

Servicing the Lenovo ThinkSystem SR650 server

ES71743C

January 2019

The Lenovo logo is a green rectangular box with the word "Lenovo" written vertically in white. The background of the slide is dark grey with a pattern of small, light grey dots of varying sizes.

Lenovo

Prerequisites

- ES41758 - ThinkSystem servers architecture introduction
<https://lenovoedu.lenovo.com/course/view.php?idnumber=ES41758>
- ES51757 - Introducing ThinkSystem tools
<https://lenovoedu.lenovo.com/course/view.php?idnumber=ES51757>
- ES41759 - ThinkSystem problem determination
<https://lenovoedu.lenovo.com/course/view.php?idnumber=ES41759>
- ES51780 - Servicing the ThinkSystem storage controllers
<https://lenovoedu.lenovo.com/course/view.php?idnumber=ES51780>

Objectives

After completing the course, you will be able to:

- Describe the Lenovo ThinkSystem SR650 server MT 7X05 and MT 7X06 and components.
- List the server specifications.
- Describe the new Intel 6137 CPU and the system configuration changes to the ThinkSystem SR650.
- Describe the rich NVMe configuration.
- Describe the server configurations and diagrams.

New: ThinkSystem SR650 rich NVMe configuration

Supports up to 24 NVMe drives

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ThinkSystem SR650 rich NVMe configuration overview

The ThinkSystem SR650 can now support up to 24 NVMe drives due to its new NVMe backplane design, NVMe switch adapter, cable, and riser card. The ThinkSystem SR650 has configurations with 16, 20, or 24 NVMe drives. These configurations have the following limitations:

- Two processors must be installed.
 - The maximum supported processor Thermal Design Power (TDP) is 165 watts.
- A 1100 W PSU is required.
- Single DIMM capacities of up to 128GB are supported.
 - Apache Pass DIMMs (AEP) are not supported.
- The SSD Add-in-Card (AIC) is not supported.
- GPU adapters are not supported.
- Under normal operating conditions, the server will operate in ambient temperatures of up to 30°C (86°F). With a single fan failure, the maximum limit is 27°C (80.6°F).

New parts for the ThinkSystem SR650 rich NVMe configuration

The ThinkSystem SR650 rich NVMe configuration includes the following new parts:

- The ThinkSystem SR650 2.5-inch NVMe 8-Bay backplane
- The ThinkSystem SR650 x16/x8/x16 PCIe Riser card 1
- The ThinkSystem 1610-8P NVMe switch adapter
- The SR650 24 NVMe config cable kit
- The SR650 20 NVMe config cable kit
- The SR650 16 NVMe config cable kit

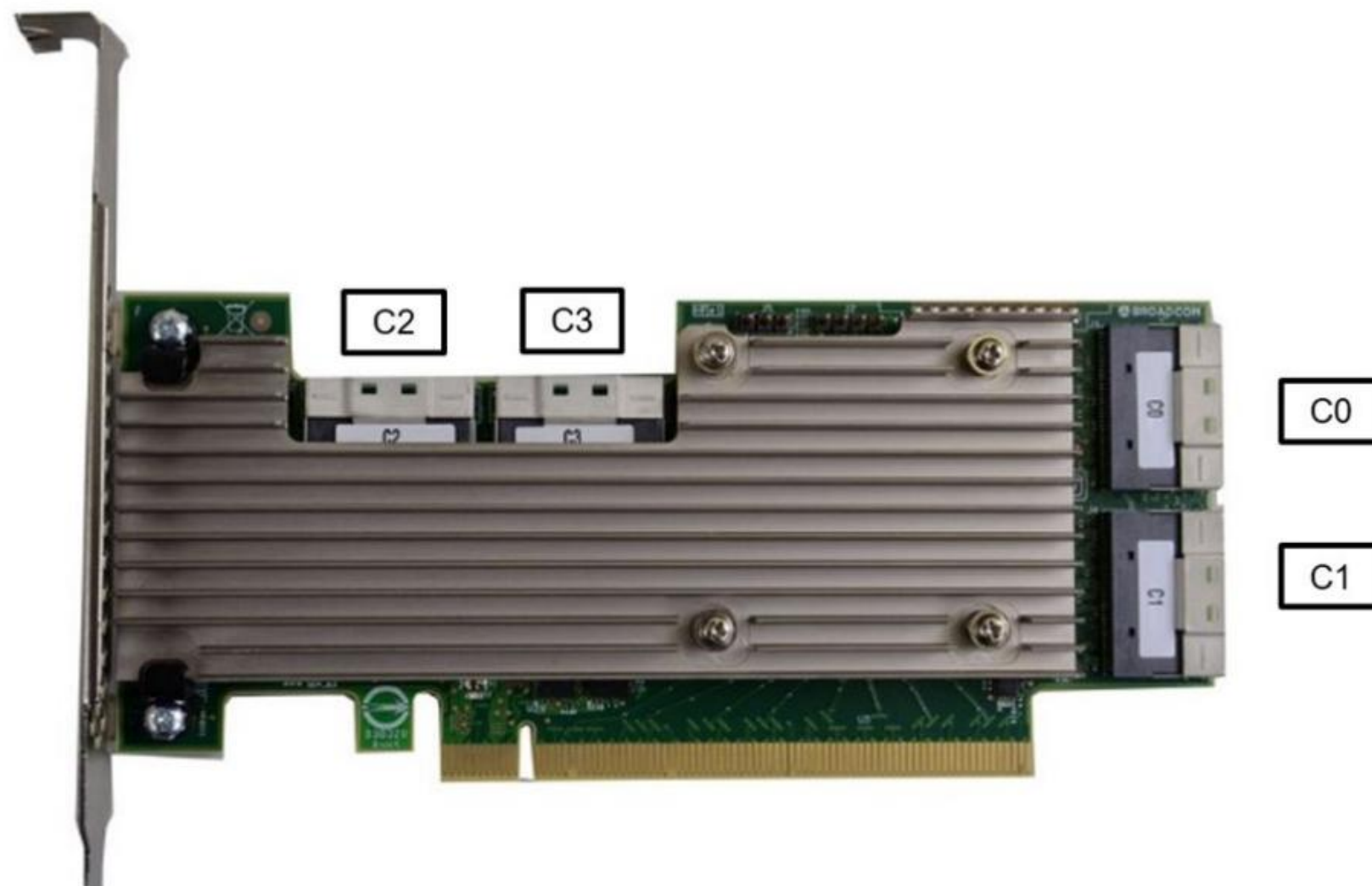
The ThinkSystem SR650 2.5-inch NVMe 8-Bay Backplane

There are four NVMe connectors and one power connector on the 2.5-inch NVMe 8-bay backplane. Each NVMe connector supports two NVMe drives.



The ThinkSystem 1610-8P NVMe Switch Adapter

The 1610-8P NVMe switch adapter can support eight NVMe drives. It is only available in the 24 NVMe configuration.



The ThinkSystem SR650 x16/x8/x16 PCIe Riser1

The SR650 x16/x8/x16 PCIe riser1 contains two connectors to connect to onboard NVMe 0-1 and NVMe 2-3 connectors to support a x16 PCIe slot. It is only used in the 24 NVMe configuration.



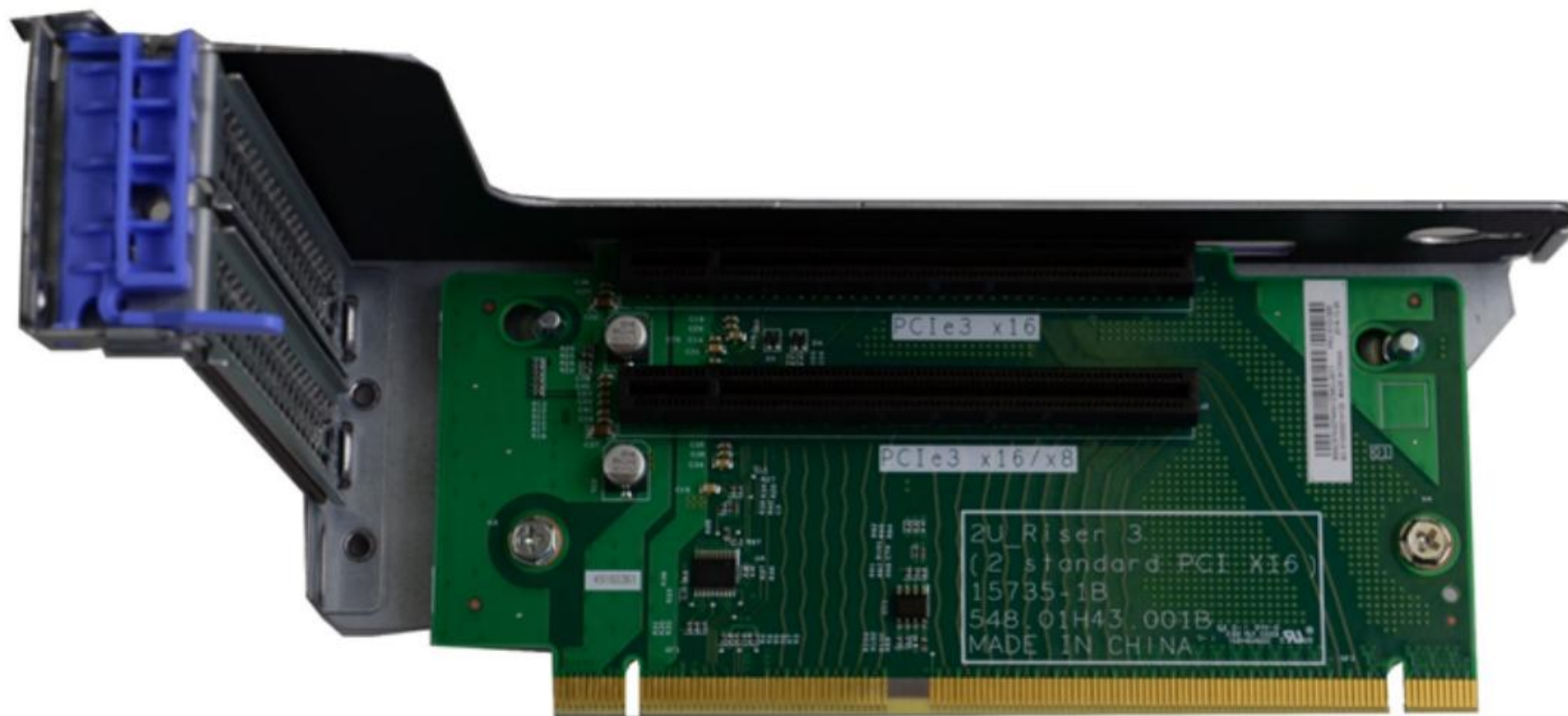
The ThinkSystem SR650 x16/x8 PCIe riser card 1

The ThinkSystem SR650 x16/x8 PCIe riser card 1 is not new, but it will be used for the 16 and 20 NVMe configurations.



The ThinkSystem SR550/SR650 x16/x16 PCIe riser card 2

The ThinkSystem SR550/SR650 x16/x16 PCIe riser card 2 is the only option for 16, 20, and 24 NVMe configurations.

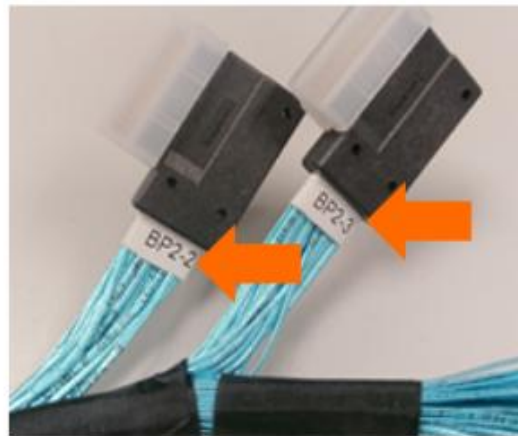
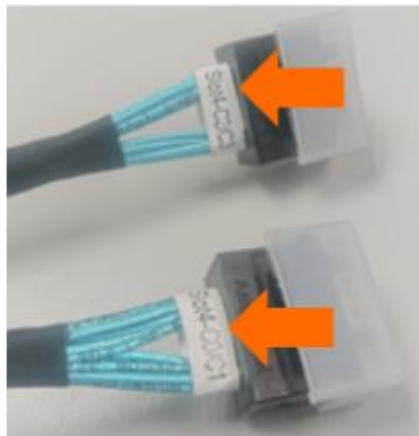


The SR650 rich NVMe config cable kit

There are three types of rich NVMe config cable kit:

- The ThinkSystem SR650 24 NVMe config cable kit
- The ThinkSystem SR650 20 NVMe config cable kit
- The ThinkSystem SR650 16 NVMe config cable kit

All cables for the rich NVMe config cable kit are clearly labeled to indicate their corresponding connectors. Be sure to follow the label instructions when plugging in the cables to prevent errors from occurring.



The ThinkSystem SR650 PCIe slots and onboard NVMe connectors

The following graphics show the location of the PCIe slots and onboard NVMe connectors.

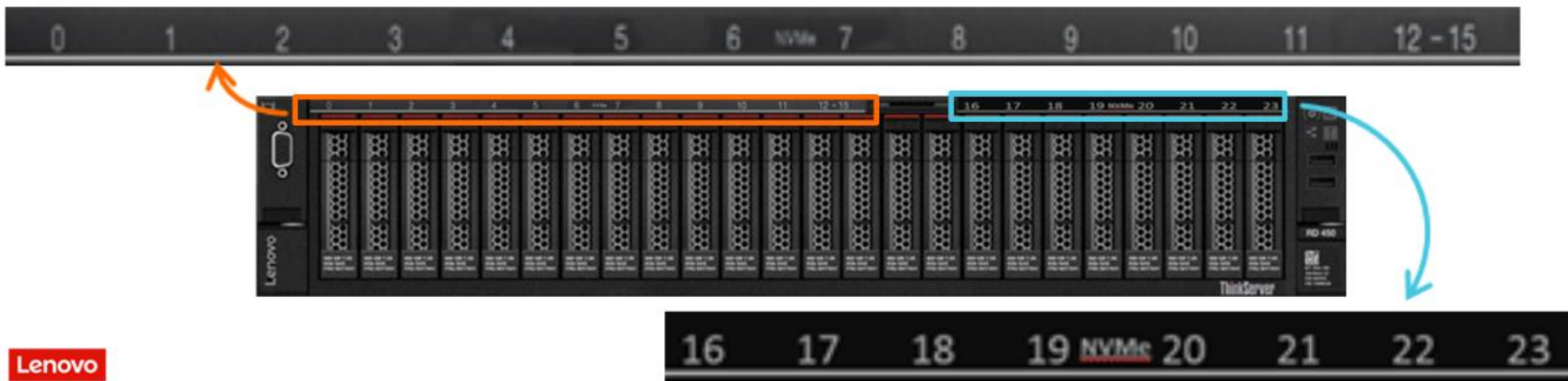


24 NVMe configuration

The 24 NVMe configuration requires the following components:

- Three ThinkSystem SR650 2.5-inch NVMe 8-Bay Backplanes
- One new ThinkSystem SR650 x16/x8/x16 PCIe Riser card 1
- The ThinkSystem SR550/SR650 x16/x16 PCIe Riser card 2
- Four ThinkSystem 810-4P NVMe switch adapters installed in PCIe slots 2, 4, 6, and 7 (internal RAID slot)
- One ThinkSystem 1610-8P NVMe switch adapter installed in PCIe slot 1
- One SR650 24 NVMe config cable kit

PCIe slots 3 and 5 will be free for customer use, and the onboard NVMe connectors will connect to PCIe Riser1.



24 NVMe configuration table

Refer to the following table for configuration details. This configuration is different to the 16 and 20 NVMe configurations. Because the onboard NVMe connectors are connected to riser1 and provide a connection to PCIe slot 1, this slot is connected to CPU2 instead of CPU1.

- CPU1 supports 12 NVMe drives.
- CPU2 supports 12 NVMe drives.

PCIe Slot number	Device	NVMe drive quantity	Drive ID number	CPU
1	1610-8P	8	4 to 11	2
2	810-4P	4	20 to 23	1
3	Free			
4 (vertical)	810-4P	4	12 to 15	
7 (internal RAID slot)	810-4P	4	16 to 19	
5	Free			2
6	810-4P	4	0 to 3	

24 NVMe configuration cable routing

Select each item for
cable routing details.

NVMe 8-Bay
Backplane 1

NVMe 8-Bay
Backplane 2

NVMe 8-Bay
Backplane 3

Onboard NVMe
connectors

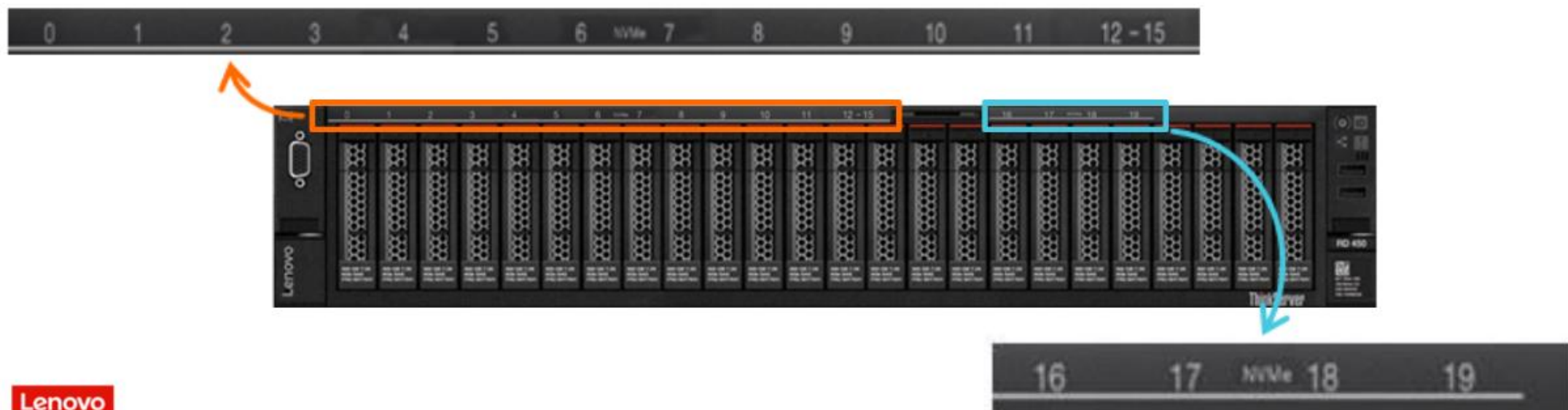


20 NVMe configuration

The 20 NVMe configuration requires the following components:

- Three ThinkSystem SR650 2.5-inch NVMe 8-Bay Backplanes
- One ThinkSystem SR650 x16/x8 PCIe Riser card 1
- One ThinkSystem SR550/SR650 x16/x16 PCIe Riser card 2
- Two ThinkSystem 810-4P NVMe switch adapters installed in PCIe slots 4 and 7
- Three ThinkSystem 1610-4P NVMe switch adapters installed in PCIe slots 1, 5, and 6
- One SR650 20 NVMe config cable kit.

PCIe slot 3 will be free for customer use, and the onboard NVMe connectors provide connections for four NVMe drives.



20 NVMe configuration table

Refer to the following table for configuration details.

- CPU1 supports eight NVMe drives.
- CPU2 supports 12 NVMe drives.

PCIe Slot number	Device	NVMe drive quantity	Drive ID number	CPU
1	1610-4P	4	16 to 19	1
2	None			
3	Free			
4 (vertical)	810-4P	2	12, 13	
7 (internal RAID slot)	810-4P	2	14, 15	
5	1610-4P	4	8 to 11	2
6	1610-4P	4	4 to 7	
	Onboard NVMe connectors	4	0 to 3	

20 NVMe configuration cable routing

Select each item for
cable routing details.

NVMe 8-Bay
Backplane 1

NVMe 8-Bay
Backplane 2

NVMe 8-Bay
Backplane 3



20 NVMe configuration cable routing

✕ Click X to go back.

NVMe 8-Bay Backplane 1

- 1610-4P in slot 5
- Onboard NVMe connectors
- Power connector 1

Power

NVMe 0

NVMe 1

NVMe 2

NVMe 3



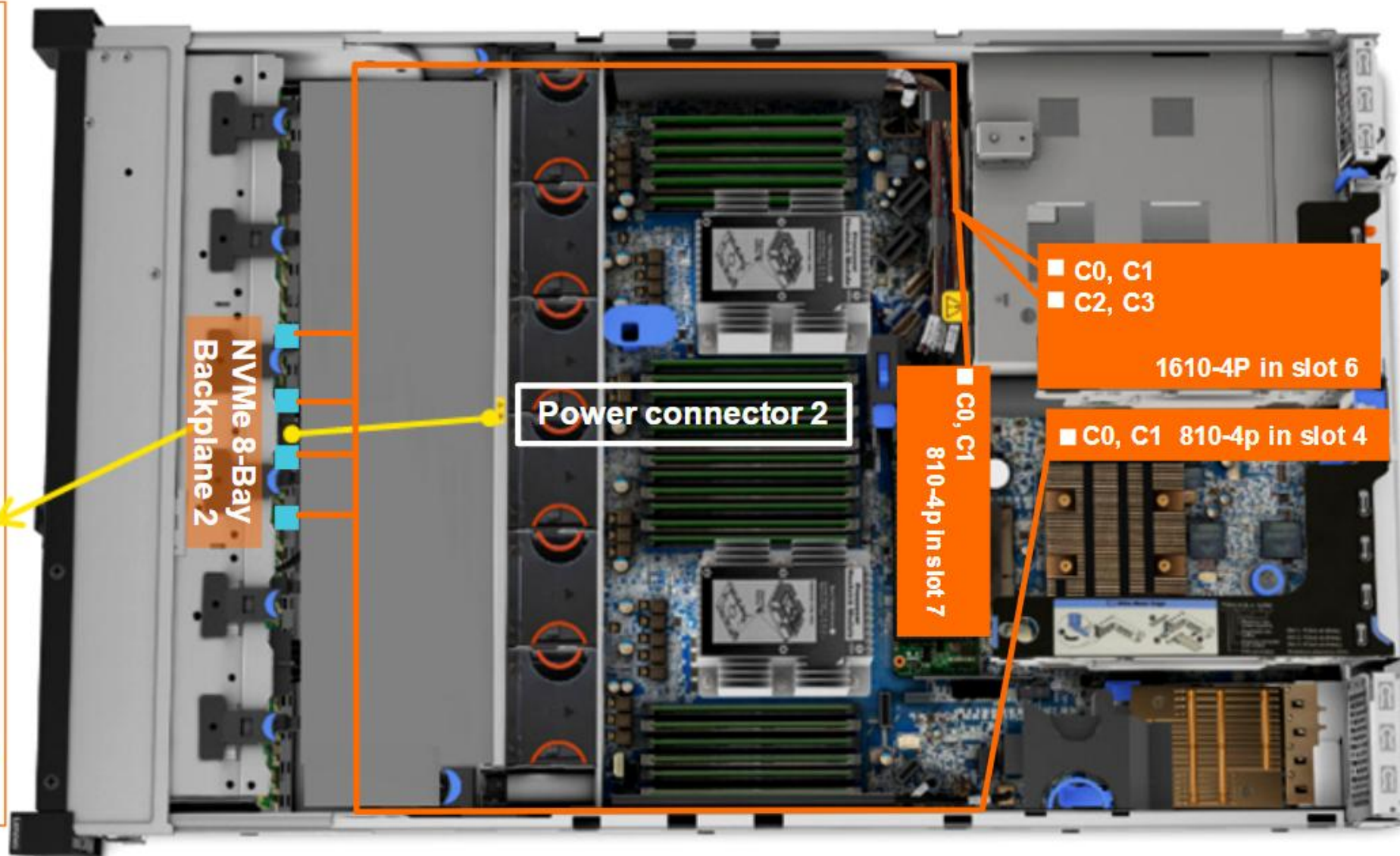
20 NVMe configuration cable routing



Click X to go back.

NVMe 8-Bay Backplane 2

- 810-4P in slot 4
- 1610-4P in slot 6
- 810-4P in slot 7
- Power connector 2



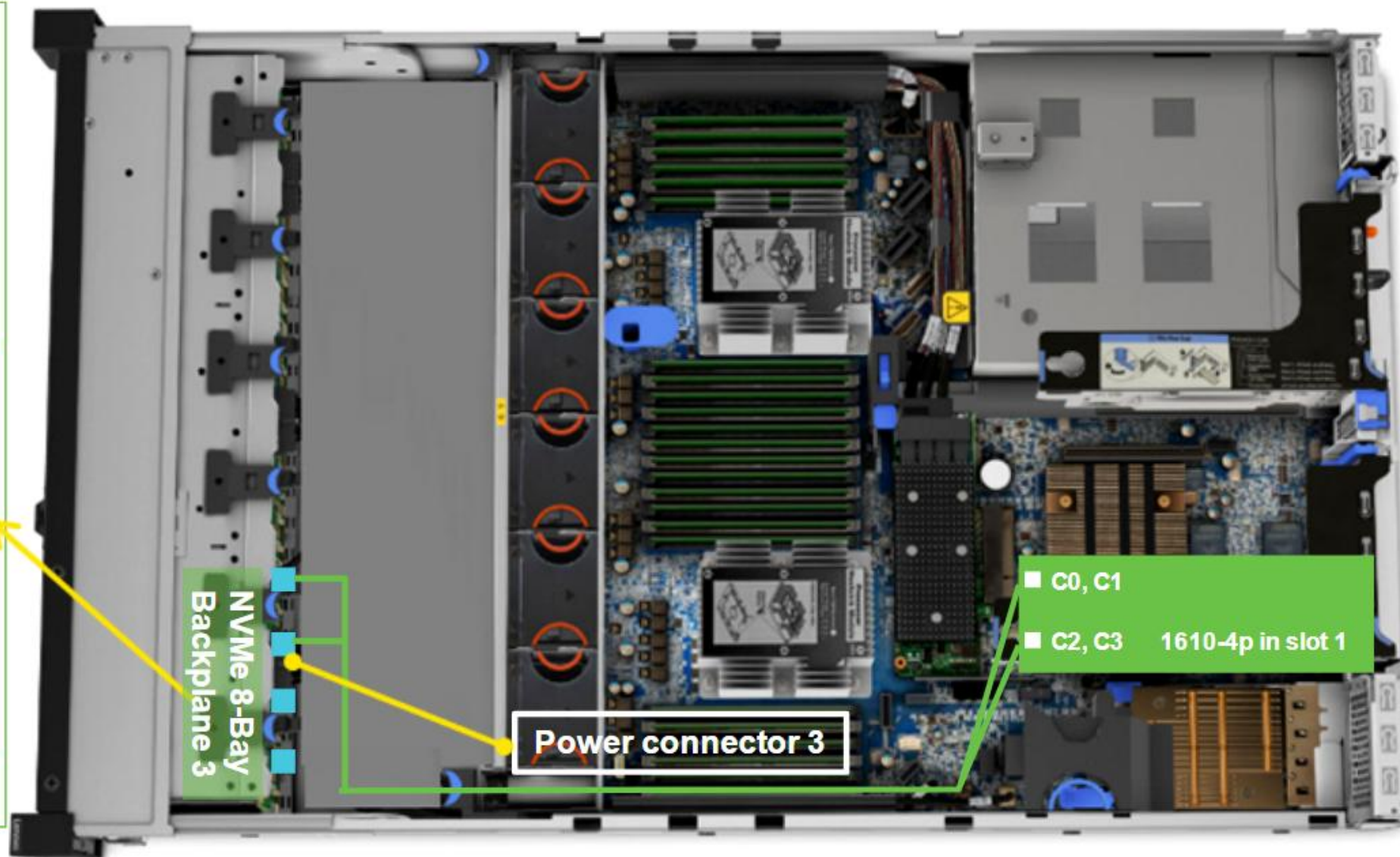
20 NVMe configuration cable routing



Click X to go back.

NVMe 8-Bay Backplane 3

- 1610-4P in slot 1
- Power connector 3



16 NVMe configuration

The 16 NVMe configuration supports up to 16 NVMe drives and up to eight SAS/SATA drives. The configuration requires the following components:

- Two ThinkSystem SR650 2.5-inch NVMe 8-Bay Backplanes
- One ThinkSystem SR650 2.5-inch SATA/SAS 8-Bay Backplane
- One ThinkSystem SR650 x16/x8 PCIe Riser card 1
- One ThinkSystem SR550/SR650 x16/x16 PCIe riser card 2
- Two ThinkSystem 810-4P NVMe switch adapters installed in PCIe slots 4 and 7
- Two ThinkSystem 1610-4P NVMe switch adapters installed in PCIe slots 1 and 6
- One SAS/SATA RAID adapter installed in PCIe slot 3 (optional)
 - 530-8i/730-8i/930-8i RAID or 430-8i HBA
- One SR650 16 NVMe config cable kit

PCIe slot 5 will be free for customer use, and the onboard NVMe connectors provide connections for four NVMe drives.

The drive ID numbering will start with 0 to 15 for NVMe drivers and 16 to 23 for SAS/SATA drives.



16 NVMe configuration table

Refer to the following table for configuration details.

- CPU1 supports eight NVMe drives and eight SAS/SATA drives.
- CPU2 supports eight NVMe drives.

PCIe Slot number	Device	NVMe drive quantity	SAS/SATA drive quantity	Drive ID number	CPU
1	1610-4P	4		12 to 15	1
2	None				
3	SAS/SATA RAID adapter		8	16 to 23	
4 (vertical)	810-4P	2		8, 9	
7 (internal RAID slot)	810-4P	2		10, 11	
5	Free				2
6	1610-4P	4		4 to 7	
	Onboard NVMe connectors	4		0 to 3	

16 NVMe configuration cable routing

Select each item for
cable routing details.

NVMe 8-Bay
Backplane 1

NVMe 8-Bay
Backplane 2



16 NVMe configuration cable routing

✕ Click X to go back.

NVMe 8-Bay Backplane 1

- 1610-4P in slot 6
- Onboard NVMe connectors
- Power connector 1

Power

NVMe 0

NVMe 1

NVMe 2

NVMe 3



16 NVMe configuration cable routing

✖ Click X to go back.

NVMe 8-Bay Backplane 2

- 1610-4P in slot 1
- 810-4P in slot 4
- 810-4P in slot 7
- Power connector 2

