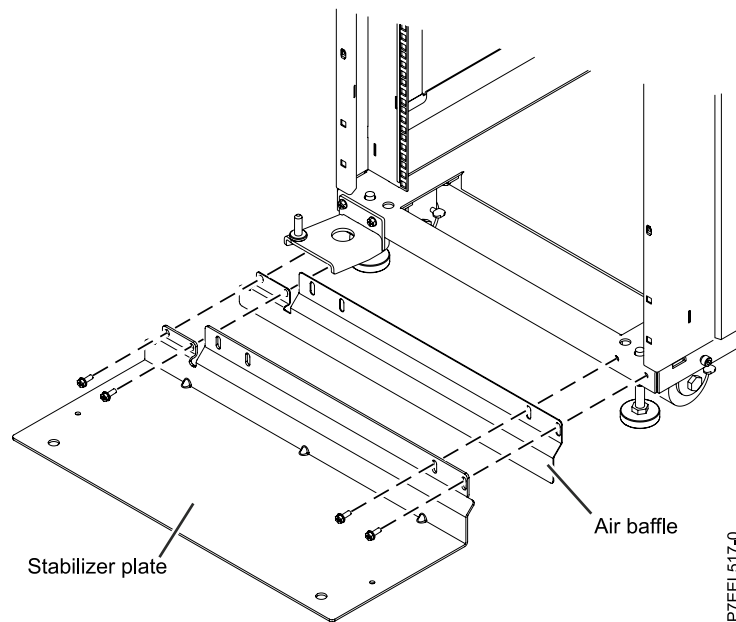


Figure 6. Installing the air baffle and front stabilizer bracket using the Rack Door Kit

- d. Tighten the screws until the stabilizer bracket is flush against the recirculation prevention plate.

---

## Verifying that the Storwize V7000 control enclosure is cabled between racks

If you ordered your Lenovo Converged System with Storwize V7000 storage, make sure that the rack-to-rack SAS cables are connected between the Storwize V7000 control enclosure in rack 1 to the Storwize V7000 expansion enclosure in rack 2.

- Step 1. If you have a second rack, and if the second rack has an v V7000 expansion enclosure, make sure the rack-to-rack SAS cables are connected between the v V7000 control enclosure in the system rack to the Storwize V7000 expansion enclosure in the expansion rack as shown in figure Figure 7 “Cabling between racks” on page 17. For more information about connecting the Storwize V7000 SAS cables to the Storwize V7000 expansion enclosures, see [http://publib.boulder.ibm.com/infocenter/storwize/ic/index.jsp?topic=%2Fcom.ibm.storwize.v7000.doc%2Ftbrd\\_qisascables\\_b4jtyu.html](http://publib.boulder.ibm.com/infocenter/storwize/ic/index.jsp?topic=%2Fcom.ibm.storwize.v7000.doc%2Ftbrd_qisascables_b4jtyu.html).



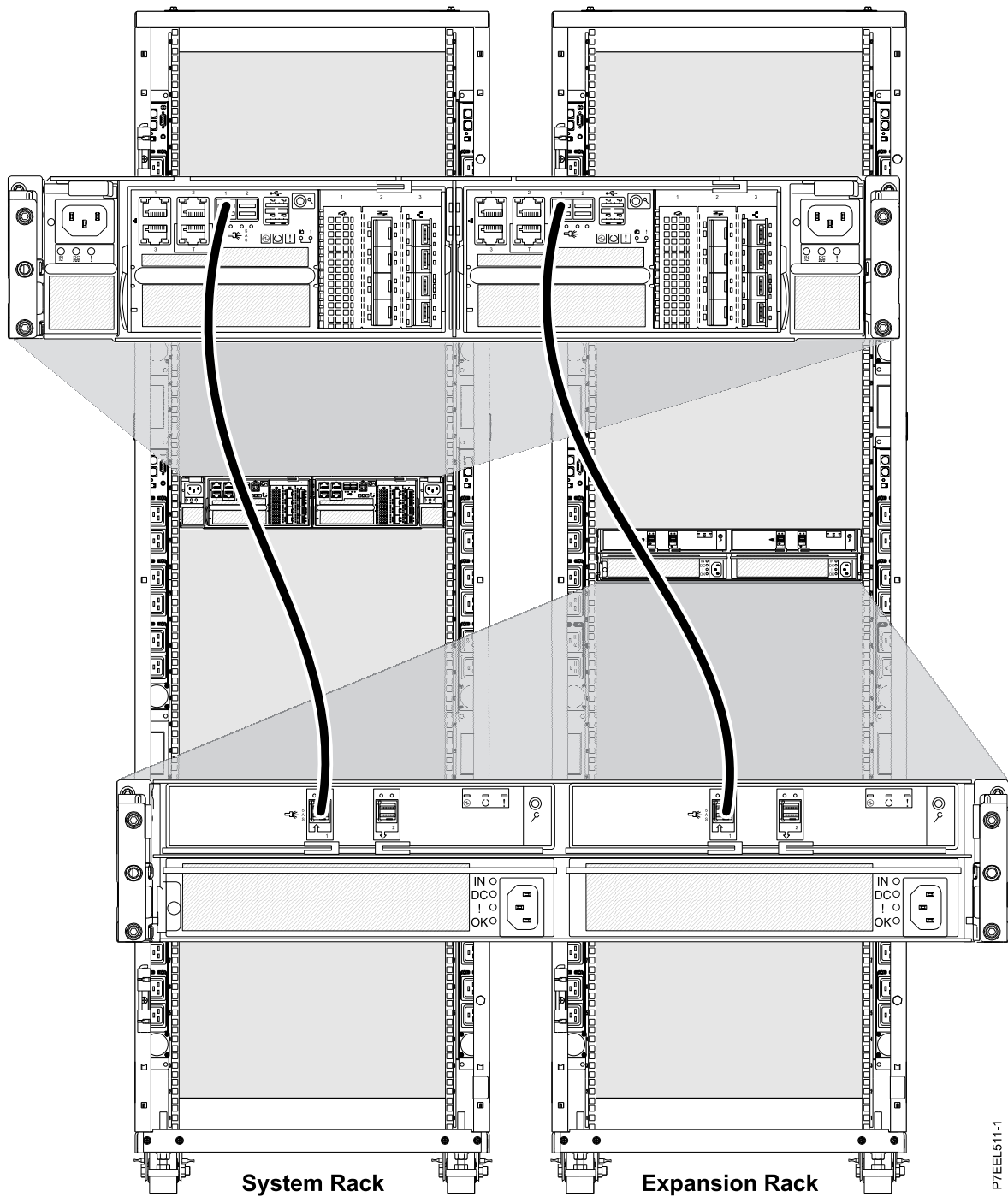


Figure 7. Cabling between racks

## Connecting power cords

You must connect the power cords to the power source before configuring the system.

After you perform this task, do not press the power button on the Flex System Manager (FSM). The FSM power button is shown below.

Do the following to connect power cords:

Step 1. Plug the system power cord and the power cords for any other attached devices into the alternating current (AC) power source.

**Note:** If you have difficulty plugging the power cord into the PDU on the right side of the rack, loosen the PDU fasteners enough to allow the PDU to slide a few millimeters to the left and then tighten the fasteners.

Step 2. Wait at least 10 minutes for the system to complete its power application process.

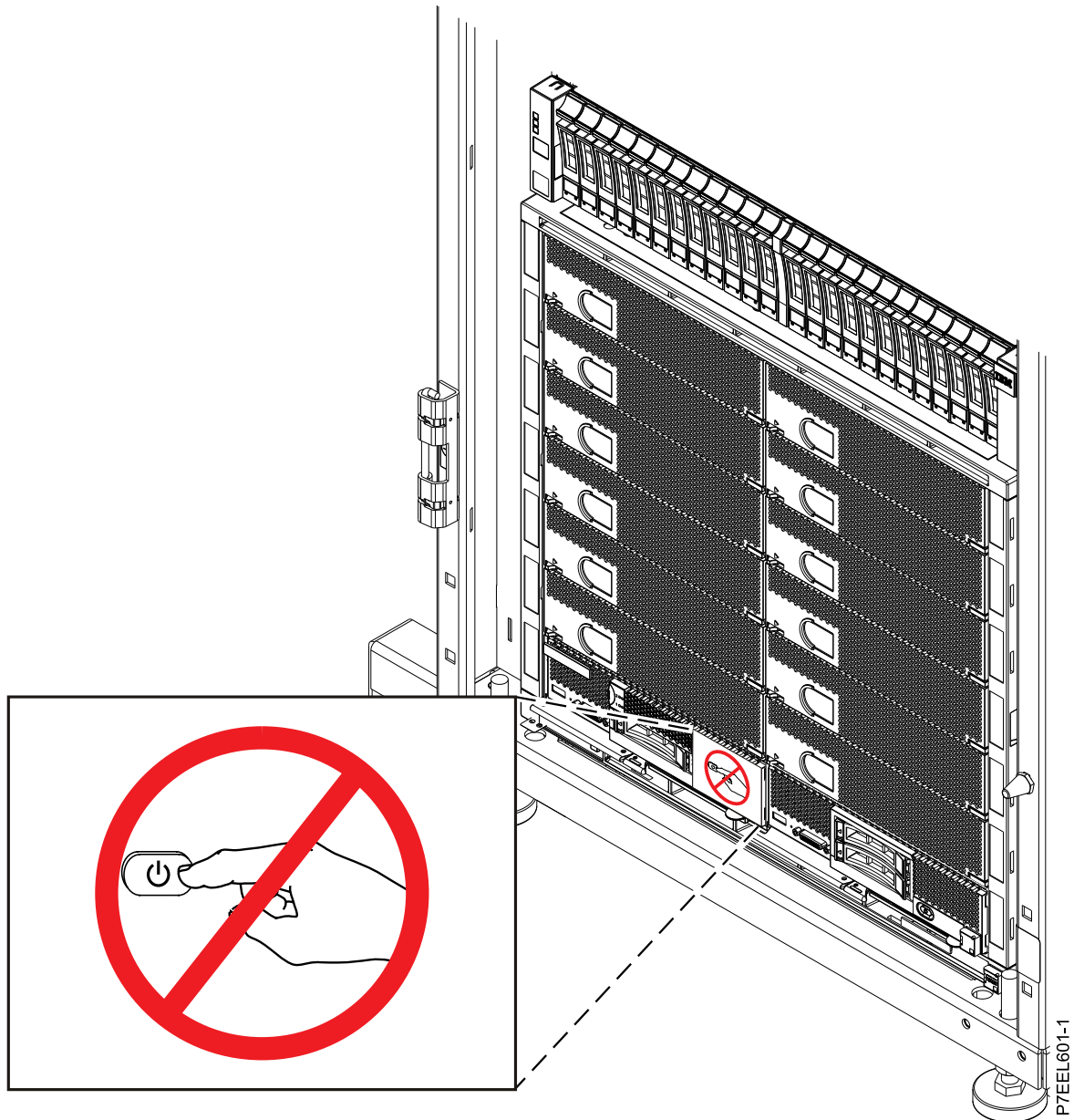


Figure 8. Do not press the power button on the Flex System Manager (FSM)

The green power status indicator on the front panel flashes to indicate that the system is in standby mode and is ready to be powered on.

Step 3. Before you boot the nodes, read and then remove the blue attention label on each node.

Step 4. Do not press the power button on the Flex System Manager (FSM).

After you connect the power cable, you must perform a verification check. For more information, see “Performing a verification check” on page 19.

---

## Performing a verification check

Check to ensure that all of your hardware components are present and functioning properly.

Make sure that the following LEDs on the front of the system are lit:

- The logo on the chassis front information panel.
- The power LED on the Flex System Manager management node
- The power LED on each compute node flashes slowly to indicate that the compute node is connected to power and is ready to be turned on.
- The power LED on the top of rack switch (if applicable).

Make sure that the following LEDs on the back of the system are lit:

- The dc power and ac power LEDs on each power supply.
- The power LED on each I/O module.

For more information about identifying your system's components, see the Overview section for your offering.

Cable a system to the Chassis Management Module (CMM) to perform a verification check, and access your Storwize V7000 to ensure that it is functioning.

Step 1. Perform a chassis installation verification check.

1. Install the BNT SFP (RJ45) transceiver (**B** in Figure 9 “Connecting to port 6 on the chassis I/O module” on page 20). This SFP transceiver is included in the ship group. Install the transceiver in I/O module slot 1, port 6 on the chassis.
2. Connect a device that has browser access and an Ethernet port to the transceiver on I/O module slot 1, port 6 (**A** in Figure 9 “Connecting to port 6 on the chassis I/O module” on page 20).

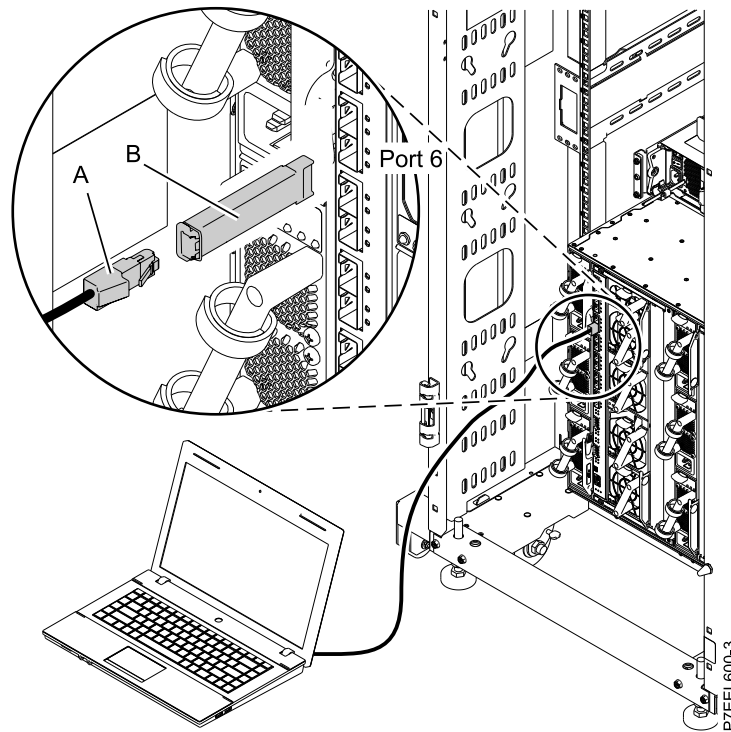


Figure 9. Connecting to port 6 on the chassis I/O module

3. On your device, open a browser window.
4. Ensure that your device is set to IP address 192.168.93.5, subnet mask 255.255.255.0, and gateway 192.168.93.217.
5. In the address field, type `https://192.168.93.100`.

**Note:** Ensure that you type `https://`. The **s** means that you will be using the Secure Sockets Layer (SSL) when you communicate with the CMM.

6. Accept any security exceptions to continue.
7. In the Chassis Management Module sign-in window, type the user name and password. The user name is **USERID** and the password is **PASSWORD**.
8. Click **Log In**. Create a new password. The new password is **Passw0rd**.
9. Cancel out of the Initial Setup Wizard.
10. Click **System Status**.
11. Hover over each component on the **System Status - Chassis** tab to ensure that it is functioning properly.

**Note:** If you identify a component that is in the **Error** state, contact your service provider.

12. Click the **Events** tab and ensure that there are no errors.

Step 2. Verify that your Storwize V7000 storage is functioning.

**Note:** Your Storwize V7000 storage is preconfigured.

1. Connect your device to port 1 on the Storwize V7000 upper controller.
2. Open a different browser window, and type `https://192.168.93.213/service`. Accept any security exceptions to continue.
3. In the Storwize V7000 Service Assistant Tool, type `passw0rd` for the password.

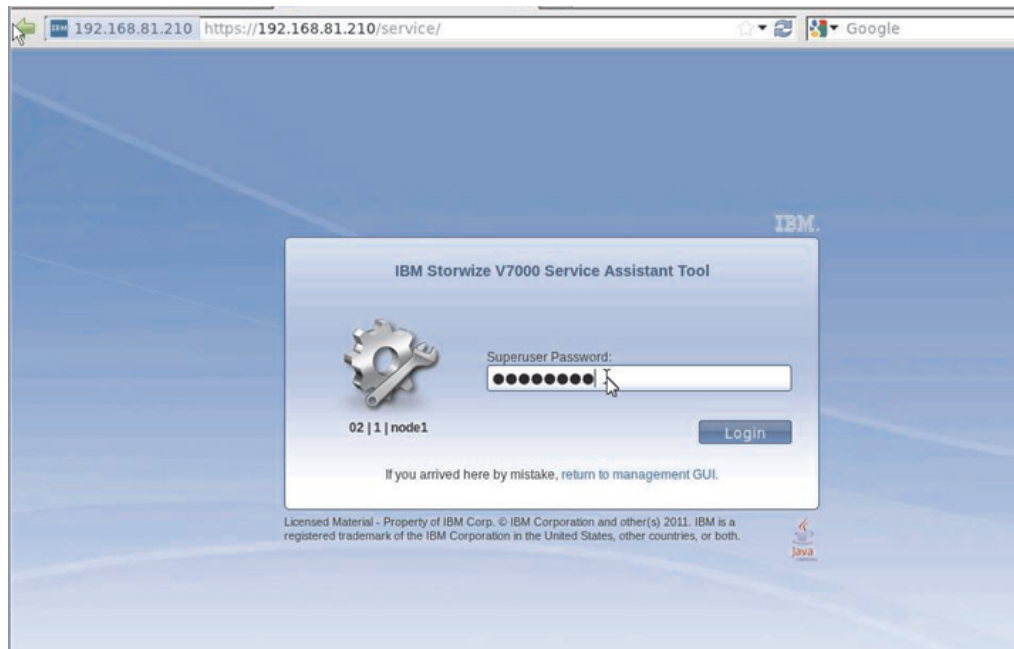


Figure 10. Storwize V7000 Service Assistant Tool sign-in window

4. Ensure that there are no errors reported in the **Error** field.

**Note:** If you identify a component that is in the **Error** state, contact your service provider.

5. If you have a second Storwize V7000, type 192.168.93.217 / service in a different browser window. Complete steps 2.c3 on page 20 and 2.d4 on page 21 for this second Storwize V7000.
6. You may now disconnect the device from the upper controller port.

---

## Completing the installation

Learn more about the tasks you must perform to complete the system installation.

When you have finished installing your Lenovo Converged System, save the configuration.

You might want to do the following after the Service Team representative leaves your site:

- Change passwords
- Create users
- Create partitions or virtual servers
- Install operating systems

For more information about the tasks you can perform after the system has been installed, see [http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.pureflex.doc/p7ef9\\_managingyourenterprisesystem.html](http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.pureflex.doc/p7ef9_managingyourenterprisesystem.html).



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## Chapter 3. Managing your system

Learn how to manage your Lenovo Converged System, including saving your configuration, configuring storage and networks, and the Flex System Manager.

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### Saving your Lenovo Converged System component configurations

Learn about saving your Lenovo Converged System component configurations.

**Note:** The initial configuration of your Lenovo Converged System is installed by the Services Team and is included with your purchase. To ensure initial configuration success, it is important that you do not change the default shipped configuration until these services are complete.

Some of the components you can back up include:

- Compute nodes
- Storage nodes
- Chassis I/O modules
- Enterprise chassis
- V7000 storage

Anytime you change your configuration, you must save your component configurations again.

#### Saving your initial configuration before the Flex System Manager is active

After you complete the initial component configuration verification, you must save the default shipped configuration. This action must be done before the Services Team completes the initial configuration.

**Important:** Do *not* return to the default configuration. This action returns your system to a factory default, not the base Lenovo Converged System configuration.

#### Saving your configuration with the Flex System Manager running

Anytime you change a components configuration, you must save the configuration.

**Important:** Do *not* return to the default configuration. This action returns your system to a factory default, not the base Lenovo Converged System configuration.

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### Configuring storage for the Lenovo Converged System

The Storwize V7000 storage system provides a modular storage system that includes the capability to virtualize external SAN-attached storage and its own internal storage

**Note:** The initial configuration of your Lenovo Converged System is performed by the Services Team and is included with your purchase. To ensure initial configuration success, it is important that you do not change the default shipped configuration until these services are complete.

The Storwize V7000 system is built upon the IBM SAN Volume Controller technology base and uses technology from the IBM System Storage DS8000 family.

An Storwize V7000 system provides a number of configuration options that are aimed at simplifying the implementation process. It also provides automated wizards, called Directed Maintenance Procedures (DMP) to help resolve any events that might occur. An Storwize V7000 system is a clustered, scalable, and midrange storage system, and an external virtualization device.

## Configuring and zoning the integrated SAN switch

Learn the requirements for configuring and zoning the integrated storage area network (SAN) switch.

The Lenovo Converged System configuration 7V includes two Flex System FC 5022 16 Gb SAN scalable switches.

For information about how to configure zoning, refer to the Fabric OS Administrator's Guide. See the Brocade Downloads website at <http://ibm.brocadeassist.com/public/FabricOSv7xRelease>

To locate the software documentation from this website, perform the following steps:

1. Select the **documentation** tab at the top of the page.
2. Select **SAN Switches** in the Download list. The available Fabric Operating System manuals is shown.
3. Select **Fabric OS Administrator's Guide pdf** from the list.

With the Lenovo Converged System offering, more paths and cabling are also included to each switch for I/O resiliency and performance. For details on the paths between the switches and the Storwize V7000 storage controller, see "Setting up zoning for theLenovo Converged System" on page 24.

## Setting up zoning for theLenovo Converged System

Learn how to set up zoning for your Lenovo Converged System.

Aliases are used for each component in the zoning configuration. The aliases use naming conventions to represent the worldwide port names (WWPNs) associated with the components.

There are two main categories in the SAN zoning. Different manufacturers call them different names but they are essentially the same thing:

1. The zone configuration or zone set
2. The individual zones

A zone set or zone configuration consists of one or more zones. Each zone needs a name along with the zone set (zone configuration). There is one zone set (zone configuration) name for the entire SAN. The name for the zone set for Lenovo Converged System is "SWITCHxxxxxxxxxxxxxxx", where the x's refer to the World Wide Name (WWN) for the switch. Each node will have its own zone with the zone set or zone configuration.

Here is an example of the zoning. The names that are used do not match the names in your configuration, but are representative of what you might see. First, is a table of alias names. In Table 14 "Port and alias names" on page 24, SNXXXXXXX is the serial number of the Storwize V7000 system and SNYYYYYYY is the serial number of the Storwize V7000 node.

Table 14. Port and alias names

Port	Alias name
V7000 CAN 1 port 1	SNXXXXXXX_NODE1_PORT1
V7000 CAN 1 port 2	SNXXXXXXX_NODE1_PORT 2
V7000 CAN 1 port 3	SNXXXXXXX_NODE1_PORT3
V7000 CAN 1 port 4	SNXXXXXXX_NODE1_PORT 4
V7000 CAN 2 port 1	SNXXXXXXX_NODE2_PORT 1
V7000 CAN 2 port 2	SNXXXXXXX_NODE2_PORT 2



Table 14. Port and alias names (continued)

Port	Alias name
V7000 CAN 2 port 3	SNXXXXXXXX_NODE2_PORT 3
V7000 CAN 2 port 4	SNXXXXXXXX_NODE2_PORT 4
Node 1 HBA 1 port 0	SNYYYYYYYY_HBA1_PORT1
Node 1 HBA 1 port 1	SNYYYYYYYY_HBA1_PORT2
Node 1 HBA 2 port 0	SNYYYYYYYY_HBA2_PORT1
Node 1 HBA 2 port 1	SNYYYYYYYY_HBA2_PORT2

Next, is an example of a zone for a Storwize V7000 and a Lenovo System x compute node with the VMware ESXi Hypervisor (xHyp1) as the host.

Zone: SN10XXXXX\_xHyp1:

SN10XXXXX\_xHyp1 SNXXXXXXXX\_NODE1\_PORT1 associated with V7000 WWPN AB:CD:EF:12:34:56:78:90

SN10XXXXX\_xHyp1 SNXXXXXXXX\_NODE2\_PORT1 associated with V7000 WWPN AB:CD:EF:12:34:56:78:90

SN10XXXXX\_xHyp1 SN10XXXXX\_HBA1\_PORT1 associated with ESXi WWPN AB:CD:EF:12:34:56:78:90

Notice that only one host bus adapter (HBA) port is configured since this zone is configured on a single Fibre Channel switch that is mapped to the one HBA port on the compute node.

The second HBA port is mapped to a second switch and thus a different zone. In this case, the port number becomes 2.

See Table 15 “Example of an X-Architecture compute node” on page 25 for an example of an X-Architecture compute node without the scalable switches (only the Flex System FC3171 8 Gb SAN switches are present).

Table 15. Example of an X-Architecture compute node

Primary node	Zone name	Members
2S – Switch 1	SN10XXXXX_xHyp1	SNXXXXXXXX_NODE1_PORT1 SNXXXXXXXX_NODE2_PORT1 SNXXXXXXXX_NODE1_PORT3 SNXXXXXXXX_NODE2_PORT3 SN10XXXXX_HBA1_PORT1
2S – Switch 2	SN10XXXXX_xHyp1	SNXXXXXXXX_NODE1_PORT2 SNXXXXXXXX_NODE2_PORT2 SNXXXXXXXX_NODE1_PORT4 SNXXXXXXXX_NODE2_PORT4 SN10XXXXX_HBA1_PORT2

## Configuring the Storwize V7000

Learn the requirements for configuring Fibre Channel host bus adapters for the Storwize V7000 control enclosure.

To effectively configure the Storwize V7000 control enclosure, you must configure Fibre Channel host bus adapter.

### Configuring Fibre Channel host bus adapters

Learn the requirements for configuring Fibre Channel host bus adapters.

Apply these Storwize V7000 configuration details to Fibre Channel host bus adapters (HBAs):

- The Storwize V7000 system must be configured to export volumes only to host Fibre Channel ports that are on the list of supported HBAs. Operation with other HBAs is not supported.
- The Storwize V7000 system supports configurations that use N-port virtualization in the host bus adapter or SAN switch.

Table 16. Node configuration details

Item	Details
Host bus adapters and nodes	Storwize V7000 type 100 node canisters contain four ports for Fibre Channel connection and two ports for 1 Gb per second Ethernet connection.
Volumes	Each node presents a volume to the SAN through four ports. Each volume is accessible from the two nodes in an I/O group. Each HBA port can recognize up to eight paths to each logical unit (LU) that is presented by the clustered system. The hosts must run a multi-pathing device driver before the multiple paths can resolve to a single device. You can use fabric zoning to reduce the number of paths to a volume that are visible by the host.
Port speed	The Fibre Channel ports on canister nodes can operate at 2 Gb per second, 4 Gb per second, or 8 Gb per second. For the Lenovo Converged System, 8 Gb per second speeds are used.

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## Configuring the network for the Lenovo Converged System

Learn the details for configuring the network for Lenovo Converged System.

### Overview of configuring the network for the Lenovo Converged System

Learn the overview for configuring the network for Lenovo Converged System.

**Note:** The initial configuration of your Lenovo Converged System is performed by the Services Team and is included with your purchase. To ensure initial configuration success, it is important that you do not change the default shipped configuration until these services are complete.

The Lenovo Converged System configuration 5V with feature code ETS2 and configuration 7V come with three networks, each of which is isolated from the others by Virtual LAN (VLAN) assignment within the Ethernet switches. Your view to each network is through one or more "uplink" ports, which are untagged. (That is, the frames that are coming out of those ports do not have any IEEE 802.1q VLAN tags, and incoming untagged frames are automatically sent to the right network.) The networks can be differentiated by the color of the cabling used: Green, Purple, and Gold.

### **Green network**

The green network is for your data and it is assigned to VLAN 4092. There are no IP addresses assigned to this network in manufacturing, so you can assign them to meet your needs.

### **Purple network**

The purple network is assigned to VLAN 4091. All entities on the purple network are assigned IPv4 addresses within the 10.91.0.0/16 network (that is, 10.91.\*.\* with netmask 255.255.0.0). This address is the network where you access the Flex System Manager node on its external Ethernet (eth1) interface. You can also directly access the following nodes:

- The ESXi hypervisor on X-Architecture compute nodes

In addition, any guest operating systems that you want to manage by using the Flex System Manager must have an IP address on this network.

### **Gold network**

The gold internal device management network is assigned to VLAN 4093 on single-chassis systems without any top-of-rack switches, and is entirely isolated on the top-of-rack switches, if present. This network contains the following endpoints:

- The internal Ethernet (eth0) interface on the Flex System Manager node
- The chassis management modules (CMMs)
- The management interfaces for any Ethernet or SAN switches
- The integrated management modules (IMMs) of X-Architecture compute nodes
- The Storwize V7000 management interfaces

Each of these endpoints is assigned a fixed IPv4 address on the 192.168.93.0/24 network (that is, 192.168.93.\* addresses with netmask 255.255.255.0), and an IPv6 Unique Local Address (ULA) that will not conflict with any address on the customer's network. The Flex System Manager node manages all of these endpoints by using the IPv6 addresses, so you can choose to reassign the IPv4 addresses as wanted to fit into your network.

As noted above, the Flex System Manager is able to communicate on both the purple and gold networks.

## **Uplinks**

Learn the details for configuring the network uplinks.

Every Lenovo Converged System has at least two 10 Gbps short-range optical Ethernet interfaces that are associated with the green network, at least one 1 Gbps BASE-T (RJ45, CAT-5/CAT-6 cable) interface for the purple network, and one BASE-T interface for the gold network.

All switches have the Per-Vlan Rapid Spanning Tree (PVRST) protocol that is enabled, with each virtual LAN (VLAN) assigned to a separate Spanning Tree Group (STG). The in-chassis 10 Gb Ethernet switches ship with bridge priority 61440. If you have top-of-rack switches, they ship with bridge priority 32768. This should prevent any routing loops, regardless of how many cables you plug into each uplink group.

If you have top-of-rack switches, the green and purple uplink ports are on the G8264 switches, and all of the empty ports on the G8052 switches serve as uplink ports for the yellow network. In these two configurations, there is no need for you to directly access the 10 Gb Ethernet switches that are in the chassis.

If there are no top-of-rack switches, all of the uplink ports are on the 10 Gb Ethernet switches that are in the chassis.

Within a switch, all green uplink ports have Link Aggregation Control Protocol (LACP) enabled with a common key. If you connect with an LACP-aware partner, those ports form a common aggregate (also called a trunk or portchannel), that allows traffic that is run in parallel across all of the ports.

Likewise, if you use a top-of-rack G8264 switch, the purple uplink ports are configured to share an LACP key.

### **Customer uplink map in each configuration**

The following information describes the switch configuration for each uplink group. Unless stated otherwise, all of the uplink ports have the appropriate transceivers. If there is a “links” statement, that means that only those ports have transceivers that are plugged, but more transceivers can be added to empty ports in that group to offer more bandwidth.

- Green - 10 Gb Ethernet switch 1-4
  - Lenovo Converged System – links in 1-2
  - Lenovo Converged System – links in 1-2 or 1-4 (optional)
- Purple - 10 Gb Ethernet switch 5
- Yellow - 10 Gb Ethernet switch 6

## **Single chassis configurations**

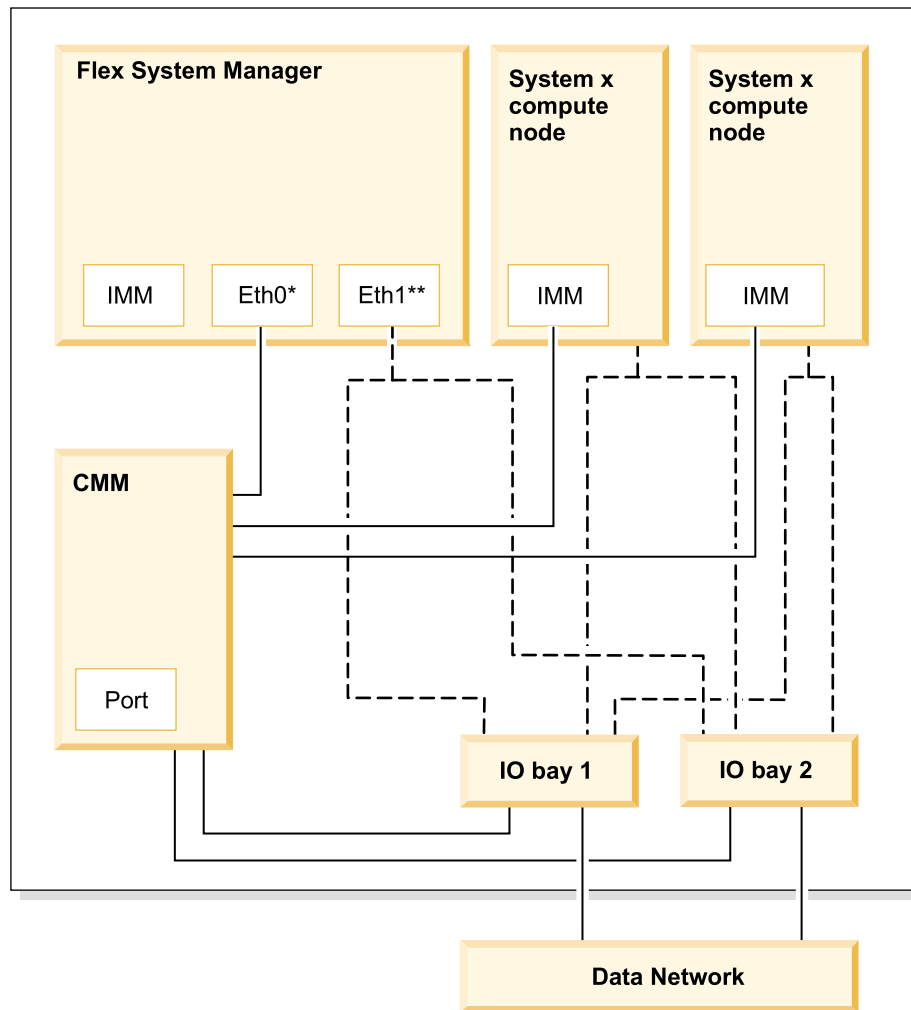
Learn the details for a single chassis Lenovo Converged System configuration.

The Lenovo Converged System comes with two chassis management modules (CMMs). The CMMs are configured in an IP failover environment.

The Storwize V7000 is configured with three IP addresses. These IP addresses consist of service IP addresses for each of the two controller nodes and a cluster IP address which both nodes can respond to for management purposes.

### **Cabling for a single chassis configuration**

Figure 11 “Cabling for a single chassis configuration” on page 29 shows the cabling and VLAN tagging that are done in the Ethernet IO Module in bay 1 of the chassis. The E# values are the port numbers on the switch.



Eth0\* - Special GbE management network adapter  
 Eth1\*\* - - Embedded 2-port 10 GbE controller with Virtual Fabric Connector

P7FE9500-0

Figure 11. Cabling for a single chassis configuration

## Flex System Manager management node

The Flex System Manager management node manages the components of the Lenovo Converged System.

**Note:** The initial configuration of your Lenovo Converged System is performed by the Services Team and is included with your purchase. To ensure initial configuration success, it is important that you do not change the default shipped configuration until these services are complete. The Flex System Manager management node IP address is 10.91.0.2 after the Services Team completes the installation engagement.

## Overview of the Flex System Manager management node

The Flex System Manager management node is a systems management appliance that drives efficiency and cost savings in the data center.

**Note:** The initial configuration of your Flex System Manager is performed by the Services Team and is included with your purchase. To ensure initial configuration success, it is important that you do not change the default shipped configuration until these services are complete.

The Flex System Manager node provides a pre-integrated and virtualized management environment across servers, storage, and networking that is easily managed from a single interface. A single focus point for seamless multi-chassis management provides an instant and resource-oriented view of chassis and chassis resources for X-Architecture compute nodes. You can reduce the number of interfaces, steps, and clicks it takes to manage IT resources, intelligently manage, and deploy workloads that are based on resource availability and predefined policies. You can also manage events and alerts to increase system availability and reduce downtime while reducing operational costs.

On a practical level, the Flex System Manager provides the ability for you to perform standard system management tasks. Every day activities include taking hardware and software inventory in the environment, the constant monitoring of critical systems, establishing compliance baseline for future patching and upgrade services. Every day activities also include health status metrics to allow the support team to better detect potential issues in a timely manner.

The capabilities of the Flex System Manager node include:

- A management appliance on a special compute node
- A single user interface to manage multiple chassis
- Hardware setup, configuration, and status
- System element updates and fixes
- User management and security
- System element time and date
- Remote access to and control of system elements
- Service and support management
- Virtualization management
- Storage management
- Network management
- Additional systems management applications (both Lenovo and third-party applications)

The initial focus of the Flex System Manager node is on the management of the Flex System Enterprise Chassis. In addition, it can also be the portal for the administration of the storage and network modules and the manipulation of the virtualization objects on X-Architecture compute nodes. In your virtual environment, the Flex System Manager interface helps with workload alerting, workload capture, and rapid workload deployments. This single management point has the capability to monitor both virtual systems and physical systems, construct a new virtual system environment, import virtual appliance packages into the environment, and create system pools to optimize resource utilization.

The tool within the Flex System Manager node that is responsible for the lifecycle management of virtual resources is called VMControl. This single tool is capable of managing various types of hypervisors that include the ability to create virtual servers, relocate virtual servers, remove and import virtual servers, and capture existing workloads. The tool also can rebalance workloads and create a virtual image repository to accelerate future workload deployments. This single interface delivers enterprise class management of virtual objects across heterogeneous virtualization technologies and hardware platforms.

## **Software for the Flex System Manager management node**

The Flex System Manager management node contains software to manage the components of the Lenovo Converged System.

This software is available in the following offerings:

Table 17. Software offerings for the Flex System Manager

Offering	Details
Flex System Manager Standard	<p>Includes the following features:</p> <ul style="list-style-type: none"> <li>• Open Fabric Manager</li> <li>• Storage Manager</li> </ul> <p>The following products are not included, but can be purchased separately:</p> <ul style="list-style-type: none"> <li>• Flex System Manager TPC for Performance</li> <li>• Flex System Manager Service Fabric Provisioning</li> <li>• Flex System Manager Fabric Optimization</li> <li>• Flex System Manager Fabric Optimization Workload</li> <li>• Flex System Manager Advanced</li> <li>• Fabric Manager</li> </ul>

## Virtualization support

Learn about the virtualization support available for System x architecture compute nodes.

Virtualization support on the Flex System Manager management node differs based on what type of compute nodes you are managing.

### Virtualization on System x architecture compute nodes

Learn about the virtualization requirements for System x compute nodes.

vSphere 5 from VMware is the latest supported hypervisor on the X-Architecture compute node. VMware provides many advanced virtualization capabilities. When integrated with the Flex System Manager, the Flex System Manager is used to manage the physical vSphere host. All virtual server or virtual object-related management is handled by the vCenter server.

By using the Flex System Manager in this capacity, you can gather inventory on the vSphere hosts and on the virtual servers that are then presented to the vCenter server. This inventory helps you to maintain a central repository of information that is related to your VMware environment.

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## Using the quick start guides to manage your system

To manage your Lenovo Converged System, you can also use the quick start guides that have step-by-step instructions. These quick start guides also include information about how to manage your Lenovo Converged System environment and how to use your hardware to achieve your business goals.

Your Lenovo Converged System purchase included a certain level of configuration that is done by manufacturing and additional configuration by the Services Team. The following table contains some of the goals that you might want to achieve with your Lenovo Converged System. The table also includes links to the quick start guides that you can follow to help you achieve those goals. You might want to use some of these quick start guides as reference when you are adding more components to your Lenovo Converged System.

Table 18. Goals and corresponding quick start guides

If you want to...	Follow these steps and quick start guides
Learn to navigate and use the Flex System Manager software	<p>To learn to navigate and use the Flex System Manager software, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_navigating_fsm.html</a> and select the following PDFs:</p> <ul style="list-style-type: none"> <li>• Navigating the Flex System Manager management software</li> <li>• Finding and navigating resources.</li> </ul>
Set up your virtualization environment	<p>To learn to set up your virtualization environment, follow these steps:</p> <ol style="list-style-type: none"> <li>1. Install agents that are needed for VMControl (RHEL, KVM, and VMware ESXi). Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Installing agents that are needed for VMControl PDF.</li> <li>2. Discover storage resources. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Discovering Storwize V7000 storage resources PDF.</li> <li>3. Configure network resources to support virtual server relocation. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Configuring network resources to support deployment and virtual server relocation PDF. Perform the setup steps in this guide, then choose one of these tasks: <ul style="list-style-type: none"> <li>• Configure your environment so VLANs are dynamically created. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Configuring your environment so VLANs are dynamically created PDF.</li> <li>• Configure VLANs manually by using configuration manager templates. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Configuring VLANs manually by using configuration manager templates PDF.</li> </ul> </li> <li>4. Create an image repository. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Creating an image repository PDF.</li> </ol>
Install a guest operating system into a virtual server on an X-Architecture compute node (by using local storage)	<p>To learn to install a guest operating system into a virtual server on an X-Architecture compute node (by using local storage), follow these steps:</p> <ol style="list-style-type: none"> <li>1. Optional: Configure a virtual Network Interface Controller (vNIC) or a virtual LAN: <ul style="list-style-type: none"> <li>• To configure a vNIC, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_configure_hardware.html</a> and select the Configuring a virtual Network Interface Controller (vNIC) PDF.</li> <li>• To configure a virtual LAN, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_configure_hardware.html</a> and select the Configuring a virtual LAN (VLAN) on an Ethernet switch PDF.</li> </ul> </li> <li>2. Install a hypervisor on the compute node. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_install_os.html</a> and select the Installing an operating system on an X-Architecture compute node PDF.</li> <li>3. Install agents that are needed for VMControl. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Installing agents that are needed for VMControl PDF.</li> <li>4. Create a virtual server. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Create a virtual server PDF.</li> <li>5. Install a guest operating system on a virtual server. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Installing a guest operating system into a virtual server PDF.</li> </ol>



Table 18. Goals and corresponding quick start guides (continued)

If you want to...	Follow these steps and quick start guides
Manage your hardware (including updates to the software and firmware on your various components and collecting logs and service data)	To learn to manage your hardware, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a> and select the appropriate PDF links under Performing updates and Working with logs and service data.
Keep your environment operating smoothly	<p>To learn to keep your environment operating smoothly, perform the following actions:</p> <ul style="list-style-type: none"> <li>• To enable information about problems to be sent to Lenovo automatically, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a>. Then, select the Enable information about problems to be sent to Lenovo automatically PDF under Working with logs and service data.</li> <li>• To set up email notification of problems, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a> and select the Setting up email notification of problems under Configuring hardware and management interfaces.</li> </ul>
Monitor the status of your environment and automate responses to problems	<p>To learn how to monitor the status of your environment and automate responses to problems, see the following information:</p> <ul style="list-style-type: none"> <li>• View monitors. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a> and select the Viewing monitors PDF under Working with monitors and alerts.</li> <li>• View alerts. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a> and select the Viewing alerts PDF under Working with monitors and alerts.</li> <li>• Set thresholds. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_managing_hw.html</a> and select the Setting thresholds PDF under Working with monitors and alerts.</li> </ul>
Perform basic virtualization tasks (such as creating a virtual server and installing an operating system on a virtual server)	To perform basic virtualization tasks, go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the appropriate virtualization quick start guide.
Relocate virtual servers automatically when a host is undergoing maintenance, in response to a hardware failure, or to maximize the use of resources	<p>To relocate virtual servers automatically, perform the following steps.</p> <ol style="list-style-type: none"> <li>1. Create and populate a server system pool. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Creating and populating a server system pool PDF under Advanced virtualization tasks.</li> <li>2. Deploy a workload. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Deploy a workload PDF under Advanced virtualization tasks.</li> <li>3. Set up a server system pool that supports relocation. Go to <a href="#">../com.ibm.acc.commontasks.doc/commontasks_virtualization.html</a> and select the Creating a system pool that supports relocation PDF under Advanced virtualization tasks.</li> </ol>



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## Chapter 4. Troubleshooting a Lenovo Converged System

Use this information to diagnose and fix any problems that might occur in a Lenovo Converged System.

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### Troubleshooting the hardware components

Find troubleshooting procedures and fix any problems that might occur in an Lenovo Converged System.

If you suspect a problem with a device in a chassis that is being managed by the Flex System Manager management node and the Flex System Manager management software is running and accessing the Lenovo Flex System Chassis Management Module (CMM), see [http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.common.nav.doc/diagnosing\\_a\\_problem\\_flex\\_system\\_manager.html](http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.common.nav.doc/diagnosing_a_problem_flex_system_manager.html). Otherwise, begin by logging into the CMM. To diagnose a problem by using CMM, see [http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.common.nav.doc/diagnosing\\_a\\_problem\\_chassis\\_management\\_module.html](http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.common.nav.doc/diagnosing_a_problem_chassis_management_module.html).

If you know the specific component that has a failure, use the following table to find troubleshooting procedures for the failing component in a Lenovo Converged System.

Table 19. Troubleshooting procedures for failing components

Failing component name	Failing component troubleshooting procedures
<b>Chassis</b>	
Flex System Enterprise Chassis type 8721	See <a href="http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8721.doc/troubleshooting_the_system.html">http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8721.doc/troubleshooting_the_system.html</a> .
<b>Compute nodes</b>	
Flex System x220 Compute Node	See <a href="http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7906.doc/troubleshooting.html">http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7906.doc/troubleshooting.html</a> .
Flex System x222 Compute Node	See <a href="http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7916.doc/troubleshooting.html">http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7916.doc/troubleshooting.html</a> .
Flex System x240 Compute Node	See <a href="http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8737.doc/troubleshooting.html">http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8737.doc/troubleshooting.html</a> .
Flex System x440 Compute Node	See <a href="http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7917.doc/troubleshooting.html">http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7917.doc/troubleshooting.html</a> .
Flex System x480 and x880 Compute Node	See <a href="http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7903.doc/troubleshooting.html">http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.7903.doc/troubleshooting.html</a> .
<b>Management devices</b>	
Flex System Manager management node type 7955	See <a href="http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8721.doc/cmm_error_messages.html">http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8721.doc/cmm_error_messages.html</a> .

Table 19. Troubleshooting procedures for failing components (continued)

Failing component name	Failing component troubleshooting procedures
Flex System Chassis Management Module (CMM)	See <a href="http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8731.doc/troubleshooting.html">http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8731.doc/troubleshooting.html</a> and <a href="http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8731.doc/troubleshooting.html">http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.8731.doc/troubleshooting.html</a> .
<b>Storage</b>	
Storwize V7000 control and expansion enclosures	See <a href="http://publib.boulder.ibm.com/infocenter/storwize/ic/topic/com.ibm.storwize.v7000.doc/svc_webtroubleshooting_21pbmm.html">http://publib.boulder.ibm.com/infocenter/storwize/ic/topic/com.ibm.storwize.v7000.doc/svc_webtroubleshooting_21pbmm.html</a> .
7316-TF2 flat panel monitor console kit 1U	See <a href="http://publibfp.dhe.ibm.com/epubs/pdf/a3806310.pdf">http://publibfp.dhe.ibm.com/epubs/pdf/a3806310.pdf</a> .
<b>Networking and I/O</b>	
Flex System FC5022 16 Gb SAN Fibre Channel scalable switch	See <a href="http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network_iomodule.html">http://pic.dhe.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network_iomodule.html</a> .
Flex System CN4093 10 Gb converged scalable switch	
Flex System EN2092 1 Gb Ethernet scalable switch	
Flex System EN4093R 10 Gb Ethernet scalable switch	
Flex System FC3171 8 Gb SAN switch	
System Storage SAN24B-4 Express	See <a href="http://www.ibm.com/support/docview.wss?uid=ssg1S7002303&amp;aid=1">http://www.ibm.com/support/docview.wss?uid=ssg1S7002303&amp;aid=1</a> .

## Identifying hardware components in a Lenovo Converged System

Locate and identify the hardware components in an Lenovo Converged System.

The following indexed diagrams help you map a hardware component to its position on the unit in a Lenovo Converged System. Use these diagrams with the following tables.

# Lenovo Converged System assembly

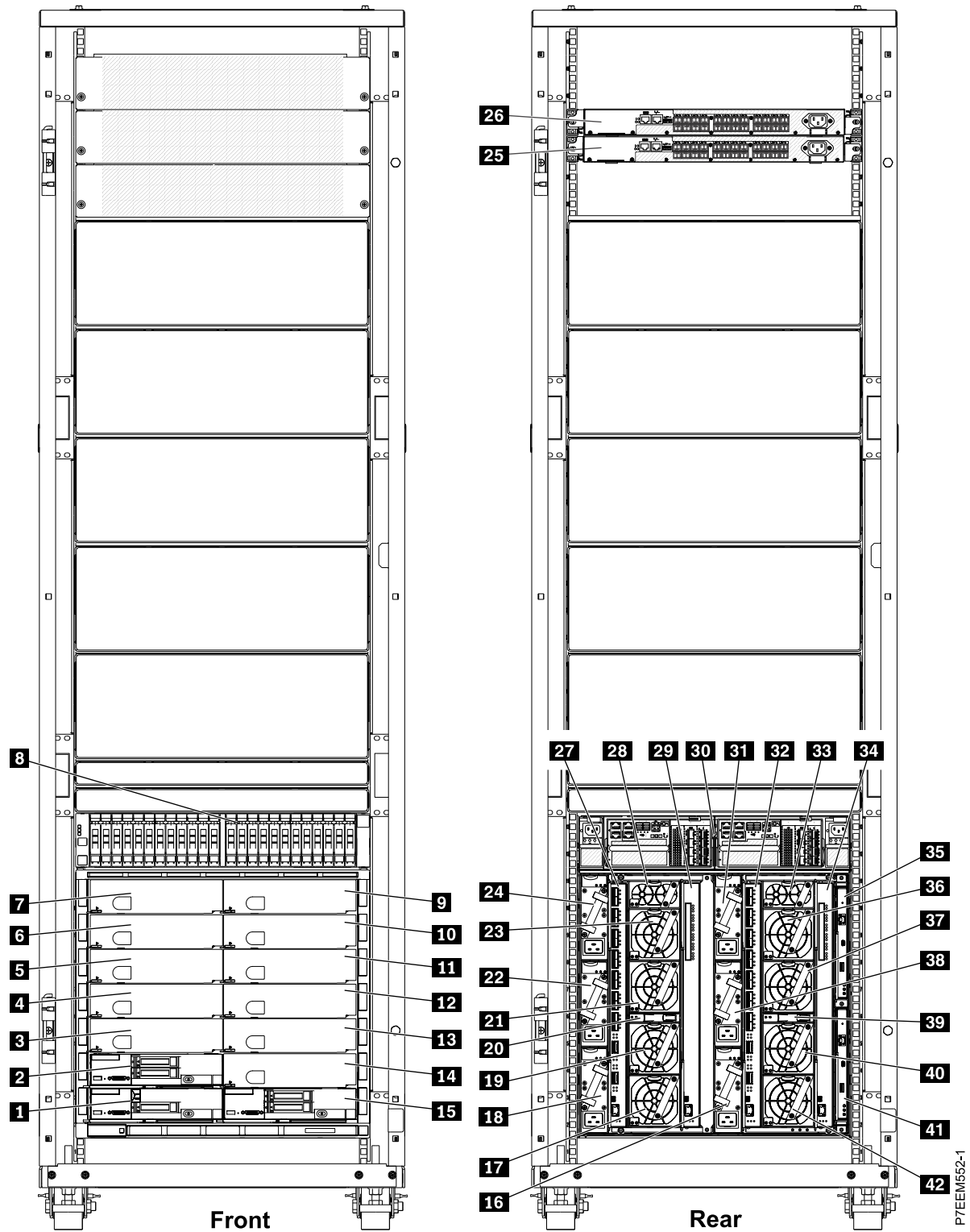
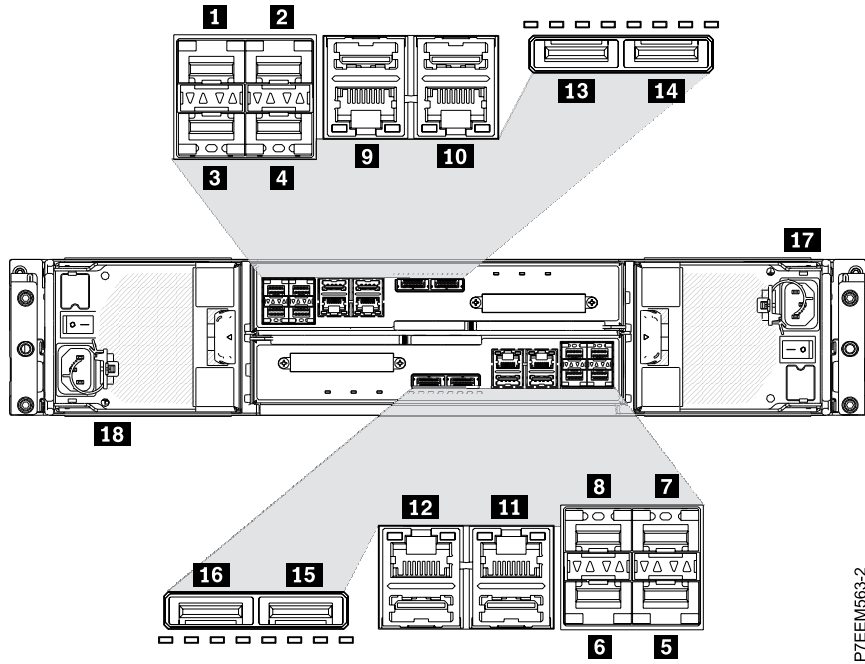


Figure 12. Lenovo Converged System assembly details

Table 20. *Lenovo Converged System assembly details*

<b>Index number</b>	<b>Description</b>
1	Flex System Manager
2	Compute node
3 - 7	Bays 3 - 7 (front)
8	Storwize V7000 control enclosure (front)
9 - 14	Bay 9 - 14 (front)
15	Compute node
16	Power supply module, bay 1
17	Fan, bay 6
18	Power supply module, bay 4
19	Fan, bay 7
20	Fan logic, bay 2
21	Fan, bay 8
22	Power supply module, bay 5
23	Fan, bay 9
24	Power supply module, bay 6
25	8 Gb Brocade Fibre Channel switch SAN24B
26	8 Gb Brocade Fibre Channel switch SAN24B
27	I/O module, bay 1
28	Fan, bay 10
29	I/O module, bay 3
30	Storwize V7000 control enclosure (rear)
31	Power supply module, bay 3
32	I/O module, bay 2
33	Fan, bay 5
34	I/O module, bay 4
35	Flex System Chassis Management Module (CMM), bay 2
36	Fan, bay 4
37	Fan, bay 3
38	Power supply module, bay 2
39	Fan logic, bay 1
40	Fan, bay 2
41	CMM, bay 1
42	Fan, bay 1

## Storage



P7EEM563-2

Figure 13. Storwize V7000 control enclosure

Table 21. Storwize V7000 enclosure details

Index number	Description
1	Small form-factor pluggable (SFP)+ port 1 (canister 1 or controller A)
2	SFP+ port 2 (canister 1 or controller A)
3	SFP+ port 3 (canister 1 or controller A)
4	SFP+ port 4 (canister 1 or controller A)
5	SFP+ port 1 (canister 2 or controller B)
6	SFP+ port 2 (canister 2 or controller B)
7	SFP+ port 3 (canister 2 or controller B)
8	SFP+ port 4 (canister 2 or controller B)
9	1 GbE RJ-45 port 1 (canister 1 or controller A)
10	1 GbE RJ-45 port 2 (canister 1 or controller A)
11	1 GbE RJ-45 port 1 (canister 2 or controller B)
12	1 GbE RJ-45 port 2 (canister 2 or controller B)
13	SAS port 1 (canister 1 or controller A)
14	SAS port 2 (canister 1 or controller A)
15	SAS port 1 (canister 2 or controller B)
16	SAS port 2 (canister 2 or controller B)

Table 21. Storwize V7000 control enclosure details (continued)

Index number	Description
17	C14 connector (canister 1 or controller A)
18	C14 connector (canister 2 or controller B)

**Network devices**

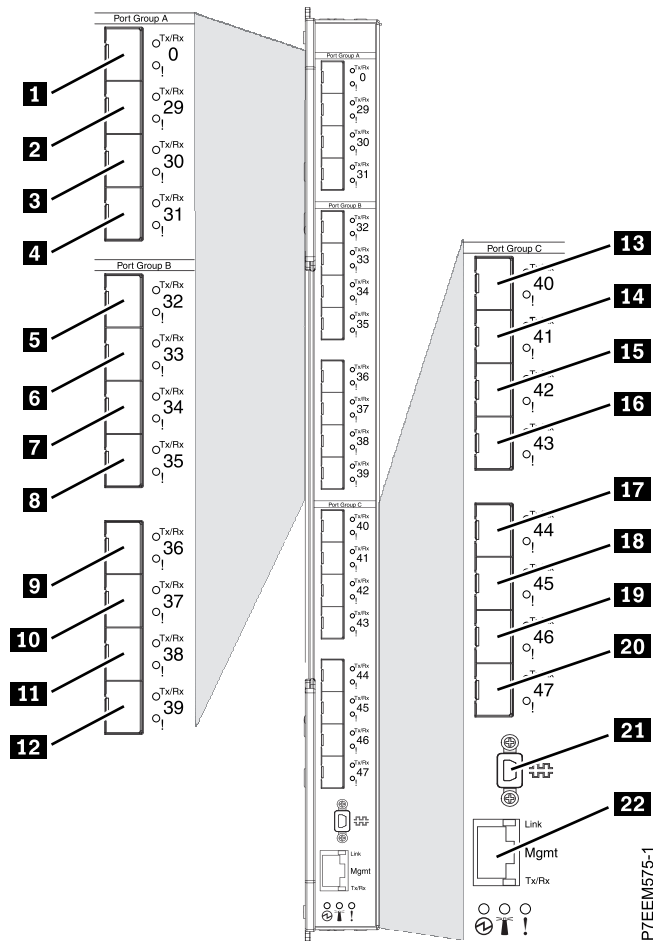


Figure 14. Flex System 16 Gb SAN Fibre Channel scalable switch

Table 22. Flex System 16 Gb SAN Fibre Channel scalable switch details

Index number	Description
1	External Fibre Channel port 0
2 - 4	External Fibre Channel ports 29 - 31
5 - 8	External Fibre Channel ports 32 - 35
9 - 12	External Fibre Channel ports 36 - 39
13 - 16	External Fibre Channel ports 40 - 43
17 - 20	External Fibre Channel ports 44 - 47



Table 22. Flex System 16 Gb SAN Fibre Channel scalable switch details (continued)

Index number	Description
21	Mini Universal Serial Bus (USB) console port
22	Ethernet port

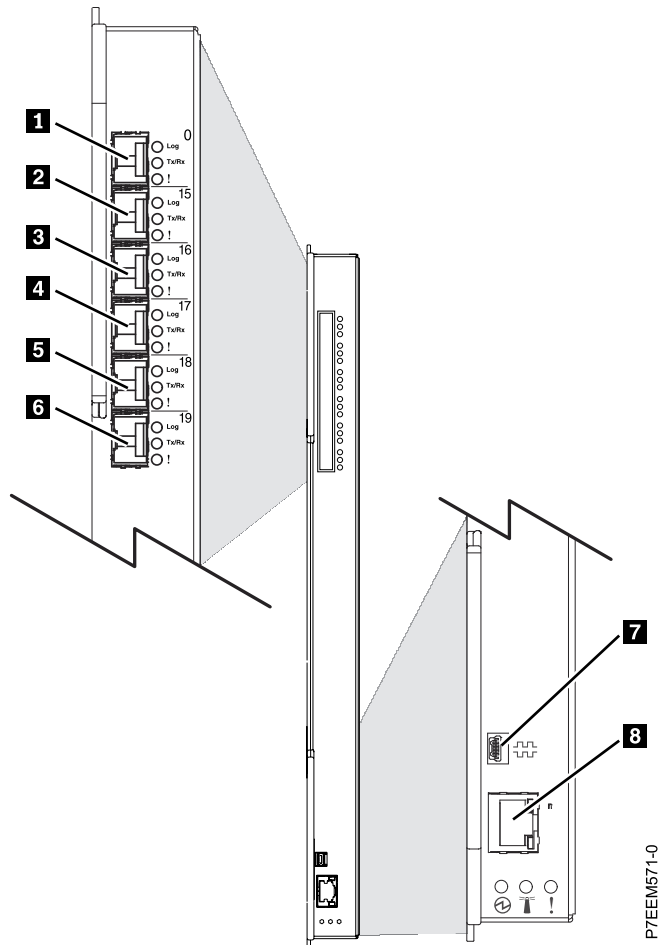


Figure 15. QLogic 8 Gb Fibre Channel scalable switch

Table 23. QLogic 8 Gb Fibre Channel scalable switch details

Index number	Description
1	External Fibre Channel port 0
2	External Fibre Channel port 15
3	External Fibre Channel port 16
4	External Fibre Channel port 17
5	External Fibre Channel port 18
6	External Fibre Channel port 19
7	Serial port
8	Ethernet port

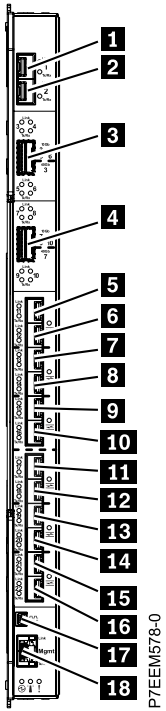


Figure 16. CN4093 10 Gb converged scalable switch

Table 24. CN4093 10 Gb converged scalable switch details

Index number	Description
1	10 GbE SFP+ port 1
2	10 GbE SFP+ port 2
3	10 Gb quad small form-factor pluggable (QSFP)+ ports 3 - 6
4	10 Gb QSFP+ ports 7 - 10
5	10 GbE Omni port 11
6	10 GbE Omni port 12
7	10 GbE Omni port 13
8	10 GbE Omni port 14
9	10 GbE Omni port 15
10	10 GbE Omni port 16
11	10 GbE Omni port 17
12	10 GbE Omni port 18
13	10 GbE Omni port 19
14	10 GbE Omni port 20
15	10 GbE Omni port 21
16	10 GbE Omni port 22

Table 24. CN4093 10 Gb converged scalable switch details (continued)

Index number	Description
17	RS-232 serial management port
18	1 GbE RJ-45 port

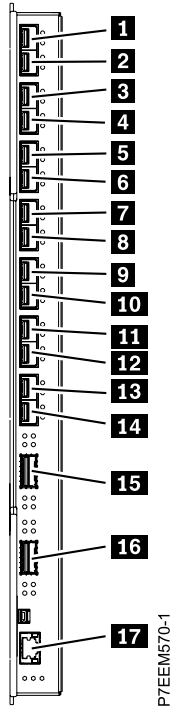


Figure 17. EN4093R 10 GbE scalable switch

Table 25. EN4093R 10 GbE scalable switch details

Index number	Description
1	10 GbE SFP+ port 1
2	10 GbE SFP+ port 2
3	10 GbE SFP+ port 3
4	10 GbE SFP+ port 4
5	10 GbE SFP+ port 5
6	10 GbE SFP+ port 6
7	10 GbE SFP+ port 7
8	10 GbE SFP+ port 8
9	10 GbE SFP+ port 9
10	10 GbE SFP+ port 10
11	10 GbE SFP+ port 11
12	10 GbE SFP+ port 12
13	10 GbE SFP+ port 13

Table 25. EN4093R 10 GbE scalable switch details (continued)

Index number	Description
14	10 GbE SFP+ port 14
15	40 GbE QSFP ports 15 - 18
16	40 GbE QSFP ports 19 - 22
17	1 GbE RJ-45 port

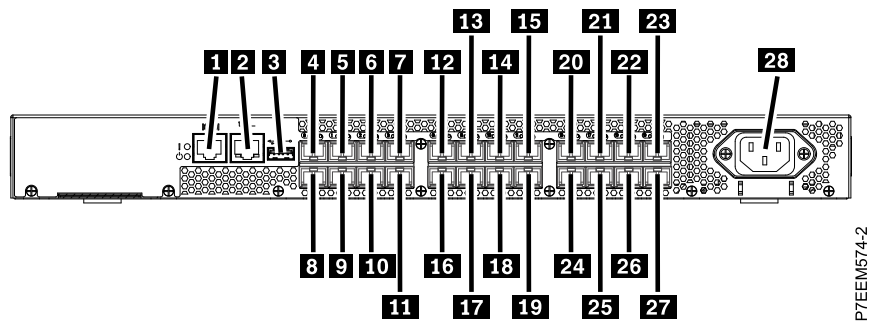


Figure 18. 8 Gb Brocade Fibre Channel switch SAN24B scalable switch details

Table 26. 8 Gb Brocade Fibre Channel switch SAN24B scalable switch details

Index number	Description
1	1 GbE RJ-45 port
2	1 GbE RJ-45 port
3	Universal Serial Bus (USB) port
4 - 11	8 GbE SFP+ ports 0 - 7
12 - 19	8 GbE SFP+ ports 8 - 15
20 - 27	8 GbE SFP+ ports 16 - 23
28	Power receptacle

## Cabling a Lenovo Converged System (single chassis)

Locate and identify the hardware components, cable part numbers, power distribution unit (PDU) part number, and port-to-port cabling sequence in an Lenovo Converged System single-chassis configuration.

Select your Lenovo Converged System single-chassis configuration from the following list of options.

### 5V: Cabling dual CN4093 10 Gb converged scalable switches and a Storwize V7000 (single chassis)

Locate and identify the hardware components, cable part numbers, power distribution unit (PDU) part number, and port-to-port cabling sequence in a dual CN4093 10 Gb converged scalable switches and in a Storwize V7000 (Lenovo Converged System single-chassis configuration). This configuration is also known as configuration 5V.

The following indexed diagrams help you map a hardware component to its position on the unit and understand port-to-port cabling sequence between the components. Use these diagrams with the tables that follow.

**Note:** To locate and identify the hardware components, types of ports, and port numbers in an Lenovo Converged System, see “Identifying hardware components in a Lenovo Converged System” on page 36.

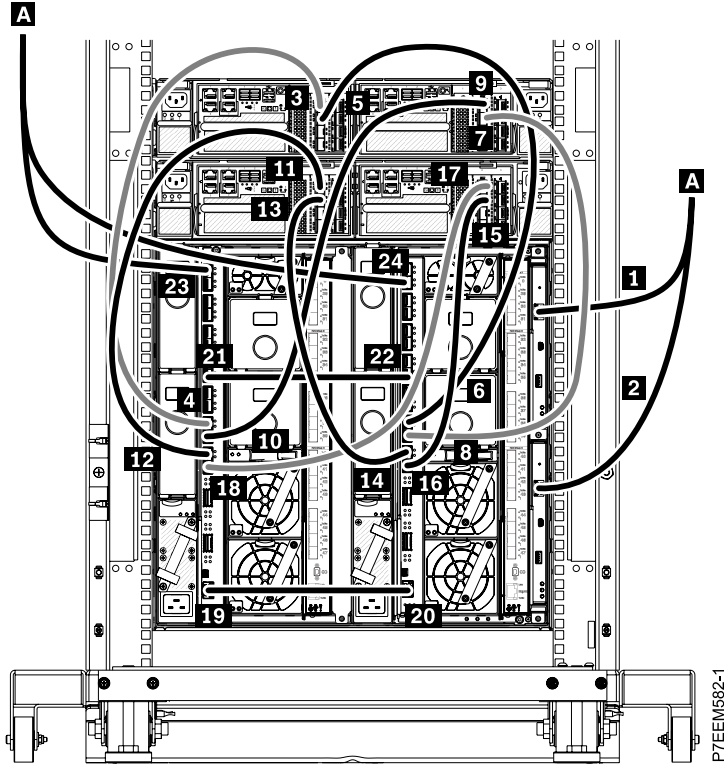


Figure 19. CN4093 10 Gb converged scalable switch cabling for Storwize V7000 control enclosures

Table 27. CN4093 10 Gb converged scalable switch cabling details

Index	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
1	Flex System Chassis Management Module (CMM) 1, chassis 1 (U2)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
2	CMM 2, chassis 1 (U2)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
<b>Storwize V7000 control enclosure 1</b>							

Table 27. CN4093 10 Gb converged scalable switch cabling details (continued)

In-dex	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
3	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Channel cable	Check the cable label to determine the part number.	4	Port 13 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	Small form-factor pluggable (SFP)+ (8 Gbps)
5	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			6	Port 13 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	SFP+ (8 Gbps)
7	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			8	Port 14 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	SFP+ (8 Gbps)
9	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			10	Port 14 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	SFP+ (8 Gbps)
<b>Storwize V7000 control enclosure 2</b>							
11	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Channel cable	Check the cable label to determine the part number.	12	Port 15 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	SFP+ (8 Gbps)
13	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			14	Port 15 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	SFP+ (8 Gbps)

Table 27. CN4093 10 Gb converged scalable switch cabling details (continued)

In-dex	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
15	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			16	Port 16 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	SFP+ (8 Gbps)
17	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			18	Port 16 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	SFP+ (8 Gbps)
<b>CN4093 10 Gb converged scalable switch</b>							
19	Management port in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	RJ-45 (1 Gbps)	1.5 m (4.9 ft) blue Cat5e	40K8967	20	Management port in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	RJ-45 (1 Gbps)
21	Port 7 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	Quad small form-factor pluggable (QSFP)+ (40 Gbps)	1 m (3.2 ft) QSFP+ to QSFP+	49Y7934	22	Port 7 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	QSFP+ (40 Gbps)
23	Port 1 in 10 Gb converged scalable switch, chassis 1, bay 1 (U2)	SFP+ (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
24	Port 1 in 10 Gb converged scalable switch, chassis 1, bay 2 (U2)	SFP+ (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	

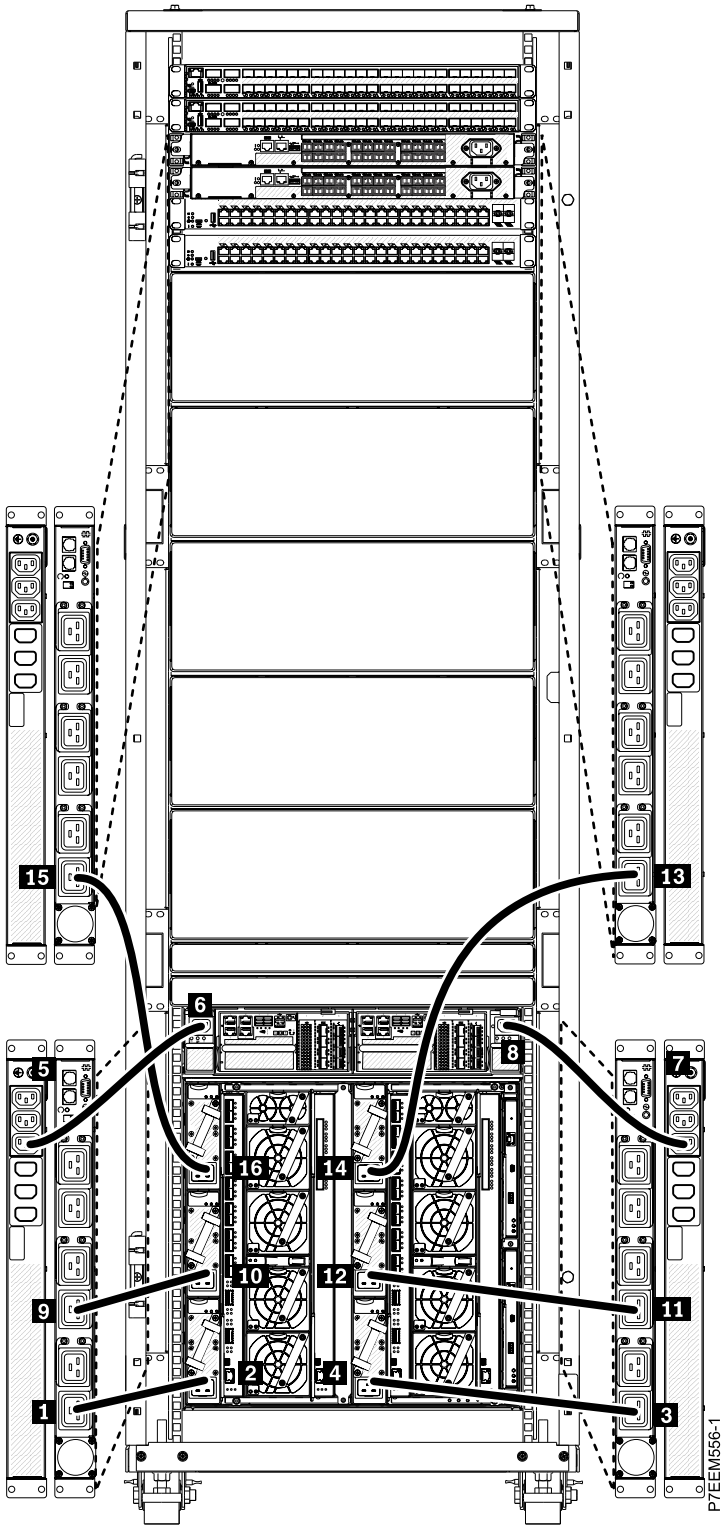


Figure 20. 32 A single-phase power distribution unit (PDU) cabling



Table 28. 32 A single-phase PDU cabling details

In-dex	From	Connector type	Cable type	Cable part number	Index	To	Connector type
<b>PDU part number: 42R8744 (North America only), 42R8743 (worldwide)</b>							
1	Outlet 6 in PDU 1 (front)	C19	16 A, 100-240 V power cord	Check the power cord label to determine the part number.	2	Power supply module, bay 4	C20
3	Outlet 6 in PDU 2 (front)	C19	16 A, 100-240 V power cord		4	Power supply module, bay 1	C20
5	Outlet 1A in PDU 1 (rear)	C13	10 A, 200-240 V power cord		6	Canister 1 in Storwize V7000 controller (rear)	C14
7	Outlet 1A in PDU 2 (rear)	C13	10 A, 200-240 V power cord		8	Canister 2 in Storwize V7000 controller (rear)	C14
9	Outlet 4 in PDU 1 (front)	C19	16 A, 100-240 V power cord		10	Power supply module, bay 5	C20
11	Outlet 4 in PDU 2 (front)	C19	16 A, 100-240 V power cord		12	Power supply module, bay 2	C20
13	Outlet 6 in PDU 3 (front)	C19	16 A, 100-240 V power cord		14	Power supply module, bay 3	C20
15	Outlet 6 in PDU 4 (front)	C19	16 A, 100-240 V power cord		16	Power supply module, bay 6	C20

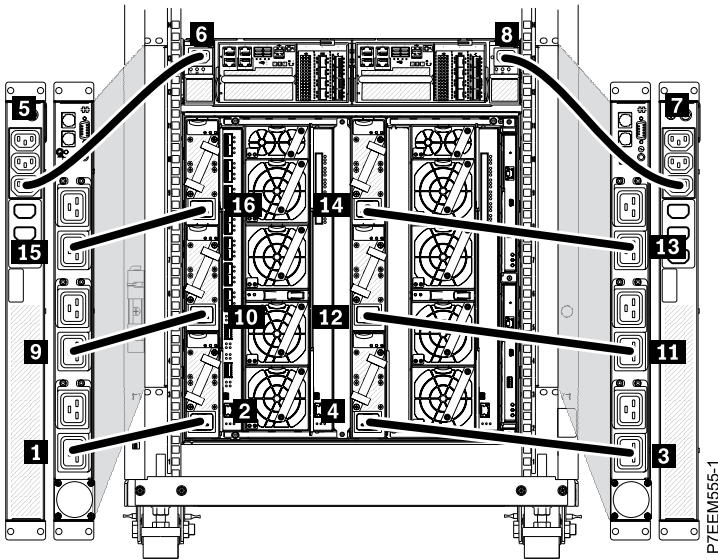


Figure 21. 32 A three-phase PDU cabling

Table 29. 32 A three-phase PDU cabling details

Index	From	Connector type	Cable type	Cable part number	Index	To	Connector type
<b>PDU part number: 42R8744 (North America only), 42R8743 (worldwide)</b>							
1	Outlet 6 in PDU 1 (front)	C19	16 A, 100-240 V power cord	Check the power cord label to determine the part number.	2	Power supply module, bay 4	C20
3	Outlet 6 in PDU 2 (front)	C19	16 A, 100-240 V power cord		4	Power supply module, bay 1	C20
5	Outlet 1A in PDU 1 (rear)	C13	10 A, 200-240 V power cord		6	Canister 1 in Storwize V7000 controller (rear)	C14
7	Outlet 1A in PDU 2 (rear)	C13	10 A, 200-240 V power cord		8	Canister 2 in Storwize V7000 controller (rear)	C14
9	Outlet 4 in PDU 1 (front)	C19	16 A, 100-240 V power cord		10	Power supply module, bay 5	C20

Table 29. 32 A three-phase PDU cabling details (continued)

In- dex	From	Connec- tor type	Cable type	Cable part number	Index	To	Connector type
11	Outlet 4 in PDU 2 (front)	C19	16 A, 100- 240 V power cord		12	Power supply module, bay 2	C20
13	Outlet 2 in PDU 2 (front)	C19	16 A, 100- 240 V power cord		14	Power supply module, bay 3	C20
15	Outlet 2 in PDU 1 (front)	C19	16 A, 100- 240 V power cord		16	Power supply module, bay 6	C20

## 7V: Cabling dual EN4093R 10 Gb Ethernet scalable switches and dual 16 Gb SAN Fibre Channel Switches with a Storwize V7000 (single chassis)

Locate and identify the hardware components, cable part numbers, power distribution unit (PDU) part number, and port-to-port cabling sequence in a dual EN4093R 10 Gb Ethernet scalable switches and in a Storwize V7000 (Lenovo Converged System single-chassis configuration). This configuration is also known as configuration 7V.

The following indexed diagrams help you map a hardware component to its position on the unit and understand port-to-port cabling sequence between the components. Use these diagrams with the tables that follow.

**Note:** To locate and identify the hardware components, types of ports, and port numbers in an Lenovo Converged System, see “Identifying hardware components in a Lenovo Converged System” on page 36.

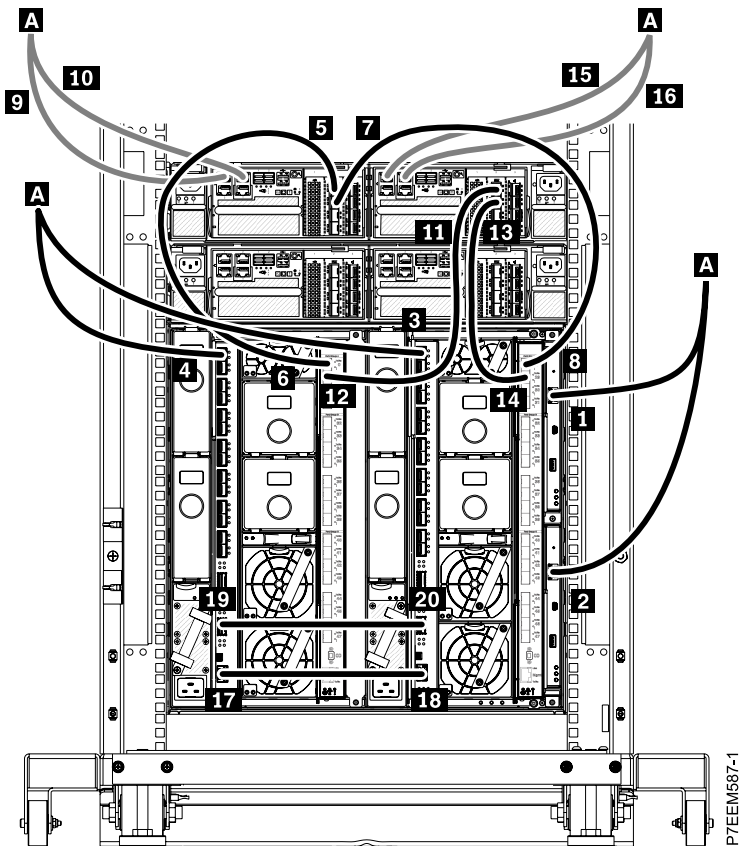


Figure 22. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 1 and 16 Gb SAN Fibre Channel scalable switch

Table 30. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 1 and 16 Gb SAN Fibre Channel scalable switch details

Index	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
1	Flex System Chassis Management Module (CMM) 1, chassis 1 (U2)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
2	CMM 2, chassis 1 (U2)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
3	Port 1 in 10 GbE scalable switch module, chassis 1, bay 2 (U2)	Small form-factor pluggable (SFP)+ (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	

Table 30. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 1 and 16 Gb SAN Fibre Channel scalable switch details (continued)

In-dex	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
4	Port 1 in 10 GbE scalable switch module, chassis 1, bay 1 (U2)	SFP+ (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
<b>Storwize V7000 control enclosure 1</b>							
5	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Channel cable	Check the cable label to determine the part number.	6	Port 0 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 3 (U2)	RJ-45 (8 Gbps)
7	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			8	Port 0 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 4 (U2)	RJ-45 (8 Gbps)
9	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
10	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	

Table 30. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 1 and 16 Gb SAN Fibre Channel scalable switch details (continued)

In- dex	From: (U- Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
11	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Channel cable	Check the cable label to determine the part number.	12	Port 29 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 3 (U2)	RJ-45 (8 Gbps)
13	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			14	Port 29 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 4 (U2)	RJ-45 (8 Gbps)
15	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
16	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
<b>EN4093R 10 GbE scalable switch</b>							
17	Management port in 10 GbE scalable switch module, chassis 1, bay 1 (U2)	RJ-45 (1 Gbps)	1.5 m (4.9 ft) blue Cat5e	40K8967	18	Management port in 10 GbE scalable switch module, chassis 1, bay 2 (U2)	RJ-45 (1 Gbps)
19	Port 19 in 10 GbE scalable switch module, chassis 1, bay 1 (U2)	Quad small form-factor pluggable (QSFP)+ (40 Gbps)	1 m (3.2 ft) QSFP+ to QSFP+	49Y7934	20	Port 19 in 10 GbE scalable switch module, chassis 1, bay 2 (U2)	QSFP+ (40 Gbps)

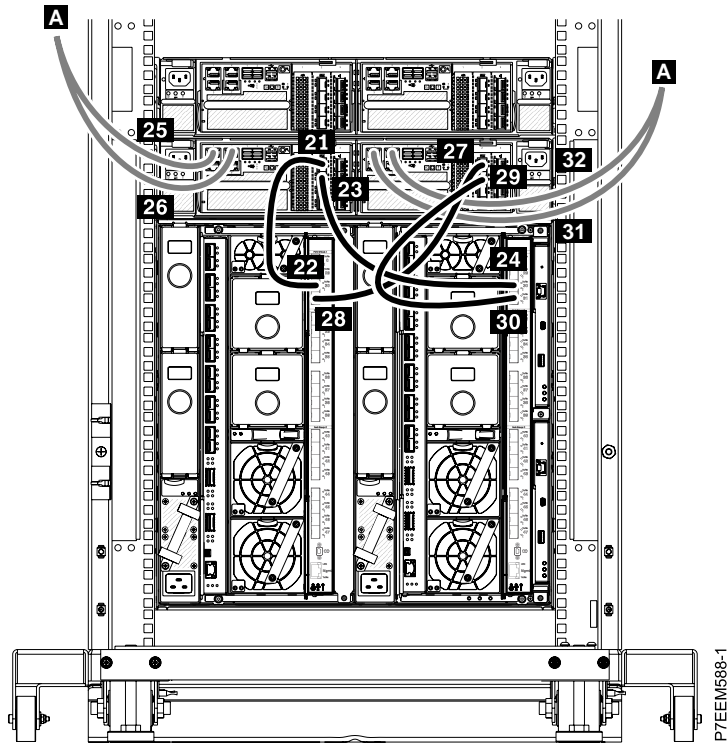


Figure 23. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 2 and 16 Gb SAN Fibre Channel scalable switch

Table 31. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 2 and 16 Gb SAN Fibre Channel scalable switch details

In- dex	From: (U- Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
<b>Storwize V7000 control enclosure 2 (optional)</b>							
21	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Chan- nel cable	Check the cable label to deter- mine the part number.	22	Port 30 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 3 (U2)	RJ-45 (8 Gbps)
23	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			24	Port 30 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 4 (U2)	RJ-45 (8 Gbps)

Table 31. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 2 and 16 Gb SAN Fibre Channel scalable switch details (continued)

In-dex	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
25	Port 1 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
26	Port 2 in canister 1 or controller A in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
27	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)	1 m (3.2 ft) or 1.5 m (4.9 ft) Fibre Channel cable	Check the cable label to determine the part number.	28	Port 31 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 3 (U2)	RJ-45 (8 Gbps)
29	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	Fibre Channel (8 Gbps)			30	Port 31 in Flex System 16 Gb SAN Fibre Channel scalable switch module, chassis 1, bay 4 (U2)	RJ-45 (8 Gbps)



Table 31. EN4093R 10 GbE scalable switch cabling for Storwize V7000 control enclosure 2 and 16 Gb SAN Fibre Channel scalable switch details (continued)

In-dex	From: (U-Loc)	Port type (bandwidth)	Cable type	Cable part number	Index	To: (U-Loc)	Port type (bandwidth)
31	Port 1 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	
32	Port 2 in canister 2 or controller B in Storwize V7000 control enclosure (U18)	RJ-45 (1 Gbps)	Cat5e	Use the proper cable	A	To customer network	

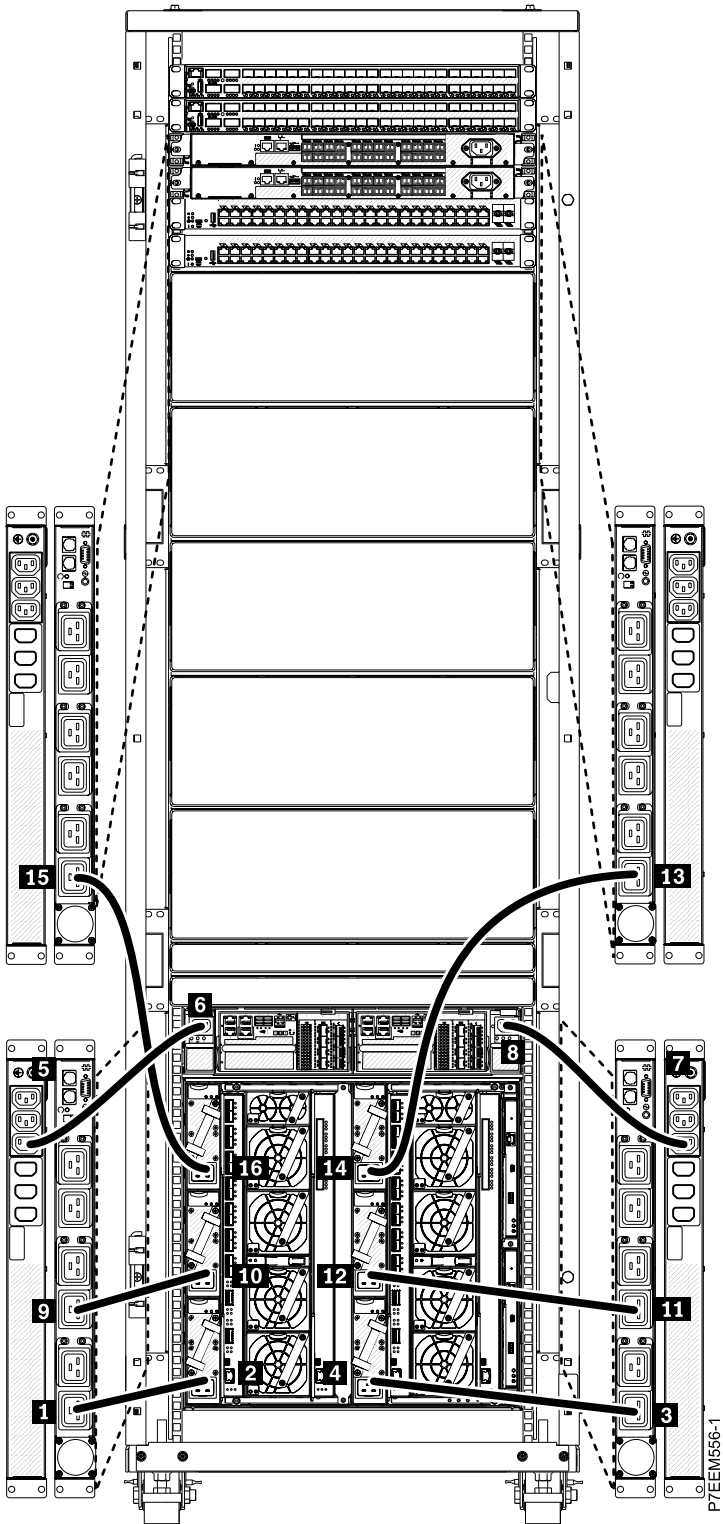


Figure 24. 32 A single-phase power distribution unit (PDU) cabling

Table 32. 32 A single-phase PDU cabling details

In-dex	From	Connector type	Cable type	Cable part number	Index	To	Connector type
<b>PDU part number: 42R8744 (North America only), 42R8743 (worldwide)</b>							
1	Outlet 6 in PDU 1 (front)	C19	16 A, 100-240 V power cord	Check the power cord label to determine the part number.	2	Power supply module, bay 4	C20
3	Outlet 6 in PDU 2 (front)	C19	16 A, 100-240 V power cord		4	Power supply module, bay 1	C20
5	Outlet 1A in PDU 1 (rear)	C13	10 A, 200-240 V power cord		6	Canister 1 in Storwize V7000 controller (rear)	C14
7	Outlet 1A in PDU 2 (rear)	C13	10 A, 200-240 V power cord		8	Canister 2 in Storwize V7000 controller (rear)	C14
9	Outlet 4 in PDU 1 (front)	C19	16 A, 100-240 V power cord		10	Power supply module, bay 5	C20
11	Outlet 4 in PDU 2 (front)	C19	16 A, 100-240 V power cord		12	Power supply module, bay 2	C20
13	Outlet 6 in PDU 3 (front)	C19	16 A, 100-240 V power cord		14	Power supply module, bay 3	C20
15	Outlet 6 in PDU 4 (front)	C19	16 A, 100-240 V power cord		16	Power supply module, bay 6	C20

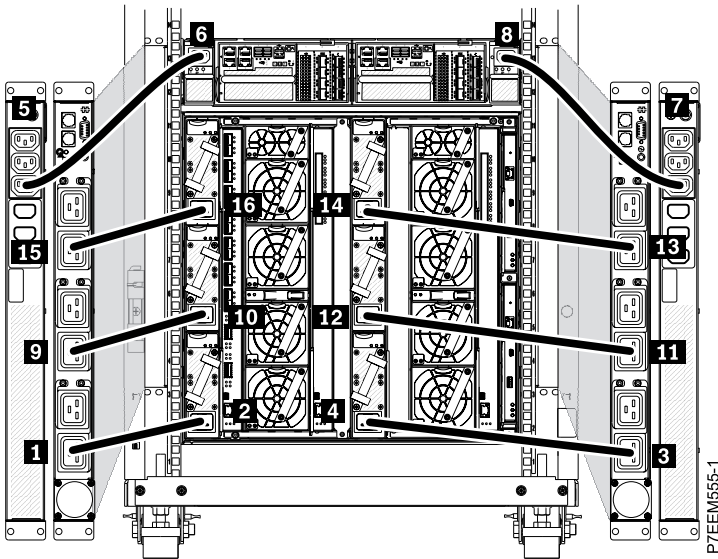


Figure 25. 32 A three-phase PDU cabling

Table 33. 32 A three-phase PDU cabling details

Index	From	Connector type	Cable type	Cable part number	Index	To	Connector type
<b>PDU part number: 42R8744 (North America only), 42R8743 (worldwide)</b>							
1	Outlet 6 in PDU 1 (front)	C19	16 A, 100-240 V power cord	Check the power cord label to determine the part number.	2	Power supply module, bay 4	C20
3	Outlet 6 in PDU 2 (front)	C19	16 A, 100-240 V power cord		4	Power supply module, bay 1	C20
5	Outlet 1A in PDU 1 (rear)	C13	10 A, 200-240 V power cord		6	Canister 1 in Storwize V7000 controller (rear)	C14
7	Outlet 1A in PDU 2 (rear)	C13	10 A, 200-240 V power cord		8	Canister 2 in Storwize V7000 controller (rear)	C14
9	Outlet 4 in PDU 1 (front)	C19	16 A, 100-240 V power cord		10	Power supply module, bay 5	C20

Table 33. 32 A three-phase PDU cabling details (continued)

In- dex	From	Connec- tor type	Cable type	Cable part number	Index	To	Connector type
11	Outlet 4 in PDU 2 (front)	C19	16 A, 100- 240 V power cord		12	Power supply module, bay 2	C20
13	Outlet 2 in PDU 2 (front)	C19	16 A, 100- 240 V power cord		14	Power supply module, bay 3	C20
15	Outlet 2 in PDU 1 (front)	C19	16 A, 100- 240 V power cord		16	Power supply module, bay 6	C20



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## Chapter 5. Additional product offerings

Additional offerings are available for the Lenovo Converged System, including the Network Integration Offering and the Lenovo Converged System Virtual Desktop Infrastructure (VDI) solution.

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### Network integration offering

The Services Team personnel work with the client networking team to tailor the Lenovo Converged System network configuration for the client environment.

For additional details, see the <http://www-935.ibm.com/services/us/en/it-services/network-integration-services.html> website.

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### SmartCloud Desktop Infrastructure Solution

The SmartCloud Desktop Infrastructure (SDI) solution provides support for virtual desktops by using Citrix XenDesktop or VMware View with the VMware ESXi hypervisor. Hosted shared desktops can also be used with Citrix XenDesktop.

Reference architecture PDFs are available, which provide a technical description of the solution, and give sizing and bill of materials information for ordering a SmartCloud Desktop Infrastructure Solution. A base reference architecture PDF covers general VDI concepts. Build-to-order solutions that are based on the Flex System are also described.

- [https://www-304.ibm.com/partnerworld/wps/servlet/download/DownloadServlet?id=\\_RBWTuTXa\\$SiPCAScnt&attachmentName=ibm\\_smartcloud\\_desktop\\_infrastructure\\_with\\_citrix\\_xendesktop\\_reference\\_architecture.pdf&token=MTM4NDE4NjQwODcyNw==&locale=en\\_ALL\\_ZZ](https://www-304.ibm.com/partnerworld/wps/servlet/download/DownloadServlet?id=_RBWTuTXa$SiPCAScnt&attachmentName=ibm_smartcloud_desktop_infrastructure_with_citrix_xendesktop_reference_architecture.pdf&token=MTM4NDE4NjQwODcyNw==&locale=en_ALL_ZZ) (Reference architecture PDF)
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- [https://www-304.ibm.com/partnerworld/wps/servlet/download/DownloadServlet?id=5pQAJuTO0pziPCAScnt&attachmentName=ibm\\_smartcloud\\_desktop\\_infrastructure\\_reference\\_architecture.pdf](https://www-304.ibm.com/partnerworld/wps/servlet/download/DownloadServlet?id=5pQAJuTO0pziPCAScnt&attachmentName=ibm_smartcloud_desktop_infrastructure_reference_architecture.pdf) (Base reference architecture PDF)

An Installation Guide PDF is also available.

- [http://public.dhe.ibm.com/partnerworld/pub/misc/pureflex\\_smartcloud\\_desktop\\_infrastructure\\_install\\_guide.pdf](http://public.dhe.ibm.com/partnerworld/pub/misc/pureflex_smartcloud_desktop_infrastructure_install_guide.pdf) (Installation Guide PDF)





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## 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.

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### Before you call

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 <http://www.lenovo.com/serverproven/> to make sure that the hardware and software is supported by your product.
- Go to <http://www.ibm.com/supportportal> to 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 (Lenovo 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to <https://www-947.ibm.com/support/servicerequest/Home.action> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The 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.

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## Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the product documentation. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/supportportal>.

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## Getting help and information from the World Wide Web

Up-to-date information about Lenovo products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support is available at <http://www.ibm.com/supportportal>. The most current version of the product documentation is available in the following product-specific Information Centers:

**Flex System products:**<http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp>

**System x products:**<http://www.ibm.com/systems/x>

**NeXtScale System products:**<http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp>

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## How to send DSA data

You can use the Enhanced Customer Data Repository to send diagnostic data to Lenovo.

Before you send diagnostic data to Lenovo, read the terms of use at <http://www.ibm.com/de/support/ecurep/terms.html>.

You can use any of the following methods to send diagnostic data:

- **Standard upload:** [http://www.ibm.com/de/support/ecurep/send\\_http.html](http://www.ibm.com/de/support/ecurep/send_http.html)
- **Standard upload with the system serial number:** [http://www.ecurep.ibm.com/app/upload\\_hw](http://www.ecurep.ibm.com/app/upload_hw)
- **Secure upload:** [http://www.ibm.com/de/support/ecurep/send\\_http.html#secure](http://www.ibm.com/de/support/ecurep/send_http.html#secure)
- **Secure upload with the system serial number:** [https://www.ecurep.ibm.com/app/upload\\_hw](https://www.ecurep.ibm.com/app/upload_hw)

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## Creating a personalized support web page

You can create a personalized support web page by identifying Lenovo products that are of interest to you.

To create a personalized support web page, go to <http://www.ibm.com/support/mynotifications>. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

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## Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your Lenovo products.

For more information about Support Line and other Lenovo services, see <http://www.ibm.com/services> or see <https://datacentersupport.lenovo.com/us/en/supportphonenumberlist> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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## Hardware service and support

IBM is Lenovo's preferred service provider for the System x, Flex System and NeXtScale System products.

You can receive hardware service through your Lenovo reseller or from IBM. To locate a reseller authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/us/en/serviceprovider> and click **Business Partner Locator**. For IBM support telephone numbers, see <https://datacentersupport.lenovo.com/us/en/supportphonenumberlist>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

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## Taiwan product service

Use this information to contact product service for Taiwan.

委製商/進口商名稱: 荷蘭商聯想股份有限公司台灣分公司  
進口商地址: 台北市內湖區堤頂大道2段89號5樓  
進口商電話: 0800-000-702 (代表號)



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## Trademarks

Lenovo, the Lenovo logo, Flex System, System x, NeXtScale System, and x Architecture are trademarks of Lenovo in the United States, other countries, or both.

Intel and Intel Xeon are trademarks of Intel Corporation in the United States, other countries, or both.

Internet Explorer, Microsoft, and Windows are trademarks of the Microsoft group of companies.

Linux is a registered trademark of Linus Torvalds.

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## 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.

Maximum memory might require replacement of the standard memory with an optional memory module.

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.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

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

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## Recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to: <http://www.lenovo.com/recycling>.



US & Canada Only



US & Canada Only

## Particulate contamination

**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.

Table 34. Limits for particulates and gases

Limits for particulates and gases

Contaminant	Limits
Particulate	<ul style="list-style-type: none"> <li>The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2<sup>1</sup>.</li> <li>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.</li> <li>The deliquescent relative humidity of the particulate contamination must be more than 60%<sup>2</sup>.</li> <li>The room must be free of conductive contamination such as zinc whiskers.</li> </ul>
Gaseous	<ul style="list-style-type: none"> <li>Copper: Class G1 as per ANSI/ISA 71.04-1985<sup>3</sup></li> <li>Silver: Corrosion rate of less than 300 Å in 30 days</li> </ul>
<p><sup>1</sup> ASHRAE 52.2-2008 - <i>Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size</i>. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.</p> <p><sup>2</sup> 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.</p> <p><sup>3</sup> ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p>	

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## 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.

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## 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.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

## 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.

## Australia and New Zealand Class A statement

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.

## European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

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.



Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia



**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.

## Germany Class A statement

### **Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

**Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit** Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der Klasse A der Norm gemäß Richtlinie.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

### **Deutschland:**

**Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln** Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln“ EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten“). Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EU Richtlinie 2014/30/EU, für Geräte der Klasse A.**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die Lenovo (Deutschland) GmbH, Meitnerstr. 9, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4: **Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse A.**

Nach der EN 55032: „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.

# Japanese electromagnetic compatibility statements

## 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障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。 V C C I - A

## Japanese Electrical Appliance and Material Safety Law statement (for detachable AC power cord)

本製品およびオプションに電源コード・セットが付属する場合は、それぞれ専用のものでありますので他の電気機器には使用しないでください。

## JEITA harmonics guideline - Japanese Statement for AC power consumption (W)

定格入力電力表示  
(社) 電子情報技術参照委員会 家電・汎用品高調波抑制対策ガイドライン  
実行計画書に基づく定格入力電力値： W  
お手持ちのユニットの定格入力電力値(W)はユニットの電源装置に貼付されている電源仕様ラベルをご参照下さい

## JEITA harmonics guideline - Japanese Statement of Compliance for Products Less than or Equal to 20A per phase

**JEITA 高調波電流抑制対策適合品表示 (JEITA harmonics statements– Japan)**  
定格電流が 20A/相以下の機器 (For products where input current is less than or equal to 20A per phase)

日本の定格電流が 20A/相 以下の機器に対する高調波電流規制高調波電流規格  
JIS C 61000-3-2 適合品

## JEITA harmonics guideline - Japanese Statement of Compliance for Products More than 20A

定格電流が 20A/相を超える機器 (For products where input current is less than 20A/Phase of one PSU, but total system power is over 20A/Phase)

本製品は、1相当たり20Aを超える機器ですが、個々のユニットが「高調波電流規格 JIS C 61000-3-2適合品」であり、  
本製品はその組み合わせであるため、「高調波電流規格 JIS C 61000-3-2適合品」としてあります

## Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 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 оборудованию класса А. При использовании в бытовой обстановке это оборудование может нарушать функционирование других технических средств в результате создаваемых промышленных радиопомех. В этом случае от пользователя может потребоваться принятие адекватных мер.

## 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。

## Taiwan BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模塊	-	○	○	○	○	○
處理器模塊	-	○	○	○	○	○
鍵盤	-	○	○	○	○	○
調製解調器	-	○	○	○	○	○
監視器	-	○	○	○	○	○
滑鼠	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
電源	-	○	○	○	○	○
儲備設備	-	○	○	○	○	○
電池匣組零件	-	○	○	○	○	○
電池	-	○	○	○	○	○
有mech的電路卡	-	○	○	○	○	○
無mech的電路卡	-	○	○	○	○	○
雷射器	-	○	○	○	○	○
<p>備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。            Note1 : “exceeding 0.1 wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。            Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “-” 係指該項限用物質為排除項目。            Note3 : The “-” indicates that the restricted substance corresponds to the exemption.</p>						

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