

IBM Storage Scale System 3500

Hardware Planning and Installation Guide



Note

Before using this guide and the product it supports, read the information in [Chapter 2, “Notices,” on page 3](#).

This edition applies to version 6 release 2 modification 2 of the following product and to all subsequent releases and modifications until otherwise indicated in new editions:

- IBM Storage Scale Data Management Edition for IBM Storage Scale System (product number 5765-DME)
- IBM Storage Scale Data Access Edition for IBM Storage Scale System (product number 5765-DAE)

IBM welcomes your comments; see the topic [“How to submit your comments”](#) on page xvii. When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© **Copyright International Business Machines Corporation 2022, 2026.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Figures.....	vii
Tables.....	xiii
About this information.....	xv
Who should read this information.....	xv
IBM Storage Scale System information units.....	xv
Related information.....	xv
Conventions used in this information.....	xvi
How to submit your comments.....	xvii
Chapter 1. Summary of changes.....	1
Chapter 2. Notices.....	3
Trademarks.....	4
Homologation statement.....	5
Safety and environmental notices.....	5
Safety notices and labels.....	5
Special caution and safety notices.....	13
Environmental notices.....	16
FCC certification.....	16
Electromagnetic compatibility notices.....	16
Canada Notice.....	16
European Community and Morocco Notice.....	16
Germany Notice.....	17
Japan Electronics and Information Technology Industries Association (JEITA) Notice.....	17
Japan Voluntary Control Council for Interference (VCCI) Notice	18
Korea Notice.....	18
People's Republic of China Notice.....	18
Russia Notice.....	18
Saudi Arabia Notice.....	19
Taiwan Notice.....	19
The United Kingdom Notice.....	19
United States Federal Communications Commission (FCC) Notice.....	19
Chapter 3. Technical overview.....	21
System overview.....	21
IBM Storage Scale System 3500 Solution configurations.....	26
Drives.....	26
Drive slots.....	26
Power modules.....	27
SSR access port.....	27
Hardware specification sheets.....	28
EMS node specifications.....	28
Chapter 4. Planning for hardware.....	29
Planning for site preparation.....	29
Site preparation and physical planning.....	29
Planning for hardware installation.....	29

Planning for racks.....	29
Reviewing IBM Storage Scale System 3500 location guidelines.....	30
IBM Storage Scale System 3500 model.....	30
Planning for power for server canister.....	30
Physical installation planning.....	32
Operating environment.....	33
IBM Storage Scale System 3500 requirements.....	33
IP address allocation and usage.....	41
Planning your network and storage network.....	42
Planning for high-speed network adapter.....	42
Planning for cables.....	42
Connections for the Utility Node.....	42
Planning for adapters.....	44
Supported environment.....	44
Planning worksheets: Customer task.....	44
 Chapter 5. Installing.....	 53
Detailed installation steps (SSR task).....	53
IBM Storage Scale System system view.....	53
Rack details.....	53
Installing the EMS server in a rack.....	54
Unpacking IBM Storage Scale System 3500 (IBM SSR task).....	54
Installing support rails for the IBM Storage Scale System 3500 system (IBM SSR task).....	55
Installing enclosures (IBM SSR task).....	59
Installing cable management assembly (IBM SSR task).....	62
 Chapter 6. Monitoring the system using LEDs.....	 67
System status LEDs.....	67
Drive carrier assembly LEDs.....	68
Fan module LEDs.....	69
Power module LEDs.....	70
Server canister LEDs.....	71
Ethernet port LEDs.....	72
Server canister status LEDs.....	73
 Appendix A. IBM Storage Scale System 5141-FN2 - Slot placement summary.....	 75
 Appendix B. PCIe5 x16 2-port NDR 200 GB InfiniBand ConnectX-7 CAPI Capable adapter (FC AJQS).....	 77
 Appendix C. Switches for IBM Storage Scale System 3500.....	 79
The MTM 5149-N64 switch.....	80
The 5149-N64 switch introduction.....	80
Service indicators.....	85
The 5149-N64 switch installation.....	88
MTM 5149-N64 switch service.....	92
The MTM 5149-S05 switch.....	97
Key features and components of the MTM 5149-S05 switch.....	98
Views of the MTM 5149-S05 switch.....	98
Labels of the MTM 5149-S05 switch.....	99
Specifications of the MTM 5149-S05 switch.....	100
Service indicators: LEDs of the MTM 5149-S05 switch.....	101
MTM 5149-S05 switch installation.....	105
MTM 5149-S05 switch service.....	112
The MTM 5149-S54 switch.....	117
Key features and components of the MTM 5149-S54 switch.....	118

Views of the MTM 5149-S54 switch.....	120
Labels of the MTM 5149-S54 switch.....	121
Specifications of the MTM 5149-S54 switch.....	122
Service indicators: LEDs of the MTM 5149-S54 switch.....	123
MTM 5149-S54 switch installation.....	124
MTM 5149-S54 switch service.....	134
Configuration and cabling.....	136
Warranty and service.....	138
Reference documentation.....	140
Accessibility features for the system.....	141
Accessibility features.....	141
Keyboard navigation.....	141
IBM and accessibility.....	141
Glossary.....	143
Index.....	151

Figures

1. Front view of IBM Storage Scale System 3500.....	21
2. Rear view of IBM Storage Scale System 3500.....	21
3. IBM Storage Scale System 3500 Networking.....	23
4. Network topology.....	24
5. IBM Storage Scale System 3500 high-level architecture and topology.....	25
6. Performance configuration.....	26
7. Front view of IBM Storage Scale System 3500 with drives installed.....	27
8. Power module.....	27
9. SSR access port.....	27
10. Rear view of an IBM Storage Scale System 3500.....	30
11. Service envelope illustration (Dimensions in millimeters).....	38
12. Sample illustration to show space around the rack.....	39
13. Acoustical declaration with noise hazard notice.....	40
14. Orientation of ports on the Utility Node.....	43
15. SSR access port in the Utility Node.....	45
16. Management port in the Utility Node.....	45
17. SSR access port.....	45
18. Management ports of each canister.....	45
19. Networking for IBM Storage Scale Systems.....	46
20. Rail assembly.....	55
21. Removal of square post screw.....	55
22. Installation of round post screw.....	56
23. Removal of the inner rail.....	56

24. Release tab.....	56
25. Installation of left rear bracket.....	57
26. Securing the rear end of the left outer rail.....	57
27. Removal of the middle screw.....	57
28. Installation of the front bracket.....	58
29. Securing the front of the rails.....	58
30. Standoffs aligned with the keyholes.....	59
31. Standoffs secured over the keyholes.....	59
32. Securing the rail.....	59
33. Alignment of the enclosure.....	60
34. Inserting the enclosure.....	60
35. Replacing left ear cap.....	61
36. Displaying left ear cap front view.....	61
37. Replacing right ear cap.....	61
38. Release tab.....	62
39. Securing the enclosure.....	62
40. Cable management assembly.....	63
41. Cable management assembly installation.....	63
42. CMA release buttons.....	64
43. Installing inner CMA arm connector on inner rail connector.....	64
44. Installing outer CMA arm connector on outer rail connector.....	64
45. Installing CMA body connector (E) on the left CMA body rail.....	65
46. System status LEDs on an IBM Storage Scale System 3500 enclosure.....	67
47. Displaying system status LEDs on an IBM Storage Scale System 3500 enclosure.....	67
48. Drive status LEDs on an IBM Storage Scale System 3500 drive carrier.....	69

49. IBM Storage Scale System 3500 fan LEDs.....	70
50. IBM Storage Scale System 3500 power module status LED.....	70
51. IBM Storage Scale System 3500 server canister	71
52. Close-up view of server canister LEDs.....	72
53. Close up view of IBM Storage Scale System 3500 Ethernet port LEDs.....	72
54. Slot placement summary.....	75
55. 2-port HDR 100 Gb InfiniBand ConnectX-7 adapter (FC AJQS).....	77
56. Ports view of the MTM 5149-N64 switch.....	79
57. PSUs view of the MTM 5149-N64 switch.....	79
58. Ports view of the MTM 5149-S05 switch.....	79
59. PSUs view of the MTM 5149-S05 switch.....	79
60. Ports views of the MTM 5149-S54 switch.....	80
61. PSUs view of the MTM 5149-S54 switch.....	80
62. 5149-N64 switch ports.....	80
63. 5149-N64 switch power.....	80
64. Port view of the 5149-N64 switch	82
65. Power side view.....	82
66. Chassis labels.....	83
67. Switch labels.....	84
68. LEDs on the port.....	85
69. Fan LEDs.....	86
70. Power supply unit LEDs.....	87
71. Port LEDs.....	88
72. The 5149-N64 switch and rails alignment.....	90
73. A rail secured to the 5149-N64 switch.....	90

74. Inserting rack rails into the back of the rack.....	90
75. A rack rail that is inserted into the back of the rack.....	91
76. Extending the telescopic rail.....	91
77. Fully inserted latch into the rack slots.....	91
78. Sliding the switch into the channel.....	92
79. Tightening the two captive screws.....	92
80. Loosening the captive screws.....	94
81. Pulling out the system.....	94
82. Pressing the spring latches.....	95
83. Releasing the metal latches.....	95
84. Pressing the lock button.....	95
85. Releasing latch while pulling the handle.....	96
86. Extracting a fan module.....	96
87. PSUs view of the MTM 5149-S05 switch.....	97
88. Ports view of the MTM 5149-S05 switch.....	97
89. Ports of an MTM 5149-S05 switch.....	99
90. Switch port numbers of an MTM 5149-S05 switch.....	99
91. Hot-swappable fans and PSUs of an MTM 5149-S05 switch.....	99
92. PSUs label.....	99
93. Labels on the bottom of the switch enclosure.....	100
94. LED indicators for system, fans, PSUs, and identifier of an MTM 5149-S05 switch.....	101
95. Switch port LEDs of an MTM 5149-S05 switch.....	102
96. LED splitting options of an MTM 5149-S05 switch.....	102
97. Example of a fan LED (fan unit 4).....	104
98. LED indicator for the PSUs of an MTM 5149-S05 switch.....	104

99. Aligning the bottom of the air duct with the PSUs side of the switch enclosure.....	107
100. Sliding the switch enclosure into the bottom of the air duct.....	107
101. Aligning the enclosure pins with the key holes of the rack mounting rail.....	108
102. Securing the rack mounting rail.....	108
103. Inserting the cage nuts (example of two cage nuts that are inserted in position in a left rack post)	108
104. Placing a rack mounting blade on a right rack post.....	109
105. Tilting the switch enclosure to install it.....	109
106. Inserting the rack mounting blades in the rack mounting rails.....	110
107. Securing the rack mounting rail.....	110
108. Displaying one of the cables grommets of an air duct.....	111
109. Aligning the right edge tabs of the air duct top with the right edge of the air duct bottom.....	111
110. Sliding the air duct top into the air duct bottom.....	111
111. Securing the air duct top.....	112
112. Loosening the thumbscrews of the air duct top.....	115
113. Removing the securing hardware.....	115
114. Locating the release latch and handle of a PSU.....	116
115. Removing a PSU.....	116
116. Locating the release latch and handle of a fan.....	117
117. Removing a fan module.....	117
118. PSUs view of the MTM 5149-S54 switch.....	118
119. Ports views of the MTM 5149-S54 switch.....	118
120. Ports of an MTM 5149-S54 switch on the rear of the enclosure.....	120
121. Switch port numbers of an MTM 5149-S54 switch.....	120
122. PSUs and fixed fans of an MTM 5149-S54 switch.....	121
123. PSUs label.....	121

124. Labels on the bottom of the switch enclosure.....	121
125. LED indicators for system, LOC, PSUs, fans, and PoE of an MTM 5149-S54 switch.....	123
126. LED indicators for the management port of an MTM 5149-S54 switch.....	124
127. LED indicators for the 6 SFP + uplink ports of an MTM 5149-S54 switch.....	124
128. Contents of the package.....	125
129. 6U rack space of clearance that are required for installation.....	127
130. View from the switch ports side: Example of a properly installed MTM 5149-N64 switch and airflow control shelf.....	127
131. View from the switch PSUs side: Example of a properly installed MTM 5149-N64 switch and airflow control shelf.....	128
132. Orienting the airflow control shelf.....	128
133. Marking the rack position for the airflow control shelf (example).....	129
134. Aligning the bracket sides for installation.....	130
135. Aligning the front bracket and the enclosure for installation.....	130
136. Attaching the rack brackets to the MTM 5149-S54 switch enclosure.....	130
137. Securing the MTM 5149-S54 switch to the rack.....	131
138. Connecting an external AC power source to the PSUs of an MTM 5149-S54 switch.....	131
139. Connecting cables to the RJ-45 port of an MTM 5149-S54 switch.....	132
140. Connecting cables the SFP+ port of an MTM 5149-S54 switch.....	132
141. Making the management connections for an MTM 5149-S54 switch.....	133

Tables

1. Conventions.....	xvi
2. Latest updates made in the IBM Storage Scale System 3500 Hardware Planning and Installation Guide.....	1
3. Overview of IBM Storage Scale System 3500.....	22
4. Storage capacities and feature codes of NVMe-attached SSD drives.....	22
5. Power cord feature codes.....	30
6. Power planning reference information for Power9.....	31
7. Power planning reference information for IBM Storage Scale System Utility Node	32
8. System maximum measured power specifications.....	35
9. Power rating specifications per power module.....	36
10. Temperature requirements.....	36
11. Physical characteristics of the enclosures.....	37
12. Rack space requirements for the IBM Storage Scale System 3500.....	37
13. Service clearance requirements.....	39
14. Clearances.....	39
15. Drive specifications.....	40
16. Shock testing results.....	41
17. Vibration testing results.....	41
18. Random vibration PSD profile breakpoints1.....	41
19. Ports on the Utility Node.....	43
20. Summary of supported host interface adapters.....	44
21. Behavior of system status LEDs.....	68
22. IBM Storage Scale System 3500 LEDs behavior.....	69

23. IBM Storage Scale System 3500 fan LEDs.....	70
24. IBM Storage Scale System 3500 power module status LED.....	71
25. IBM Storage Scale System 3500 Ethernet port status LEDs.....	72
26. Behavior of IBM Storage Scale System 3500 server canister status LEDs	73
27. ConnectX-7 cable matrix.....	78
28. IBM MTM and NVIDIA system model.....	81
29. IBM IBM and NVIDIA system model.....	97
30. Descriptions for the LED indicators for system, fans, PSUs, and identifier of an MTM 5149-S05 switch.....	101
31. Descriptions for the LED splitting options of an MTM 5149-S05 switch.....	103
32. Descriptions for the fan LEDs of an MTM 5149-S05 switch.....	104
33. Descriptions for the PSU LEDs of an MTM 5149-S05 switch.....	104
34. IBM IBM and Edgecore system model.....	118
35. Cable part numbers.....	134

About this information

Who should read this information

This information is intended for administrators of IBM Storage Scale System that includes IBM Storage Scale RAID.

IBM Storage Scale System information units

IBM Storage Scale System 3500 documentation consists of the following information units.

Information unit	Type of information	Intended users
Hardware Planning and Installation Guide	This unit provides IBM Storage Scale System 3500 information including technical overview, planning, installing, troubleshooting, and cabling.	System administrators and IBM support team
Quick Deployment Guide	This unit provides IBM Storage Scale System 3500 information including the software stack, deploying, upgrading, setting up call home, and best practices.	System administrators, analysts, installers, planners, and programmers of IBM Storage Scale clusters who are very experienced with the operating systems on which each IBM Storage Scale cluster is based
Service Guide	This unit provides IBM Storage Scale System 3500 information including servicing and parts listings.	System administrators and IBM support team
Problem Determination Guide	This unit provides IBM Storage Scale System 3500 information including events, replacing servers, issues, maintenance procedures, and troubleshooting.	System administrators and IBM support team
Command Reference	This unit provides information about IBM Storage Scale System 3500 commands and scripts.	System administrators and IBM support team
IBM Storage Scale RAID: Administration	This unit provides IBM Storage Scale System 3500 information including administering, monitoring, commands, and scripts.	• System administrators of IBM Storage Scale systems • Application programmers who are experienced with IBM Storage Scale systems and familiar with the terminology and concepts in the XD SM standard

Related information

For information about:

- IBM Storage Scale RAID, see [IBM Storage Scale System documentation](#).
- **mmvdisk** command, see [mmvdisk documentation](#).

- Mellanox OFED (MLNX_OFED_LINUX-24.01-0.3.3.5), see its [Release Notes](#) in NVIDIA documentation.
- IBM Storage Scale System, see [IBM Storage Scale System solution documentation](#).
- IBM Storage Scale call home, see [Overview of call home](#) in the *IBM Storage Scale: Concepts, Planning, and Installation Guide*.
- Installing IBM Storage Scale and CES protocols with the installation toolkit, see [Installing IBM Storage Scale on Linux® nodes with the installation toolkit](#).
- Detailed information about the IBM Storage Scale installation toolkit, see [Using the installation toolkit to perform installation tasks: Explanations and examples](#).
- CES HDFS, see [Adding CES HDFS nodes into the centralized file system](#).
- Installation toolkit support by IBM Storage Scale System, see [IBM Storage Scale System awareness with the installation toolkit](#).
- IBM Power9 servers, see [5105 22E: Reference information](#).
- IBM Storage Scale System Utility Node servers, see [IBM Storage Scale System Utility Node documentation](#).

For the latest support information about IBM Storage Scale RAID, see the [IBM Storage Scale RAID FAQ](#) in [IBM Documentation](#).

Conventions used in this information

Table 1 on page xvi describes the typographic conventions used in this information. UNIX file name conventions are used throughout this information.

Table 1. Conventions

Convention	Usage
bold	Bold words or characters represent system elements that you must use literally, such as commands, flags, values, and selected menu options. Depending on the context, bold typeface sometimes represents path names, directories, or file names.
<u>bold underlined</u>	<u>bold underlined</u> keywords are defaults. These take effect if you do not specify a different keyword.
constant width	Examples and information that the system displays appear in constant-width typeface. Depending on the context, constant-width typeface sometimes represents path names, directories, or file names.
<i>italic</i>	<i>Italic</i> words or characters represent variable values that you must supply. <i>Italics</i> are also used for information unit titles, for the first use of a glossary term, and for general emphasis in text.
<key>	Angle brackets (less-than and greater-than) enclose the name of a key on the keyboard. For example, <Enter> refers to the key on your terminal or workstation that is labeled with the word <i>Enter</i> .
\	In command examples, a backslash indicates that the command or coding example continues on the next line. For example: <pre>mkcondition -r IBM.FileSystem -e "PercentTotUsed > 90" \ -E "PercentTotUsed < 85" -m p "FileSystem space used"</pre>
{item}	Braces enclose a list from which you must choose an item in format and syntax descriptions.

Table 1. Conventions (continued)

Convention	Usage
[item]	Brackets enclose optional items in format and syntax descriptions.
<Ctrl-x>	The notation <Ctrl-x> indicates a control character sequence. For example, <Ctrl-c> means that you hold down the control key while pressing <c>.
item...	Ellipses indicate that you can repeat the preceding item one or more times.
 	In <i>synopsis</i> statements, vertical lines separate a list of choices. In other words, a vertical line means <i>Or</i>. In the left margin of the document, vertical lines indicate technical changes to the information.

How to submit your comments

To contact the IBM Storage Scale development organization, send your comments to the following email address: scale@us.ibm.com.

Chapter 1. Summary of changes

Summary of changes for IBM Storage Scale System 3500 documentation.

The updates to the *IBM Storage Scale System 3500 Hardware Planning and Installation Guide* include the changes that are detailed in the following table.

Table 2. Latest updates made in the IBM Storage Scale System 3500 Hardware Planning and Installation Guide		
Month of the update	Change description	Updated page
March 2025	Add MTM 5149-S05 switch.	“The MTM 5149-S05 switch” on page 97
	Add MTM 5149-S54 switch.	“The MTM 5149-S54 switch” on page 117
June 2025	Add product numbers and feature codes for cabling components that can be used with MTM 5149-S05 switch and MTM 5149-S54 switch.	“Configuration and cabling” on page 136
September 2025	Add installation instructions for the airflow control shelf that is now included with MTM 5149-S54 switch.	“Installing the MTM 5149-S54 switch” on page 126
April 2026	Add 03KX086 cable as a requirement for the installation of an MTM 5149-S54 switch.	“Installing the MTM 5149-S54 switch” on page 126
July 2026	New rules for VLAN tag use in IBM Storage Scale System 3500.	“The MTM 5149-S54 switch” on page 117

Chapter 2. Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.*

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

*Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan, Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan*

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

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

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and ibm.com® are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at Copyright and trademark information at www.ibm.com/legal/copytrade.shtml.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java™ and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

The registered trademark Linux is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Microsoft, Windows, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Red Hat® and Ansible® are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other product and service names might be trademarks of IBM or other companies.

Homologation statement

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, neither to be used in a Public Service Network. Further certification might be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Safety and environmental notices

Review all safety notices, environmental notices, and electronic emission notices before you install and use the product.

Suitability for telecommunication environment: This product is not intended to connect directly or indirectly by any means whatsoever to interfaces of public telecommunications networks.

To find the translated text for a caution or danger notice, complete the following steps.

1. Look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (C001) and (D002) are the identification numbers.



CAUTION: A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)



DANGER: A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)

2. Locate the *IBM Systems Safety Notices* with the user publications that were provided with your system hardware.
3. Find the matching identification number in the *IBM Systems Safety Notices*. Then, review the topics about the safety notices to ensure that you are in compliance.
4. (Optional) Read the multilingual safety instructions on the system website.
 - a. Go to www.ibm.com/support
 - b. Search for "IBM Storage Scale System 3500"
 - c. Click the documentation link.

Safety notices and labels

Review the safety notices and safety information labels before you use this product.

To view a PDF file, you need Adobe Acrobat Reader. You can download it at no charge from the Adobe website:

www.adobe.com/support/downloads/main.html

IBM Systems Safety Notices

This publication contains the safety notices for the IBM Systems products in English and other languages. Anyone who plans, installs, operates, or services the system must be familiar with and understand the safety notices. Read the related safety notices before you begin work.

Note: The *IBM System Safety Notices* document is organized into two sections. The danger and caution notices without labels are organized alphabetically by language in the "Danger and caution notices by language" section. The danger and caution notices that are accompanied with a label are organized by label reference number in the "Labels" section.

Note: You can find and download the current *IBM System Safety Notices* by searching for Publication number **G229-9054** in the [IBM Publications Center](#).

The following notices and statements are used in IBM documents. They are listed in order of decreasing severity of potential hazards.

Danger notice definition

A special note that emphasizes a situation that is potentially lethal or extremely hazardous to people.

Caution notice definition

A special note that emphasizes a situation that is potentially hazardous to people because of some existing condition, or to a potentially dangerous situation that might develop because of some unsafe practice.

Note: In addition to these notices, labels might be attached to the product to warn of potential hazards.

Finding translated notices

Each safety notice contains an identification number. You can use this identification number to check the safety notice in each language.

To find the translated text for a caution or danger notice:

1. In the product documentation, look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (D002) and (C001) are the identification numbers.



DANGER: A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)



CAUTION: A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

2. After you download the *IBM System Safety Notices* document, open it.
3. Under the language, find the matching identification number. Review the topics about the safety notices to ensure that you are in compliance.

Danger notices for the system

Ensure that you are familiar with the danger notices for your system.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Systems Safety Notices*.



DANGER: When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard: If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product. Do not open or service any power supply assembly. Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. For AC power, disconnect all power cords from their AC power source. For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected. For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate. For racks with a DC power distribution panel (PDP), connect the customer's DC power

source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.

- Connect any equipment that will be attached to this product to properly wired outlets.
- 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.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- When performing a machine inspection: Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements. Do not attempt to switch power to the machine until all possible unsafe conditions are corrected. Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. For AC power, remove the power cords from the outlets.
3. For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source.
4. Remove the signal cables from the connectors.
5. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. For AC power, attach the power cords to the outlets.
5. For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP.
6. Turn on the devices.



- Sharp edges, corners and joints might be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)



DANGER: Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)



DANGER: Serious injury or death can occur if loaded lift tool falls over or if a heavy load falls off the lift tool. Always completely lower the lift tool load plate and properly secure the load on the lift tool before moving or using the lift tool to lift or move an object. (D010)



DANGER: Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed.

- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or workspaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Stability hazard:
 - The rack may tip over causing serious personal injury.
 - Before extending the rack to the installation position, read the installation instructions.
 - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
 - Do not leave the slide-rail mounted equipment in the installation position.
- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
 - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 3)



DANGER: The provided equipment that is intended to be installed in a customer-supplied rack can pose weight, mechanical, stability, electrical, and thermal hazards. See the safety instructions of the selected rack for installing this hardware, along with these general guidelines:

- Weight hazard:
 - Heavy equipment. Personal injury or equipment damage might result if mishandled.
- Mechanical hazard:
 - Do not use rack-mounted devices as shelves or workspaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Do not move or relocate a rack with the equipment installed. Remove all hardware from the rack if the rack needs to be moved or relocated. Use professional movers.

- Stability hazard:
 - With hardware installed in a rack, the rack can tip over causing serious personal injury or death.
 - To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack.
 - Always lower the leveling pads on the rack, if provided.
 - Always install stabilizer or earthquake brackets on the rack, if provided.
 - Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- Electrical hazard:
 - The rack might have more than one power cord. Be sure to disconnect all power cords when directed to disconnect power during servicing.
 - Connect all devices that are installed in a rack to power devices that are installed in the same rack. Do not plug a power cord from a device that is installed in one rack into a power device that is installed in a different rack.
 - An electrical outlet that is not correctly wired might place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlets are correctly wired and grounded to prevent an electrical shock.
 - Consideration must be given to the connection of the equipment to the power supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, see the rating labels that are located on the equipment in the rack to determine the total power requirement of the supply circuit.
- Thermal hazard:
 - Do not install a unit in a rack where the internal rack ambient temperatures exceed the recommended ambient temperature of the manufacturer for all your rack-mounted devices.
 - Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced at ventilation openings that can adversely affect thermal performance of the equipment.
- Install and service each drawer according to its installation and service instructions, following the applicable safety notices in the respective documentation. (R001 part 3 of 3)



DANGER: Racks with a total weight of > 227 kg (500 lb.), Use Only Professional Movers! (R003)



DANGER: Do not transport the rack via fork truck unless it is properly packaged, secured on top of the supplied pallet. (R004)

DANGER:



Main Protective Earth (Ground):

This symbol is marked on the frame of the rack.

The **PROTECTIVE EARTHING CONDUCTORS** should be terminated at that point. A recognized or certified closed loop connector (ring terminal) should be used and secured to the frame with a lock washer using a bolt or stud. The connector should be properly sized to be suitable for the bolt or stud, the locking washer, the rating for the conducting wire used, and the considered rating of the breaker. The intent is to ensure the frame is electrically bonded to the **PROTECTIVE EARTHING CONDUCTORS**. The hole that the bolt or stud goes into where the terminal conductor and the lock washer contact should be free of any non-conductive material to allow for metal to metal contact. All **PROTECTIVE EARTHING CONDUCTORS** should terminate at this main protective earthing terminal or at points marked with . (R010)

Caution notices for the system

Ensure that you understand the caution notices for the system.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Systems Safety Notices*.



CAUTION:



or



or



or

The weight of this part or unit is 18 - 32 kg (39.7 - 70.5 lb). It takes two persons to safely lift this part or unit. (C009)



CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)



CAUTION: Use safe practices when lifting. (R007)



CAUTION:



Enclosure integrity:

- Access covers are intended only for occasional removal.
- Follow documented procedures when opening during live or temporary service.
- When service is complete, promptly reinstall all covers, lids, and/or doors for correct operation. (L031)



CAUTION: CAUTION regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers). Read and completely understand the contents of LIFT TOOL operator's manual before using.
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's website.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads. (C048, part 1 of 2)

- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL.
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or forklift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048, part 2 of 2)



or



CAUTION:

High levels of acoustical noise are (or could be under certain circumstances) present.

Use approved hearing protection and/ or provide mitigation or limit exposure. (L018)



CAUTION: Removing components from the upper positions in the rack cabinet improves rack stability during a relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions.
 - Remove all devices in the 32U position (compliance ID RACK-001) or 22U (compliance ID RR001) and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001) or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.

- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet or in an earthquake environment bolt the rack to the floor.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off the pallet and bolt the rack cabinet to the pallet. (R002)

Equipment batteries

- The system battery contains lithium manganese dioxide. If the battery pack is not handled properly, there is risk of fire and burns.
- Do not disassemble, crush, puncture, short external contacts, or dispose of the battery in fire or water.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- The system battery is not replaceable. If the battery is replaced by an incorrect type, there is danger of explosion. Replace the battery only with a spare designated for your product.
- Do not attempt to recharge the battery.
- Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Special caution and safety notices

This information describes special safety notices that apply to the system. These notices are in addition to the standard safety notices that are supplied; they address specific issues that are relevant to the equipment provided.

General safety

When you service the IBM Storage Scale System 3500, follow general safety guidelines.

Use the following general rules to ensure safety to yourself and others.

- Observe good housekeeping in the area where the devices are kept during and after maintenance.
- Follow the guidelines when lifting any heavy object:
 1. Ensure that you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 18 kg (40 lb) or objects that you think are too heavy for you.*

- Do not perform any action that causes a hazard or makes the equipment unsafe.
- Before you start the device, ensure that other personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the unit.
- Keep your tool case away from walk areas so that other people cannot trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a device. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconducting clip, approximately 8 cm (3 in.) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly after you have finished servicing the unit.

Inspecting the system for unsafe conditions

Use caution when you are working in any potential safety hazardous situation that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Before you start the safety inspection, make sure that the power is off, and that the power cord is disconnected.

Each device has the required safety items that are installed to protect users and support personnel from injury. Only those items are addressed.

Important: Good judgment must also be used to identify potential safety hazards due to the attachment of non-IBM features or options that are not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard might be and whether you can continue without first correcting the problem. For example, consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)

Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards

A damaged CRT face or a bulging capacitor can cause serious injury.

Mechanical hazards

Loose or missing items (for example, nuts and screws) can cause serious injury.

To inspect each node for unsafe conditions, use the following steps. If necessary, see any suitable safety publications.

1. Turn off the system and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables by using the following steps:
 - a) Ensure that the third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
 - b) Ensure that the power cord is the appropriate type, as specified in the parts listings.
 - c) Ensure that the insulation is not worn or damaged.

4. Check for any obvious nonstandard changes, both inside and outside the unit. Use good judgment about the safety of any such changes.
5. Check inside the node for any obvious unsafe conditions, such as metal particles, contamination, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the power-supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit are not removed or disturbed.
9. Check the grounding of the network switch before you connect the system to the storage area network (SAN).
10. Contact technical support if there are any issues.

Checking external devices

Ensure that you complete an external device check before you install or service the system.

To conduct an external device check, complete the following steps:

1. Verify that all external covers are present and are not damaged.
2. Ensure that all latches and hinges are in the correct operating condition.
3. Check for loose or broken feet when the system is not installed in a rack cabinet.
4. Check the power cords for damage.
5. Check the external signal cables for damage.
6. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
7. Check the bottom of the external cover for any loose or broken feet.
8. Contact technical support if there are any issues.

Checking internal devices

Ensure that you complete an internal device check before you install or service your system.

To conduct the internal device check, use the following steps.

1. Check for any non-IBM changes that were made to the device.
2. Check the condition of the inside of the device for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Handling static-sensitive devices

Ensure that you understand how to handle devices that are sensitive to static electricity.



Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic bag, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This action removes static electricity from the package and from your body).
- Remove the device from its package and install it directly into your system, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component-side up.) Do not place the device onto the cover of the system or onto a metal table.

- Take additional care when you handle devices during cold weather. Indoor humidity tends to decrease in cold weather, causing an increase in static electricity.

Sound pressure



Attention: Depending on local conditions, the sound pressure can exceed 85 dB(A) during service operations. In such cases, wear appropriate hearing protection.

Environmental notices

This information contains all the required environmental notices for IBM Systems products in English and other languages.

The *IBM Systems Environmental Notices* includes statements on limitations, product information, product recycling and disposal, battery information, flat panel display, refrigeration and water-cooling systems, external power supplies, and safety data sheets.



CAUTION: The control canisters of IBM Storage Scale System (5141-FN2, LJII-2U24) are factory-sealed, contain no serviceable parts, and must be replaced by IBM-authorized service personnel only.

FCC certification

The FCC certification pertains solely to the IBM Storage Scale System itself. Any components that are installed by the customer might impact the certifications, and it is the customer's responsibility to ensure that the certification requirements are met in the geography where the IBM Storage Scale System will be used.

Electromagnetic compatibility notices

The following Class A statements apply to IBM products and their features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

IBM Storage Scale System 3500 (MTM 5141-FN2). When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

meets all regulatory EMC compliance requirements as offered, including auxiliary equipment and cables that may be ordered from IBM to be used in conjunction with IBM Storage Scale System 3500 (MTM 5141-FN2).

Canada Notice

CAN ICES-3 (A)/NMB-3(A)

European Community and Morocco Notice

This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Germany Notice

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 EN 55032 Klasse A ein.

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

EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)." Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC 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 Einhaltung der EMV-Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 800 225 5426
e-mail: Halloibm@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse A.

Japan Electronics and Information Technology Industries Association (JEITA) Notice

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値: IBM Documentation の各製品
の仕様ページ参照

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類：6（単相、P F C回路付）
- 換算係数：0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類：5（3相、P F C回路付）
- 換算係数：0

Japan Voluntary Control Council for Interference (VCCI) Notice

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

Korea Notice

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

People's Republic of China Notice

警告:在居住环境中,运行此设备可能会造成 无线电干扰。

Russia Notice

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

russe

Saudi Arabia Notice

قد يتسبب هذا المنتج في حدوث تداخل إذا تم استخدامه في المناطق السكنية.

ويجب تجنب هذا الاستخدام ما لم يتخذ المستخدم تدابير خاصة لتقليل الانبعاثات الكهرومغناطيسية لمنع التداخل مع استقبال البث الإذاعي والتلفزيوني.

SASO CISPR 32 تحذير: هذا الجهاز متوافق مع الفئة أ من

في البيئة السكنية، قد يتسبب هذا الجهاز في حدوث تداخل لاسلكي.

Taiwan Notice

CNS 13438

警告使用者：此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

CNS 15936

警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境。

IBM Taiwan Contact Information:

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

The United Kingdom Notice

This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

United States Federal Communications Commission (FCC) Notice

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, grounded, and approved cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than approved 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 might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Responsible Party:

International Business Machines Corporation

New Orchard Road

Armonk, NY 10504

Contact for FCC compliance information only: fccinfo@us.ibm.com

Chapter 3. Technical overview

The technical overview topics provide information about the key concepts of IBM Storage Scale System 3500.

Target audience of this chapter: Customers and IBM Service Support Representative (SSR).

System overview

An IBM Storage Scale System 3500 enclosure contains Non-Volatile Memory Express (NVMe) attached SSD drives and a pair of server canisters.

IBM Storage Scale System 3500 is an all-Flash array platform. This storage platform uses NVMe-attached SSD drives to provide significant performance improvements as compared to SAS-attached flash drives.

IBM Storage Scale System 3500 can contain up to 24 NVMe-attached SSD drives. You can either use 12 drives in a half-populated configuration or 24 drives in a fully populated configuration. These drives are accessible from the front of IBM Storage Scale System 3500, as shown in the following figure.

Note: The minimum number of drives is 12. In a 12-drive configuration, drives must be plugged into slots 1 - 6 and then 13 - 18.

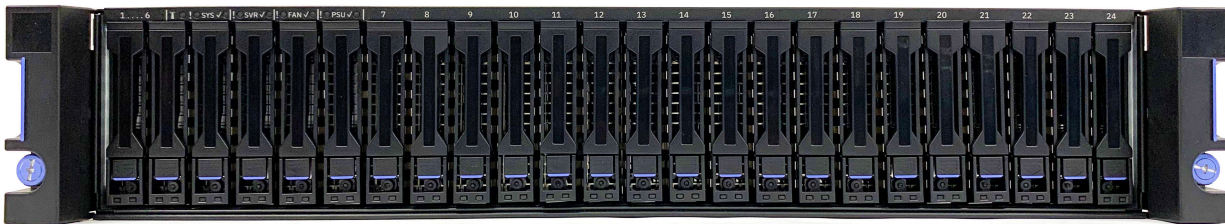


Figure 1. Front view of IBM Storage Scale System 3500

Each IBM Storage Scale System 3500 contains two identical server canisters. The following figure shows two server canisters and two power modules.



Figure 2. Rear view of IBM Storage Scale System 3500

The IBM Storage Scale System 3500 uses a single socket AMD EPYC Rome processor per server canister. The following table provides an overview of IBM Storage Scale System.

Table 3. Overview of IBM Storage Scale System 3500

Product	Number of DIMMs per server canister	Total memory per server canister	Total storage (raw capacity) per IBM Storage Scale System 3500	Server Canister features
IBM Storage Scale System 3500	8 (64 GB DIMM)	512 GB	Up to 360 TB per IBM Storage Scale System 3500 unit	Single socket AMD EPYC 7642 48-core processor.
	8 (128 GB DIMM)	1024 GB	Up to 720 TB per IBM Storage Scale System 3500 unit	Dual 960 GB NVMe boot drives.

The major key characteristics of the IBM Storage Scale System 3500 system are as follows:

- IBM Storage Scale software with enclosure-based, all-inclusive software feature licensing.
- NVMe transport protocol for high performance of 2.5-inch (SFF) NVMe-attached SSD drives and flash drive:
 - Support for industry-standard 2.5-inch NVMe-attached SSD drive options with the following storage capacities: 3.84 TB, 7.68 TB, 15.36 TB, and 30.72 TB mentioned in [Table 4 on page 22](#).

Table 4. Storage capacities and feature codes of NVMe-attached SSD drives

Feature Code	Description	FRU Part number
AJP4	3.84 TB 2.5-inch PCIe Gen4 NVMe-attached SSD drive	01LL727
AJP5	7.68 TB 2.5-inch PCIe Gen4 NVMe-attached SSD drive	01LL728
AJP6	15.36 TB 2.5-inch PCIe Gen4 NVMe-attached SSD drive	01LL729
AJPT	30.72 TB 2.5-inch PCIe Gen4 NVMe-attached SSD drive	01LL993

- 12 or 24 drives per enclosure configurations are available.
- Onboard ports:
 - One RJ45 x1 Gbps for Mgmt
 - One RJ45 x1 Gbps for BMC inter canister communication
 - One micro HDMI port for console display
 - One USB 3.1 Gen 1 Type A upper port for crash-cart keyboard
 - One USB 3.1 Gen 1 Type A lower port for SSR
 - One USB Mini-B for service
- Four Gen4 x16 PCIe slots each, per canister that supports the following adapter options:
 - AJZL - CX-6 InfiniBand/VPI in PCIe form factor (InfiniBand and Ethernet), HHHH PCIe G4 adapter.
 - AJZN - CX-6 DX in PCIe form factor (Ethernet only), HHHH PCIe G4 adapter.
- Slot 1 and 3 Gen4 x16 PCIe each, per canister that supports the following adapter:
 - AJQS - CX-7 InfiniBand/VPI Dual Port HPC Adapter

Networking details

The networking details of IBM Storage Scale System 3500 are shown in the following figure.

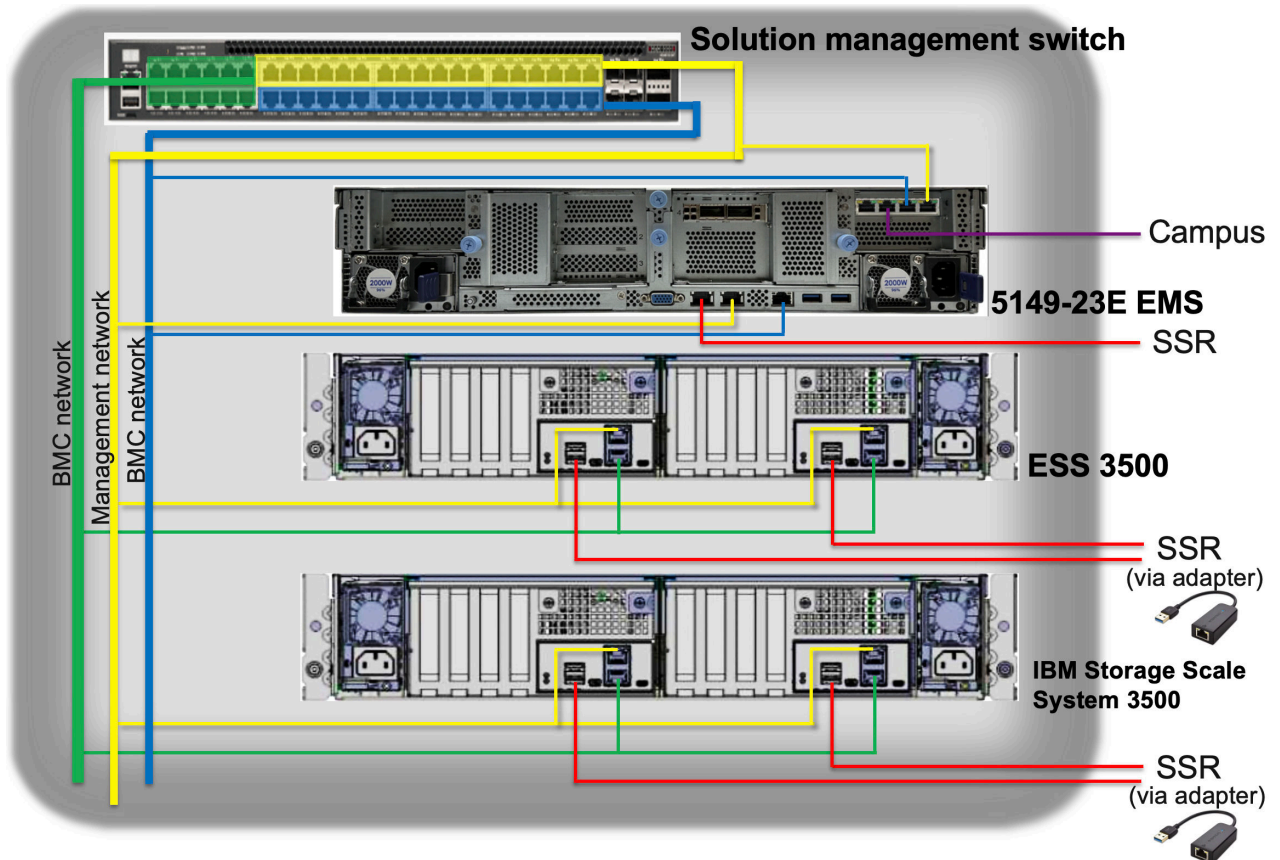


Figure 3. IBM Storage Scale System 3500 Networking

- AJQS: CX-7 InfiniBand/VPI Dual Port HPC Adapter
 - InfiniBand - HDR200 200 Gb / HDR100 100 Gb / EDR 100 Gb / NDR 200 Gb
 - Ethernet - 100 GbE / 200 GbE
- AJZL: CX-6 InfiniBand/VPI in PCIe form factor
 - InfiniBand - HDR200 200 Gb / HDR100 100 Gb / EDR 100 Gb
 - Ethernet - 100 GbE / 200 GbE
- AJZN: CX-6 DX in PCIe form factor (Ethernet - 100 GbE)

You can configure IBM Storage Scale System 3500 in a mixed cluster where other IBM Storage Scale System products are used. The following figure shows the IBM Storage Scale System network topology of a mixed IBM Storage Scale System cluster that contains ESS 5000, IBM Storage Scale System 3500, ESS 3200, and ESS 3000 systems.

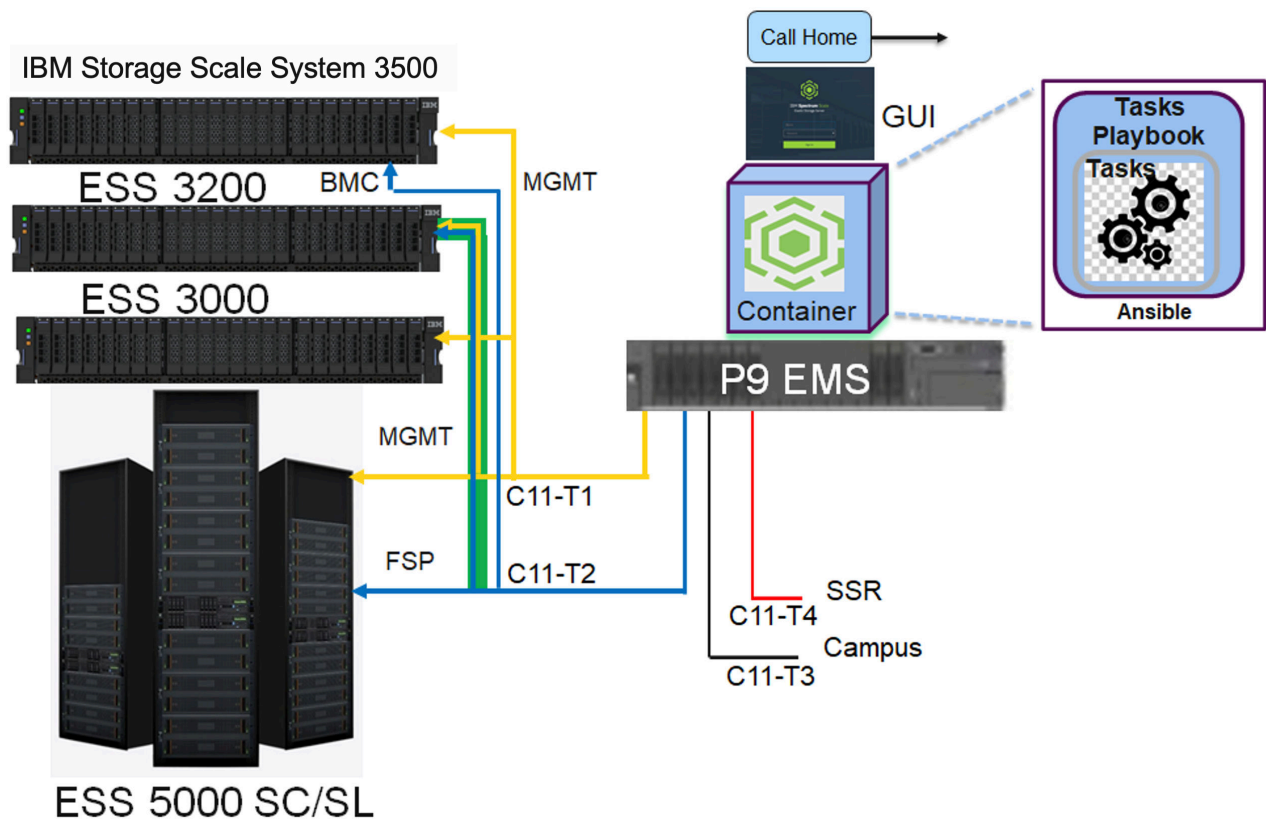


Figure 4. Network topology

NVMe transport protocol in IBM Storage Scale System 3500

The IBM Storage Scale System 3500 systems use the Non-Volatile Memory express (NVMe) drive transport protocol.

- NVMe is designed specifically for flash technologies. It is a faster and less complicated storage drive transport protocol than SAS.
- The NVMe-attached drives support multiple queues so that each CPU core can communicate directly with the drive. This avoids the latency and overhead of core-to-core communication to give the best performance.
- NVMe offers better performance and lower latencies exclusively for solid-state drives through multiple I/O queues and other enhancements.
- High-performance IBM Storage Scale RAID supports the following RAID code options:
 - 3WayReplication
 - 4WayReplication
 - 8+2p
 - 8+3p

Note: For information about RAID code options, see [IBM Storage Scale RAID Administration Guide](#).

- The NVMe transport protocol supports industry standard NVMe flash drives.

Enterprise-level software and support

IBM Storage Scale System 3500 consists of two server canisters that run the IBM Storage Scale software, which is a part of the IBM Spectrum® family. For more information about the IBM Storage Scale capabilities, see [IBM Storage Scale](#).

Enterprise-level software and support are available based on the IBM Storage Scale software stack.

System topology

The following figure shows high-level architecture and topology.

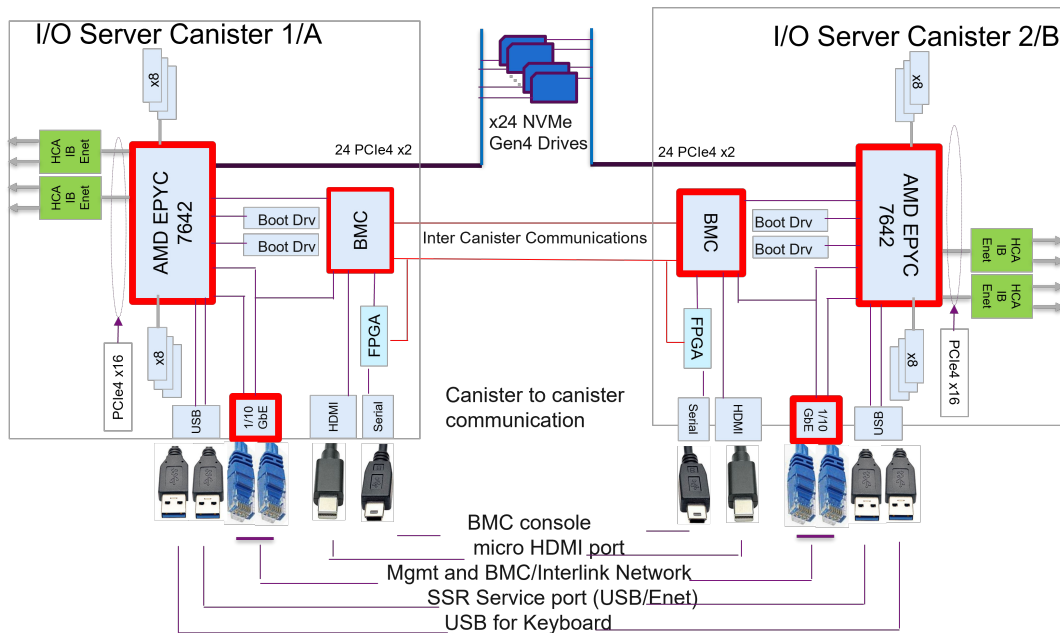


Figure 5. IBM Storage Scale System 3500 high-level architecture and topology

EMS node

POWER9 EMS node (MTM 5105-22E) and IBM Storage Scale System Utility Node (MTM 5149-23E) are enterprise management servers (EMSs). Each IBM Storage Scale System of one or more building blocks requires an EMS. If you have an existing POWER9 EMS node, you can use it to manage IBM Storage Scale System 3500. You can order an IBM Storage Scale System Utility Node with IBM Storage Scale System 3500, but this mostly applies to new clusters. Conversion from POWER9 EMS to IBM Storage Scale System Utility Node is not yet supported. Mixing EMS types in the same environment is not supported either.

You need a minimum of one EMS node as a part of your IBM Storage Scale System cluster. When IBM Storage Scale System 3500 is added to an existing IBM Storage Scale System cluster that has a POWER9 EMS node, the same POWER9 EMS node can also be used to manage IBM Storage Scale System 3500. The EMS node can be ordered as a part of an IBM Storage Scale System 3500.

IBM Storage Scale System 3500 is supported on both the POWER9 EMS and the IBM Storage Scale System Utility Node. The minimum release level on the IBM Storage Scale System 3500 canisters depends on the chosen EMS:

- IBM Storage Scale System 6.1.3 for POWER9 .
- IBM Storage Scale System 6.1.8.2 for IBM Storage Scale System Utility Node.

For more information about the POWER9 EMS node, see [Model 5105-22E server specifications](#).

For more information about the IBM Storage Scale System Utility Node EMS, see [Model 5149-23E server specifications](#).

The EMS node also serves as a third IBM Storage Scale quorum node in a configuration with one building block.

System management

An EMS node in an IBM Storage Scale System 3500 cluster provides system management functions. IBM Storage Scale System 3500 GUI and call home run on the EMS nodes and provide management and health monitoring capabilities. The EMS node also runs a container with Ansible playbook that can provide orchestration of complex tasks, such as cluster configuration, file system creation, and code update. [Figure 4 on page 24](#) shows high-level view of system management topology.

IBM Storage Scale System 3500 Solution configurations

IBM Storage Scale System 5141 - FN2 Server Enclosure supports three solution configurations: Performance, Capacity, and Hybrid.

Performance Configuration

A single IBM Storage Scale System 5141 - FN2 Server Enclosure with 12 or 24 NVMe-attached SSD drives serves as the data storage component of the performance configuration.

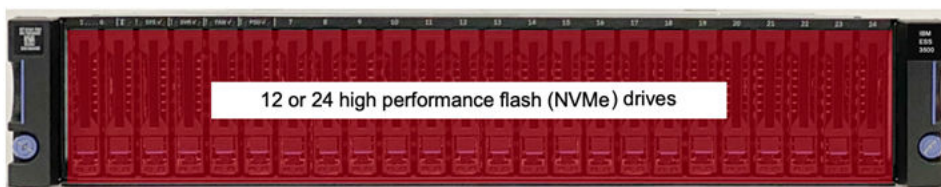


Figure 6. Performance configuration

For more information, see *Capacity and Hybrid configurations* of the *Overview* chapter in *ESS 5147 - 102 Hardware Planning and Installation Guide*.

Drives

IBM Storage Scale System 3500 supports industry-standard 2.5-inch NVMe-attached SSD drive options. The following storage capacities are supported: 3.84 TB, 7.68 TB, 15.36 TB, and 30.72 TB. Drives are hot swappable from the front of the enclosure.

Self-encrypting drives

On IBM Storage Scale System 3500, you can configure NVMe drives as self-encrypting drives (SEDs). When your IBM Storage Scale System 3500 is connected to an IBM Storage Scale System 5147-102 Storage Enclosure, you can configure the following HDDs as SEDs.

- 10 TB HDD (product number 03JN602)
- 22 TB HDD (product number 03NK733)

Drive slots

A drive slot represents the location in an enclosure into which a drive can be inserted.

Each drive slot must contain either a drive or an empty carrier. The empty carriers do not have drive indicators. The numbering scheme for the drive slots is indicated on the enclosure.

The following figure displays enclosures that have 24 drives, with 2.5-inch drive slots. The drive slots are arranged in one row of vertically mounted drive assemblies.

IBM Storage Scale System 3500 supports 12 and 24 drive configurations. All drives must be identical in an IBM Storage Scale System 3500 enclosure. In a 12 drive configuration, drives must be installed in slots 1 - 6 and 13 - 18.

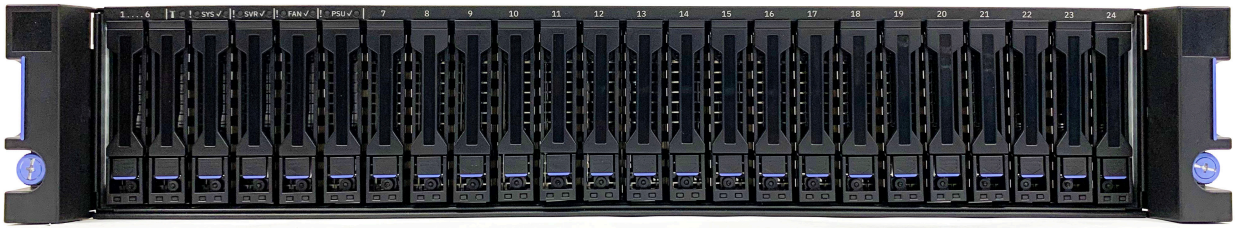


Figure 7. Front view of IBM Storage Scale System 3500 with drives installed

Power modules

Power modules are subcomponents of enclosures. A power module takes electrical power from the rack Power Distribution Units (PDUs) and distributes the power to other components in the enclosure.

For redundancy, two power modules are installed in the enclosure.



Figure 8. Power module

SSR access port

The bottom USB-A port is the SSR access port on the back panel of the canister that a service personnel can use to initialize a system.

You can use the SSR access port to set the IP address of the management interface. For more information, see *IBM Storage Scale Install Complete Guide*.

Note: An IBM intranet connection is required to access this content.

In each of the IBM Storage Scale System 3500 server canister, the bottom USB-A port is designated as the SSR access port, as shown in the following figure.

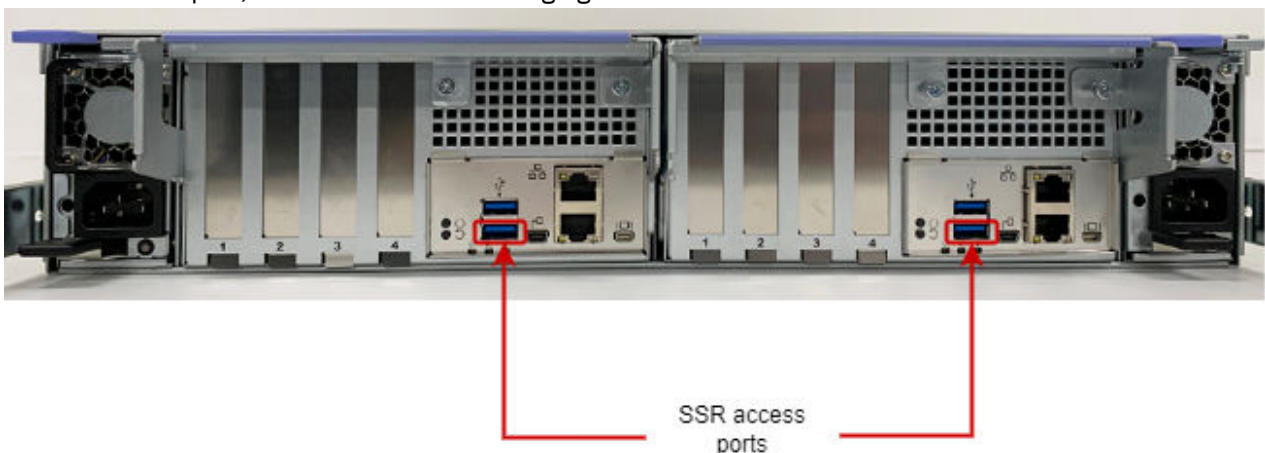


Figure 9. SSR access port

EMS node specifications

IBM Storage Scale System 3500 uses one EMS node in the basic configuration. The EMS node acts as the management server and provides infrastructure for hardware monitoring and hosts GUI.

The EMS server has the following roles:

- Quorum node
- GUI server
- Call home server

For more information about the POWER9 EMS (FC ESZX) node, see [Model 5105-22E server specifications](#).

For more information about the IBM Storage Scale System Utility Node, see [Model 5149-23E server specifications](#).

Chapter 4. Planning for hardware

Before the IBM Service Support Representative (SSR) installs the system hardware, the customer must provide a plan that explains where and how the hardware will be installed, configured, and connected in the customer's network. Ensure that the system's physical configuration records are easily accessible to be used as a reference as needed.

The customers have to work with the IBM technical team to plan for installation and deployment of IBM Storage Scale System 3500.

Planning for site preparation

This information is intended to help you prepare your physical site for the installation of a Utility Node. Marketing and installation planning representatives are also available to help you plan your installation. Proper planning for your new system facilitates a smooth installation and a fast system startup.

The use of the terms, “server”, “processor”, “system” and “all models” in the following information refer to the IBM Storage Scale System Utility Node.

Site preparation and physical planning

For detailed guidelines about site preparation and physical planning, see the [Site preparation and physical planning](#) document.

Planning for hardware installation

Before the IBM SSR installs the system, you must plan the physical configuration and the initial data configuration.

Certain physical site specifications must be met before you can set up your system. This activity includes verifying that adequate space is available, and that requirements for power, network and environmental conditions are met.

Important: The IBM SSR refers to these system configuration details when they perform the system installation, so it is important that these records are complete and accurate.

1. Review all the guidelines in the Planning topics to understand where the system can be installed and identify all prerequisites, such as building structure, equipment rack, environmental controls, power supply, and accessibility.

If there are dependencies identified, you need to resolve them before the IBM SSR installs your system hardware.

2. Use the hardware locations of enclosures and other devices to identify the rack locations where the IBM SSR will install each enclosure.

Planning for racks

For detailed rack specification information on the 7965-S42 rack, see: [Planning for the 7965-S42 rack](#).

If you do not have a 7965-S42 rack and want to install the system into a non-IBM rack, see “[IBM Storage Scale System 3500 requirements](#)” on page 33. Ensure that the physical environment meet the specified requirements, such as rack space, power, and environmental conditions.

Reviewing IBM Storage Scale System 3500 location guidelines

Consult these guidelines when you plan the location of IBM Storage Scale System 3500 and any existing IBM Storage Scale System in your environment, including any IBM Storage Scale client or protocol node.

IBM Storage Scale System 3500 contains two server canisters. Each IBM Storage Scale System 3500 cluster consists of the following components:

- One or more IBM Storage Scale System 3500 systems – each system requires 2U (standard rack units) in a rack.
- One EMS node - requires 2U space in a rack.
- 1 GbE Network switch for management network - requires 1U in rack.
- High-Speed InfiniBand or Ethernet network for internode communication – requires 1U space in rack.

IBM Storage Scale System 3500 model

The model contains two hot swappable server canisters that have one CPU each.

Planning for power for server canister

Each enclosure is provided power through two power supplies. Either of the power module can power the enclosure independently if there is a loss of input power to the other power supply in the enclosure.

Plan to connect the power cords of the power supplies on the left side of the enclosures (when viewed from the rear) to one power source, and connect the power cords of the power supplies on the right side of the enclosures to another power source.



Attention: The power cords are the main power disconnect. Ensure that the socket outlets are located near the equipment and are easily accessible.

The following figure shows the rear view of an IBM Storage Scale System 3500. Each power module is located on the sides of IBM Storage Scale System 3500.



Figure 10. Rear view of an IBM Storage Scale System 3500

Planning for cable connections to PDUs

Each enclosure must be connected to a pair of power outlets by selecting appropriate feature codes while ordering the system. The following table lists the feature codes of the power cords.

Table 5. Power cord feature codes	
Feature codes	Description
6577	Power Cable - Drawer to IBM PDU, 200-240V/10A C13/C14
END3	Power Cable - Drawer to IBM PDU, 200-240V/10A C13/C14
ELC5	Power Cable - Drawer to IBM PDU (250V/10A) C13/C20

<i>Table 5. Power cord feature codes (continued)</i>	
Feature codes	Description
END7	Power Cable - Drawer to IBM PDU (250V/10A) C13/C20
6458	Power Cord 4.3 m (14 ft), Drawer to IBM PDU (250V/10A) C13/C14
6671	Power Cord 2.7 m (9 ft), Drawer to IBM PDU (250V/10A) C13/C14
6672	Power Cord 2M (6.5 ft), Drawer to IBM PDU, 250V/10A C13/C14
END0	Power Cord 2M (6.5 ft), Drawer to IBM PDU, 250V/10A C13/C14
END1	Power Cord 2.7 m (9 ft), Drawer to IBM PDU, (250V/10A) C13/C14
END2	Power Cord 4.3m (14 ft), Drawer to IBM PDU, (250V/10A) C13/C14
6665	Power Cable 2.8m (9.2 ft), Drawer to IBM PDU, (250V/10A) C13/C20
ELC9	Power Cord 4.3m (14 ft), C13/C20 Drawer to IBM PDU, (250V/10A) C13/C20
END5	Power Cord 2.8m (9.2 ft), Drawer to IBM PDU, (250V/10A) C13/C20
END9	Power Cord 4.3m (14 ft), C13/C20 Drawer to IBM PDU, (250V/10A) C13/C20



Attention: Ensure that sufficient power supply circuits are available to provide the total power requirements of the equipment that is connected to each power supply circuit.

EMS node power planning

The following table lists the documentation that can be used as a reference while planning for power requirements.

<i>Table 6. Power planning reference information for Power9</i>	
For this information...	Go to...
Planning for power for EMS node	https://www.ibm.com/docs/en/power9?topic=shp-planning-power-8
Determining your power requirements	https://www.ibm.com/docs/en/power9?topic=pp-determining-your-power-requirements-8
Server Information Form 3A	https://www.ibm.com/docs/en/power9?topic=dypr-server-information-form-3a-8
Workstation Information Form 3B	https://www.ibm.com/docs/en/power9?topic=dypr-workstation-information-form-3b-8
Plugs and receptacles	https://www.ibm.com/docs/en/power9?topic=pp-plugs-receptacles-8

<i>Table 6. Power planning reference information for Power9 (continued)</i>	
For this information...	Go to...
Supported power cords	https://www.ibm.com/docs/en/power9?topic=pr-supported-power-cords-8
Modification of IBM-provided power cords	https://www.ibm.com/docs/en/power9?topic=pp-modification-provided-power-cords-8
Power distribution unit and power cord options for 7014, 7953, and 7965 racks	https://www.ibm.com/docs/en/power9?topic=pp-power-distribution-unit-power-cord-options-7014-7953-7965-racks-9
Planning for cables	https://www.ibm.com/docs/en/power9?topic=shp-planning-cables-8
Power cord routing and retention	https://www.ibm.com/docs/en/power9?topic=cm-power-cord-routing-retention-8
System calculators	https://www.ibm.com/docs/en/power9?topic=ps-system-calculators-8

<i>Table 7. Power planning reference information for IBM Storage Scale System Utility Node</i>	
For this information...	Go to...
PSU	https://www.ibm.com/docs/en/sssun?topic=overview-power-supply-units-psus
EMS node specifications	https://www.ibm.com/docs/en/sssun?topic=sheets-ems-node-specifications
Model 7965-S42 rack specifications	https://www.ibm.com/docs/en/sssun?topic=rack-model-7965-s42-specifications
Rack installation specifications for racks that are not purchased from IBM	https://www.ibm.com/docs/en/sssun?topic=pr-rack-installation-specifications-racks-that-are-not-purchased-from
IBM Storage Scale System Utility Node requirements	https://www.ibm.com/docs/en/sssun?topic=planning-storage-scalesystem-utility-node-requirements
Connections for the IBM Storage Scale System Utility Node	https://www.ibm.com/docs/en/sssun?topic=cables-connections-utility-node
Installing and connecting the management server for an IBM Storage Scale System	https://www.ibm.com/docs/en/sssun?topic=task-installing-connecting-management-server-elastic-storage-system
PSU LEDs	https://www.ibm.com/docs/en/sssun?topic=leds-power-supply-unit-psu

Physical installation planning

Before you set up your system environment, you must verify that the prerequisite conditions for the system are met.

This information applies to the supported hardware components. Answer the following questions before you start the installation process:

- Does your physical site meet the environment requirements for your system?

The system requires the physical site to meet the environment requirements. For detailed guidelines about site preparation and physical planning, see the [Site preparation and physical planning](#) document.

- Do you have adequate rack space for your hardware?

The system requires two Electronic Industries Alliance (EIA) units for each IBM Storage Scale System 3500.

- Do the power circuits that you are planning to use have sufficient capacity and the correct sockets for your installation?
 - A clearly visible and accessible emergency power off switch is required.
 - For redundancy, two independent power circuits are required. One circuit connects to each power supply in each enclosure.
- Have you provided appropriate connectivity by preparing your environment?

The appropriate power requirements for each power supply unit are provided. For more information, see [“Power requirements for each power supply \(two per enclosure\)”](#) on page 35.

Operating environment

To use the system, you must meet the minimum hardware and software requirements and ensure that the other operating environment criteria are met.

Supported hosts

IBM Storage Scale needs to be installed on the host server before it is connected to IBM Storage Scale System 3500. IBM Storage Scale provides the high-performance scale-out clustering capabilities. For a list of supported host type and OS, see [IBM Storage Scale Frequently Asked Questions](#).

User interfaces

The system provides the following user interfaces:

- The management GUI, which is a web-accessible graphical user interface (GUI) that supports flexible and rapid access to storage management information. The IBM Storage Scale System 3500 GUI also provides a Directed Maintenance Procedure (DMP) for drive replacement.
- A command-line interface (CLI) that uses Secure Shell (SSH).

IBM Storage Scale System 3500 requirements

Before you install a system, your physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Safety notices

Use the following general safety information for all rack-mounted devices:

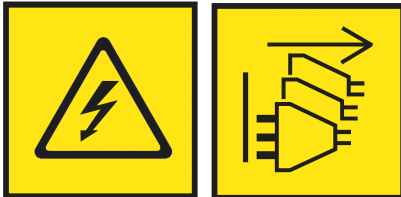
DANGER:

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.



- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)
- Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)



**CAUTION:**

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

Important: In addition, remember:

- The rack design must support the total weight of the installed enclosures and incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or normal use.
- The rack must not exceed the maximum enclosure operating ambient temperature of 32-degrees C, using any optical cable or discrete optical transceiver, including all Ethernet cables and InfiniBand that are ≥ 3 meter in length.

In particular, the rack front and rear doors must be at least 60% perforated to enable sufficient airflow through the enclosure. If there is less airflow, additional mechanisms are required to cool the enclosure. An appropriate IBM rack configuration would be the 7965-S42 IBM Rack Model S42, with standard rear door and feature code 6069 Front Door For 2.0 Meter Rack (High Perforation).

- The rack must have a safe electrical distribution system. It must provide overcurrent protection for the enclosure and must not be overloaded by the total number of enclosures installed. The electrical power consumption rating that is shown on the nameplate should be observed.
- The electrical distribution system must provide a reliable ground for each enclosure in the rack.

Power requirements for each power supply (two per enclosure)

Ensure that your environment meets the following power requirements.

Table 8. System maximum measured power specifications					
Product	kVA	Amps	Power supplies	Inlet	Watts
5141-FN2	1.550	7.75	2	C14	1500

To aid in power and cooling requirements planning, the following table lists the rating of each power module by enclosure.

The power that is used by the system depends on various factors, including the number of enclosures and drives in the system and the ambient temperature.

Table 9. Power rating specifications per power module				
Model and type	Power module	Input power requirements	Maximum input current	Maximum power output
5141-FN2	2000 W (2)	200 V to 240 V single phase AC At a frequency of 50 Hz or 60 Hz IEC C14 standardized	10A (x2)	2000 W

Note: The data in Table 8 on page 35 and Table 9 on page 36 measurements are presented as an example. Measurements that are obtained in other operating environments might vary. Conduct your own testing to determine specific measurements for your environment.

Each IBM Storage Scale System 3500 enclosure contains two power modules for redundancy. The total power consumption values represent the total power that is drawn by both power modules when operating together or a single power module when operating in a maintenance or failure mode.

Environmental requirements

System airflow is from the front to the rear of each enclosure:

- Airflow passes between drive carriers and through each enclosure.
- The combined power and cooling module exhausts air from the rear of each canister.

Ensure that your environment falls within the ranges that are listed in the following table.

Table 10. Temperature requirements			
Environment	Ambient temperature	Altitude	Relative humidity
Operating	5°C to 35°C ¹ (41°F to 95°F)	-61 to 3048 m ^{2, 3} (-200 to 10000 ft)	20% to 80% non-condensing
Non-operating	5°C to 45°C (41°F to 113°F)		10% to 90% non-condensing
Transit	-40°C to 60°C (-40°F to 140°F)	-61 to 12192 m (-200 to 40000 ft)	10% to 90% non-condensing

Important: Regardless of the system specifications about absolute maximum temperature, the nonoperating environmental conditions of the system solid-state devices must adhere to the *JEDEC JESD218 Enterprise-class SSD* requirements for data retention endurance. These requirements must be met particularly for the system storage, transit, or shipping maximum temperatures. To best maintain the data retention of the system solid-state devices, keep an *optimal* condition for nonoperating temperatures by making sure that the system does not remain for longer than 3 months at temperatures that exceed 40°C.

Note:

- Max ambient temperature environment = 32C / 950 m
- Max altitude environment = 25C / 3,050 m

- Decrease the maximum air temperature by 1 degree C per 300 m above 950 m.
- The maximum ambient operating temperature when using an optical cable or discrete optical transceiver is 32C, which includes all Ethernet (100 Gb) cables and InfiniBand (100 Gb EDR) that are greater than or equal to 3 meter in length.

Dimensions and weight requirements for rack installation

Ensure that space is available in a standard 19" rack that is capable of supporting the enclosure. The rack rail kit supports racks with threaded round and square rail mounting holes. The following table lists the dimensions and weights of the enclosures.

Table 11. Physical characteristics of the enclosures				
Enclosure	Height	Width	Depth (including cable management arm)	Maximum weight
IBM Storage Scale System 3500 with 24 drive slots	87 mm (3.5 in.)	483 mm (19 in.)	940 mm (37.00 in.) from front EIA surface to rear of CMA assembly. 700 mm (27.55 in.) from front EIA surface to rear surface of the enclosure arm.	29.3 kg (64.7 lb)



CAUTION:



or



or



The weight of this part or unit is more than 29.3 kg (64.7 lb). It takes two persons to safely lift this part or unit.

The following table shows the rack space requirements for IBM Storage Scale System 3500 in tabular form.

Table 12. Rack space requirements for the IBM Storage Scale System 3500	
Minimum rail length	Maximum rail depth (including cable management arm)
686 mm (27 in.)	940 mm (37 in.)

Service envelope illustration

The following figure provides a close-up view of the IBM Storage Scale System 3500 mounting envelope.

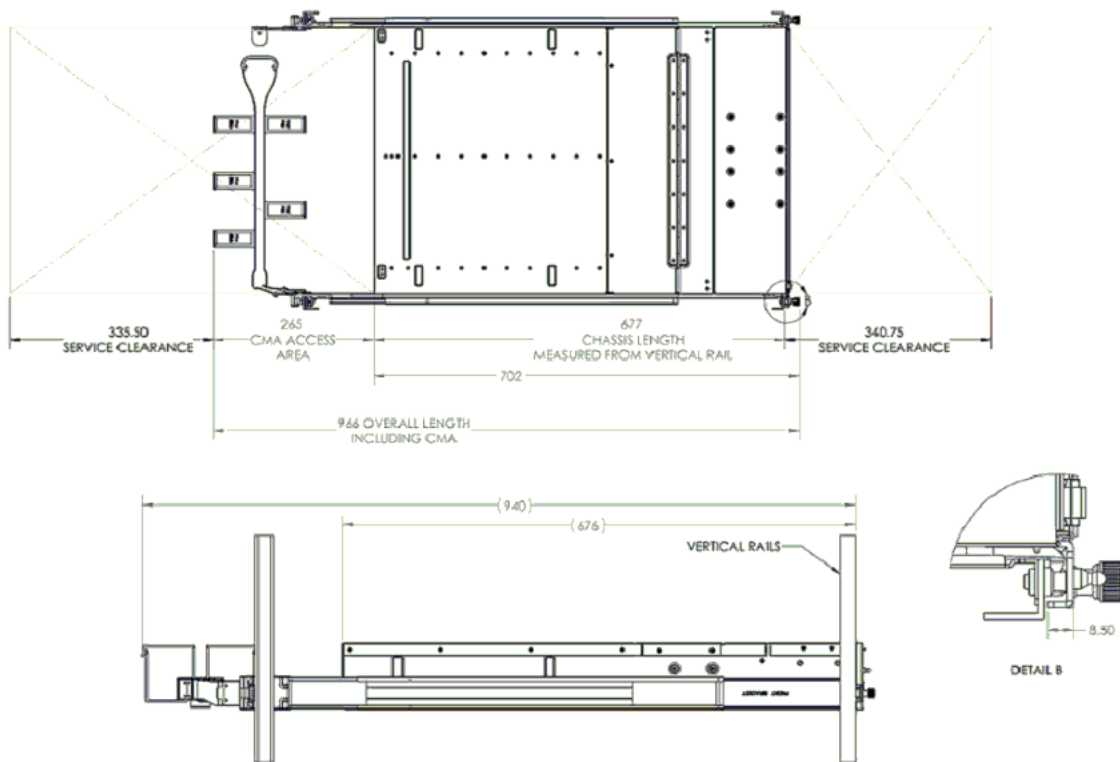


Figure 11. Service envelope illustration (Dimensions in millimeters)

Service clearance for IBM Storage Scale System 3500

The service clearance area is the area around the rack which is needed for the authorized service representatives to service the enclosure as shown in the sample illustration in the following figure.

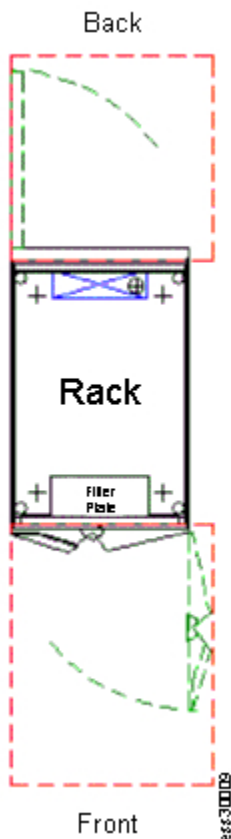


Figure 12. Sample illustration to show space around the rack

For IBM Storage Scale System 3500, use the recommended measurements that are given in the following table.

Table 13. Service clearance requirements	
Front ¹	Back
915 mm (36 in.)	915 mm (36 in.)
¹ Storage racks require larger service clearances in the front of the rack.	

For more information on the layout of the room, see [Computer room layout](#).

See the [Site preparation and physical planning](#) section to help you prepare your physical site for the installation of IBM Storage Scale System 3500.

Additional space requirements

Ensure that these additional space requirements, as shown in the following table, are available around the enclosures.

Table 14. Clearances		
Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.)	Cable exit

Supported drives

The following table provides drive specifications for your IBM Storage Scale System 3500 system.

Table 15. Drive specifications	
Model and type	2.5-inch drives
IBM Storage Scale System 3500 with 24 2.5-inch drive slots	12/24 dual port NVMe drives

For more information about the feature codes of the NVMe drives, see [Table 4 on page 22](#).

Acoustical declaration with noise hazard notice

The following figure indicates the declared noise emissions values in accordance with ISO 9296.

SSRs must be enrolled in a hearing conservation program and use hearing protection when servicing the system.

Declared noise emission values in accordance with ISO 9296 ¹⁻⁷											
Product Description: ESS 3500 MTM 5141-FN2	Mean A-weighted sound power level, $L_{WA,m}$ (B)		Mean A-weighted emission sound pressure level, $L_{pA,m}$ (dB)							Statistical adder for verification, K_v (B)	
	Operating	Idle	Front			Rear			Bystander Average	Operating	Idle
			1.0m Height	1.18m Height (System Level)	1.5m Height	1.0m Height	1.18m Height (System Level)	1.5m Height			
Typical configuration, 23 ± 2° C	7.3	7.2	-	-	64	-	-	60	60	0.3	0.3
Typical configuration, 27° C	7.4	7.4	-	-	63	-	-	60	59	0.3	0.3
Maximum configuration, 37° C	7.3	7.4	-	-	62	-	-	61	59	0.3	0.3
Maximum configuration, 37° C Service Position	-	-	68	70	68	67	69	66	-	0.3	0.3
1. Declared level $L_{WA,m}$ is the upper-limit A-weighted sound power level. 2. Declared level $L_{pA,m}$ is the mean A-weighted emission sound pressure level that is measured either at the 0.5-meter operator positions with doors open or 1-meter bystander positions with doors closed. 3. The statistical adder for verification, K_v, is a quantity to be added to the declared mean A-weighted sound power level, $L_{WA,m}$, such that there is a 95% probability of acceptance, when using the verification procedures of ISO 9296, if no more than 6.5% of the batch of new equipment has A-weighted sound power levels greater than $(L_{WA,m} + K_v)$. 4. The quantity $L_{WA,c}$ (formerly called $L_{WA,d}$), can be computed from the sum of $L_{WA,m}$ and K_v. 5. All declared data for systems that are obtained through a combination of measurements made in accordance with ISO 7779 and modeled results. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296. 6. 10 dB (decibel) equals 1 B (bel). 7. Under certain environments, configurations, system settings, or workloads, there is an increase in fan speeds that results in higher noise levels. Notice: Government regulations (such as those prescribed by OSHA or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. The actual sound pressure levels in your installation depend upon various factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon various extra factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.											

Figure 13. Acoustical declaration with noise hazard notice

Shock and vibration specifications for IBM Storage Scale System 3500 enclosures

Table 16 on page 41 and Table 17 on page 41 provide the shock and vibration testing results for your IBM Storage Scale System 3500 system.

Table 16. Shock testing results		
Shock categories	Test level	Sweep rate of shocks
Operational	5 g 11 ms 1/2 Sine	3 positive shocks 3 negative shocks
Non-operational	10 g 11 ms 1/2 Sine	3 positive shocks 3 negative shocks

Table 17. Vibration testing results		
Vibration categories	Test level	Frequency range
Operational	0.10 g Swept Sine	5 - 500 Hz
Non-operational	0.75 g Swept Sine	5 - 500 Hz
Operating random vibration	0.15 g	5 - 500 Hz
Non-operating random vibration	0.5 g	5 - 500 Hz

Table 18. Random vibration PSD profile breakpoints ¹									
Class	5 Hz	17 Hz	45 Hz	48 Hz	62 Hz	65 Hz	150 Hz	200 Hz	500 Hz
V1L/V2	2.0x10 ⁻⁷	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵	2.2x10 ⁻⁵
V1H ²	1.0x10 ⁻⁷	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶	5.2x10 ⁻⁶
V3	2.0x10 ⁻⁵	3.0x10 ⁻⁴	3.0x10 ⁻⁴	3.0x10 ⁻⁴	3.0x10 ⁻⁴	3.0x10 ⁻⁴	3.0x10 ⁻⁴	8.0x10 ⁻⁵	8.0x10 ⁻⁵
V5L	2.0x10 ⁻⁵	1.1x10 ⁻³	1.1x10 ⁻³	8.0x10 ⁻³	8.0x10 ⁻³	1.0x10 ⁻³	1.0x10 ⁻³	5.0x10 ⁻⁴	5.0x10 ⁻⁴
V5H	1.0x10 ⁻⁵	4.0x10 ⁻⁴	4.0x10 ⁻⁴	3.0x10 ⁻³	3.0x10 ⁻³	5.0x10 ⁻⁴	5.0x10 ⁻⁴	2.0x10 ⁻⁴	2.0x10 ⁻⁴

Note:

- ¹ All values in this table are g²/Hz.
- For reference only, no test required.

IP address allocation and usage

As you plan your installation, you must consider IP address requirements and service access for the system.

IBM Storage Scale System 3500 uses 100GbE/200GbE/100Gb EDR/200Gb HDR network for cluster communication and data transport. For IP port usage requirement, see [IBM Storage Scale Documentation](#).

For configuration and management, you must allocate an IP address to the system. This IP address is referred to as the *management IP address*. The storage system also has a BMC IP address, which is known as the *service IP address*. The addresses must be fixed. Only IPv4 addresses are supported for management and service.



Attention: The address for a management IP cannot be the same as the service IP. Using the same IP address causes communication problems.

Name servers are not used to locate other devices. You must supply the numeric IP address of the device. To locate a device, the device must have a fixed IP address.

Planning your network and storage network

You need to plan to provide the network infrastructure and the storage network infrastructure that your system requires.

Planning for high-speed network adapter

Review the prerequisite system requirements and installation considerations before deployment.

It is helpful to be familiar with the following term when you are considering the features of the high-speed network adapter for these connections.

Remote Direct Memory Access (RDMA)

RDMA is a networking standard that allows the adapters to transfer data directly to or from the endpoints in a connection without using CPU resources on either of the endpoints. These transfers occur simultaneously with other system operations and do not impact overall system performance. When the system performs an I/O operation over an RDMA-based connection, data is sent directly to the network, which reduces latency and increases the speed of data transfers.

Review the following elements when you are deciding to install the high-speed network adapters:

- The following adapter is available:
 - (FC AJZL) CX-6 VPI in PCIe form factor
 - InfiniBand: HDR200 200 Gb / HDR100 100 Gb / EDR 100 Gb
 - Ethernet: 100 GbE / 200 GbE

Support for high-speed switches

The following list includes all the high-speed switches that are compatible with an IBM Storage Scale System 3500.

- IBM MTM 5149-N64 – NDR IB high-speed switch
- IBM MTM 8831-H40 – HDR IB high-speed switch
- IBM MTM 8831-S52 1G management switch
- IBM MTM 8831-00M – 100 GbE high-speed network switch
- Cisco Nexus 9000 200 GbE high-speed network switch. For more information, see [Cisco Nexus 9300-GX Series Switches Data Sheet](#) in Cisco documentation.

Planning for cables

Connections for the Utility Node

Care must be taken to note the orientation of each Utility Node so that the interconnect cables are properly connected.

The following figure shows the ports on the Utility Node.

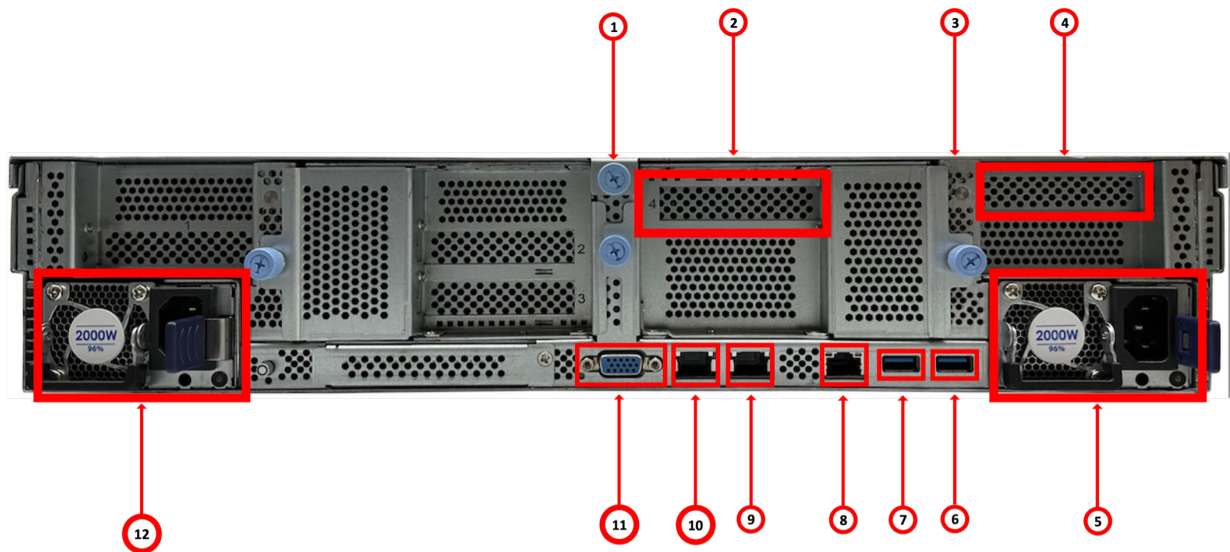


Figure 14. Orientation of ports on the Utility Node

Table 19. Ports on the Utility Node		
Item number	Feature	Description
1	Riser C	Provides for riser card C to plug in CX-6 network adapter.
2	CX-6 VPI adapter (FC AJZL)	Provides two port high-speed cluster management for Ethernet or InfiniBand connection.
3	Riser D	Provides for riser card D to plug in 4-port 10 GbE adapter.
4	4-port 10 GbE adapter (FC EN2X)	
5	PSU 1	Provides power supply to the system.
6	USB connector (for service use only)	Provides for keyboard connection.
7	USB connector (for service use only)	Reserved for service.
8	BMC display port	Provides one RJ45 1 GbE port for BMC connection.
9	Management port	Provides one RJ45 10 GbE port for management or campus connection.
10	SSR port	Provides one RJ45 10 GbE port for SSR connection.
11	VGA port	Provides a video connection to the BMC.
12	PSU 0	Provides power supply to the system.

Onboard Ethernet ports on the server provide system management and BMC connections. The 1 Gbps Ethernet ports on the server use RJ45 connection.

The Utility Node has two PCIe Gen 4 x16 slots to support optional host interface adapters. The host interface adapters can be supported in any of the interface slots. The following table provides an overview of the host interface adapters.

Table 20. Summary of supported host interface adapters

Protocol	Feature code	Ports	FRU part number	Quantity supported
CX-6 VPI network adapter	AJZL	2 per adapter	01LL648	1

Planning for adapters

Each Utility Node server has two PCIe interface slots to support extra adapters.

Supported environment

Refer to the [IBM support website](#) for up-to-date information about the supported environment for your system.

Environmental topics can include updates about the following items:

- Host attachments
- Switches
- Firmware levels
- Other support hardware

Planning worksheets: Customer task

Customers are responsible for completing the system planning worksheets. The customer then provides the worksheets to the IBM SSR when they install and configure the system.

Installation worksheet

This worksheet is intended for customers as part of the TDA process to outline the items that are required to be implemented by the SSR during setup.

Important: Click [here](#) to download the blank worksheet.

Customer task

Customer fills out the desired IP addresses.

SSR task

The SSR uses this information to properly set the desired IP addresses on each canister and the management server (if applicable).

Note: The management IP addresses must be on the same subnet as the management server bridge interface. If you already have an existing management server, set IP addresses on the same subnet (all must be reachable).

Note: This document does not describe about the high-speed network. Customers must have that in place and ready to fill in (or update) the `/etc/hosts` file on the management server node during the software installation. For reference, see *IBM Storage Scale Install Complete Guide* and *IBM Storage Scale System Deployment Guide*. The high-speed interfaces are on a separate switch and must be defined on a different subnet.

- For instance, if your management interfaces are all 192.168.21.X/24, your high-speed hosts should be any other network. For instance, 172.16.0.0/24. You should use /24 (255.255.255.0), if possible.

Prerequisite (for SSR)

You must be connected to the SSR access port of the target canister (left or right).



Figure 15. SSR access port in the Utility Node



Figure 16. Management port in the Utility Node

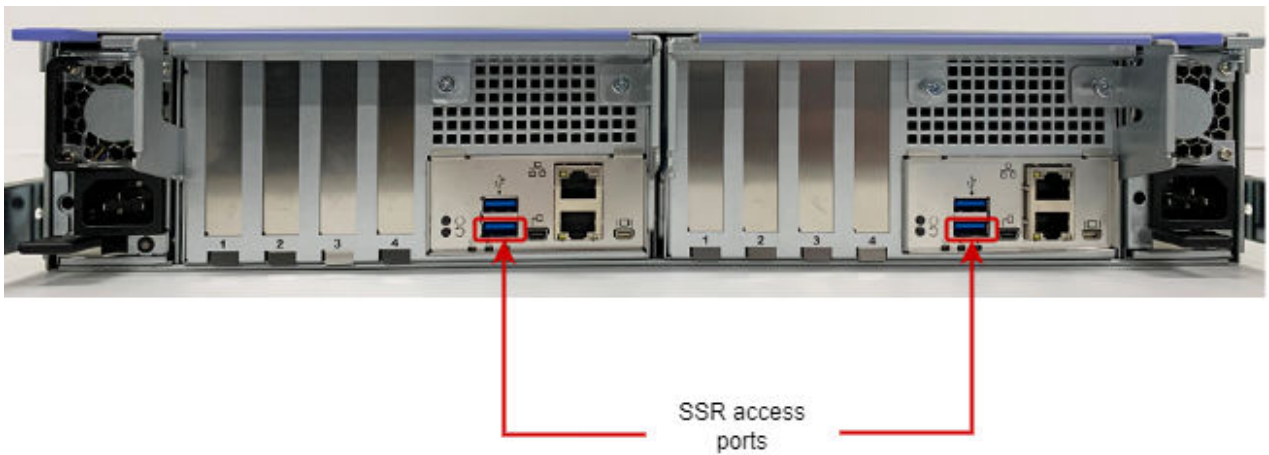


Figure 17. SSR access port

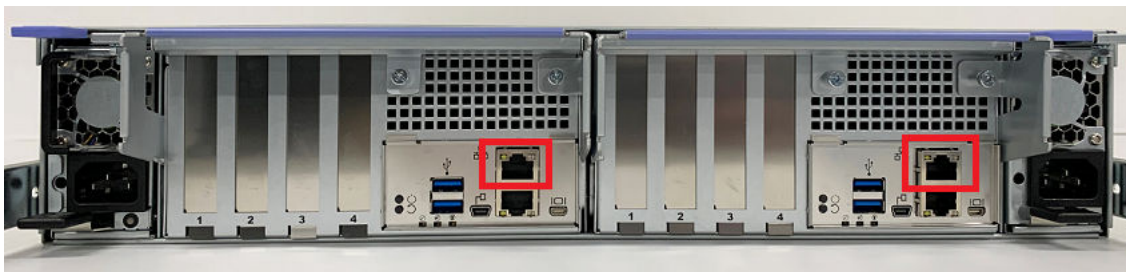


Figure 18. Management ports of each canister

The following figure shows the cabling for IBM Storage Scale Systems.

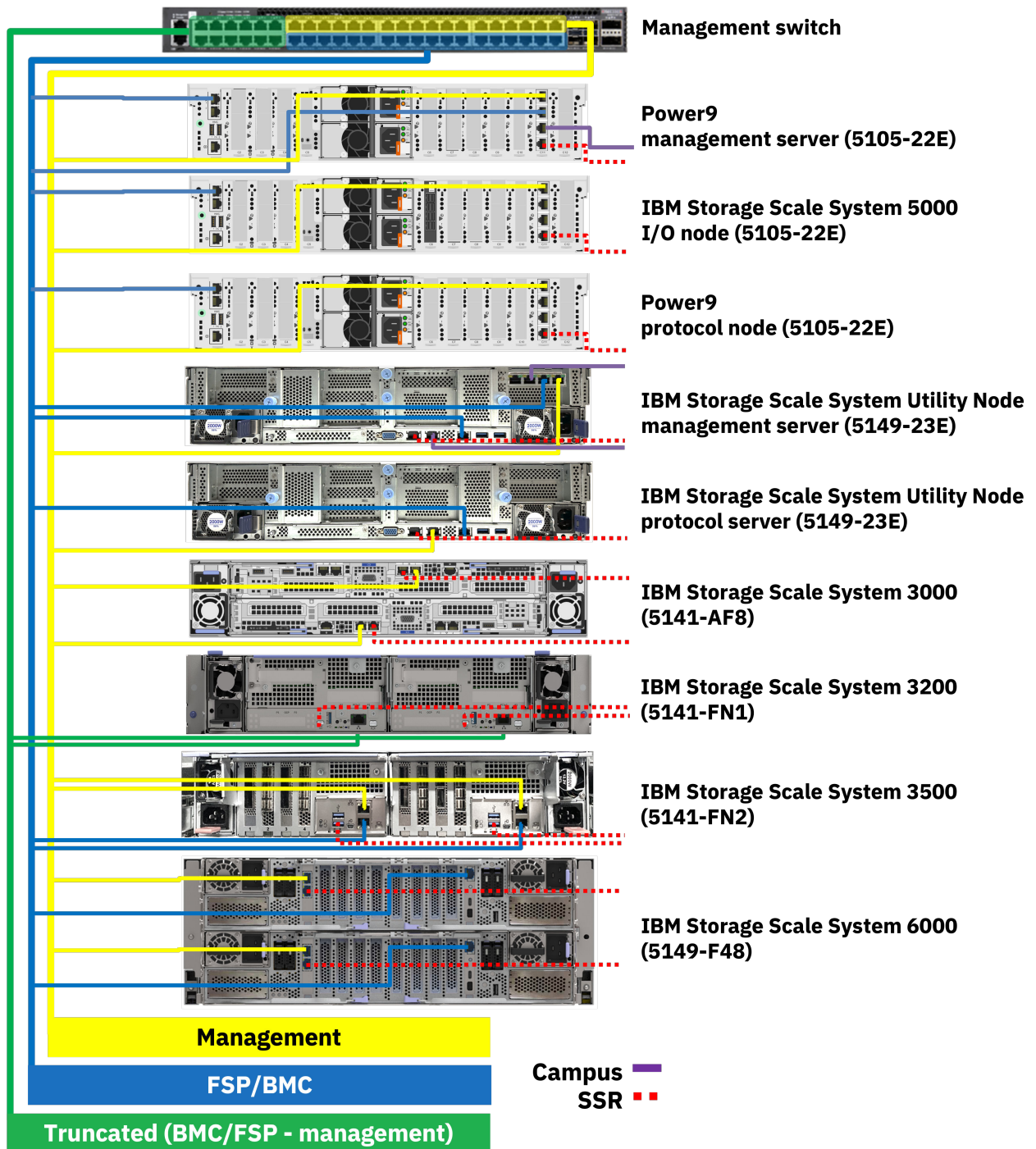


Figure 19. Networking for IBM Storage Scale Systems

SSR / Customer:

- Ensure that the management switch is in the rack and powered on.
- Ensure that there is one Ethernet cable from the management switch (if there are VLANs, connect from the management VLAN) to port (management port) on each canister as shown in the previous figures.
- If a management server node is received with IBM Storage Scale System 3500, connect two Ethernet cables from the management switch (if there are VLANs, connect from the management VLAN) to port C11-T1 (top port) and to port C11-T2 (second from top).

SSR: General guidance

- For each IBM Storage Scale System 3500 canister in the flow, connect your laptop point-to-point to the SSR port as shown in the previous *SSR access port* figure. You need to use this port to access each canister, perform hardware checks, and set the management IP address.

Reference:

- SSR user ID is **essserv1**
- SSR default password for Power nodes is the server serial number
- SSR default password is the IBM Storage Scale System 3500 serial number
 - Add 'A' for left or top canister
 - Add 'B' for right or bottom canister
- Other than the SSR access port, there are no default IP addresses set on any canister
- All management interfaces should be connected to the same VLAN switch
- Default physical Power9® Protocol or IBM Storage Scale System 5000 I/O node ports
 - C11-T1 = Management Interface (set by the SSR) - Logical port: enP1p8s0f0
- Default physical Power9 management server ports
 - C11-T1 = Management Interface (set by the SSR) - Logical port: mgmt
 - C11-T2 = FSP (BMC) interface (set by the SSR) - Logical port: mgmt
- Default physical IBM Storage Scale System 3500 ports (per canister)
 - Port 1 – Management port (set by the SSR) - Logical port: mgmt
 - The SSR connects a laptop to the SSR port when performing the IBM Storage Scale System 3500 tasks. You need to move the cable when you work on a different canister.

Note: The worksheet has default IP addresses filled out in case they were not provided by the customer during the TDA process. Before setting any default IP addresses have the customer confirm that they are not currently in use by the associated networks.

Customers must fill in the following values so that the SSR is able to perform the required networking tasks. If there are more than one building-block per system type being installed, you might need to add the corresponding rows.

Recommendations:

- Keep all management interfaces on 192.168.x.x/24 (netmask 255.255.255.0).
- Keep all BMC/FSP (HMC1) interfaces on 10.0.0.x/24 (netmask 255.255.255.0).

Note: The management server has an additional FSP connection at C11-T2, which is visible to the operating system.

Important: All IP addresses must on the same subnet. For example:

- All management interfaces on 192.168.x.x/24
- All FSP interfaces on 10.0.0.x/24

IBM Storage Scale System 3500 notes:

The IBM Storage Scale System 3500 has dedicated management (f1) and BMC (f0) interfaces. The management interfaces are connected to the yellow network, while the BMC interfaces are connected to the green trunk ports.

In IBM Storage Scale System 3500, proper switch configuration and VLAN tag should be set to route traffic from the BMC to the blue service/FSP network.

The SSR connects to each canister through a dongle to the bottom USB port. This allows point to point connectivity to the SSR's laptop.

Utility Node / IBM Storage Scale System 6000 / IBM Storage Scale System 5000 notes:

The IBM Storage Scale System Utility Node has a dedicated SSR port (via Ethernet connection).

The SSR must set IP addresses for both the management interface and the BMC interface. For IBM Storage Scale System Utility Node protocol, it is management or BMC. For management server, it is campus (optional) or BMC.

Campus or remote connection notes:

A Power9 management server campus connection is highly recommended to be set prior to deployment (C11-T3). This allows remote access to the management server and ensures you will not lose a connection when starting the container. Optionally, space is also allocated to set a campus connection on the HMC2 port. This will allow remote access to the FSP which aids the recovery of the node (console/power control) in case of an outage.

The SSR is provided the commands to set the campus interface (C11-T3) and HMC2 port connection to the customer campus connection. If C11-T3 (Power9 management server) is not in place or the IP address not provided to the SSR at time of Install Complete may still, consider the task complete. It will be up to the customer/LBS to set this connection before deployment can begin.

For the IBM Storage Scale System Utility Node, it is highly recommended for the SSR to set a campus connection on the host. This is in addition to the BMC connection.

IBM Storage Scale System 3500 building-block 1 (lower position in frame)

Note: IBM Storage Scale System 3500 only applies to IBM Storage Scale System 6.1.3.0 and later.

	IP address	Netmask
IBM Storage Scale System 3500 canister 1 management interface (left)	192.168.45.30	255.255.255.0
IBM Storage Scale System 3500 canister 1 BMC interface (left)	10.0.0.121	255.255.255.0
IBM Storage Scale System 3500 canister 2 management interface (right)	192.168.45.31	255.255.255.0
IBM Storage Scale System 3500 canister 2 BMC interface (right)	10.0.0.122	255.255.255.0

IBM Storage Scale System 3500 building-block 2 (higher position in frame)

Note: IBM Storage Scale System 3500 only applies to IBM Storage Scale System 6.1.3.0 and later.

	IP address	Netmask
IBM Storage Scale System 3500 canister 1 management interface (left)	192.168.45.32	255.255.255.0
IBM Storage Scale System 3500 canister 1 BMC interface (left)	10.0.0.123	255.255.255.0
IBM Storage Scale System 3500 canister 2 management interface (right)	192.168.45.33	255.255.255.0
IBM Storage Scale System 3500 canister 2 BMC interface (right)	10.0.0.124	255.255.255.0

IBM Storage Scale System 5000 building-block 1 (lower position in frame)

	IP address	Netmask
IO node 1 management interface (bottom node in building-block)	192.168.45.21	255.255.255.0
IO node 1 FSP (HMC1 port) interface (bottom node in building-block)	10.0.0.101	255.255.255.0
IO node 2 management interface (top node in building-block)	192.168.45.22	255.255.255.0
IO node 2 FSP (HMC1 port) interface (top node in building-block)	10.0.0.102	255.255.255.0

IBM Storage Scale System 5000 building-block 2 (higher position in frame)

	IP address	Netmask
IO node 1 management interface (bottom node in building-block)	192.168.45.23	255.255.255.0
IO node 1 FSP (HMC1 port) interface (bottom node in building-block)	10.0.0.103	255.255.255.0
IO node 2 management interface (top node in building-block)	192.168.45.24	255.255.255.0
IO node 2 FSP (HMC1 port) interface (top node in building-block)	10.0.0.104	255.255.255.0

IBM Storage Scale System 5000 Power9 protocol nodes

	IP address	Netmask
Protocol node 1 management interface (bottom-most)	192.168.45.50	255.255.255.0
Power9 protocol node 1 FSP (HMC1 port) interface (bottom-most)	10.0.0.110	255.255.255.0
Protocol node 2 management interface (top)	192.168.45.51	255.255.255.0
Power9 protocol node 2 FSP (HMC1 port) interface (top)	10.0.0.111	255.255.255.0

Note: If there are additional building-blocks or Power9 protocol nodes, please add more tables.

Power9 management server (should be only one)

	IP address	Netmask	Gateway
Management server management interface	192.168.45.20	255.255.255.0	N/A
Management server FSP (HMC1 port) interface	10.0.0.100	255.255.255.0	N/A

	IP address	Netmask	Gateway
Management server FSP (C11-T2) interface	10.0.0.1	255.255.255.0	N/A
Management server campus interface (C11-T3)	X.X.X.X	X.X.X.X	X.X.X.X
Management server campus interface (C11-T3) gateway	X.X.X.X	X.X.X.X	X.X.X.X

IBM Storage Scale System Utility Node management server (5149-23E)

	IP address	Netmask	Gateway
Management server (host) campus interface	X.X.X.X	255.255.255.0	X.X.X.X
Management server (host) BMC interface	10.0.0.130	255.255.255.0	N/A
Management server (host) campus interface gateway	X.X.X.X	X.X.X.X	X.X.X.X

IBM Storage Scale System Utility Node protocol (5149-23E)

Protocol node is sold in pairs, so two are listed. Additional nodes may be purchased individually.

Node 1 is lower in the frame, node 2 is higher.

	IP address	Netmask
Protocol (host) management interface	192.168.45.80	255.255.255.0
Protocol (host) BMC interface	10.0.0.140	255.255.255.0
Protocol (host) management interface	192.168.45.81	255.255.255.0
Protocol (host) BMC interface	10.0.0.141	255.255.255.0

IBM Storage Scale System 6000 building-block 1 (lower position in frame)

	IP address	Netmask
Canister 1/A management interface (top node in building block)	192.168.45.60	255.255.255.0
Canister 1/A interface (top node in building block)	10.0.0.60	255.255.255.0
Canister 2/B management interface (bottom node in building block)	192.168.45.61	255.255.255.0
Canister 2/B interface (bottom node in building block)	10.0.0.61	255.255.255.0

IBM Storage Scale System 6000 building-block 2 (higher position in frame)

	IP address	Netmask
Canister 1/A management interface (top node in building block)	192.168.45.62	255.255.255.0
Canister 1/A interface (top node in building block)	10.0.0.62	255.255.255.0
Canister 2/B management interface (bottom node in building block)	192.168.45.62	255.255.255.0
Canister 2/B interface (bottom node in building block)	10.0.0.62	255.255.255.0

Additional notes for customer / LBS:

The root password should be set for the **essserv1** SSR ID to execute commands. When prompted, set the password.

Account type	Account ID	Password
Linux OS	root	

Recommended HMC2 port campus connection (Power9 only). Consider cabling this port to a public network and setting a campus IP. This will allow remote recovery/debug of the management server in case of an outage. The gateway may be needed to for this IP address to work properly.

Management server HMC2 port IP	HMC2 port
Management server HMC2 port IP gateway	

The VLAN tag is required to route traffic on the BMC interface to the service network. This interface is connected to the **green** trunk ports on the switch. This is required only on IBM Storage Scale System 3200 and IBM Storage Scale System 3500. The default is 101.

IBM Storage Scale System 3500 VLAN tag	VLAN TAG	101 (default)

The IBM Storage Scale license that the customer has purchased. The options are Data Access Edition (DAE) or Data Management Edition (DME). When deciding which edition to download and copy to the /serv directory, you will need this information.

The IBM Storage Scale license field is only need for IBM Storage Scale System 6.1.3.0 or later.

IBM Storage Scale license	DAE or DME	

Note: Write down any vital information that should be shared with the customer / LBS that you encountered during execution of the Install Complete app.

Chapter 5. Installing

This section covers how to install, configure, set IP addresses, and VLAN tag.

The Service Support Representatives (SSR) can refer to *IBM Storage Scale Install Complete Guide* to perform a hardware checkout and to set the management interface IP, BMC interface IP, and VLAN tag.

Note: An IBM intranet connection is required to access this content.

Note: Much of the information in this section is intended only for IBM authorized service providers. Customers need to consult the terms of their warranty to determine the extent to which they must attempt any IBM Storage Scale System maintenance.

Tasks to be done by the Customers or an IBM SSR are marked in this chapter.

Detailed installation steps (SSR task)

This section is intended for IBM authorized service personnel only.

IBM Storage Scale System system view

Components required to set up EMS

For information on the components required to set up EMS, see [Before Installation \(Sections 1 through 8\)](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

IBM Storage Scale System network connection diagram

For information on the IBM Storage Scale System network connection diagram, see [Section 2.3.1 - ESS network connection diagrams](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

Management Server description and feature table

For information on the Management Server description and feature table, see [Section 2.3.2 - 5105-22E Management Server description and feature table](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

Technical and Delivery Assessments (TDAs)

For information on the Technical and Delivery Assessments (TDAs), see [Section 3.1 - ESS - Technical and Delivery Assessments \(TDAs\)](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

Rack details

Prepare the rack for installation work

For information on preparing the rack for installation work, see [Section 10.2 - Prepare the rack for installation work](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

Verify the position and installation of new system racks

For information on verifying the position and installation of new system racks, see [Section 10.3 - Verify the position and installation of new system racks](#) on the *IBM Worldwide Customized Installation Instructions (WCII)* website.

Installing the EMS server in a rack

For information about the instructions to install an EMS server on a rack, see [Installing, removing and replacing customer-installable parts](#).

Unpacking IBM Storage Scale System 3500 (IBM SSR task)

Before you unpack IBM Storage Scale System 3500, ensure that you have reviewed and followed all the related instructions.

The IBM Storage Scale System 3500 system and related parts are shipped preinstalled in the enclosure:

- The IBM Storage Scale System 3500 system comes preinstalled with the following components:
 - Two server canisters with adapters and memory feature codes
 - Two power modules
 - Six 60 mm single impeller fans
 - [12 or 24 disks](#)
 - Network adapters (Depends on order)
 - Interface cables (if ordered)
- Rail kit that includes:
 - One left adjustable rack mounting rail
 - One right adjustable rack mounting rail
 - Four M4 x 4 Philips screws
 - Eight #10 32 X 14.5 round hole rack screws
 - Two M5 X 9 Philips shipping screws
- Left and right bezel ear caps
- Cable Management Assembly (CMA)

Note: You might need a box knife to unpack the IBM Storage Scale System 3500 system.



CAUTION: To lift the assembled enclosure, two persons are required unless a suitable lifting equipment is available or the enclosure is unpacked and dismantled as described in the procedure.

Perform the following steps to unpack the IBM Storage Scale System 3500 system:

1. Cut the box tape and open the lid of the shipping carton.
2. Remove the rail kit box and set them aside in a safe location.
3. Remove the cable management assembly kit box and set them aside in a safe location.
4. Lift the bezel kit box and set them aside in a safe location.
5. Lift the front and rear foam packing pieces from the carton.
6. Remove the four corner reinforcement pieces from the carton.
7. Using the box knife, carefully cut the four corners of the carton from top to bottom.
8. Fold the sides and back of the carton down to uncover the rear of the IBM Storage Scale System 3500 system.
If necessary, carefully cut along the lower fold line of the sides and remove them.
9. Carefully cut the raised section of the foam packing away from the rear of the enclosure.
10. Carefully cut open the bag covering the rear of the enclosure.
11. Remove the left power module from the enclosure.
12. Record the last six digits of the serial number on the back of the power supply, and then set the power supply aside.
13. Remove the right power module, record its serial number, and set it aside.
14. Remove the left server canister from the enclosure.

15. Record the serial number (on the side of the canister) and the BMC Mac address (on the release handle), then set the canister aside.
16. Remove the right server canister, record its serial number (on the side of the canister) and the BMC Mac address (on the release handle), and then set it aside.
17. Lift the enclosure from the shipping carton.

Installing support rails for the IBM Storage Scale System 3500 system (IBM SSR task)

Before you install the IBM Storage Scale System 3500 system, you must first install the support rails for it.

To install the support rails for the IBM Storage Scale System 3500 system, complete the following steps:

1. Locate the IBM Storage Scale System 3500 system rails.

The rail assembly consists of two rails that must be installed in the rack cabinet.

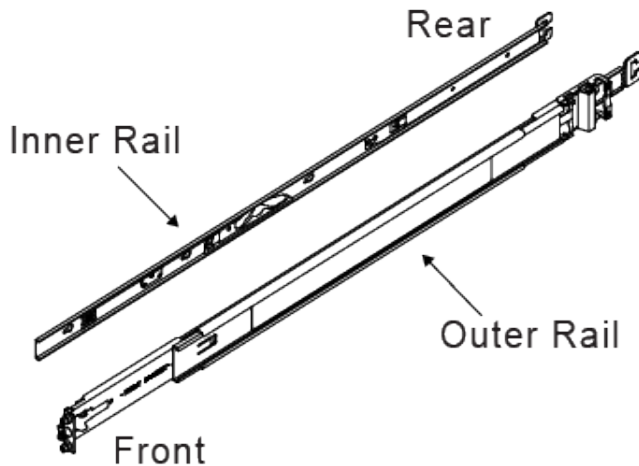


Figure 20. Rail assembly

Note: The rail kit accommodates racks with square or round rack post holes. Preparation for each type is nearly identical to the exception that round post holes would require different set of screws. No changes are necessary for racks with square rack post holes.

2. For racks with round post holes, remove the eight preinstalled screws (used for racks with square post holes) from the front and rear ends of the two rails as shown in the following figure.

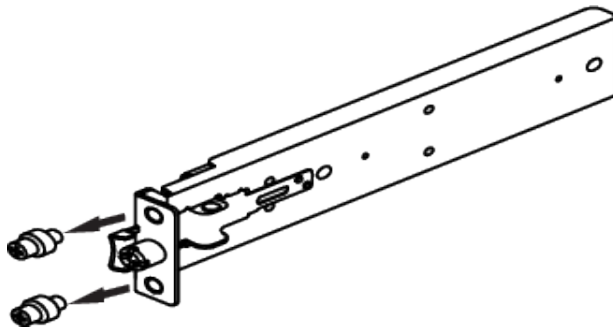


Figure 21. Removal of square post screw

3. Install the eight screws (used for racks with round post holes) on the front and rear ends of the two rails as shown in the following figure.

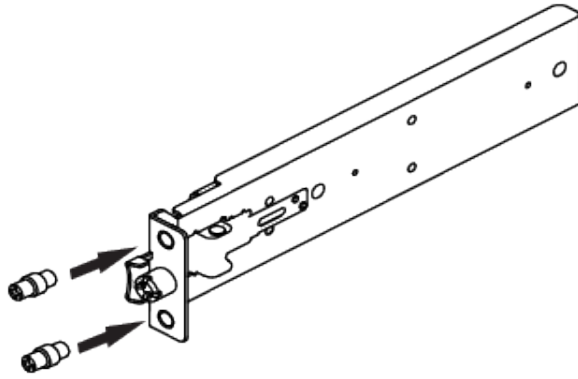


Figure 22. Installation of round post screw

Note: Before the rail kit is installed, the inner chassis member rails must be separated from the outer cabinet member rail.

4. Remove the inner rail from the left outer rail as follows:
 - a) Slide the inner rail out from the left outer rail until you hear an audible click.

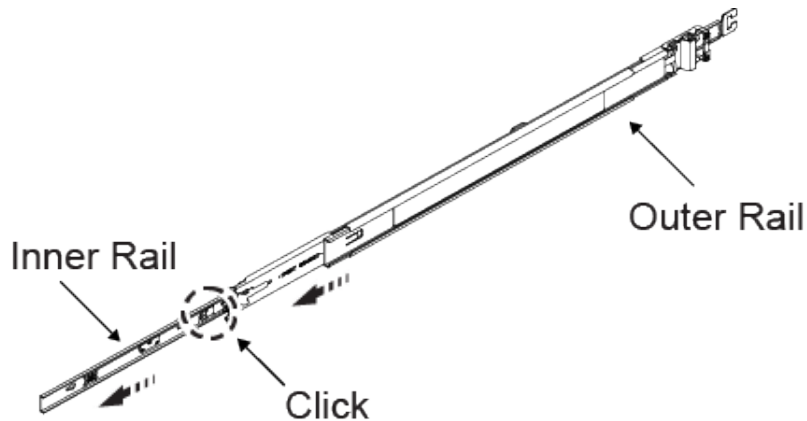


Figure 23. Removal of the inner rail

- b) Pull the release tab on the inner rail forward as shown in the following figure.

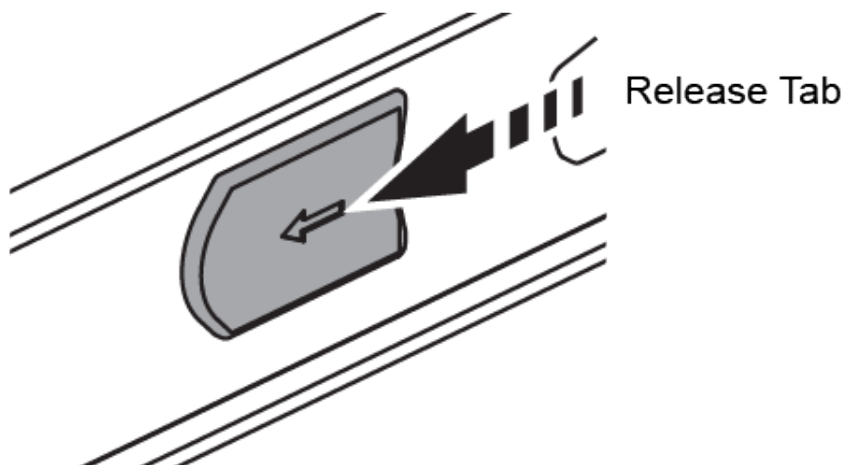


Figure 24. Release tab

- c) Remove the inner rail from the left outer rail and set aside.
5. Repeat the removal steps of inner rail from left outer rail to remove the other inner rail from the right outer rail.

6. Install the left outer rail on the rack post as follows:

- a) Align the left rear bracket mounting screws with the appropriate rear rack post holes as shown in the following figure.

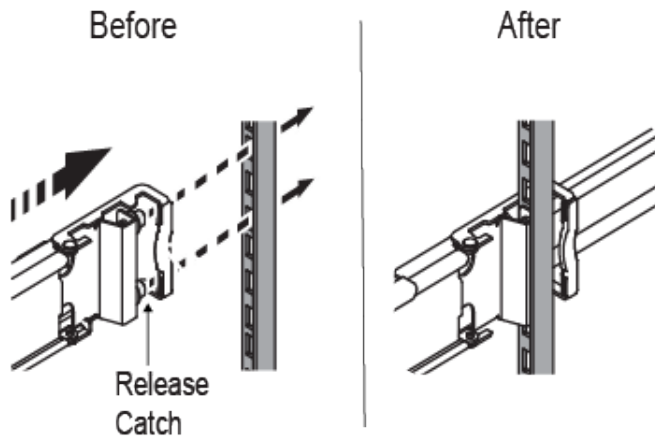


Figure 25. Installation of left rear bracket

- b) Press and hold the release catch and push the bracket into place so that the mounting screws can be installed securely into the rack post holes.
- c) Release the catch to secure the rail to the post once the screws are fully inserted.
- d) Align the left front bracket mounting screws with the appropriate rack post holes in the front left rack post. Ensure that the rail is level before you continue.
- e) Secure the rear end of the left outer rail to the rack using the M5 shipping screw that comes with the supplier rail kit.

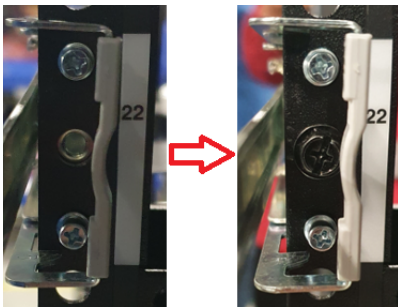


Figure 26. Securing the rear end of the left outer rail

- f) Remove the middle screw (as shown in the following figure) from the front end of the left outer rail using a flat tip screwdriver.

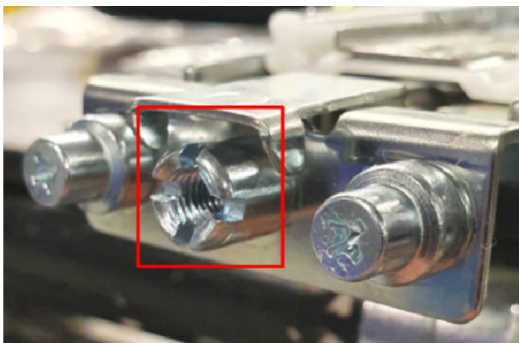


Figure 27. Removal of the middle screw

- g) Push and hold the release catch outward and insert the left front bracket mounting screws into the left front rack post holes. Verify that the rail is level.

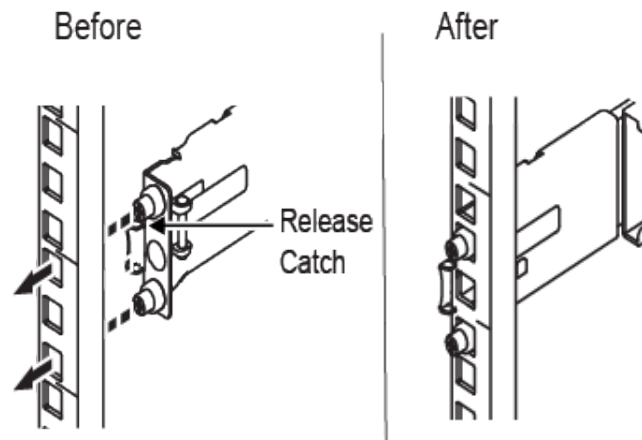


Figure 28. Installation of the front bracket

- h) Once the mounting screws are fully inserted into the rack post holes, release the catch to secure the rail to the post.
- i) Install the middle screw on the front end of the left outer rail as shown in the following figure.



Figure 29. Securing the front of the rails

- 7. Repeat the installation steps of left outer rail to install the right outer rail on the rack post.
- 8. Install the inner rail on the right side of the enclosure as follows:
 - a) Align the large section of the keyholes on the right inner rail with the standoffs on the right side of the chassis. See the following figure.

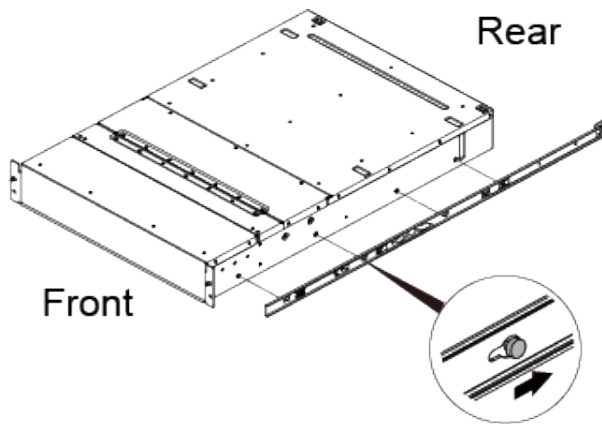


Figure 30. Standoffs aligned with the keyholes

- b) Slide the rail toward the back of the enclosure to secure the standoff on the smaller section of the keyhole to lock the rail in place, which is accompanied by an audible click. See the following figure.

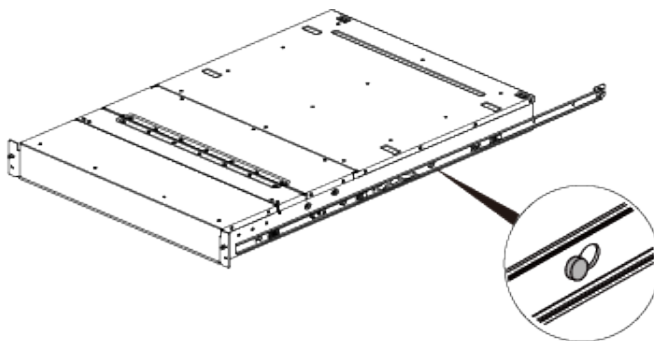


Figure 31. Standoffs secured over the keyholes

- c) Secure the rail in place by using one of the M4 screws in the hole just behind the release tab. See the following figure.

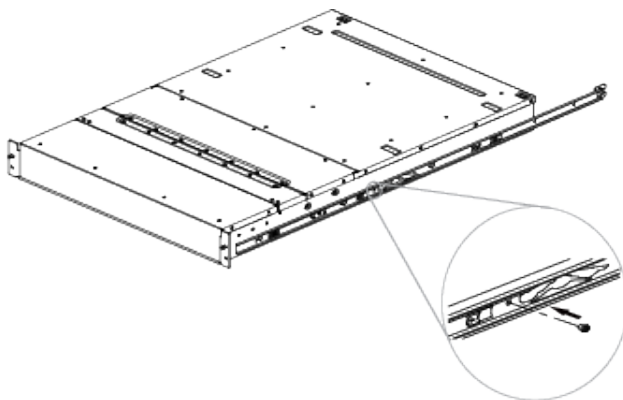


Figure 32. Securing the rail

- d) Repeat the installation steps of inner rail on right side of the enclosure to secure the other inner rail on left side of the enclosure.

Installing enclosures (IBM SSR task)

Following your enclosure location plan, install the IBM Storage Scale System 3500 system.



CAUTION:

- To lift an IBM Storage Scale System 3500 system requires at least two people. To reduce the enclosure weight to permit one person to safely lift the enclosure, you must temporarily remove the server canisters, power modules, and all drives from the enclosure.

- Install an IBM Storage Scale System 3500 system only onto the IBM Storage Scale System 3500 system rails supplied with the enclosure.
- Load the rack from the bottom up to ensure rack stability. Empty the rack from the top down.

To install an enclosure, complete the following steps:

1. Align the enclosure both horizontally and square to the rails, while facing the front of the IBM Storage Scale System 3500 as shown in the following figure.

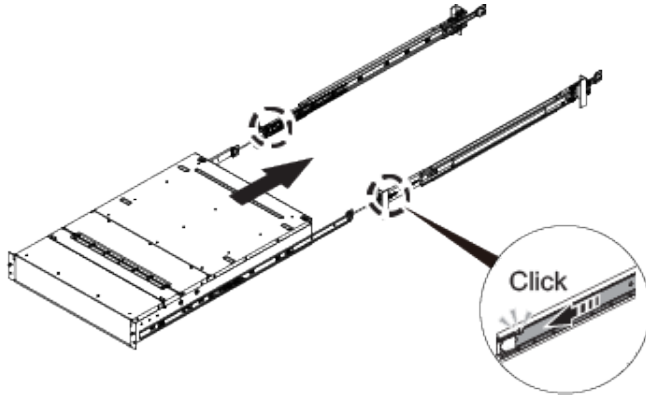


Figure 33. Alignment of the enclosure

2. Ensure that the ball bearing retainers are at the front of the left and right cabinet member rails. This is followed by an audible click.
3. Insert each inner rail into the rack cabinet as shown in the following figure.

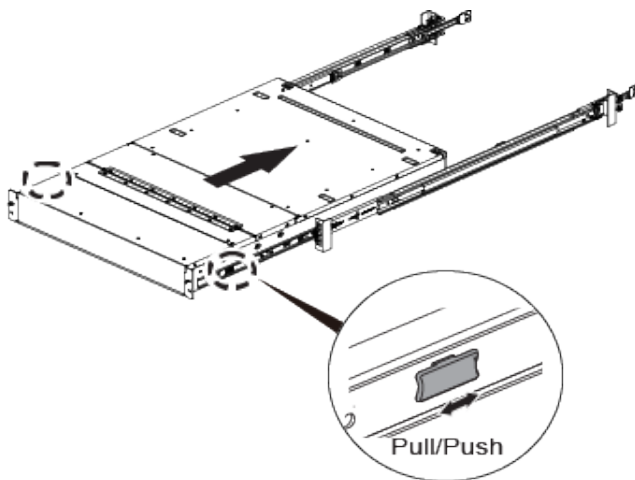


Figure 34. Inserting the enclosure

4. Install the two bezel ear caps on the enclosure as follows:
 - a) Place the left bezel ear cap on the left side of the enclosure and align the mounting holes as shown in the following figure.

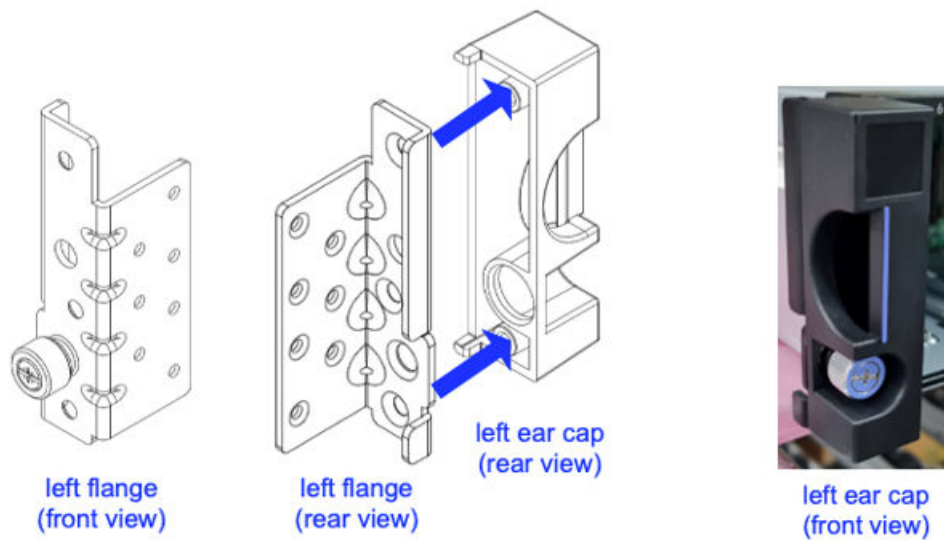


Figure 35. Replacing left ear cap

b) Install the two screws on the rear side of the left bezel ear cap as shown in the following figure.



Figure 36. Displaying left ear cap front view

c) Repeat the above steps to install the right bezel ear cap on the right side of the enclosure.

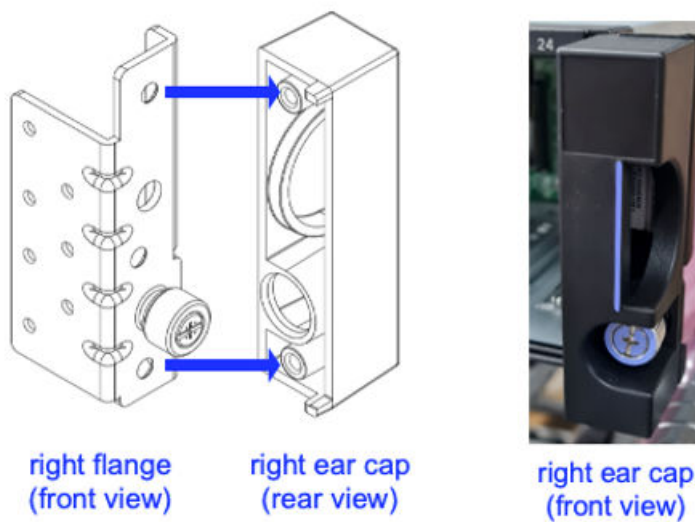


Figure 37. Replacing right ear cap

5. Push the enclosure into the rack while pulling the outer rail until the outer and the inner rails lock into the serviceable position. This is accompanied by an audible click.
6. Press the release tab and push the enclosure fully into the rack.

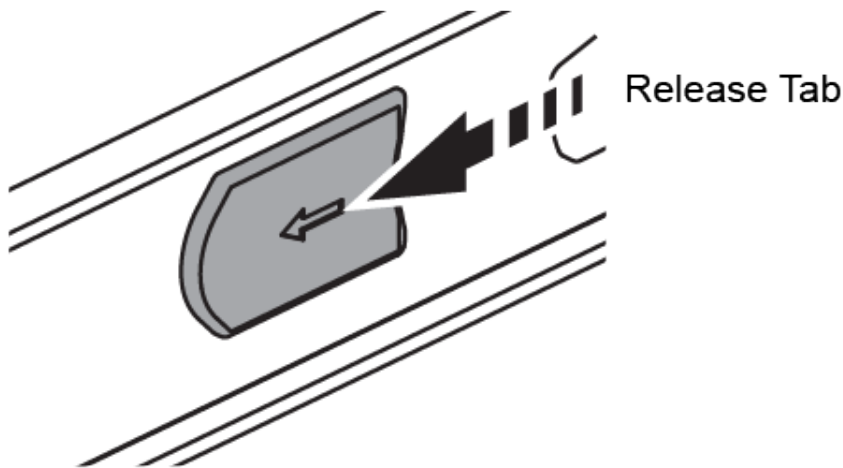


Figure 38. Release tab

7. Secure the enclosure on the left and right front of the enclosure to the left and right front rack posts by using the two M5 X 9 shipping screws as shown in the following figure.

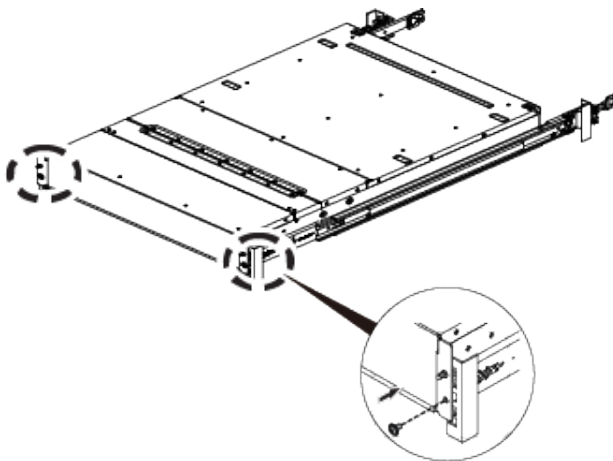


Figure 39. Securing the enclosure

At this point, the rails and IBM Storage Scale System 3500 enclosure are installed. The enclosure is mounted on the rail with all the components that were removed, reinserted into the slots.

Installing cable management assembly (IBM SSR task)

The cable management assembly (CMA) aids in better routing and securing of the system's cabling. The CMA enables the storage enclosure easily slid in and out of the rack for drive installation or replacement without disconnecting the cables from the power modules or server canisters. A properly installed CMA prevents cable tangling and interference with other components in the rack, allowing for smooth operation of the rails.

Note: If the CMA is preinstalled, the CMA would be secured by a strap to the cross bar during transportation to avoid damage. This strap must be removed before installation.

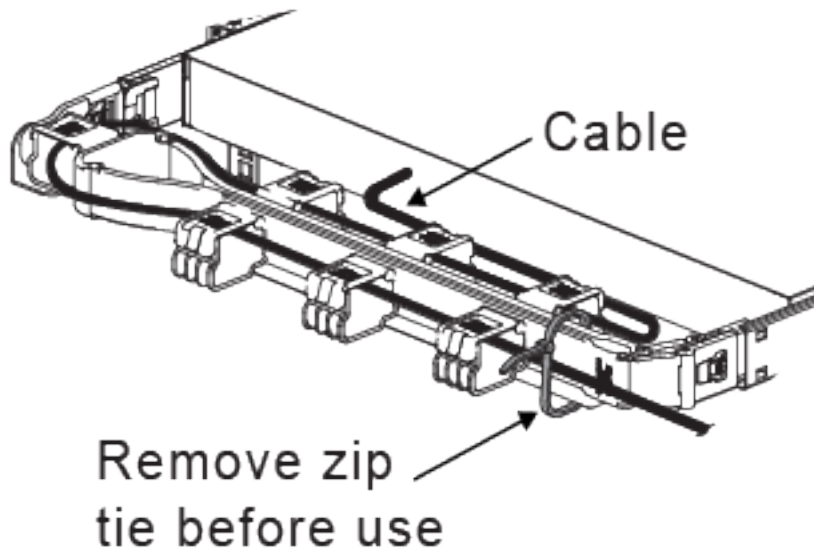
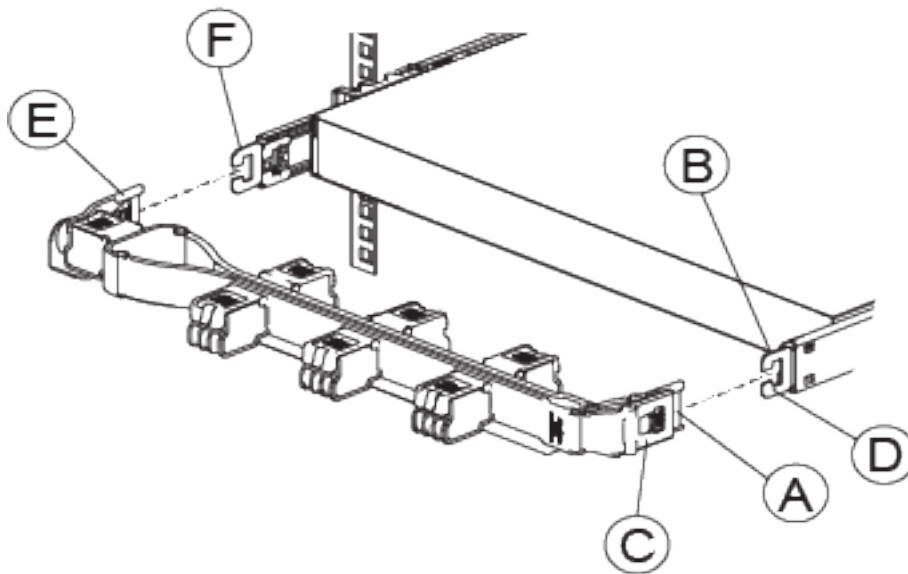


Figure 40. Cable management assembly

1. Verify the direction of the CMA arm as shown in the following figure.



- A** - Inner CMA arm connector
- B** - Inner rail connector
- C** - Outer CMA arm connector
- D** - Outer rail connector
- E** - CMA body connector
- F** - CMA body rail connector

Figure 41. Cable management assembly installation

2. To change the direction of the arm for use on the opposite side of the enclosure, press the release buttons on the outside of the CMA elbow and rotate the arm 180 degrees.

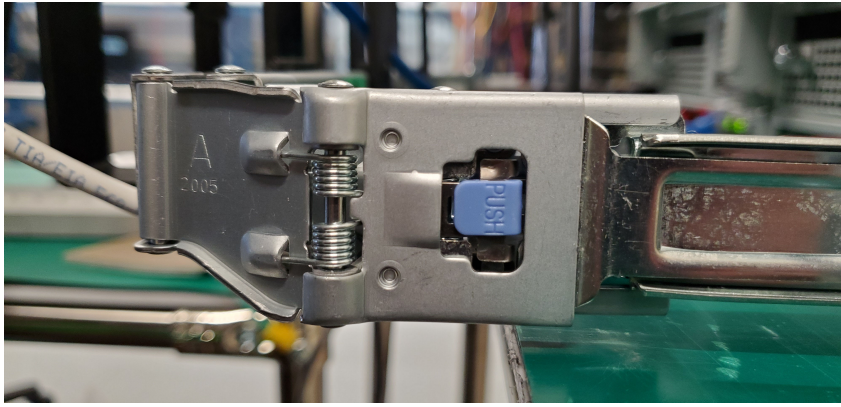


Figure 42. CMA release buttons

3. Slide the inner CMA arm connector (A) onto the lower right inner rail connector (B) as shown in the following figure.

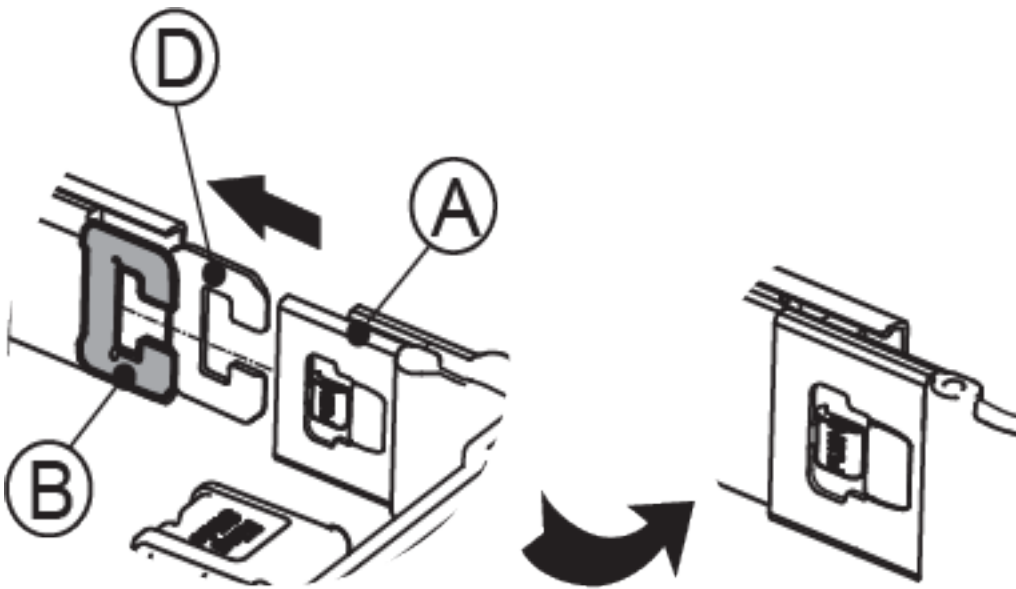


Figure 43. Installing inner CMA arm connector on inner rail connector

4. Slide the outer CMA arm connector (C) onto the lower right outer rail connector (D) as shown in the following figure.

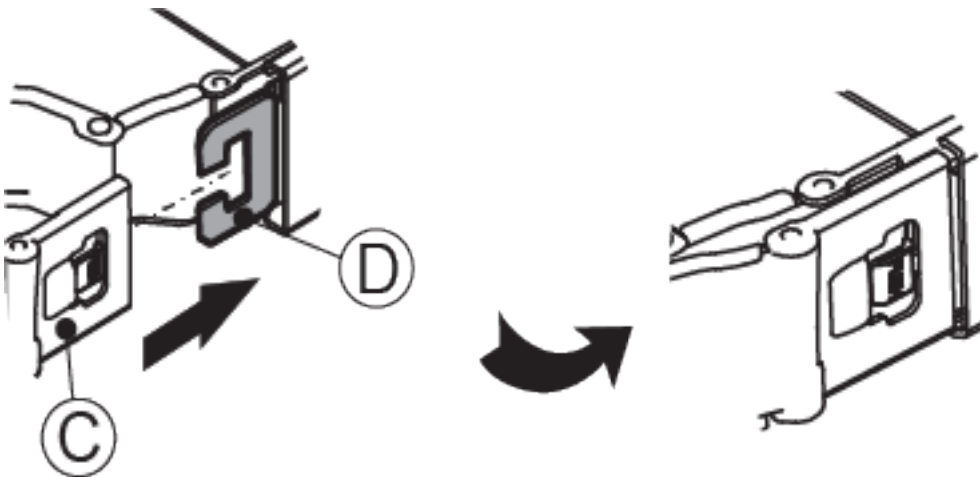


Figure 44. Installing outer CMA arm connector on outer rail connector

5. Slide the CMA body connector (E) onto the lower left CMA body rail (F) as shown in the following figure.



Figure 45. Installing CMA body connector (E) on the left CMA body rail

6. Connect the cables to the appropriate ports on the server canister operator panels and the jacks for the power modules. Do not connect the power cords to a power module now.
7. Starting with the thickest gauge cable first, run each cable through the loops on the CMA.
8. Test the CMA to ensure smooth operation. Ensure that the cables do not have pinching or bindings.

Note: When you pull the enclosure from the rack, the rails lock in the serviceable position. To release the rails from the serviceable position, press the release tab on each inner member rail and simultaneously push the enclosure into the rack.

Chapter 6. Monitoring the system using LEDs

The section provides information about LED based monitoring of IBM Storage Scale System 3500. The chapter guides customers to use LEDs for monitoring and maintenance of the system.

The following components of IBM Storage Scale System 3500 support LED-based monitoring:

- System status
- Drive carrier assembly
- Fan module
- Power module
- Server canister

System status LEDs

System status LEDs provide status of IBM Storage Scale System 3500.

Ten status LEDs are available along the upper-left edge on the front of the enclosure, just above the drive bays as shown in Figure 46 on page 67. From left of the enclosure, the first three LEDs provide status of FRUs that are not visible from the cold aisle—the fans, server canisters, and power modules.

The next six LEDs provide status of FRU groups and direct the user to the appropriate FRU for further investigation when there is a fault. The last LED on the enclosure is not in use.

The following figure shows system status LEDs on an IBM Storage Scale System 3500 enclosure:

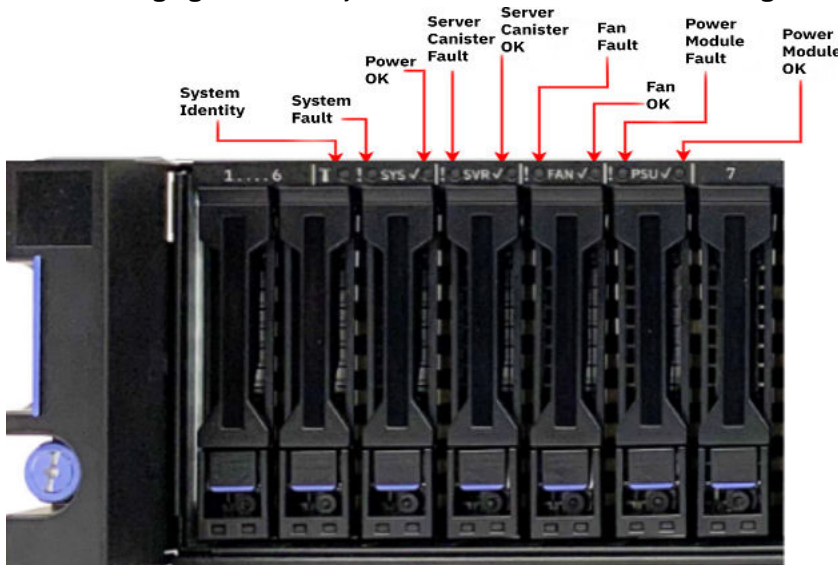


Figure 46. System status LEDs on an IBM Storage Scale System 3500 enclosure

The following figure shows the location of each LED available on an IBM Storage Scale System 3500 enclosure from left to right:

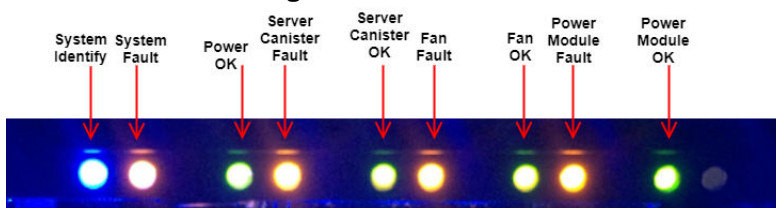


Figure 47. Displaying system status LEDs on an IBM Storage Scale System 3500 enclosure

Table 21 on page 68 describes the behavior of system status LEDs according to their position on an enclosure from left to right as shown in [Figure 47](#) on page 67.

<i>Table 21. Behavior of system status LEDs</i>		
LED Type	Color	Behavior
System Identify	Blue	ON - The enclosure is receiving an identify command. OFF - The enclosure is not receiving an identify command.
System Fault	Amber	ON - One or more components within the enclosure experience a fault that requires a service action. OFF - No detectable faults are present in the enclosure.
Power OK	Green	ON - The enclosure is powered on and operating correctly. OFF - The enclosure is not powered on.
Server Canister Fault	Amber	ON - One or more server canisters experience a fault that requires a service action.
Server Canister OK	Green	ON - Both server canisters are powered on and operating correctly.
Fan Fault	Amber	ON - One or more fan modules experience a fault that requires a service action.
Fans OK	Green	ON - All fan modules are powered on and operating correctly.
Power Module Fault	Amber	ON - One or more power modules experience a fault that requires a service action.
Power Module OK	Green	ON - Both modules are powered on and operating correctly.

Drive carrier assembly LEDs

Each drive carrier assembly of IBM Storage Scale System 3500 includes a set of LEDs that are visible from the bottom of the drive carrier. On system startup, the green LED illuminates automatically.

The drive status LEDs on a drive carrier shown in the following figure.



Figure 48. Drive status LEDs on an IBM Storage Scale System 3500 drive carrier

The following table describes the behavior of drive carrier assembly LEDs of IBM Storage Scale System 3500.

Table 22. IBM Storage Scale System 3500 LEDs behavior		
LED type	Color	Behavior
Identify LED	Blue	ON (Solid): The SSD has been identified (with Green LED) or in replace state. OFF: The SSD is not in Identify or Replace state.
Drive carrier (bi-color, Green/Amber) LED	Green	Solid: Refers drive power. There are no detectable faults. Flash: The drive LED flashes green for an activity.
	Amber	ON: The drive is in Failing state.
	OFF	The SSD does not have any power.

Fan module LEDs

The IBM Storage Scale System 3500 includes three LEDs with each of the six fan modules. The available LEDs are of blue, amber, and green color. These LEDs are used to monitor fan modules.

Note: To get access to the fan, requires the removal of the fan cover screw.

On system startup, the green LED illuminates automatically until the system is initialized completely. The following figure shows fan module LEDs.



Figure 49. IBM Storage Scale System 3500 fan LEDs

The following table describes the behavior of IBM Storage Scale System 3500 fan LEDs.

Table 23. IBM Storage Scale System 3500 fan LEDs			
Blue	Amber	Green	Behavior
OFF	OFF	ON	The fan module is functioning properly.
OFF	ON	OFF	A fan module fault is detected.
ON	OFF	ON	An identify command is being issued to the fan.

Power module LEDs

These LEDs are used to monitor power modules of the IBM Storage Scale System 3500.

The power module status LEDs are visible from the rear of the enclosure. The following figure provides a close view of the power module status LED.



Figure 50. IBM Storage Scale System 3500 power module status LED

The following table describes bi-color power module status LED behavior.

Table 24. IBM Storage Scale System 3500 power module status LED		
Green Color	Amber Color	Behavior
ON	OFF	Power module ON and OK.
OFF	OFF	No AC power to all power modules.
OFF	ON	A power module critical event is causing shutdown. Also, indicates the AC power cord is unplugged.
OFF	Flashing 0.5 Hz	Indicates high temperature, hot spot temperature, slow fan, high current, or high-power warning in power module. In this condition, power module continues to operate.
Flashing 0.5 Hz	OFF	Power module is in standby state. AC present, 12 V standby ON/PSU OFF. PSU is in smart redundant state.
Flashing 2.0 Hz	OFF	Indicates that the firmware is in update mode.

Server canister LEDs

The IBM Storage Scale System 3500 server canister consists three status LEDs on the bottom of the server canister operator panel. In addition, two Ethernet port LEDs per Ethernet port (four LEDs) are located to the right of the server canister status LEDs. These LEDs are used to monitor the status of server canister and Ethernet ports.

The following figure shows server canister LEDs.

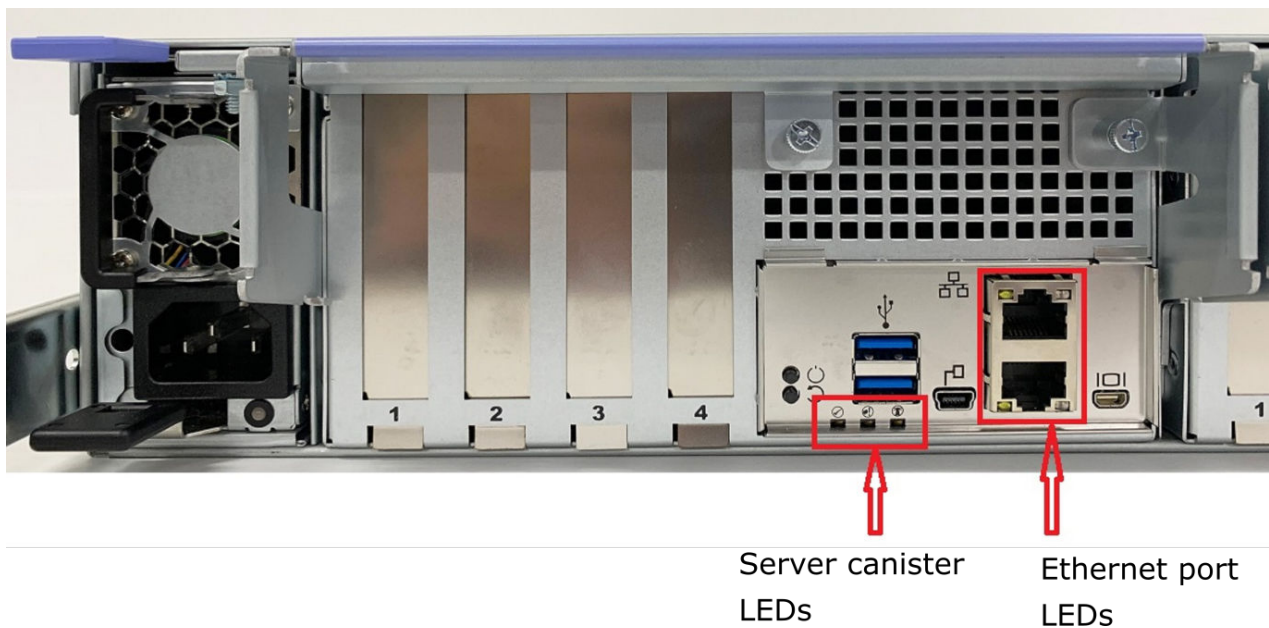


Figure 51. IBM Storage Scale System 3500 server canister

The following figure shows a close-up view of server canister LEDs.

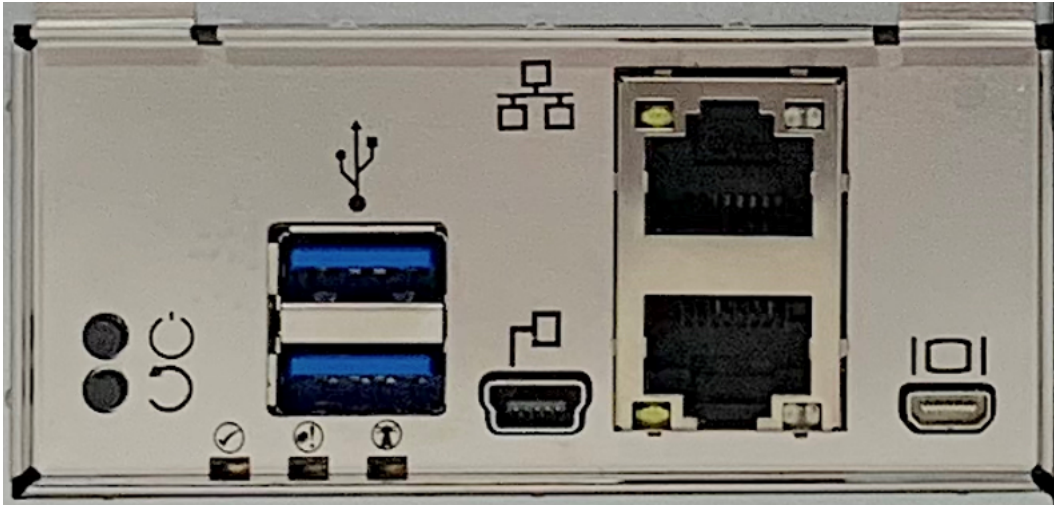


Figure 52. Close-up view of server canister LEDs

Ethernet port LEDs

The Ethernet port on the rear of server canister is a standard RJ45-style connector. These LEDs indicate speed and link activity as described in [Table 25 on page 72](#).

A close up view of Ethernet port LEDs is shown in the following figure.

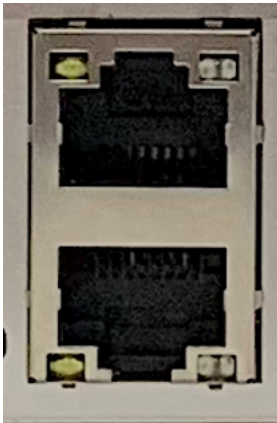


Figure 53. Close up view of IBM Storage Scale System 3500 Ethernet port LEDs

The following table describes the behavior of Ethernet port LEDs.

Table 25. IBM Storage Scale System 3500 Ethernet port status LEDs		
Left LED	Right LED	Behavior
OFF	OFF	Indicates no link.
Amber	Green	Indicates link at 1000 Mb.
Green	Green	Indicates link at 10000 Mb.
Flashing	Flashing	Indicates Ethernet link activity.

Server canister status LEDs

The following table describes the possible behavior of server canister status LEDs.

<i>Table 26. Behavior of IBM Storage Scale System 3500 server canister status LEDs</i>			
Canister status OK (Green)	Canister identify (Blue)	Canister fault (Amber)	Behavior
ON	OFF	OFF	The server canister boots and operates normally.
ON or OFF	OFF	ON	A server canister fault is detected.
ON or Flashing	ON	OFF	The server canister is being sent an identify command.
Flashing ~1 Hz	ON or OFF	ON or OFF	BMC is powered ON. Canister is powered OFF. A service action is allowed.
Slow Flashing	ON	ON	BMC is powered ON.
Rapid Flashing	OFF	ON or OFF	BMC is powering ON.

Appendix A. IBM Storage Scale System 5141-FN2 - Slot placement summary

Each slot number and its usage, as well as VM usage when setup, are explained in the slot placement summary.

The following table and the illustration represent each slot and its usage:

Slot Number	Usage	VM Usage when Configured
Slot 1 – Network	Network: CX6 or CX7 (Dual port)	CX6 – host IOMMU group
Slot 2 – Network or Aux Card or SAS	Network: CX6 or SAS: 9500-16e	CX6 – host or guest IOMMU group SAS – host IOMMU group
Slot 3 – Network	Network: CX6 or CX7 (Dual port)	CX6 – guest IOMMU group
Slot 4 – Network (Aux card or CX6) or SAS (Note 1)	Network: CX6 or SAS: 9500-16e	SAS – host IOMMU group CX6 – host or guest IOMMU group

Network: CX6 or CX7

Network or SAS: CX6 or SAS

Network: CX6 or CX7

Network or SAS: CX6 or SAS

Figure 54. Slot placement summary

Appendix B. PCIe5 x16 2-port NDR 200 GB InfiniBand ConnectX-7 CAPI Capable adapter (FC AJQS)

Learn about the specifications and operating system requirements for feature code (FC) AJQS adapter.

Overview

FC AJQS is a low-profile adapter. PCIe5 x16 2-Port high data rate NDR 200 GB InfiniBand (IB) ConnectX-7 adapter is a PCI Express (PCIe) generation 5 (Gen5) x16 adapter. This adapter can be used in Gen 4 x16 PCIe slot in the IBM Storage Scale System 3500 system. The adapter enables higher HPC performance with new Message Passing Interface (MPI) offloads, such as MPI Tag Matching and MPI AlltoAll operations, advanced dynamic routing, and new capabilities to perform various data algorithms. The NDR 200 Gb adapter supports connecting to a NDR 200 Gb switch by using NDR 200 Gb cables such as Direct Attach Copper (DAC) or Active Optical Cables (AOC). The NDR 200 Gb adapter also supports enhanced data rate (EDR) copper and optical cables when connecting to EDR 100 Gb or HDR 200 Gb InfiniBand switches. For more information about cables, ref [ConnectX-7 cable matrix](#).

Note: The Virtual Protocol Interconnect (VPI) feature is supported on this adapter. The adapter may be used as InfiniBand and/or Ethernet adapter.

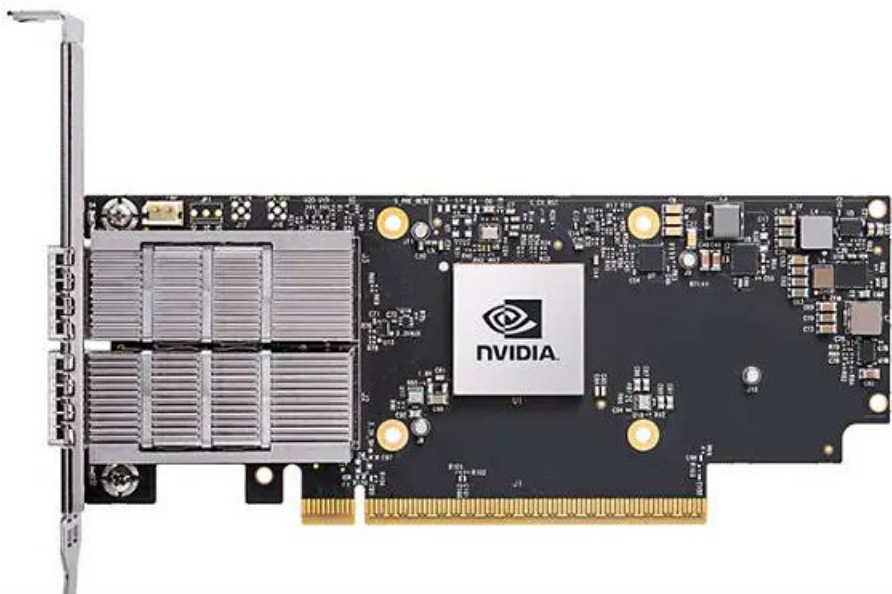


Figure 55. 2-port HDR 100 Gb InfiniBand ConnectX-7 adapter (FC AJQS)

Specifications

Item

Description

Adapter FRU number

01LL984

I/O bus architecture

The adapter is Gen 5 cable and running on Gen 4 PCIe X16 IBM Storage Scale System 3500 system.

Slot requirement

For more information about slot priorities, maximums, and placement rules, see *IBM Storage Scale System 3500 adapter concurrent MES upgrade* topic in the *IBM Storage Scale System 3500: Service Guide*.

Thermal requirement

If you have a 5105-22E system, you might be required to set the thermal mode of the system to a setting other than the default setting, depending on your system, adapter, and cable type.

Cables

For this HBA, IBM® offers either Direct Attach Copper (DAC) cables up to 2 M or Active Optical Cables (AOC) up to 100 M. QSFP112 based transceivers are included on each end of these cables.

Cable matrix

The NDR cables that are listed in the below table support connecting an NDR two port 200 Gb HBA.

Table 27. ConnectX-7 cable matrix	
Feature	Description
AJQV	NVIDIA MMF MPO12 cable, 5m
AJQW	NVIDIA MMF MPO12 cable, 10m
AJQX	NVIDIA MMF MPO12 cable, 20m
AJQY	NVIDIA MMF MPO12 cable, 30m
AJR1	NVIDIA NDR400 Single Port QSFP112 Transceiver
AJR2	NVIDIA MMF MPO12 Splitter cable, 5m
AJR3	NVIDIA MMF MPO12 Splitter cable, 10m
AJR4	NVIDIA MMF MPO12 Splitter cable, 20m
AJR5	NVIDIA MMF MPO12 Splitter cable, 30m

Voltage

3.3 V, 12 V

Form factor

Short, low-profile (FC AJQS)

Attributes provided

PCI Express 5.0 (up to 32GT/s) x16.

PCIe Gen 5.0 compliant (1.1, 2.0, 3.0, and 4.0 compatible).

The adapter is based on the Mellanox ConnectX-7 adapter.

Improves performance and scalability by offloading the CPU from I/O networking tasks.

Minimizes CPU usage by using the memory access more efficiently.

Appendix C. Switches for IBM Storage Scale System 3500

These switches can be installed in the same rack as the IBM Storage Scale System solution, in a similar way as other supported high-speed data switches.

MTM 5149-N64 switch



Figure 56. Ports view of the MTM 5149-N64 switch



Figure 57. PSUs view of the MTM 5149-N64 switch

MTM 5149-S05 switch



Figure 58. Ports view of the MTM 5149-S05 switch



Figure 59. PSUs view of the MTM 5149-S05 switch

MTM 5149-S54 switch



Figure 60. Ports view of the MTM 5149-S54 switch



Figure 61. PSUs view of the MTM 5149-S54 switch

The MTM 5149-N64 switch

This topic describes the key features and specifications of the NVIDIA/Mellanox NDR switch, IBM MTM 5149-N64.

The 5149-N64 switch introduction

The NVIDIA/Mellanox NDR switch, IBM MTM 5149-N64 switch, is a managed 64-port switch that provides 400 Gb/s InfiniBand bandwidth per port in a 1U standard chassis design. The MTM 5149-N64 switch is the next generation after MTM 8831-H40, and can be installed in the same rack as the ESS solution, similar way as other supported high-speed data switches.

The following figures show the ports side and the power side of a 5149-N64 switch.



Figure 62. 5149-N64 switch ports



Figure 63. 5149-N64 switch power

For more information about the 5149-N64 switch, see [NVIDIA](#) documentation. The following table lists the IBM MTM and the NVIDIA system model:

Table 28. IBM MTM and NVIDIA system model	
IBM MTM	NVIDIA system mode
5149-N64	QM9700

Key hardware and software features

Key hardware features

Feature	Quantity
Form factor	U1
NDR 400 Gb/s InfiniBand ports	64
Octal small form factor pluggable (OSFP) connectors	32
USB management ports	1
RJ45 management ports	1
RJ45 management ports (UART)	1
Power supply units	2 (1+1 redundant)
Fan modules	7 (6+1 redundant)

Key software features

The software features of the 5149-N64 switch are as follows:

- On-board subnet manager
- NVIDIA MLNX-OS software package
- Management access via:
 - Command line interface (CLI)
 - Web based graphical user interface (GUI)
 - Simple Network Management Protocol (SNMP)
 - JavaScript Object Notation (JSON)

Note: Installing and upgrading switch software is a customer responsibility. Updates must be installed only upon the direction of IBM Support.

The IBM MTM 5149-N64 switch views

The following image labels the 32 OSFP ports and highlights features on the port side of 5149-N64 switch. Port numbers are printed on the switch between the top and bottom ports.



Figure 64. Port view of the 5149-N64 switch

The following image highlights features on the power side of the 5149-N64 switch:



Figure 65. Power side view

Labels of the 5149-N64 switch

The details of the 5149-N64 switch labels are provided in this section.

Chassis label

The chassis label is affixed to a pull out tab on the left of the system on the power side. The chassis label contains the part number, serial number, and GUID of the 5149-N64 switch.



Figure 66. Chassis labels

Switch labels

On the bottom of the switch you can find the regulatory label, and the MTM label, as shown in the following figure:

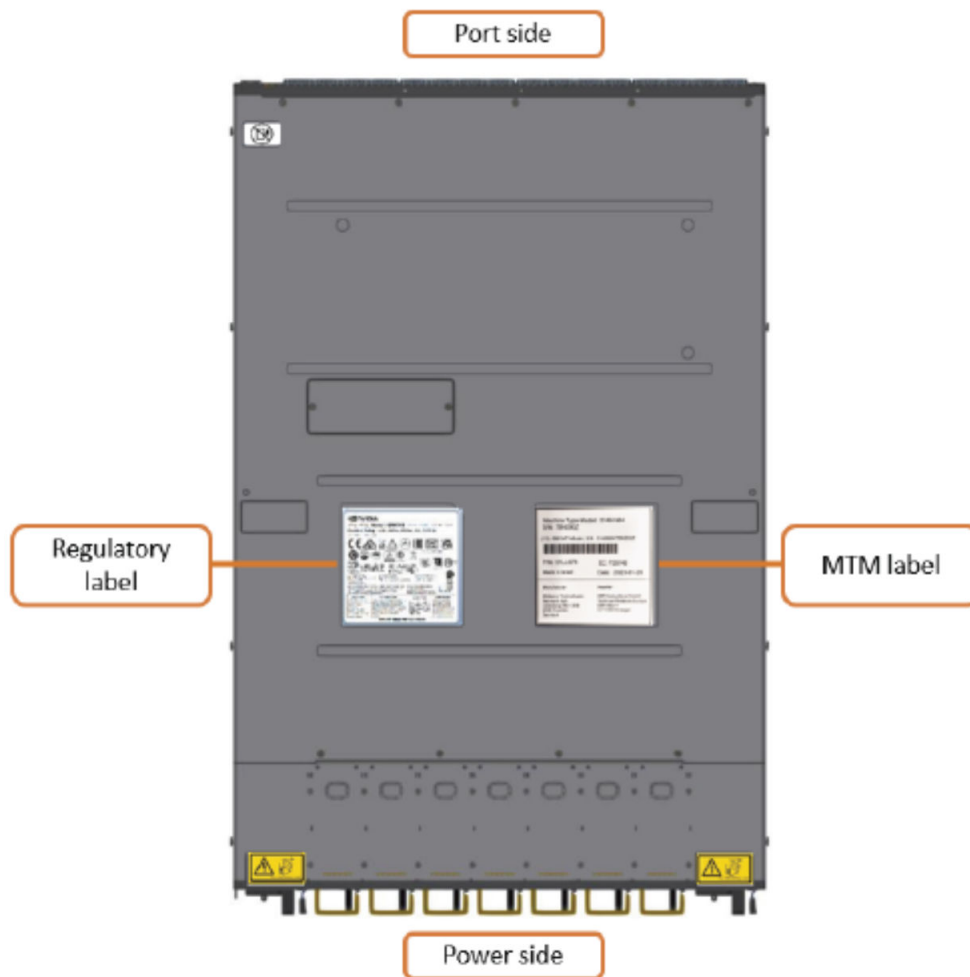


Figure 67. Switch labels

Specifications of the 5149-N64 switch

The following specifications provide brief information about the 5149-N64 switch.

System dimensions and weight

System weight and dimensions are listed in the following table:

Height (1U rack standard)	Width (19" rack standard)	Depth	Weight
4.36 cm (1.7 in)	43.8 cm (17 in)	66.04 cm (26 in)	14.5 kg (31.97 lb)

Note: Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

Air temperature

Air flows from the power side of the switch to the port side (power-to-connector (P2C) air flow configuration). Temperature requirements for the switch are listed in the following table:

Air flow direction	Operating	Storage
Forward, power-to-connector (P2C)	0° C to 35°C (32°F to 95°F) 10%-85% non-condensing humidity	-40° to 70°C (-40°F to 158°F) 10%-90% non-condensing humidity

Important: Regardless of the system specifications about absolute maximum temperature, the nonoperating environmental conditions of the system solid-state devices must adhere to the *JEDEC JESD218 Enterprise-class SSD* requirements for data retention endurance. These requirements must be met particularly for the system storage, transit, or shipping maximum temperatures. To best maintain the data retention of the system solid-state devices, keep an *optimal* condition for nonoperating temperatures by making sure that the system does not remain for longer than 3 months at temperatures that exceed 40°C.

Power

There are two hot swappable PSUs in the switch. Power requirements for each PSU are listed in the following table:

Input	Frequency
200-240 VAC	50/60 Hz

Service indicators

Service indicators for the switch are implemented by using LEDs to provide status information.

LEDs provide a visual method to identify, clarify, and resolve system issues. The system-level LEDs indicate the overall switch health and status. LEDs on individual modules, such as the power supplies, indicate the health and status of the specific module.

LEDs of the 5149-N64 switch

System LEDs

The following figure shows system LEDs on the port side of the 5149-N64 switch:

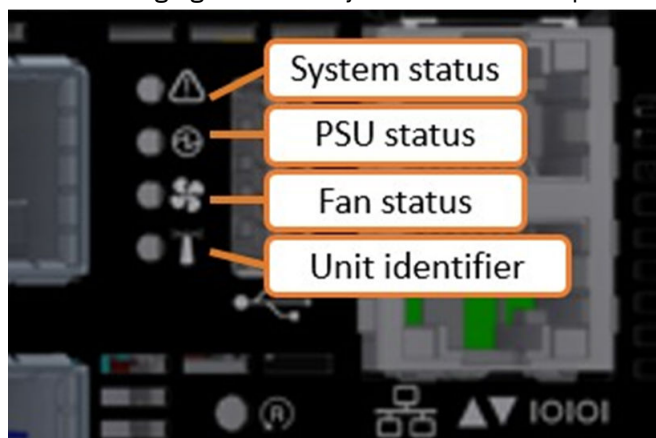


Figure 68. LEDs on the port

The following table lists the port side LED states:

LED	State	Description	Action required
System status LED	Solid green	The system is up and running normally.	-
	Flashing green	The system is booting up.	Wait up to five minutes for the end of the booting process.
	Solid amber	A major error has occurred. For example, corrupted firmware or an overheated system.	If the system status LED shows amber five minutes after starting the system, unplug the system and call your IBM support for assistance.
Power supply units status LED	Solid green	All plugged (one or two) power supplies are running normally.	-
	Solid amber	One or both of the power supplies are not operational or not powered up or the power cord is disconnected.	Make sure the power cord is plugged in and active. If the problem resumes, the FRUs might be faulty, and should then be replaced.
Fan status LED	Solid green	All fans are up and running.	-
	Solid amber	Error, one or more fans are not operating properly.	The faulty FRUs should be replaced.
Unit identification LED	Blue	On	-

Fan module LEDs

Each fan module has its own status LED. LED indicators for fans 2 and 3 are highlighted in the following figure:



Figure 69. Fan LEDs

State	Description	Action required
Solid green	This fan unit is operating as expected.	-
Solid amber	This fan unit is missing or not operating properly.	The fan unit should be replaced.

Power supply unit LEDs

Each PSU has its own status LED, which reflect the system PSU state. The LED indicator for PSU 1 is highlighted in the following figure:

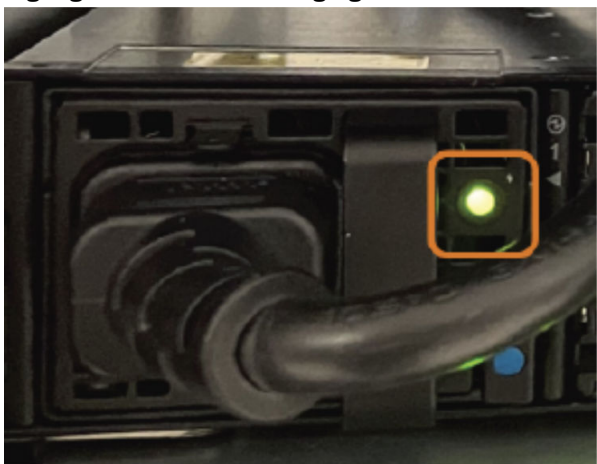


Figure 70. Power supply unit LEDs

State	Description	Action required
Solid green	All PSUs are connected and running normally.	-
Flashing green	Only 12VSB on (PSU off), PSU is in Smart-on state.	Contact IBM support.
Solid amber	AC cord unplugged or AC power lost on one PSU while the other power supply still has AC input power.	• Make sure that both PSU cords are connected and fully seated. • Determine why power was lost in the electrical outlet that the PSU is plugged into.
	PSU failure (including voltage out of range and power cord disconnected).	Check voltage. If OK, contact IBM support.
Flashing amber	Power supply warning events where the power supply continues to operate; high temp, high power, high current, or slow fan.	Contact IBM support.
Off	No AC power to all power supplies. Power might not be applied to the electrical outlets, or one or both of the PSUs might be faulty.	• Make sure that both PSU cords are connected and fully seated. • Determine why power was lost in the electrical outlet that the PSU is plugged into.

Port LEDs

Each OSFP port can be divided into 2 dual-lane ports, for a total of 4 ports.

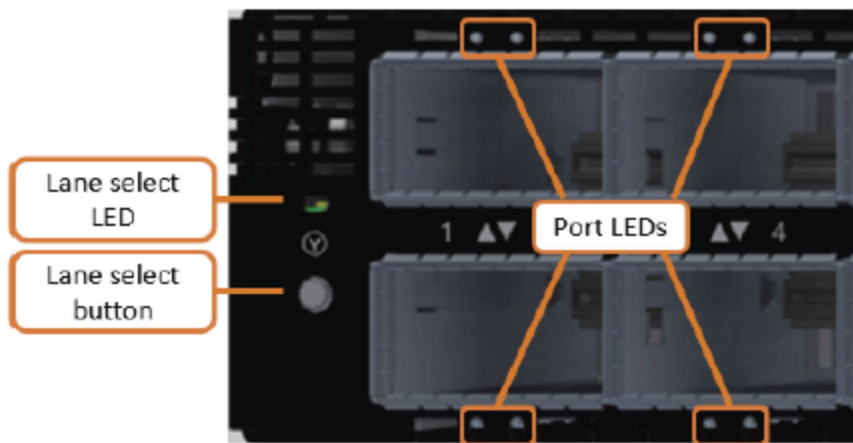


Figure 71. Port LEDs

The following table lists port LED states:

State	Description	Action required
Off	Link is down.	Check the cable.
Solid green	Link is up with no traffic.	-
Flashing green	Link is up with traffic.	-
Solid amber	Physical connection established, logical connection is pending.	Wait for the logical link to raise. Check that the subnet manager (SM) is up.
Flashing amber	There is a problem with the link.	Check that the SM is up.

The 5149-N64 switch installation

This switch is installed by the customer or by IBM, depending on the deployment.

The 5149-N64 switch is typically installed in an ESS system. ESS systems can be purchased pre-racked or unracked. SSRs are responsible for installing the 5149-N64 switch in an unracked ESS system.

For installing a system requires planning to facilitate a smooth installation, initialization, and configuration.

Planning for the 5149-N64 switch

For IBM ESS deployments, IBM is responsible for installing the switch, whether done by manufacturing for the racked solutions or by the SSR onsite for the unracked solutions.

Customers must complete a Technical and Delivery Assessment (TDA) that the assigned SSR then reviews with them. In conjunction with the TDA, planning information is available in IBM Docs. The SSR and the customer must also review and complete all of the planning information in IBM Docs. Before scheduling the trip onsite to perform the installation, the SSR should attend meetings with the customer to perform planning tasks.

Pre-install TDA checklist

TDA checklists ensure that the customer prepares the site and gathers information that is needed to deploy a system. The IBM sales team or business partner helps the customer complete the TDA checklists, with an assigned IBM quality practitioner or technical account manager (TAM) managing the communications.

Note: TDA completion is mandatory for these systems and must be completed before arriving onsite to install the system.

It is the responsibility of the customer, the sales team or business partner, and the IBM quality practitioners or TAM to ensure that the TDA is completed so that the SSR can use information in the TDA checklist to install and initially configure the solution.

Two types of TDA checklists are as follows:

Pre-sale TDA checklist

Provides a roadmap of questions associated with a configuration and proposal for IBM products and solutions. The pre-sale TDA is not relevant to SSRs or to system installations.

Pre-install TDA checklist

Provides a roadmap of questions that assess site readiness and prepares the environment for the installation. Information in the pre-install TDA checklist is used the installation and initial configuration.

TDAs are online forms, but can be exported in an .xlsx or .csv format, saved, and printed.

TDA checklists are in the [IMPACT](#) website (this site requires an IBM ID). The IBM practitioner creates the pre-install checklist. Customers, their business partner, IBM quality practitioner or TAM, and the assigned SSR can access this site to look at and to work on the TDA.

Installation overview

Switch package contents

The switch package contains the following contents.

Important: If parts are missing or damaged, do not proceed with the installation. Contact your next level of support.

- One switch
- One rail kit

Includes system rails that attach to the switch, and rack rails that attach to the rack.

- Four power cables
Type C14 to C15
- Two PSU cable retainers
- 32 dust caps
- One environmental notice user guide
- One repair identification tag

Installing the 5149-N64 switch

Complete this procedure to install the 5149-N64 switch.

Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

1. Attach the left and right system rails to the switch.
 - a) Align the switch and the system rails so that the system chassis pins align with the button holes on the rails and press the rails to the switch.
 - b) Slide the rails toward the power side of the switch.

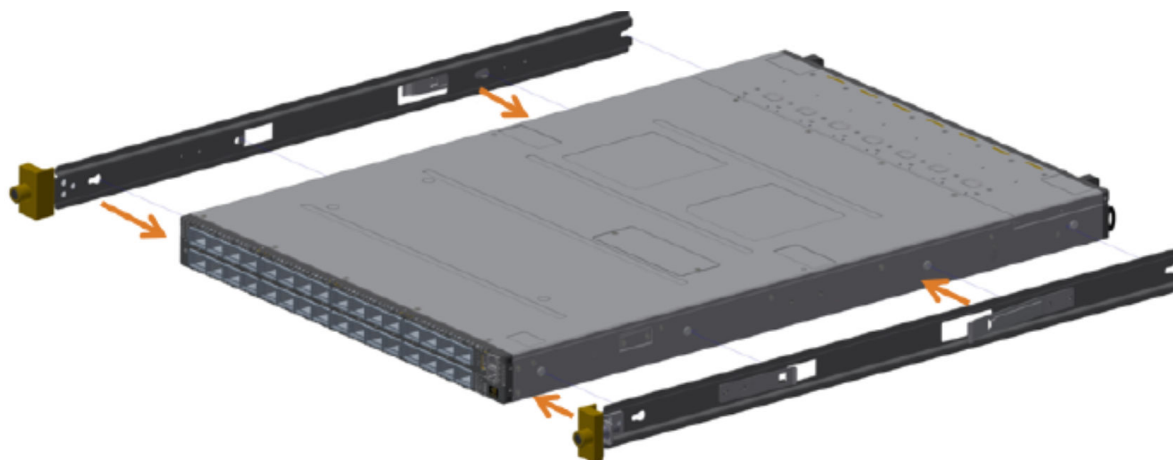


Figure 72. The 5149-N64 switch and rails alignment

The following figure shows a closeup of a rail secured to the switch:



Figure 73. A rail secured to the 5149-N64 switch

2. Attach the rack rails to the rack.

- a) Insert the rack rails into the back of the rack at an angle, then rotate the rails to align with the front rack post.

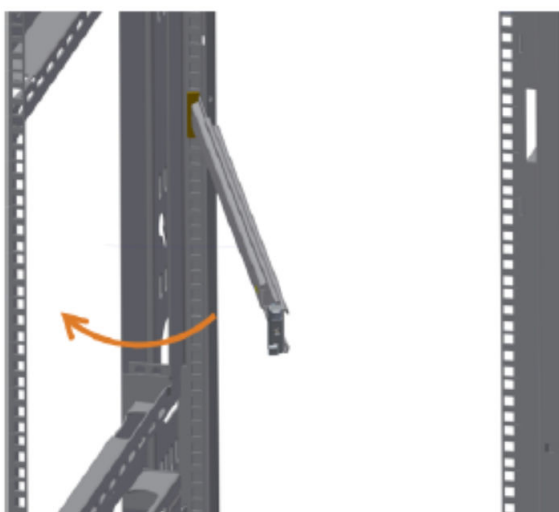


Figure 74. Inserting rack rails into the back of the rack

A rack rail that is inserted into the back of the rack is shown in the following figure:

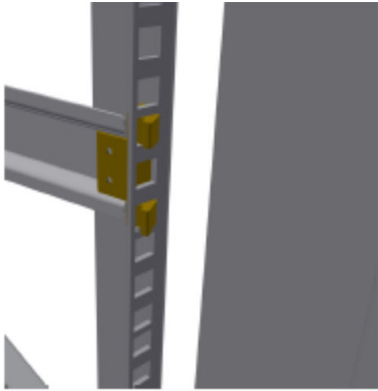


Figure 75. A rack rail that is inserted into the back of the rack

- b) Extend the telescopic rail to the front of the rack.

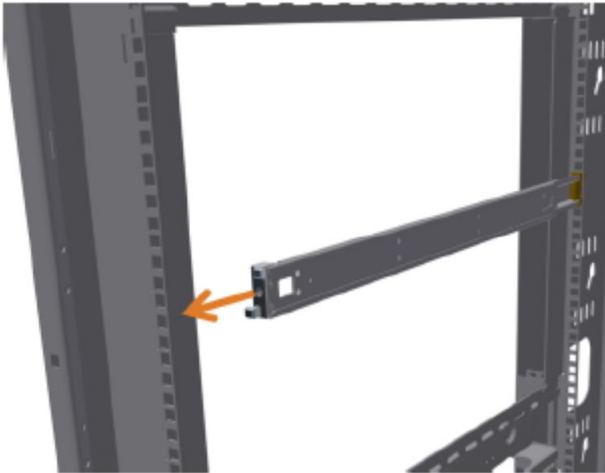


Figure 76. Extending the telescopic rail

- c) Insert the rail latches into the rack slots. The following figure shows that the latch is fully inserted. A correctly secured rack rail is shown in the following figure:

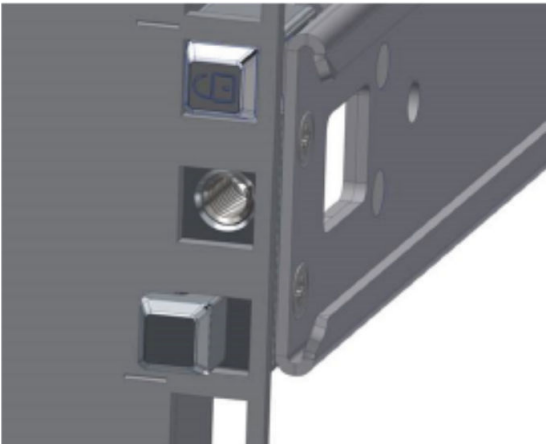


Figure 77. Fully inserted latch into the rack slots

3. Mount the 5149-N64 switch.

- a) Slide the switch into the channel on the rack rails. Push the switch until you hear the locking mechanism click on both sides.

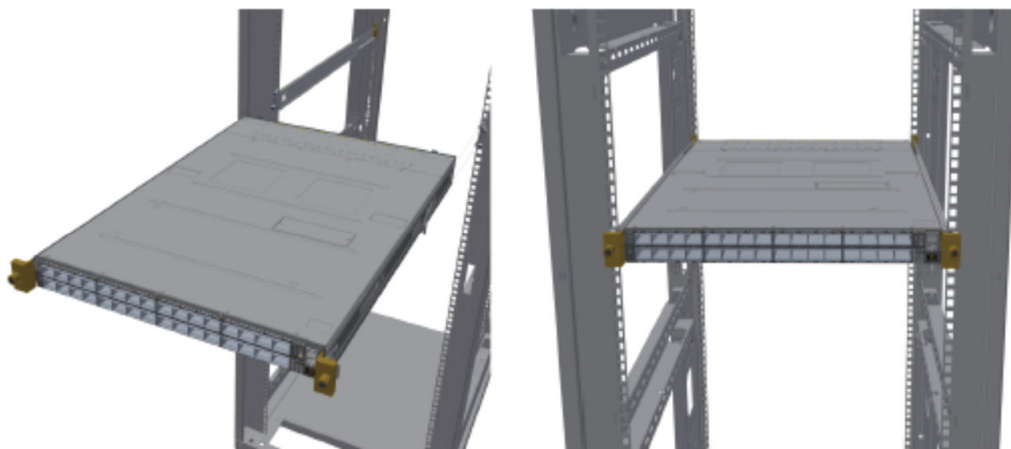


Figure 78. Sliding the switch into the channel

b) Tighten the two captive screws at the front of the mounted switch.

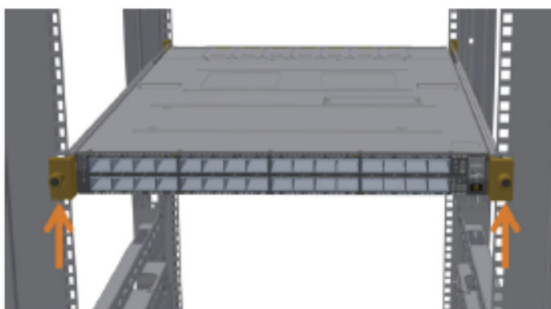


Figure 79. Tightening the two captive screws

Note: Unused OSFP cages must be closed with dust caps that are supplied with the system.

MTM 5149-N64 switch service

Service procedures and a list of replaceable parts are provided for the MTM 5149-N64 switch service.

Key replaceable parts for MTM 5149-N64 switch

The following table lists key replaceable parts for the switch. Because part numbers can change over time, in a repair situation, verify that the correct CRU or FRU is obtained.

Part	FRU part number	CRU or FRU	Concurrent replace
NVIDIAQuantum-2 based NDR InfiniBand switch, 64 NDR ports, 32 OSFP port	01LL978	FRU	No
Air duct and rack mount rail kit	01LL977	CRU Tier 1	No
NVIDIA800 Gb NDR twin port transceiver	01LL927	CRU Tier 1	No
PSU (P2C airflow)	01LL976	CRU Tier 1	Yes
Fan unit (P2C airflow)	01LL975	CRU Tier 1	Yes

Replaceable parts

Each replaceable part is assigned one of three designations. Most of the parts for this switch are classified as Tier 1 CRU. None of the parts for this switch are Tier 2 CRU.

For more information, see the following table.

Replacement designation	Description
CRU -Tier 1	Replacing a Tier 1 CRU is a customer responsibility, but dependent on if they purchased a service upgrade: • Under the standard warranty – If an IBM representative installs a Tier 1 CRU at the customer's request, the customer is charged for the installation. – If an IBM representative installs a Tier 1 CRU at IBM Support's request, the customer is not charged for the installation. • Under an IBM Storage Expert Care service upgrade: The customer can request that IBM install the CRU at no additional cost.
CRU -Tier 2	Replacing a Tier 2 CRU can be completed by the customer or can be installed at the customer's request by an IBM representative. If a Tier 2 CRU is replaced by an IBM representative: • If the product is under warranty: There is no charge for the part or for the installation if the product. • If the product is no longer under warranty: The customer is charged for the part and the installation.
FRU	Replacing a FRU must be performed by an IBM service personnel or an IBM authorized warranty service provider.

Replacing a customer replaceable unit

Use this procedure for servicing a customer replaceable unit (CRU).

Before you start a replacement, the customer must complete the following tasks:

- If the replacement procedure might put data at risk, the customer must back up the system or logical partition (including operating systems, licensed programs, and data).
- Review the replacement procedure for the part.
- Obtain the required tools for the replacement procedure.
- Inspect the replacement part. If any of the parts are incorrect, missing, or visibly damaged, they should contact the provider of the part or IBM Support.

The replacement best practices are as follows:

- For all replacements performed on an operational system, remove only one module from the enclosure at a time, unless directed otherwise by a replacement procedure.
 - To reduce the amount of time required for the replacement, remove the failed module only when the replacement module is available, unpackaged, and ready for installation.
 - Follow all recommended procedures for handling devices that are sensitive to electrostatic discharge (ESD).
1. Identify the system that contains the part to replace.
 2. Attach the ESD wrist strap. The ESD wrist strap must connect to an unpainted metal surface until the service procedure is completed.
 3. Locate the CRU part to be serviced.
 4. Remove and replace the CRU part.

5. Verify that the installed part is working as expected.

Replacing an MTM 5149-N64 switch

Complete steps in this procedure to replace a switch.

1. Locate the faulty switch.

The service ticket should include location information. Confirm that the switch location by looking for fault LEDs on the switch.

2. Back up the switch configuration, if possible. (Customer task)
3. Back up the switch firmware, if possible. (Customer task)
4. Label all data cables that connect to the switch.
5. Label all power cords that connect to the switch.
6. Disconnect the two power cords from their PDU connections.
7. Disconnect all data cables from the switch.

Important:

- Before removing the switch from the rack, ensure that the switch is powered down, with all network and power cables disconnected.
- Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be replaced. Replacement locations at 32U and higher require two people to lift the switch. For replacement locations lower than 32U, one person can safely lift the switch.

1. Unmount the system.

- a) Loosen the captive screws at the front of the system.

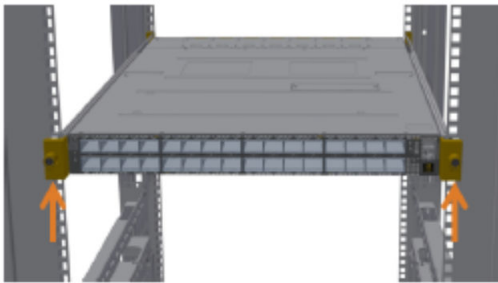


Figure 80. Loosening the captive screws

- b) Pull out the system until the rails stop.

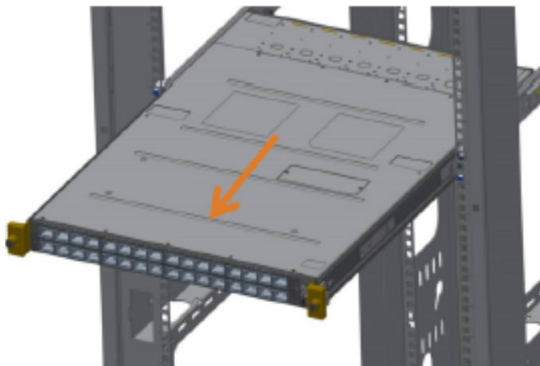


Figure 81. Pulling out the system

- c) Press the spring latches on both sides of the system. Continue pulling out the system until the system rails are clear from the rack rails.



Figure 82. Pressing the spring latches

2. (Optional) Remove the rails from the system.
 - a) Release the metal latches and slide the rails to move the system pins out of the smaller oval hole. The rail can then be removed from the system. The following figure shows the system pin and rail holes aligned so that the rail can be removed.

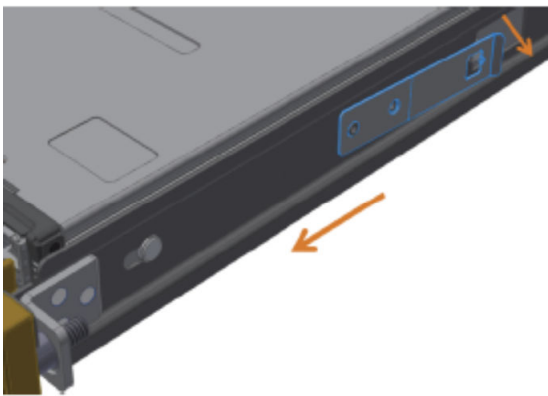


Figure 83. Releasing the metal latches

- b) Press the lock button, and pull the rail outside of the rack assembly.

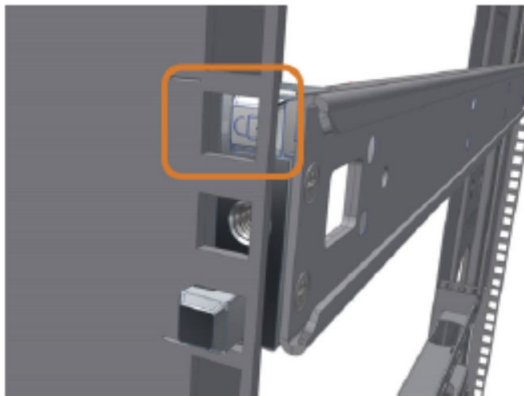


Figure 84. Pressing the lock button

3. Install the switch. For more information about installation, see [“Installation overview” on page 89](#).

Replacing the power supply unit of an MTM 5149-N64 switch

The 5149-N64 switch has two replaceable power supply units (PSUs) in a redundant configuration. Only one healthy PSU is required for the switch to function.

Before removing a PSU, ensure that the other PSU is connected and shows a solid green LED.

1. Remove a power cord from a PSU.

2. Push the release latch while pulling the handle toward you. As the power supply unit unseats, the PSU status LED turns off.



Figure 85. Releasing latch while pulling the handle

3. Install the PSU.



CAUTION: Do not insert a power supply that has power cables connected. Disconnect power cords from outlets before starting.

- a) Insert the PSU by sliding it into the opening, until a slight resistance is felt. The latch snaps into place, confirming the installation is correct.
- b) Insert the power cord into the PSU connector.
- c) Insert the other end of the power cord into an outlet of the correct voltage.
- d) Wait for the PSU LED to illuminate solid green. If the LED does not turn solid green, restart the procedure, and ensure that the PSU is correctly seated.

Replacing a fan module of an MTM 5149-N64 switch

The 5149-N64 switch can work with one failed fan module. Operating with more than one failed fan module is not supported.

1. Remove a fan module.

- a) Extract the fan module by pulling the left side of the handle. As the fan module unseats, the fan module status LED turns off.



Figure 86. Extracting a fan module

- b) Remove the fan module from the switch chassis.

2. Insert a fan module.

- a) Insert the fan module by sliding it into the opening until slight resistance is felt. Continue pressing the fan module until it seats completely.
- b) Wait for the fan module LED to illuminate solid green. If the fan module LED does not turn solid green, re-start the procedure and ensure the fan module is correctly seated.

The MTM 5149-S05 switch

This NVIDIA switch, IBM MTM 5149-S05 switch, is a 1U, Ethernet, 200 GbE (50G PAM4 per lane), 32-ports switch that offers a switching capacity of 6.4 Tb/s, with port speeds spanning from 10 Gb/s to 200 Gb/s per port. The MTM 5149-S05 switch can be installed in the same rack as the IBM Storage Scale System solution, in a similar way as other supported high-speed data switches.

Note: If Licensee purchases and incorporates IBM MTM 5149-S05 switch ("Switch") as part of your IBM Storage Scale System, the Switch may not comply with all of the requirements included in IBM's Security and Privacy by Design practices: <https://www.ibm.com/support/pages/ibm-security-and-privacy-design>.

Overview of the MTM 5149-S05 switch

Use the MTM 5149-S05 switch as a management switch in data center networking, enterprise access networking, or campus access networking.

This open network switch includes the following components:

- 32 200-GbE ports
- 1 100/1000Mb management port
- 1 RJ45 serial port
- 1 micro-USB port
- 2 hot-swappable PSUs (1+1 redundant)
- 6 hot-swappable fans (N+1 redundant)
- Open Network Install Environment (ONIE) software that supports the installation of an open source or commercial compatible network operating system (NOS).

The following figures show the PSUs side and the ports side of an MTM 5149-S05 switch.



Figure 87. PSUs view of the MTM 5149-S05 switch



Figure 88. Ports view of the MTM 5149-S05 switch

For more information about the MTM 5149-S05 switch, see [NVIDIA Spectrum SN3700](#) in NVIDIA documentation.

The following table lists the IBM MTM and the NVIDIA system model.

Table 29. IBM MTM and NVIDIA system model	
IBM MTM	NVIDIA system model
5149-S05	NVIDIA Spectrum SN3700

Key features and components of the MTM 5149-S05 switch

The key benefits and components of this entry-level open networking switch include features and components like 108 Gbps of switching capacity 61.6 Gbps in forwarding rate, 32 switch ports, and 3 management ports.

In the next table, consult the performance and capacity characteristics of an MTM 5149-S05 switch.

Feature	Performance and capacity
Switching capacity	6.4 Tb/s
Wire speed switching	8.33Bpps (Billion packets per second)
Lanes per port x maximum speed per lane	4x 50G PAM4
Latency	425 ns
CPU	Quad-core x86
System memory	8 GB
SSD memory	32 GB
Packet buffer	42 MB

Hardware components:

- 32 200-GbE ports
- 1 100/1000Mb management port
- 1 RJ-45 serial port
- 1 micro-USB port
- 2 hot-swappable PSUs (1+1 redundant)
- 6 hot-swappable fans (N+1 redundant)

Software features:

- ONIE software that supports the installation of an open source or commercial compatible NOS.
- Support to run third-party containerized applications on the switch system.

Views of the MTM 5149-S05 switch

The switch ports are accessible from one of the sides of the enclosure, the hot-swappable fans and the hot-swappable PSUs are placed on the contrary side of the enclosure.

Ports view (front of the enclosure)

The following figure shows the 32 200-GbE ports and the 3 management ports of an MTM 5149-S05 switch.

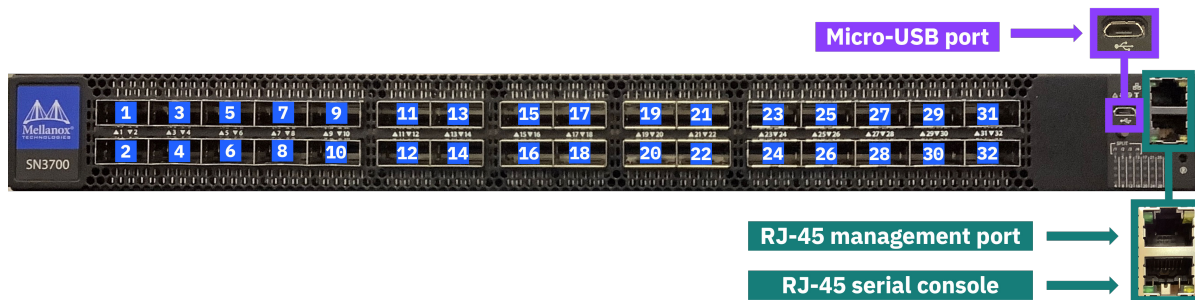


Figure 89. Ports of an MTM 5149-S05 switch

Port numbers are printed in pairs and placed between the top and bottom rows of switches, as highlighted in the following figure.

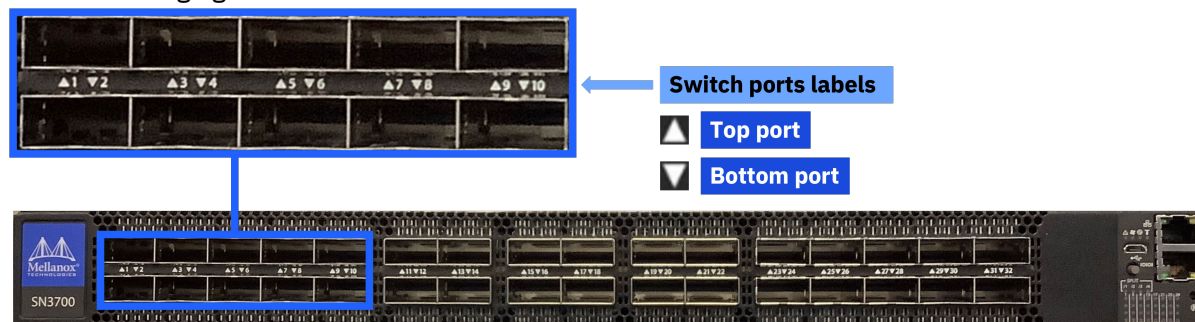


Figure 90. Switch port numbers of an MTM 5149-S05 switch

Fixed fans and PSUs view (rear of the enclosure)

The following figure highlights the placement of the six hot-swappable fans and the two hot-swappable PSUs of an MTM 5149-S05 switch.

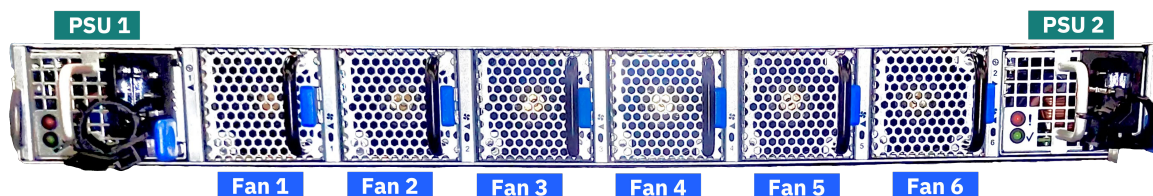


Figure 91. Hot-swappable fans and PSUs of an MTM 5149-S05 switch

Labels of the MTM 5149-S05 switch

Different details are provided in the labels of the MTM 5149-S05 switch and its PSUs.

PSUs labels

Each PSU has its labels at its top side.



Figure 92. PSUs label

Switch labels

On the bottom of the switch, you can find the regulatory label, and the MTM label, as shown in the following figure. These labels contain the part number, serial number, and GUID of the MTM 5149-S05 switch.

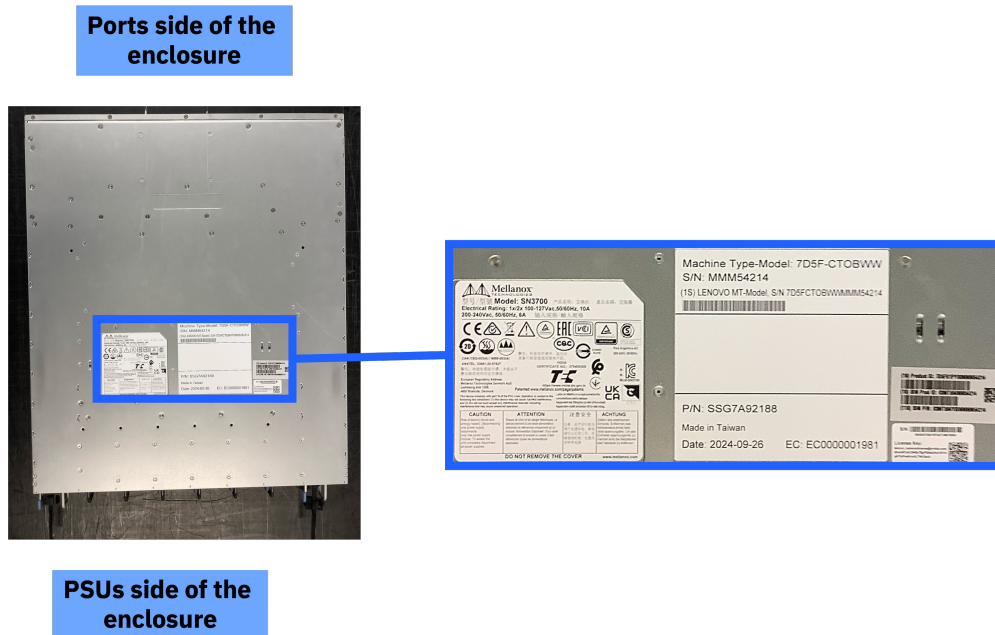


Figure 93. Labels on the bottom of the switch enclosure

Specifications of the MTM 5149-S05 switch

The following specifications provide brief information about the MTM 5149-S05 switch.

System dimensions and weight

System weight and dimensions are listed in the following table.

Height (1U rack standard)	Width (19" rack standard)	Depth	Weight
44 mm (1.72 in)	428 mm (16.84 in)	559 mm (22 in)	14 kg (30.8 lb)

Note: Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

Air temperature

Air flows from the PSUs side of the switch to the ports side (power-to-port air flow configuration). Temperature requirements for the switch are listed in the following table.

Air flow direction	Operating	Storage	Relative humidity
Power-to-connector (forward)	0°C to 40°C (32°F to 104°F)	-40°C to 70°C (-40°F to 158°F)	5% to 85%

Important: Regardless of the system specifications about absolute maximum temperature, the nonoperating environmental conditions of the system solid-state devices must adhere to the JEDEC JESD218 Enterprise-class SSD requirements for data retention endurance. These requirements must be

met particularly for the system storage, transit, or shipping maximum temperatures. To best maintain the data retention of the system solid-state devices, keep an *optimal* condition for nonoperating temperatures by making sure that the system does not remain for longer than 3 months at temperatures that exceed 40°C.

Power

The switch has two redundant, load-sharing, hot-swappable 1100W AC PSUs that comply with 80 PLUS Gold.

Power requirements for each PSU are listed in the following table.

Input	AC input current	Frequency
100 VAC to 264 VAC	2.9 A to 4.5 A	50 Hz to 60 Hz

Service indicators: LEDs of the MTM 5149-S05 switch

Service indicators for the switch are implemented by using LEDs to provide status information.

LEDs provide a visual method to identify, clarify, and resolve system issues. The system-level LEDs indicate the overall switch health and status. LEDs on individual modules, such as the PSUs, indicate the health and status of the specific module.

System LEDs (switch ports side of the enclosure)

The following figures and tables describe the LEDs on the ports side of an MTM 5149-S05 switch.

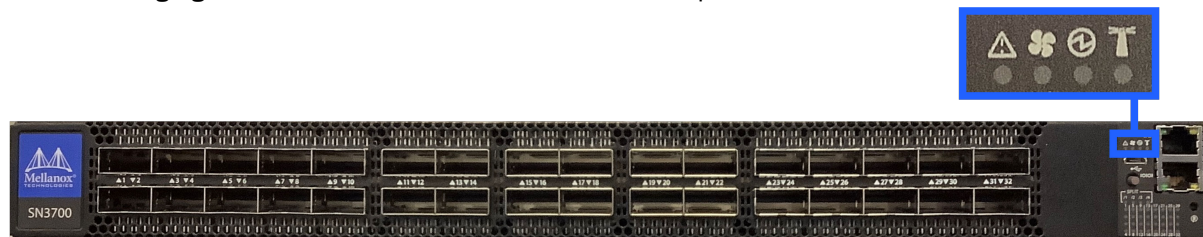


Figure 94. LED indicators for system, fans, PSUs, and identifier of an MTM 5149-S05 switch

Table 30. Descriptions for the LED indicators for system, fans, PSUs, and identifier of an MTM 5149-S05 switch			
State LED	Color	Description	Action required
 System status LED	Solid green	The system is up and running normally.	
	Flashing green	The system is initializing.	Wait up to five minutes for the end of the process.
	Solid amber	An error occurred. For example, corrupted firmware or an overheated system.	If the system status LED shows amber five minutes after the system is started, unplug the system and call your IBM Support representative for assistance.
 Fan status LED	Solid green	All fans are up and running.	The faulty FRUs should be replaced.
	Solid amber	Error, one or more fans are not operating properly.	

Table 30. Descriptions for the LED indicators for system, fans, PSUs, and identifier of an MTM 5149-S05 switch (continued)

State LED	Color	Description	Action required
 PSU LEDs	Solid green	All plugged power supplies are running normally.	
	Solid amber	One or both of the power supplies are not operational or not powered; or the power cord is disconnected.	Make sure that the power cord is plugged in and active. If the problem resumes, the FRUs might be faulty; and faulty FRUs must be replaced.
 Unit identifier LED	Solid blue	Turns on when identification is requested vis CLI.	
	Off	No identification in progress.	

Switch ports LEDs



Figure 95. Switch port LEDs of an MTM 5149-S05 switch

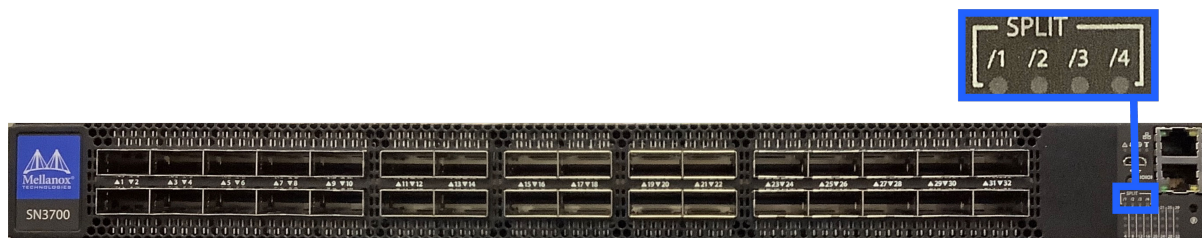


Figure 96. LED splitting options of an MTM 5149-S05 switch

Table 31. Descriptions for the LED splitting options of an MTM 5149-S05 switch

State	State indication LEDs [/1 /2 /3 /4]	Module LED indication	LED color	State description
0		Indication for all link types	Off	No 4X/2X/1X link was established on this QSFP module
			Solid green	At list one link was established: 4X/2XA/2XB/1XA /1XB/1XC/1XD
			Flashing green	Traffic is running in linked ports
			Flashing amber	N/A
1		LED indication for 4X/2XA/1XA link types	Off	The link is down
			Solid green	The link is up with no traffic
			Flashing green	The link is up with traffic
			Flashing amber ¹	A problem with the link
2		LED indication for 4X/2XB/1XB link types	Off	The link is down
			Solid green	The link is up with no traffic
			Flashing green	The link is up with traffic
			Flashing amber ¹	A problem with the link
3		LED indication for 4X/1XC link types	Off	The link is down
			Solid green	The link is up with no traffic
			Flashing green	The link is up with traffic
			Flashing amber ¹	A problem with the link
4		LED indication for 4X/1XD link types	Off	The link is down
			Solid green	The link is up with no traffic
			Flashing green	The link is up with traffic
			Flashing amber ¹	A problem with the link

Table 31. Descriptions for the LED splitting options of an MTM 5149-S05 switch (continued)

State	State indication LEDs [/1 /2 /3 /4]	Module LED indication	LED color	State description
¹ A flashing amber indicates that an action is required.				

Fan modules LEDs (PSUs side of the enclosure)

Each fan module has its own status LED.

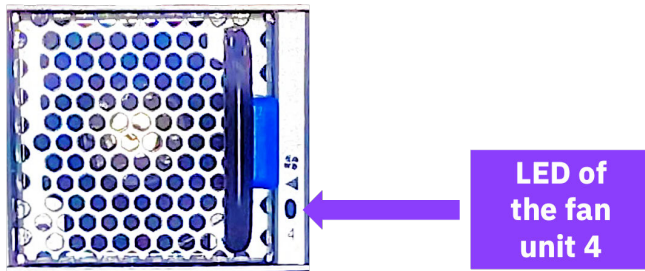


Figure 97. Example of a fan LED (fan unit 4)

Table 32. Descriptions for the fan LEDs of an MTM 5149-S05 switch

State	Description	Action required
Solid green	This fan unit is operating as expected.	N/A
Solid amber	This fan unit is missing or not operating properly.	The fan unit should be replaced.

PSU modules LEDs

Each PSU has its own status LED, which reflects the system PSU state. The LED indicators are highlighted in the following figure.

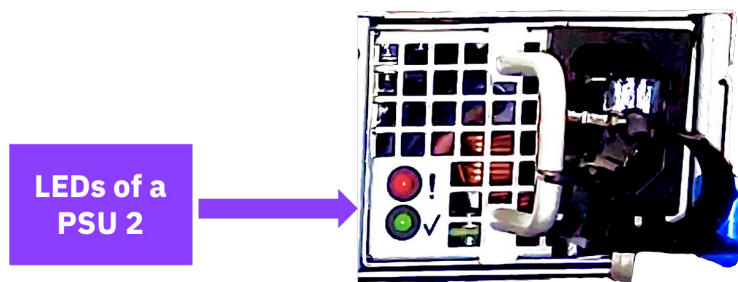


Figure 98. LED indicator for the PSUs of an MTM 5149-S05 switch

Table 33. Descriptions for the PSU LEDs of an MTM 5149-S05 switch

State	Description	Action required
Solid green	All PSUs are connected and running normally.	N/A
Flashing green	AC present / 5VSB on (the PSU is off)	Contact IBM support.

Table 33. Descriptions for the PSU LEDs of an MTM 5149-S05 switch (continued)

State	Description	Action required
Solid red or amber	AC cord is unplugged or AC power is lost on one PSU while the other PSU still has AC input power.	- Make sure that both PSU cords are connected and fully seated. - Determine why power was lost in the electrical outlet that the PSU is plugged into.
	PSU failure (voltage, current, temperature, or fan-related issue).	Check the voltage. If OK, contact IBM support.
Flashing red or amber	PSU warning events where the PSU continues to operate.	Contact IBM support.
Off	No AC power to all power supplies. Power might not be applied to the electrical outlets, or one or both of the PSUs might be faulty.	- Make sure that both PSU cords are connected and fully seated. - Determine why power was lost in the electrical outlet that the PSU is plugged into.

MTM 5149-S05 switch installation

This switch is installed by the customer or by IBM, depending on the deployment. Installing a system requires planning to facilitate a smooth installation, initialization, and configuration.

The MTM 5149-S05 switch is typically installed in an IBM Storage Scale System. IBM Storage Scale Systems can be purchased preracked or unracked. SSRs are responsible for installing the MTM 5149-S05 switch in an unracked IBM Storage Scale System.

Planning and preinstallation TDA checklist for an MTM 5149-S05 switch

For IBM Storage Scale System deployments, IBM is responsible for installing the switch, whether done by manufacturing for the racked solutions or by the SSR onsite for the unracked solutions.

Customers must complete a technical and delivery assessment (TDA) that the assigned SSR then reviews with them. In conjunction with the TDA, planning information is available in IBM Docs. The SSR and the customer must also review and complete all of the planning information in [IBM Documentation](#). Before scheduling the trip onsite to perform the installation, the SSR should attend meetings with the customer to perform planning tasks.

TDA checklists ensure that the customer prepares the site and gathers information that is needed to deploy a system. The IBM sales team or business partner helps the customer complete the TDA checklists, with an assigned IBM quality practitioner or technical account manager (TAM) managing the communications.

Note: TDA completion is mandatory for these systems and must be completed before arriving onsite to install the system.

It is the responsibility of the customer, the sales team or business partner, and the IBM quality practitioners or TAM to ensure that the TDA is completed so that the SSR can use information in the TDA checklist to install and initially configure the solution.

Two types of TDA checklists are as follows:

Presale TDA checklist

Provides a roadmap of questions that are associated with a configuration and proposal for IBM products and solutions. The pre-sale TDA is not relevant to SSRs or to system installations.

Preinstall TDA checklist

Provides a roadmap of questions that assess site readiness and prepares the environment for the installation. Information in the preinstallation TDA checklist is used in the installation and initial configuration.

TDAs are online forms, but can be exported in an .xlsx or .csv format, saved, and printed.

TDA checklists are in the [IMPACT](#) website (this site requires an IBM ID). The IBM practitioner creates the preinstallation checklist. Customers, their business partner, IBM quality practitioner or TAM, and the assigned SSR can access this site to look at and to work on the TDA.

Package contents for an MTM 5149-S05 switch

The package includes the hardware that is shown in the next figure.

Important: If parts are missing or damaged, do not proceed with the installation. Contact your next level of support.

An MTM 5149-S05 switch package includes the following components.

- One switch (includes 2 PSUs and 6 fans)
- Rail kit
 - One air duct (bottom and top parts)
 - Two rack mounting rails
 - Two rack mounting blades
 - Eight M6 standard cage nuts
 - Eight M6 standard pan-head Phillips screws
 - Six flat-head Phillips screws
- (Optional) AC power cords

Installing the MTM 5149-S05 switch

Complete this procedure to install the MTM 5149-S05 switch.

Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

Remember: Do not start the installation procedure before all the components are unpacked and placed on an antistatic flat surface.



Warning: During the installation, for safety and reliability, use only the accessories and screws that are provided with your MTM 5149-S05 switch. By using other accessories and screws, the switch might be damaged. The warranty does not cover any damages that result of the use of unapproved accessories.

Two people are required to complete steps 5 and 6 of this procedure.

1. Attach the bottom part of the air duct to the switch enclosure.
 - a) Place the bottom of the air duct near the PSUs side of the switch enclosure.

Make sure that the open side of this part is up.

And that the two holes for the securing screws are near the PSUs side of the switch enclosure.

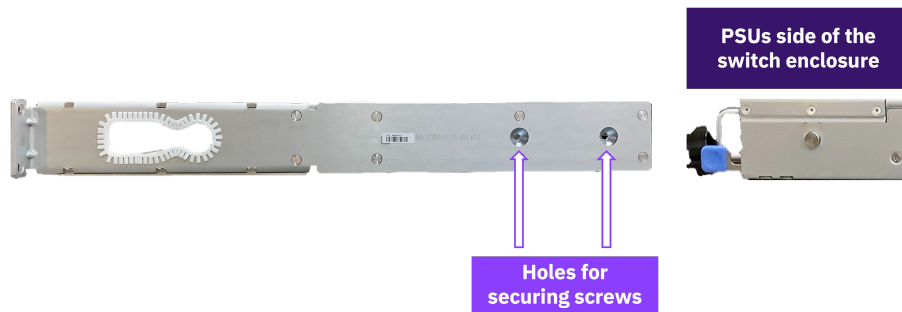


Figure 99. Aligning the bottom of the air duct with the PSUs side of the switch enclosure

- b) By using the PSU handles, gently lift the enclosure about 2.5 inches and slide it into the bottom of the air duct until the four enclosure pins (two per side) are aligned with the four pin slots (two per side) of the bottom of the air duct.

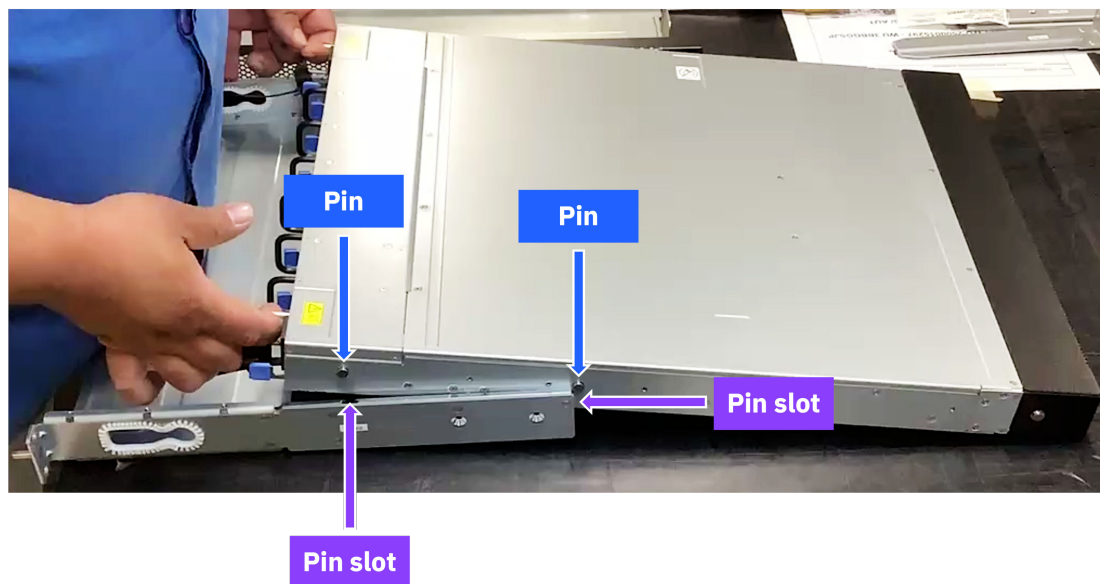


Figure 100. Sliding the switch enclosure into the bottom of the air duct

- c) Gently slide the enclosure pins on their corresponding slots.
 - d) For each side, use two flat-head Phillips screws to secure the bottom of the air duct.
2. Attach the rack mounting rails to the enclosure.
 - a) From the switches side of the enclosure, face the flat side of a rack mounting rail with one side of the enclosure.
 - b) Align the enclosure pins with the key holes in the rack mounting rail.

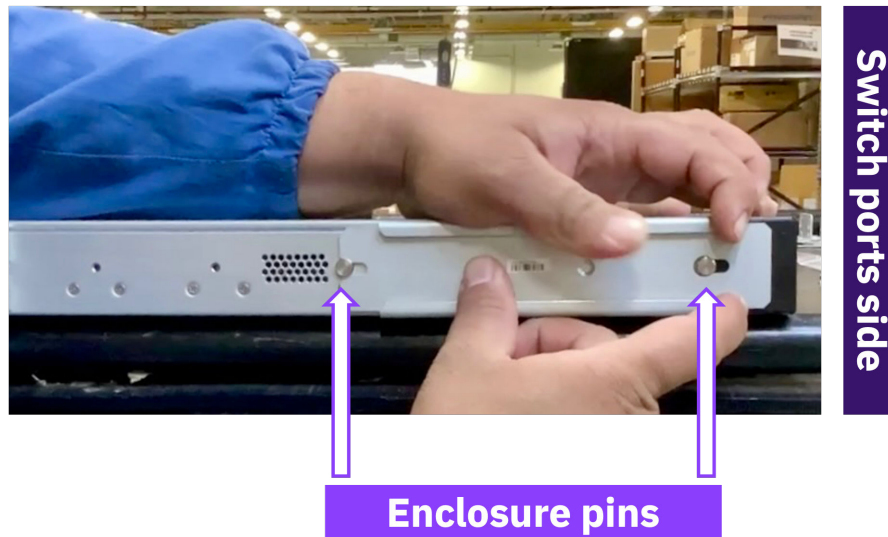


Figure 101. Aligning the enclosure pins with the key holes of the rack mounting rail

- c) Gently push the rack mounting rail toward the PSUs side of the enclosure, passing the enclosure pins through the slider key holes until the enclosure pins are locked.
- d) Use one flat-head Phillips screw to secure the rack mounting rail.



Figure 102. Securing the rack mounting rail

- e) Repeat substeps a through d for the other side of the enclosure.
3. Insert the eight cage nuts in the rack posts, in the position where the switch enclosure is meant to be installed in the rack.

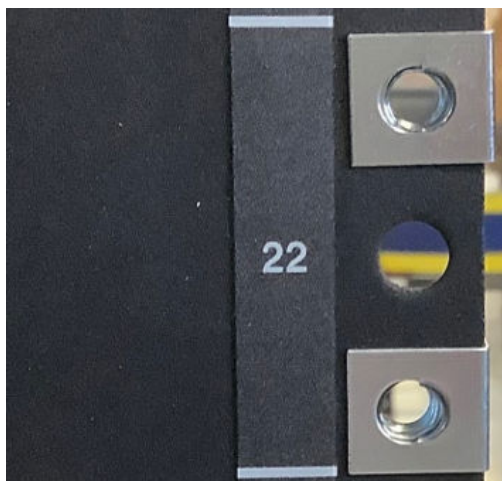


Figure 103. Inserting the cage nuts (example of two cage nuts that are inserted in position in a left rack post)

4. Loosely secure the rack mounting blades on one side of the rack.

Important: Do not tighten the screws during this substep. The rack mounting blades must have some slack to be inserted in the rack mounting rails in a following step.

- a) Place one rack mounting blade on top of two of the previously inserted cage nuts and use two M6 standard pan-head Phillips screws to loosely keep rack mounting blade in position.
- b) On the same side of the rack but on the other rack post, repeat the previous substep for the other rack mounting blade.

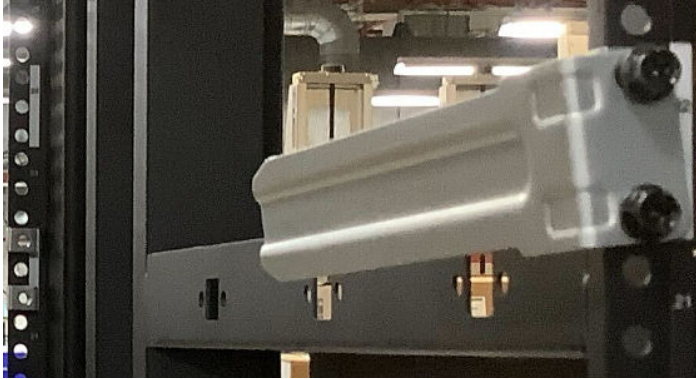


Figure 104. Placing a rack mounting blade on a right rack post

5. Place the enclosure switch in its position in the rack.

- a) Take the enclosure switch to the contrary side of the rack where you installed the rack mounting blades.
- b) Face the switch ports side toward the rack mounting blades and slightly tilt the switch enclosure to make it fit in the rack.



Figure 105. Tilting the switch enclosure to install it

- c) With the help of a second person who is at the rack side where the rack mounting blades were previously placed in position, insert the rack mounting blades in the rack mounting rails.



Figure 106. Inserting the rack mounting blades in the rack mounting rails

6. Secure the switch enclosure to the rack.

While the second person holds in place the enclosure switch, complete the next substeps.

- a) Tighten the four M6 standard pan-head Phillips screws that you previously used to loosely keep in position the rack mounting blades.
- b) Go to the contrary side of the rack and use four M6 standard pan-head Phillips screws to secure the bottom of the air duct.



Figure 107. Securing the rack mounting rail

7. Pass the PSUs cables through the cables grommet.



Warning: Do not connect the PSUs cables to the external AC power source yet.



Figure 108. Displaying one of the cables grommets of an air duct

8. Install the top of the air duct.

a) On bot sides, align the edge tabs of the air duct top with the edges of the air duct bottom.

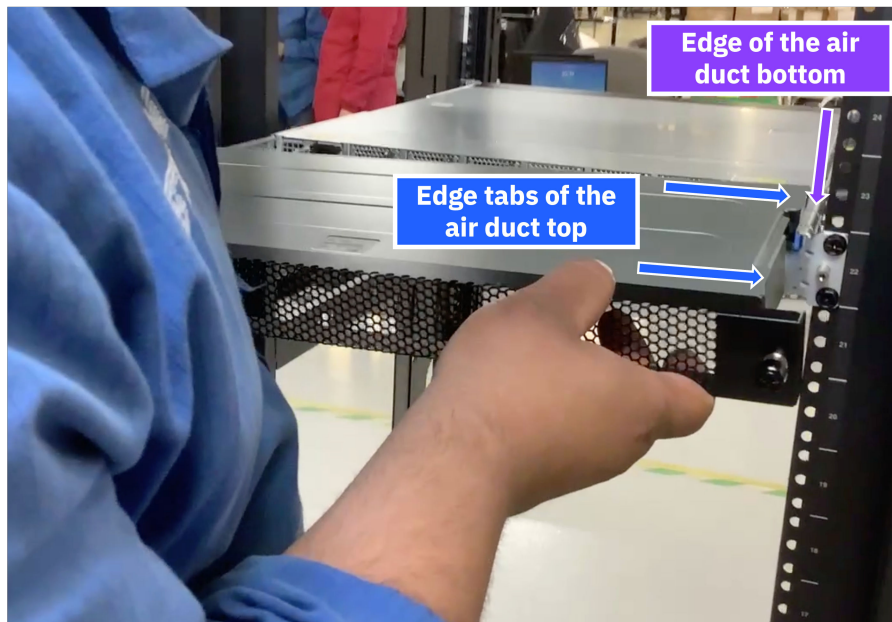


Figure 109. Aligning the right edge tabs of the air duct top with the right edge of the air duct bottom

b) Insert the edges of the air duct bottom on the edge tabs of the air duct top.



Figure 110. Sliding the air duct top into the air duct bottom

c) Secure the air duct top by tightening its two thumbscrews.

- i) While you use one hand to evenly apply a light pressure on the air duct top and keep it in place, use your other hand to tighten one of the thumbscrews.
- ii) Repeat for the other thumbscrew.



Figure 111. Securing the air duct top

9. Connect an external AC power source to the PSUs.
10. Make the network connections.
11. Make the management connections.

MTM 5149-S05 switch service

Service procedures and a list of replaceable parts are provided for the MTM 5149-S05 switch service.

Important: Before the service of any replaceable part, you must consult [“Replaceable parts” on page 93](#) and [“Replacing a customer replaceable unit” on page 93](#) to determine the replacement designation and avoid warranty infringement.

Key replaceable parts for MTM 5149-S05 switch

The following table lists key replaceable parts for the switch. Because part numbers can change over time, in a repair situation, verify that the correct CRU or FRU is obtained.

Part	FRU part number	CRU or FRU	Concurrent replace
MTM 5149-S05 switch	03GX235 03MT564	FRU	No
PSU	01PG798	FRU	Yes
Fan module	01PG799	FRU	Yes
Rail mounting kit (includes air duct)	01PG843	FRU	No
200 G QSFP56 Ethernet optical transceiver	03NK246	CRU Tier 1	No
Power cord 4.3 m (14 ft) (drawer to IBM PDU, 250 V / 10 A)	39M5510	CRU Tier 1	Yes

Part	FRU part number	CRU or FRU	Concurrent replace
Power cord 4.3 m (14 ft) (drawer to IBM PDU, 250 V / 10 A) For India only	01KV682	CRU Tier 1	Yes
Power cable 2.8 m (9.2 ft) (drawer to IBM PDU, 250 V / 10 A)	39M5392	CRU Tier 1	Yes
Power cable 2.8 m (9.2 ft) (drawer to IBM PDU, 250 V / 10 A) For India only	01PP689	CRU Tier 1	Yes

Replaceable parts

Each replaceable part is assigned one of three designations. Most of the parts for this switch are classified as Tier 1 CRU. None of the parts for this switch are Tier 2 CRU.

For more information, see the following table.

Replacement designation	Description
CRU -Tier 1	Replacing a Tier 1 CRU is a customer responsibility, but dependent on if they purchased a service upgrade: - Under the standard warranty - If an IBM representative installs a Tier 1 CRU at the customer's request, the customer is charged for the installation. - If an IBM representative installs a Tier 1 CRU at IBM Support's request, the customer is not charged for the installation. - Under an IBM Storage Expert Care service upgrade: The customer can request that IBM install the CRU at no additional cost.
CRU -Tier 2	Replacing a Tier 2 CRU can be completed by the customer or can be installed at the customer's request by an IBM representative. If a Tier 2 CRU is replaced by an IBM representative: - If the product is under warranty: There is no charge for the part or for the installation if the product. - If the product is no longer under warranty: The customer is charged for the part and the installation.
FRU	Replacing a FRU must be performed by an IBM service personnel or an IBM authorized warranty service provider.

Replacing a customer replaceable unit

Use this procedure for servicing a customer replaceable unit (CRU).

Before you start a replacement, the customer must complete the following tasks:

- If the replacement procedure might put data at risk, the customer must back up the system or logical partition (including operating systems, licensed programs, and data).
- Review the replacement procedure for the part.
- Obtain the required tools for the replacement procedure.

- Inspect the replacement part. If any of the parts are incorrect, missing, or visibly damaged, they should contact the provider of the part or IBM Support.

The replacement best practices are as follows:

- For all replacements performed on an operational system, remove only one module from the enclosure at a time, unless directed otherwise by a replacement procedure.
- To reduce the amount of time required for the replacement, remove the failed module only when the replacement module is available, unpackaged, and ready for installation.
- Follow all recommended procedures for handling devices that are sensitive to electrostatic discharge (ESD).
 1. Identify the system that contains the part to replace.
 2. Attach the ESD wrist strap. The ESD wrist strap must connect to an unpainted metal surface until the service procedure is completed.
 3. Locate the CRU part to be serviced.
 4. Remove and replace the CRU part.
 5. Verify that the installed part is working as expected.

Replacing an MTM 5149-S05 switch

Refer to the service procedure to remove and replace an MTM 5149-S05 switch enclosure.

If possible, the customer should back up the switch configuration and its firmware before the replacement procedure.

For steps 6 and 7 of this procedure, two people are needed.

The high-level steps to replace an MTM 5149-S05 switch are as follows.

1. Locate the faulty switch.
2. Label all data and power cables that connect to the faulty MTM 5149-S05 switch.
3. Remove the top of the air duct.
4. Disconnect the power supply cables from their PDU connections.
5. Disconnect all data cables from the faulty MTM 5149-S05 switch.
6. While a second person holds the MTM 5149-S05 switch enclosure, remove the four securing cage or clip nuts.
7. Pull the faulty MTM 5149-S05 switch enclosure out of the rack and place it on a flat antistatic surface.
8. Install the new MTM 5149-S05 switch.

Important:

- Before you remove the switch from the rack, make sure that the switch is powered down, with all network and power cables disconnected.
- Two people are needed to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch is meant to be replaced. Replacement locations at 32U and higher require two people to lift the switch. For replacement locations lower than 32U, one person can safely lift the switch.

To perform this service, you need access to the PSUs side of the enclosure, where the top of the air duct is installed.

1. Locate the faulty switch.

The service ticket must include location information. Confirm the switch location by looking for fault LEDs on the switch.

2. Label all data and power cables that connect to the faulty MTM 5149-S05 switch.

Take note of which cables are plugged into the specific ports before you remove any cable. This record is needed for the installation of the new MTM 5149-S05 switch.

3. Remove the top of the air duct.

- a) While you use one hand to evenly apply a light pressure on the air duct top to prevent it from falling, use your other hand to loosen the thumbscrews of the air duct top.

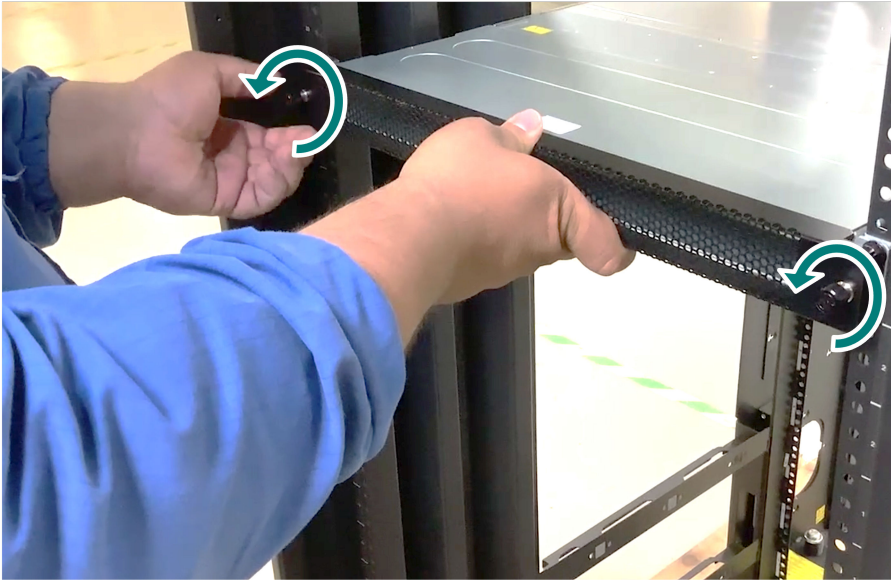


Figure 112. Loosening the thumbscrews of the air duct top

- b) Pull the air duct top out of the air duct bottom.
c) Place the air duct top on an antistatic flat surface.
4. Disconnect the power supply cables from their PDU connections.
5. Disconnect all data cables from the faulty MTM 5149-S05 switch.
6. While a second person holds the MTM 5149-S05 switch enclosure, remove the eight screws and securing cage nuts.



Figure 113. Removing the securing hardware

7. Pull the faulty MTM 5149-S05 switch enclosure out of the rack and place it on a flat antistatic surface.
8. Install the new MTM 5149-S05 switch.

To install the new MTM 5149-S05 switch, follow the steps from [“Installing the MTM 5149-S05 switch”](#) on page 106.

Replacing the PSU of an MTM 5149-S05 switch

The MTM 5149-S05 switch has two PSUs in a redundant configuration. Only one healthy PSU is required for the switch to function.

Before you remove a PSU, ensure that the other PSU is connected and shows a solid green LED.



Figure 114. Locating the release latch and handle of a PSU

1. Remove the power cord from the faulty PSU.
2. Remove the faulty PSU.
 - a) Press the release latch.
 - b) While you still keep pressing the release latch, pull the handle toward you.

As the fan unseats, its status LED turns off.



Figure 115. Removing a PSU

3. Install the PSU.



CAUTION: Do not insert a PSU whose power cables are connected. Disconnect power cords from outlets before you start the installation.

- a) Insert the FRU PSU by sliding it into the slot until you feel a slight resistance.

When the latch snaps into place, the installation is correct.

- b) Insert the power cord into the FRU PSU connector.
- c) Insert the other end of the power cord into an outlet of the correct voltage.
- d) Wait for the FRU PSU LED to be solid green.

If the LED does not turn solid green, restart the procedure, and make sure that the PSU is correctly seated.

Replacing a fan module of an MTM 5149-S05 switch

The MTM 5149-S05 switch can work with one failed fan module. Operating with more than one failed fan module is not supported.

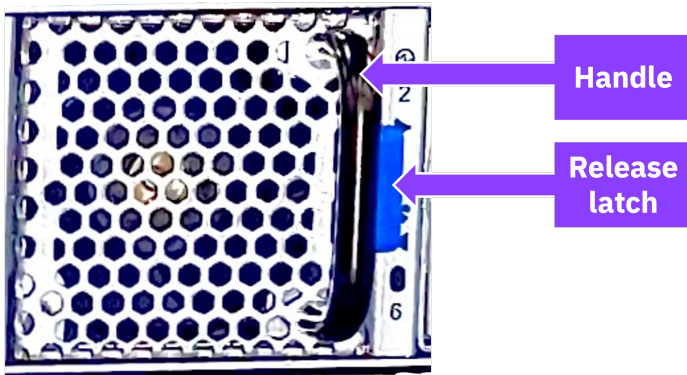


Figure 116. Locating the release latch and handle of a fan

1. Remove the faulty fan module.
 - a) Press the release latch.
 - b) While you still keep pressing the release latch, pull the handle toward you.

As the fan unseats, its status LED turns off.

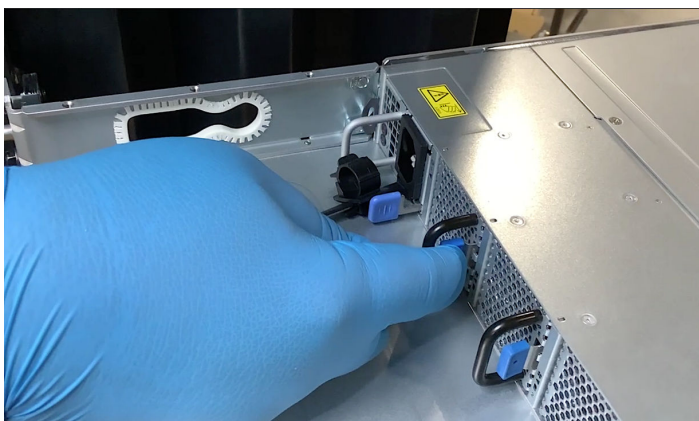


Figure 117. Removing a fan module

2. Insert a fan module.
 - a) Insert the fan module by sliding it into the opening until slight resistance is felt. Continue pressing the fan module until it seats completely.
 - b) Wait for the fan module LED to illuminate solid green. If the fan module LED does not turn solid green, restart the procedure and ensure that the fan module is correctly seated.

The MTM 5149-S54 switch

This Edgecore switch, IBM MTM 5149-S54 switch, is a 1U, Gigabit Ethernet L2, 54-ports switch that offers 108 Gbps of switching capacity and 61.6 Mbps in forwarding rate. The MTM 5149-S54 switch can be installed in the same rack as the IBM Storage Scale System solution, in a similar way as other supported high-speed data switches.

Note: If Licensee purchases and incorporates IBM MTM 5149-S54 switch ("Switch") as part of your IBM Storage Scale System, the Switch may not comply with all of the requirements included in IBM's Security and Privacy by Design practices: <https://www.ibm.com/support/pages/ibm-security-and-privacy-design>.

Overview of the MTM 5149-S54 switch

Use the MTM 5149-S54 switch as a management switch in data center networking, enterprise access networking, or campus access networking.

This open network switch includes the following components:

- 48 10/100/1000 BASE-T ports
- 6 1G/10G SFP+ uplink ports
- 2 hot-swappable AC PSUs
- 2+1 redundant, fixed fans (front-to-back airflow or back-to-front airflow)
- Open Network Install Environment (ONIE) software that supports the installation of an open source or commercial compatible network operating system (NOS).

The following figures show the PSUs side and the ports side of an MTM 5149-S54 switch.



Figure 118. PSUs view of the MTM 5149-S54 switch



Figure 119. Ports views of the MTM 5149-S54 switch

For more information about the MTM 5149-S54 switch, see [EPS121](#) in Edgecore documentation.

The following table lists the IBM MTM and the Edgecore system model.

Table 34. IBM MTM and Edgecore system model	
IBM MTM	Edgecore system model
5149-S54	EPS121 AS4625-54T

New rules for VLAN tag use in IBM Storage Scale System 3500

The original model for IBM Storage Scale System 3500 was to use a VLAN tags because of the shared BMC port that is needed also for interlink functionality. Starting with IBM Storage Scale System 7.0.1.0, this model changes and it is no longer a requirement to use VLAN tags, which were set on each IBM Storage Scale System 3500 canister by using `ipmi` commands.

The MTM 5149-S54 switch no longer routes tagged traffic. Thus, do not set the VLAN tag when you deploy new IBM Storage Scale System 3500 nodes or add an MTM 5149-S54 switch to a building block.

Key features and components of the MTM 5149-S54 switch

The key benefits and components of this entry-level open networking switch include features and components like 108 Gbps of switching capacity 61.6 Gbps in forwarding rate, 54 switch ports and 3 management ports, options to enable UEFI Secure Boot.

In the next table, consult the performance characteristics of an MTM 5149-S54 switch.

Feature	Performance
Switching capacity	108 Gbps
Forwarding rate	61.6 Gbps
MAC addresses	64 000 minimum 112 000 maximum
VLAN IDs	4000
VLAN translation	4000 ingress 2000 egress
Jumbo frames	Up to 12 288 bytes
Packet buffer size	4 MB integrated, packet buffer memory
LAG (802.3ad)	128 LAG groups 256 members in total 8 members maximum per group
VRF	1000
L3 hosts	IPv4 32K or IPv6 16 000
L3 multicast groups	4000 IPMC groups
ECMP	256 groups 1024 members in total 64 members maximum per group

Hardware components:

- 1GbE connections to server node and storage node management ports in rack, with uplinks to management network aggregation switches.
- 54 switch ports:
 - 48 10/100/1000 BASE-T RJ-45 ports
 - 6 SFP + uplink ports supporting 1GE/10GE
- 3 management ports:
 - 1 RJ-45 serial console
 - 1 RJ-45 100/1000BASE-T management port
 - 1 micro-USB storage port
- Intel Atom COM Express module with C3508 4-Core 1.6 GHz x86 processor.
- 130 Gbps, Broadcom BCM56277 Trident III switch silicon
- Infineon OPTIGA TPM SLB 9670XQ2.0
- Full line-rate L2/L3 forwarding and switching
- Hot-swappable, load-sharing, redundant AC PSUs
- 2+1 redundant fixed fans
- 1 8GB SO-DIMM
- 32GB MLC M.2 SSD

Software features:

- Options to enable UEFI Secure Boot.
- Preloaded ONIE for automated loading of compatible open source or commercial NOS offerings.
- SPI flash with capacity of 16 Mb x 2.

Views of the MTM 5149-S54 switch

The switch ports are accessible from one of the sides of the enclosure; the fixed fans and the PSUs are placed on the contrary side of the enclosure.

Switch ports view

The following figure shows the 48 BASE-T ports, the 6 SFP +uplink ports, and the 3 management ports of an MTM 5149-S54 switch.

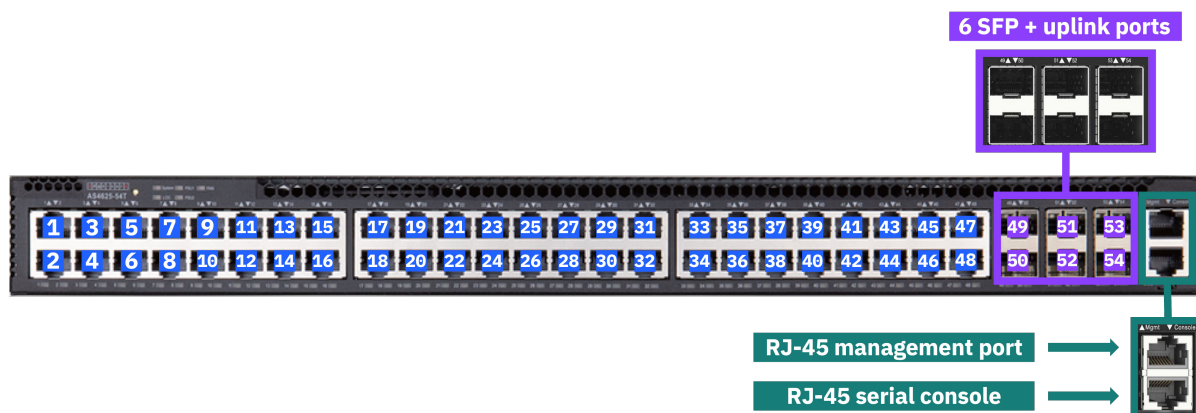


Figure 120. Ports of an MTM 5149-S54 switch on the rear of the enclosure

Port numbers are printed in pairs and placed above the top row of switches, as highlighted in the following figure.

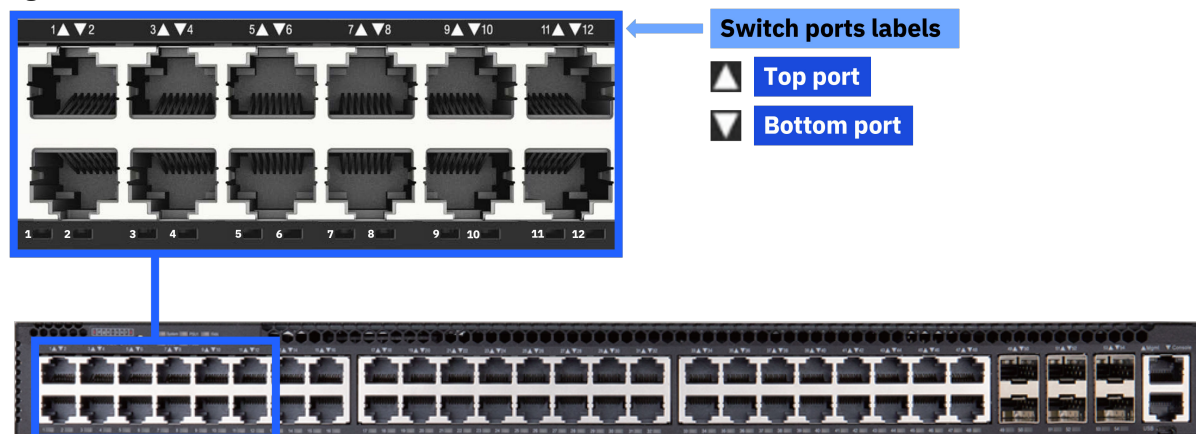


Figure 121. Switch port numbers of an MTM 5149-S54 switch

PSUs and fixed fans view

The following figure highlights the placement of the 3 fixed fans and the 2 PSUs of an MTM 5149-S54 switch.



Figure 122. PSUs and fixed fans of an MTM 5149-S54 switch

Labels of the MTM 5149-S54 switch

The details of the MTM 5149-S54 switch labels are provided in this section.

PSUs label

The PSUs label is at the bottom of the PSUs.



Figure 123. PSUs label

Switch labels

On the bottom of the switch, you can find the regulatory label, and the MTM label, as shown in the following figure. These labels contain the part number, serial number, and GUID of the MTM 5149-S54 switch.

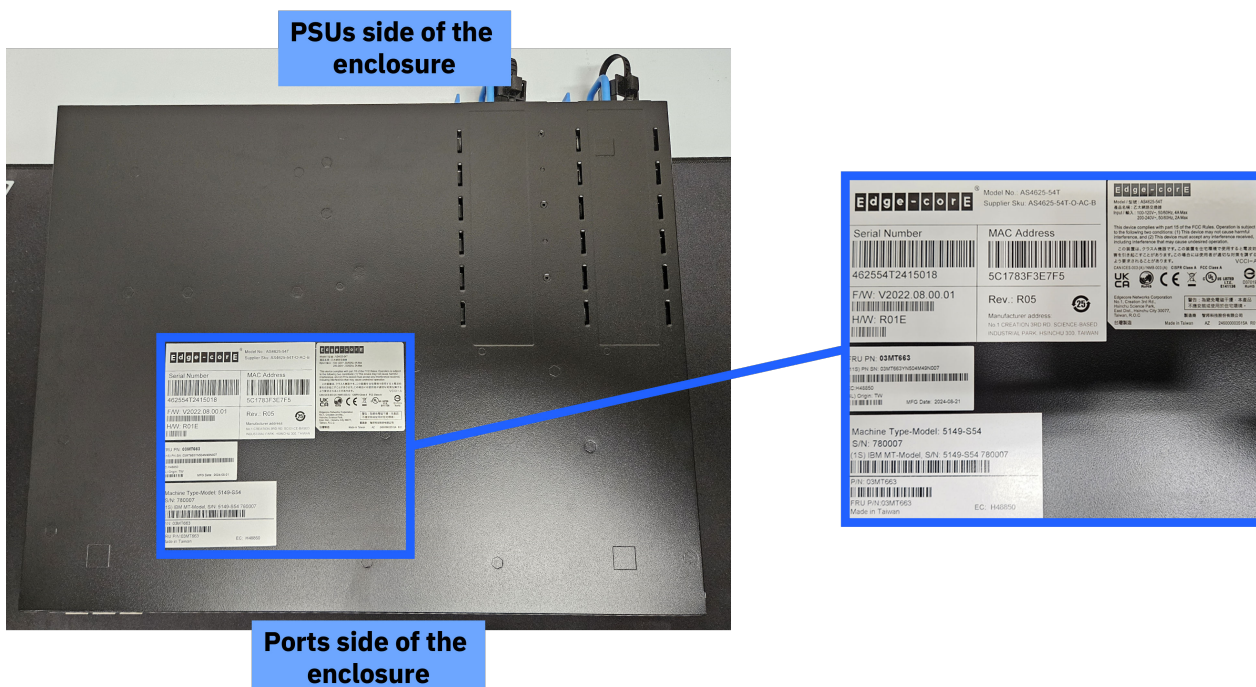


Figure 124. Labels on the bottom of the switch enclosure

Specifications of the MTM 5149-S54 switch

The following specifications provide brief information about the MTM 5149-S54 switch.

System dimensions and weight

System weight and dimensions are listed in the following table.

Height (1U rack standard)	Width (19" rack standard)	Depth	Weight
4.4 cm (1.73 in)	44.0 cm (17.32 in)	350.35 cm (13.79 in)	5.8 kg (12.77 lb)

Note: Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

Air temperature

Air flows from the power side of the switch to the port side (power-to-port air flow configuration). Temperature requirements for the switch are listed in the following table.

Air flow direction	Operating temperature and humidity	Storage
Power-to-connector (forward)	0°C to 45°C (32°F to 113°F) 5% to 95% non-condensing humidity	-40°C to 70°C (-40°F to 158°F)

Important: Regardless of the system specifications about absolute maximum temperature, the nonoperating environmental conditions of the system solid-state devices must adhere to the *JEDEC JESD218 Enterprise-class SSD* requirements for data retention endurance. These requirements must be met particularly for the system storage, transit, or shipping maximum temperatures. To best maintain the data retention of the system solid-state devices, keep an *optimal* condition for nonoperating temperatures by making sure that the system does not remain for longer than 3 months at temperatures that exceed 40°C.

Power

The switch has two redundant, load-sharing, hot-swappable 150W AC PSUs that comply with 80 PLUS Platinum. The maximum power consumption per PSU is 150W (at 25°C).

Power requirements for each PSU are listed in the following table.

Input	Frequency
100-120 VAC	50/60 Hz 4A maximum
200-240 VAC	50/60 Hz 2A maximum

Service indicators: LEDs of the MTM 5149-S54 switch

Service indicators for the switch are implemented by using LEDs to provide status information.

LEDs provide a visual method to identify, clarify, and resolve system issues. The system-level LEDs indicate the overall switch health and status. LEDs on individual modules, such as the PSUs, indicate the health and status of the specific module.

System LEDs (rear of the enclosure)

The following figure shows system state LEDs, which are visible on the port side of an MTM 5149-S54 switch.

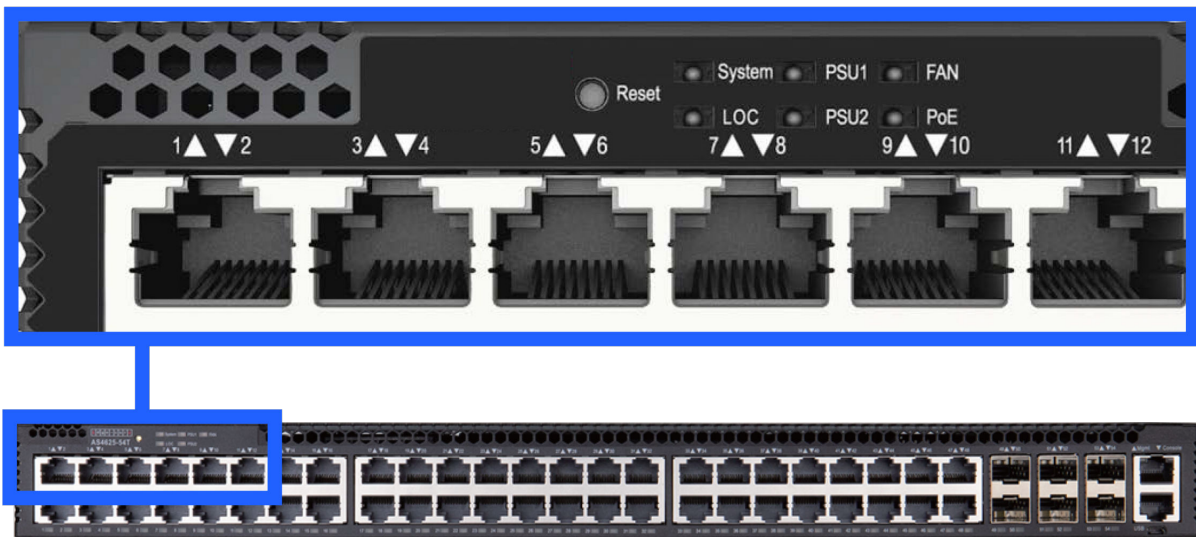


Figure 125. LED indicators for system, LOC, PSUs, fans, and PoE of an MTM 5149-S54 switch

The following figures and tables describes the LEDs on the port side (front of the enclosure).

State LED	Color	Description
System	Solid green	Okay
	Solid amber	Fault detected
Location (LOC)	Intermittent amber	Switch locator.
PSUs	Solid green	Okay
	Solid amber	Fault detected
Fans	Solid green	Okay
	Solid amber	Fault detected
Power over Ethernet (PoE)	Solid green	Working within PoE budget.
	Solid amber	Working near PoE budget limit.

The management port has two LEDs, one on each side. The left LED (see 1 in the next figure) indicates that a link is established, and the right LED (see 2 in the next figure) indicates that the port is active.

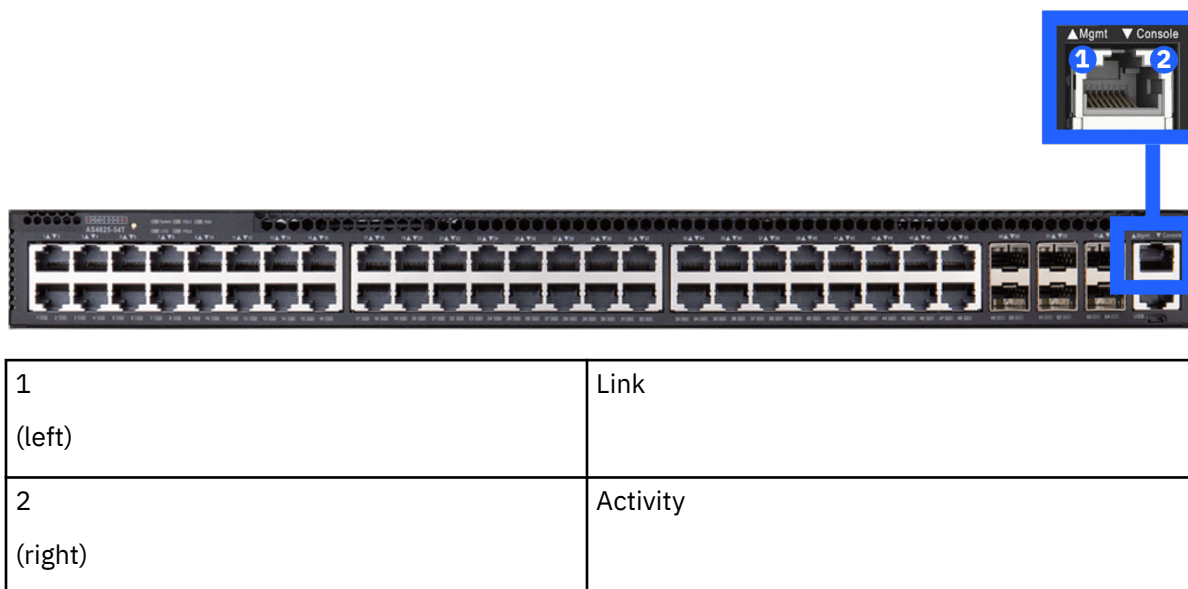


Figure 126. LED indicators for the management port of an MTM 5149-S54 switch

The LED of an SFP + uplink port uses green to indicate a 10G link and amber to indicate a 1G link.

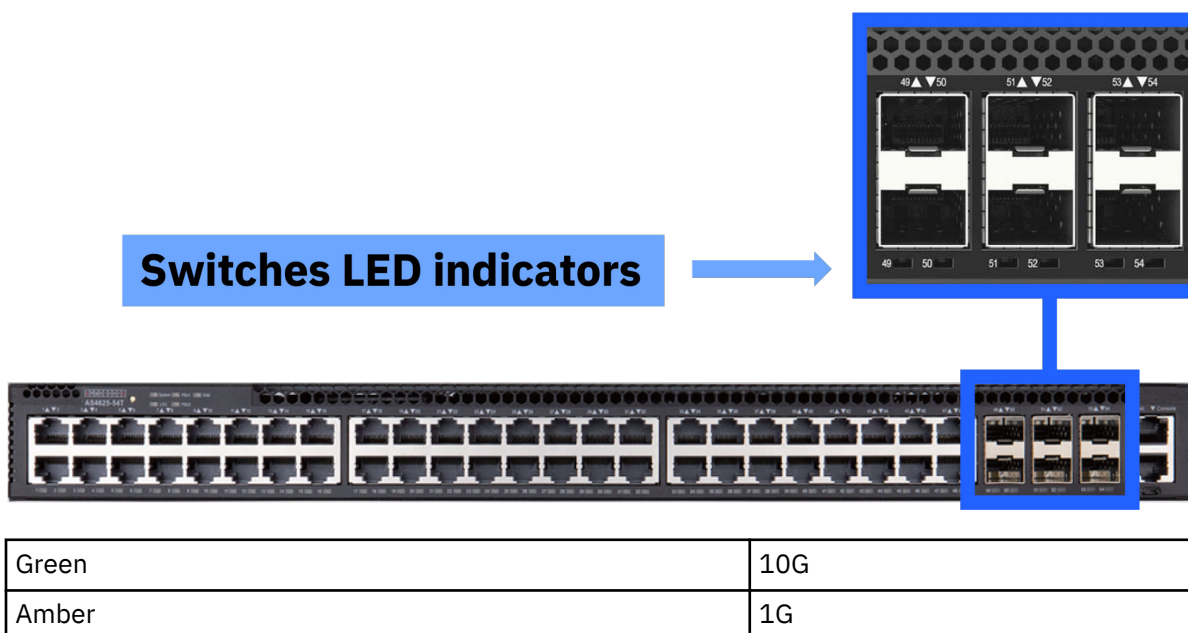


Figure 127. LED indicators for the 6 SFP + uplink ports of an MTM 5149-S54 switch

MTM 5149-S54 switch installation

This switch is installed by the customer or by IBM, depending on the deployment. Installing a system requires planning to facilitate a smooth installation, initialization, and configuration.

The MTM 5149-S54 switch is typically installed in an IBM Storage Scale System. IBM Storage Scale Systems can be purchased preracked or unracked. SSRs are responsible for installing the MTM 5149-S54 switch in an unracked IBM Storage Scale System.

Planning and preinstallation TDA checklist for an MTM 5149-S54 switch

For IBM Storage Scale System deployments, IBM is responsible for installing the switch, whether done by manufacturing for the racked solutions or by the SSR onsite for the unracked solutions.

Customers must complete a technical and delivery assessment (TDA) that the assigned SSR then reviews with them. In conjunction with the TDA, planning information is available in IBM Docs. The SSR and the customer must also review and complete all of the planning information in [IBM Documentation](#). Before scheduling the trip onsite to perform the installation, the SSR should attend meetings with the customer to perform planning tasks.

TDA checklists ensure that the customer prepares the site and gathers information that is needed to deploy a system. The IBM sales team or business partner helps the customer complete the TDA checklists, with an assigned IBM quality practitioner or technical account manager (TAM) managing the communications.

Note: TDA completion is mandatory for these systems and must be completed before arriving onsite to install the system.

It is the responsibility of the customer, the sales team or business partner, and the IBM quality practitioners or TAM to ensure that the TDA is completed so that the SSR can use information in the TDA checklist to install and initially configure the solution.

Two types of TDA checklists are as follows:

Presale TDA checklist

Provides a roadmap of questions associated with a configuration and proposal for IBM products and solutions. The pre-sale TDA is not relevant to SSRs or to system installations.

Preinstall TDA checklist

Provides a roadmap of questions that assess site readiness and prepares the environment for the installation. Information in the pre-install TDA checklist is used the installation and initial configuration.

TDAs are online forms, but can be exported in an .xlsx or .csv format, saved, and printed.

TDA checklists are in the [IMPACT](#) website (this site requires an IBM ID). The IBM practitioner creates the pre-install checklist. Customers, their business partner, IBM quality practitioner or TAM, and the assigned SSR can access this site to look at and to work on the TDA.

Package contents for an MTM 5149-S54 switch

The package includes the hardware that is shown in the next figure.

Important: If parts are missing or damaged, do not proceed with the installation. Contact your next level of support.

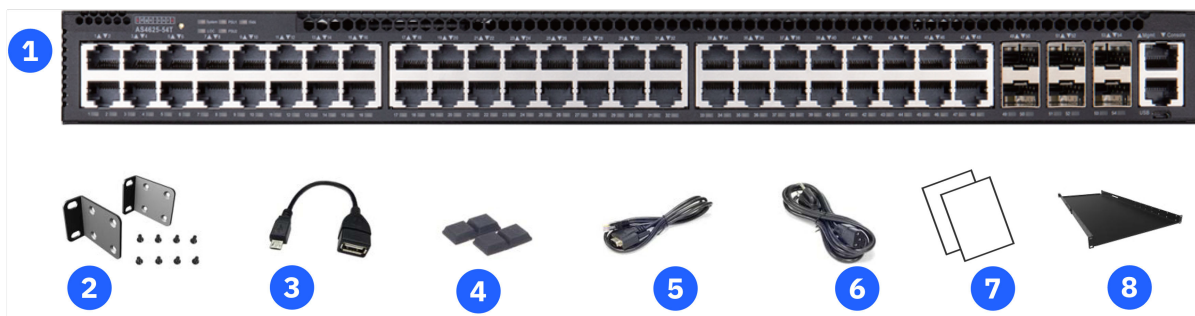


Figure 128. Contents of the package

An MTM 5149-S54 switch package includes the following components.

- One switch (includes 2 PSUs) –see 1 in the previous figure.
- Rack mounting kit (2 brackets, vented cover plate, and 8 M4x8 screws) –see 2 in the previous figure.
- USB micro-b to USB-A cable –see 3 in the previous figure.
- (Dispensable) Four adhesive rubber feet –see 4 in the previous figure.
- Console cable (RJ-45 to DE-9) –see 5 in the previous figure.

- (Optional) AC power cord –see 6 in the previous figure.
- Documentation (*Edgecore Quick Start Guide* and *Safety and Regulation Information*) –see 7 in the previous figure.
- Airflow control shelf (includes 2 solid cover plates) –see 8 in the previous figure.
- Mounting hardware:
 - 12J5289 - M6 hexagonal-head black screws
 - 12J5288 - M6 cage nuts
 - 46C6380 - M5 hexagonal-head black screws
 - 81Y2820 - M5 cage nuts
 - 00N8709 - C clip

Installing the MTM 5149-S54 switch

Complete this procedure to install the MTM 5149-S54 switch.

Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch is meant to be installed. Installation locations at 32U and higher require two people to lift the switch. For installation locations less than 32U, one person can safely lift the switch.

Important:

- For steps 1 and 3 of this procedure, two people are required.
- The airflow control shelf is meant to be installed beneath the switch.
- If your computer does not have a DE-9 serial port, you need a USB-to-serial adapter cable (part number 03KX086) to connect to the MTM 5149-S54 switch and complete step 6.

Clearance requirements: To handle the hardware for installation, you need a clearance of 6U rack space (see the next figure for reference). After the switch and its airflow control shelf are installed, they cover 2U of rack space in total.

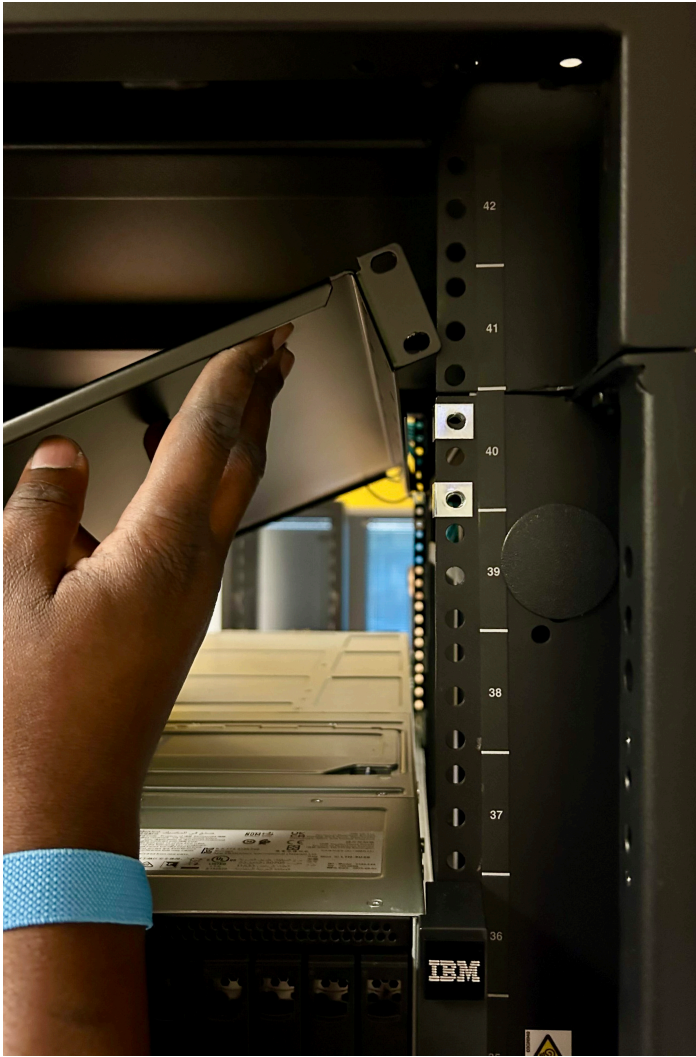


Figure 129. 6U rack space of clearance that are required for installation

The next figures show a properly installed switch (rack position 41) and its airflow control shelf (rack position 40).



Figure 130. View from the switch ports side: Example of a properly installed MTM 5149-N64 switch and airflow control shelf

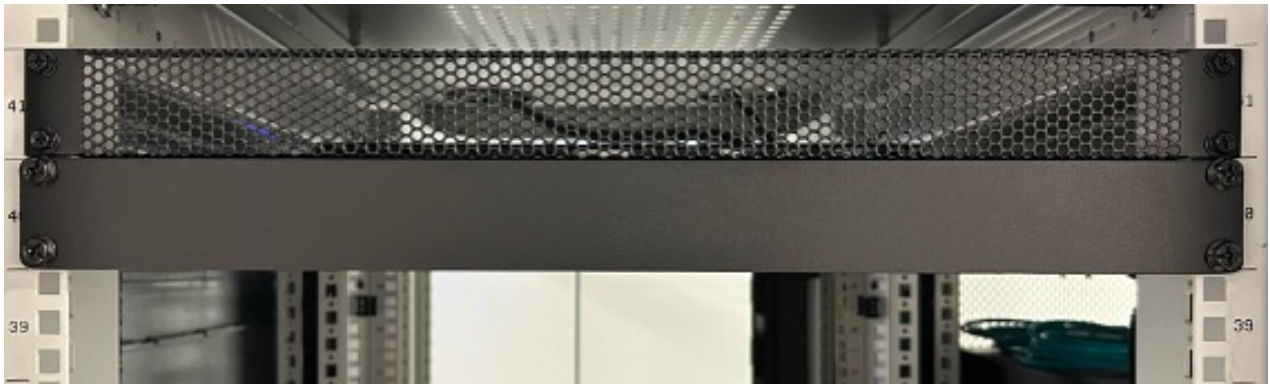


Figure 131. View from the switch PSUs side: Example of a properly installed MTM 5149-N64 switch and airflow control shelf



Warning: During the installation, for safety and reliability, use only the accessories and screws that are provided with your MTM 5149-S54 switch. By using other accessories and screws, the switch might be damaged. The warranty does not cover any damages that result of the use of unapproved accessories.

Note: The MTM 5149-N64 switch includes the software installer of Open Network Install Environment (ONIE) preinstalled, but no software image. For information about compatible software, see the [Edgecore documentation](#).

1. Beneath the predetermined rack position for the switch, install the airflow control shelf.

Remember: To complete this step, two people are required. One person holds and handles the hardware from the rack front and the other person does it from the rack rear.

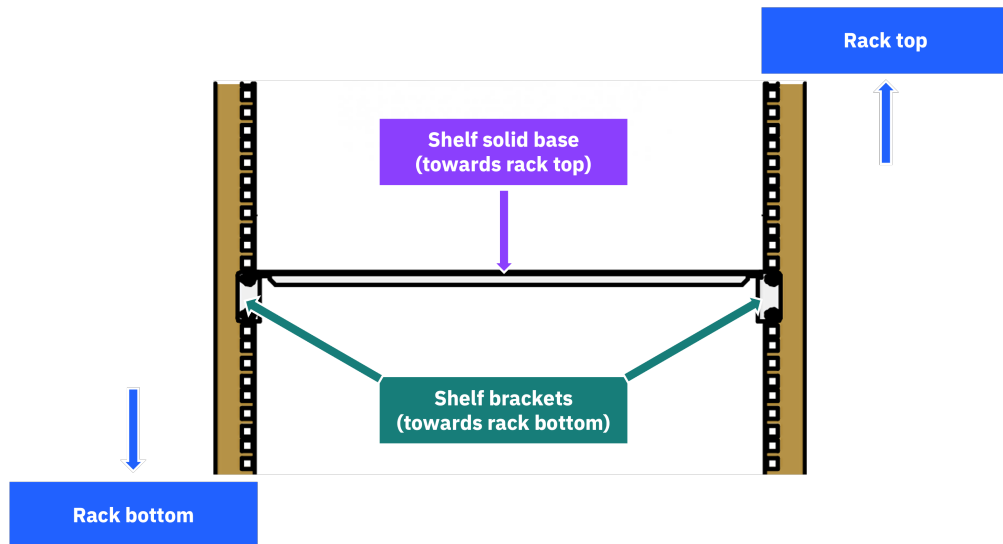


Figure 132. Orienting the airflow control shelf

- a) Orient the airflow control shelf with its solid base toward the rack top.
- b) In the rack position that is beneath the predetermined 1U rack position for the switch, place four M6 cage nuts to mark the 1U rack position for the airflow control shelf.

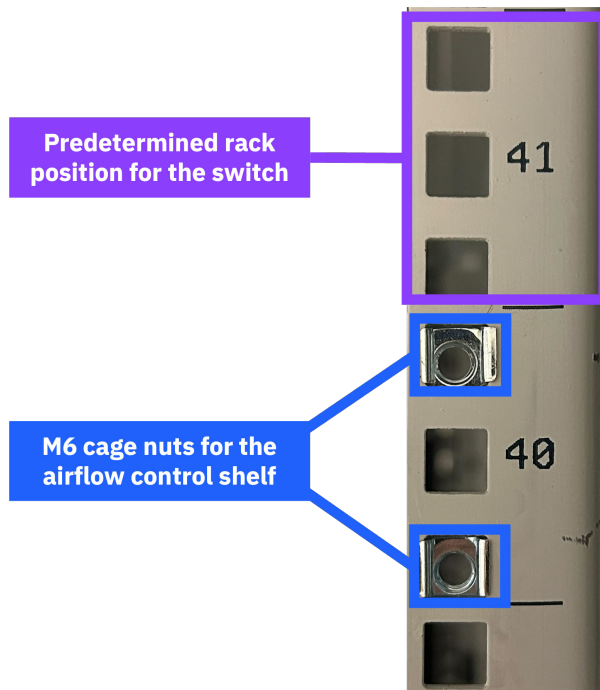


Figure 133. Marking the rack position for the airflow control shelf (example)

- c) Tilt the airflow control shelf to insert it in the rack, and then hold it in its rack position.
 - d) Align the holes of the shelf brackets with the M6 cage nuts in the rack post holes.
 - e) On one side of the rack enclosure, provisionally secure the airflow control shelf by using two M6 screws.
 - f) On the opposite side of the rack enclosure, align the holes of the solid cover plate with the holes of the four M6 cage nuts.
 - g) While a person holds the airflow control shelf, use four M6 screws to secure the solid cover plate and the airflow control shelf to the rack posts.
 - h) Back on the opposite side of the rack enclosure, while a person holds the airflow control shelf, remove the two M6 screws that were provisionally securing that side of the airflow control shelf.
 - i) Repeat step 1g.
2. Attach the rack brackets to the switch.
 - a) Take one of the front brackets and orient its front (rack securing side) toward the switch ports side of the enclosure, while aligning the enclosure-facing side of the bracket with one of the sides of the switch enclosure.

The two holes on the front of the ports side of the front bracket are meant to secure the switch to the rack posts.

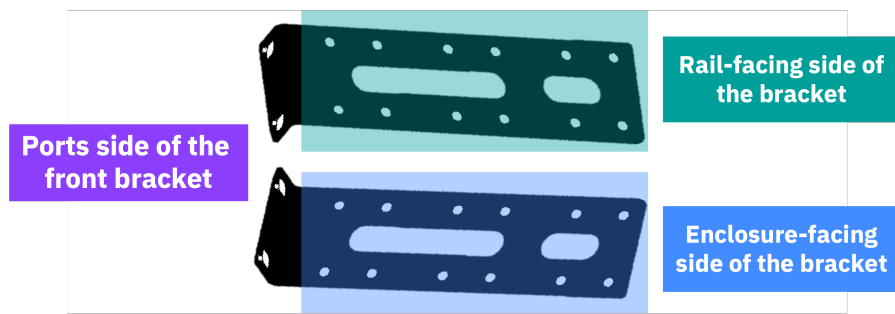


Figure 134. Aligning the bracket sides for installation

- b) Align the first set of four holes (front to rear of the front bracket) of the front bracket with the first set of four holes (ports side to PSUs side of the enclosure) of the switch.

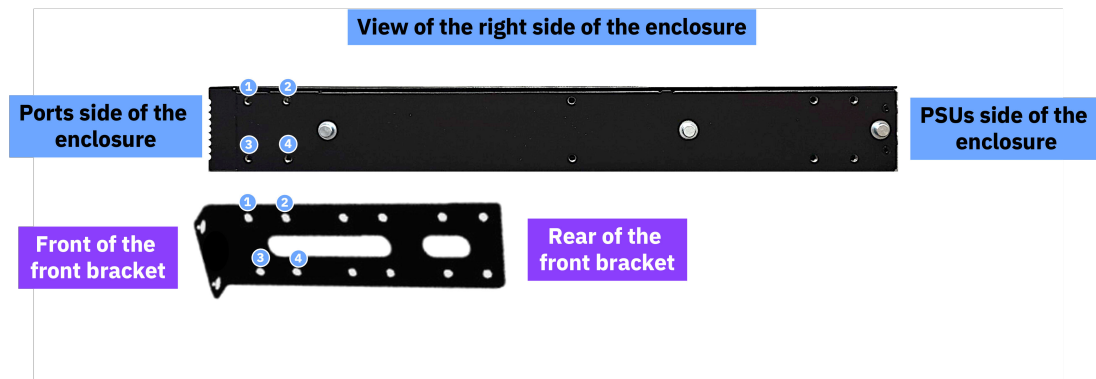


Figure 135. Aligning the front bracket and the enclosure for installation

- c) Use four M4x8 screws to secure the front bracket to the switch.

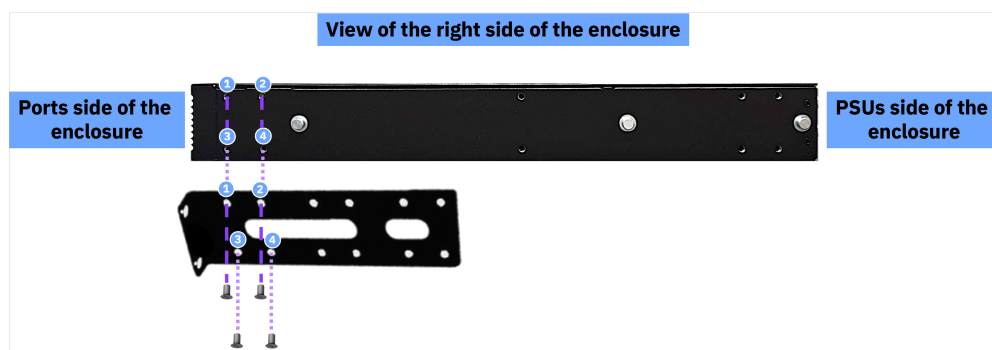


Figure 136. Attaching the rack brackets to the MTM 5149-S54 switch enclosure

- d) Repeat steps 2a through 2c for the other bracket and the other side of the switch.
3. Secure the switch to the rack enclosure.

Remember: To complete this step, two people are required. One person holds and handles the hardware from the rack front and the other person does it from the rack rear.

- a) In the predetermined rack position the 1U switch, place four M5 cage nuts to mark the position for the switch.

- b) Insert the switch and hold it in that position.
- c) Align the holes of the rack brackets with the M5 cage nuts in the rack post holes.
- d) Use four M5 cage nuts and four M5 screws to secure the switch in its position.
- e) In the opposite side of the rack enclosure but in the same rack position where you secured the switch, use four M5 cage nuts and four M5 screws to secure the vented cover plate of the switch to the rack posts.



Figure 137. Securing the MTM 5149-S54 switch to the rack

4. Connect to power.

If the PSUs are not preinstalled, install one or two. Then, connect an external AC power source to the PSUs.



Figure 138. Connecting an external AC power source to the PSUs of an MTM 5149-S54 switch

5. Make the network connections.

- a) For the RJ-45 ports, connect Category 5, 5e, or better twisted-pair cables.

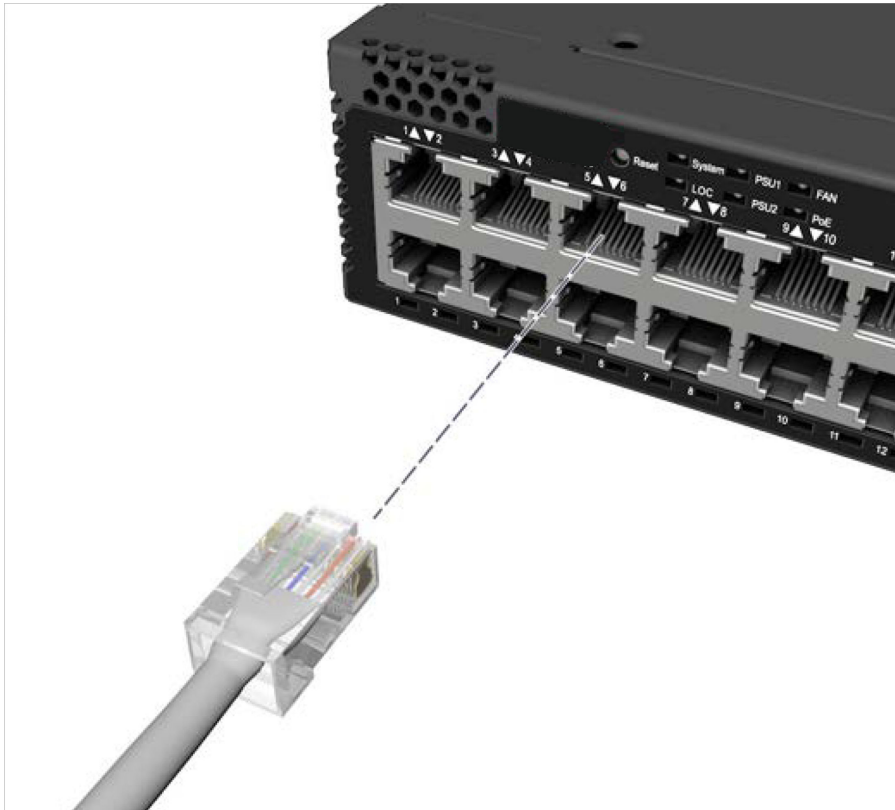


Figure 139. Connecting cables to the RJ-45 port of an MTM 5149-S54 switch

b) For the SFP+ ports, install transceivers and then connect fiber optic cabling to the transceiver ports.



Figure 140. Connecting cables the SFP+ port of an MTM 5149-S54 switch

Alternative: Connect AEC/AOC/DAC cables directly to the SFP+ slots.

The transceivers included in the next list are supported in the SFP+ ports.

- 10G BASE-SR, LR, CR, T
- 1000 BASE-SX, LX, T

6. Make the management connections.

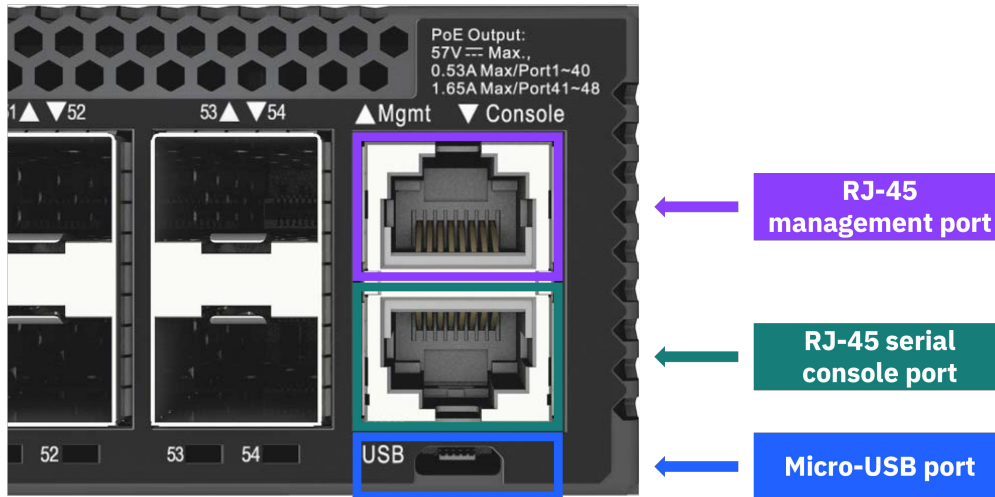


Figure 141. Making the management connections for an MTM 5149-S54 switch

- Use the micro-USB cable that is included with your MTM 5149-S54 switch to connect it to an external storage device through the micro-USB port of the MTM 5149-S54 switch.
- For the RJ-45 management port, use a Category 5, 5e, or better twisted-pair cable.
- For the RJ-45 console port, use the RJ-45-to-DE-9, null-modem, console cable that is included with your MTM 5149-S54 switch to connect it to a computer that runs a terminal emulator software.

With computers that do not have a DE-9 serial port, use a USB-to-serial adapter cable (not included).

Configure the serial connection with the following characteristics.

- 11 5200 bps
- 8 characters
- 1 stop bit
- 8 data bits
- No parity
- No flow control

Adding additional management switches

If a single management switch is already using all its available ports (MTM 5149-S54 switch to MTM 5149-S54 switch), or if a new MTM 5149-S54 switch is meant to be added to an existing switch (MTM 5149-S54 switch to MTM 5149-S54 switch, or MTM 5149-S54 switch to MTM 8831-S52 switch), use the following guidance on how to extend the VLANs.

To add the new switch (*switch 2*, an MTM 5149-S54 switch) to the existing switch (*switch 1*, either MTM 5149-S54 switch or MTM 8831-S52), connect the next ports.

- Connect port 45 (Vlan102) of switch 1 to port 47 of switch 2.
- Connect port 46 (Vlan101) of switch 1 to port 48 of switch 2.

These connections extend both the management and the service VLANs ports to the new switch.

MTM 5149-S54 switch service

Service procedures and a list of replaceable parts are provided for the MTM 5149-S54 switch service.

Important: Before the service of any replaceable part, you must consult [“Replaceable parts” on page 93](#) and [“Replacing a customer replaceable unit” on page 93](#) to determine the replacement designation and avoid warranty infringement.

Key replaceable parts for MTM 5149-S54 switch

The following table lists key replaceable parts for the switch. Because part numbers can change over time, in a repair situation, verify that the correct CRU or FRU is obtained.

Part	FRU part number	CRU or FRU	Concurrent replace
MTM 5149-S54 switch	03MT898 03MU201	FRU	No
Rail mounting kit	03MT863	FRU	No
Power cord 4.3 m (14 ft) (drawer to IBM PDU, 250 V / 10 A)	39M5510	CRU Tier 1	Yes
Power cord 4.3 m (14 ft) (drawer to IBM PDU, 250 V / 10 A) For India	01KV682	CRU Tier 1	Yes
Power cable 2.8 m (9.2 ft) (drawer to IBM PDU, 250 V / 10 A)	39M5392	CRU Tier 1	Yes
Power cable 2.8 m (9.2 ft) (drawer to IBM PDU, 250 V / 10 A) For India	01PP689	CRU Tier 1	Ye

Additional cables

Table 35. Cable part numbers	
Description	CRU part number
Ethernet cable (3 m)	00E5376
Ethernet cable (5 m)	00E5377
Fiber-optic cable with lucent connectors (25 m)	15R8848
Fiber-optic cable with lucent connectors (25 m)	88Y6857

Replaceable parts

Each replaceable part is assigned one of three designations. Most of the parts for this switch are classified as Tier 1 CRU. None of the parts for this switch are Tier 2 CRU.

For more information, see the following table.

Replacement designation	Description
CRU -Tier 1	Replacing a Tier 1 CRU is a customer responsibility, but dependent on if they purchased a service upgrade: • Under the standard warranty – If an IBM representative installs a Tier 1 CRU at the customer's request, the customer is charged for the installation. – If an IBM representative installs a Tier 1 CRU at IBM Support's request, the customer is not charged for the installation. • Under an IBM Storage Expert Care service upgrade: The customer can request that IBM install the CRU at no additional cost.
CRU -Tier 2	Replacing a Tier 2 CRU can be completed by the customer or can be installed at the customer's request by an IBM representative. If a Tier 2 CRU is replaced by an IBM representative: • If the product is under warranty: There is no charge for the part or for the installation if the product. • If the product is no longer under warranty: The customer is charged for the part and the installation.
FRU	Replacing a FRU must be performed by an IBM service personnel or an IBM authorized warranty service provider.

Replacing a customer replaceable unit

Use this procedure for servicing a customer replaceable unit (CRU).

Before you start a replacement, the customer must complete the following tasks:

- If the replacement procedure might put data at risk, the customer must back up the system or logical partition (including operating systems, licensed programs, and data).
- Review the replacement procedure for the part.
- Obtain the required tools for the replacement procedure.
- Inspect the replacement part. If any of the parts are incorrect, missing, or visibly damaged, they should contact the provider of the part or IBM Support.

The replacement best practices are as follows:

- For all replacements performed on an operational system, remove only one module from the enclosure at a time, unless directed otherwise by a replacement procedure.
 - To reduce the amount of time required for the replacement, remove the failed module only when the replacement module is available, unpackaged, and ready for installation.
 - Follow all recommended procedures for handling devices that are sensitive to electrostatic discharge (ESD).
1. Identify the system that contains the part to replace.
 2. Attach the ESD wrist strap. The ESD wrist strap must connect to an unpainted metal surface until the service procedure is completed.
 3. Locate the CRU part to be serviced.
 4. Remove and replace the CRU part.
 5. Verify that the installed part is working as expected.

Replacing an MTM 5149-S54 switch

Refer to the service procedure to remove and replace an MTM 5149-S54 switch enclosure.

If possible, the customer should back up the switch configuration and its firmware before the replacement procedure.

For step 6 of this procedure, two people are required.

The high-level steps to replace an MTM 5149-S54 switch are as follows.

1. Locate the faulty switch.
2. Label all data and power cables that connect to the faulty MTM 5149-S54 switch.
3. Disconnect the power supply cables from their PDU connections.
4. Disconnect all data cables from the faulty MTM 5149-S54 switch.
5. While holding the MTM 5149-S54 switch enclosure, remove the four securing cage nuts.
6. Pull the faulty MTM 5149-S54 switch enclosure out of the rack and place it on a flat anti-static surface.
7. Install the new MTM 5149-S54 switch.

Important:

- Before removing the switch from the rack, ensure that the switch is powered down, with all network and power cables disconnected.
- Two people are required to lift the switch above 1.4 m (57 in). Check the TDA document to identify where the switch will be replaced. Replacement locations at 32U and higher require two people to lift the switch. For replacement locations lower than 32U, one person can safely lift the switch.

1. Locate the faulty switch.

The service ticket should include location information. Confirm the switch location by looking for fault LEDs on the switch.

2. Label all data and power cables that connect to the faulty MTM 5149-S54 switch.

Take note of which cables are plugged into the specific ports before you remove any cable. You will need this record for the installation of the new MTM 5149-S54 switch.

3. Disconnect the power supply cables from their PDU connections.
4. Disconnect all data cables from the faulty MTM 5149-S54 switch.
5. While a second person holds the MTM 5149-S54 switch enclosure, remove the four securing cage nuts.
6. Pull the faulty MTM 5149-S54 switch enclosure out of the rack and place it on a flat anti-static surface.
7. Install the new MTM 5149-S54 switch.

To install the new MTM 5149-S54 switch, follow the steps from [“Installing the MTM 5149-S54 switch” on page 126](#).

Configuration and cabling

For more information about switch setup, configuration, and cabling, see the manufacturer's site.

- For MTM 5149-N64 switch, see [QM9700/QM9790 1U NDR 400Gb/s InfiniBand Switch Systems User Manual](#) in NVIDIA documentation.
- For MTM 5149-S05 switch, see [NVIDIA Spectrum SN3700](#) in NVIDIA documentation.

For detailed configuration and cabling information, see the corresponding *Hardware Planning and Installation Guide* in [IBM Storage Scale System documentation](#).

Cables for MTM 5149-S05 switch

Product number	Description	Feature code
39M5510	Power cable, drawer to IBM PDU, 200V/10A	6458
01KV682	4m jumper cord	END2
01KV679	1m jumper cord	END3
01KV680	2m jumper cord	END3
01KV681	3m jumper cord	END3
39M5392	2.8m power cable, drawer to IBM PDU, 250V/10A	6665
01PP689	2.8m power cable, drawer to IBM PDU, 250V/10A (for India)	END5
41V2458	10m InfiniBand cable	EB2J
45D6369	30m InfiniBand cable	EB2K
01FT706	100GbE, QSFP28 optical transceiver	EB59
01FT724	10m cable	EB5T
01FT726	30m cable	EB5W
03NK243	200G Ethernet cable	AJRF
01LL968	30m QSFP56	AJR9
01AF039	1.5m cable	ECCG
01AF045	3m cable	ECCJ
02CL470	5m cable	ECCW
01AF040	3m cable	1111
01AF041	10m cable	1112
01AF038	10m cable	1116
01AF045	3m cable	1118
01AF043	10m cable	1119

Cables for MTM 5149-S54 switch

Product number	Description	Feature code
39M5510	Power cable, drawer to IBM PDU, 200-240V/10A	6458
01KV682	4m jumper cord	END2

Product number	Description	Feature code
39M5392	2.8m power cable, drawer to IBM PDU, 250V/10A	6665
01PP689	2.8m power cable, drawer to IBM PDU, 250V/10A (for India)	END5
01AF040	3m cable	1111
01AF041	10m cable	1112
01AF038	10m cable	1116
01AF045	3m cable	1118
01AF043	10m cable	1119
45D4774	5m cable	ECBD
15R8848	25m LC cable	ECBE
00E5376	3m ENET cable	EN02
00E5377	5m ENET cable	EN03
02CL470	5m cable	ECCW

Warranty and service

The standard warranty period for these solutions is a 1-year, 9x5 warranty, with options available for the expanded IBM Expert Care.

IBM warranty information

Warranty type	Duration	Coverage	Service level
Standard	1 year	9x5 next business day	- IBM installation - Limited on-site FRU service - Software maintenance - for 90 days only, the customer can install an update
IBM Storage Expert Care Basic	1-5 years	9x5 next business day	Standard warranty plus: - Optional CRU service - Software maintenance (SWMA) - at anytime, the customer can install an update
IBM Storage Expert Care Advanced	1-5 years	24x7 same business day service	IBM Storage Expert Care Basic plus:

Warranty type	Duration	Coverage	Service level
			Enhanced 24x7 coverage

The following warranty upgrade options are available:

- IBM onsite-service
- 24x7 same day service

The following post-warranty options are available:

- IBM onsite-service
- 9x5 next business day service
- 9x5 same day service
- 24x7 same day maintenance
- 2-hour or 4-hour service (US only)

Service strategy

IBM attempts to resolve problems over the telephone. Following problem determination, if IBM determines a customer replaceable unit (CRU) has failed, the CRU part will be provided as part of the machine's standard warranty service. If on-site service is required, a service call is scheduled.

Installation

These switches are specified as IBM set up; installation is performed by an IBM representative.

Updates

- Under the standard warranty, the customer can obtain and install a software update for the first 90 days only. After 90 days, the customer can not obtain an update. There is no software support.
- Under Expert Care Basic, the customer can update software at anytime.
- Under Expert Care Advanced, the customer can update software at anytime.

Parts replacement

Some of the replaceable parts for these switches are classified as CRUs. IBM specifies in the materials shipped with a replacement CRU whether the defective CRU must be returned to IBM. When a return is required, return instructions are shipped with the replacement CRU. The customer might be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of receipt of the replacement.

Other replaceable parts for these switches are classified as FRUs. For FRU parts, an IBM service representative or IBM Authorized Warranty Service Provider performs the replacement.

Troubleshooting

Information from multiple sources is used to maintain and service the switches. These sources include switch status LEDs, component status LEDs, events logs, and user documentation. Customers should troubleshoot issues on their own, including collecting and reviewing logs.

Reference documentation

For more information about the switches covered in this document, refer the corresponding manufacturer's documentation.

Documentation for MTM 5149-N64 switch

- [NVIDIA QM79xx User Guide \(https://docs.nvidia.com/networking/display/qm97x0pub\)](https://docs.nvidia.com/networking/display/qm97x0pub).
- [NVIDIA QM79xx Installation instructions \(https://docs.nvidia.com/networking/display/qm97x0pub/installation\)](https://docs.nvidia.com/networking/display/qm97x0pub/installation).
- [NVIDIA QM9700/QM9790 Datasheet \(https://nvdam.widen.net/s/k8sqcr6gzb/infiniband-quantum-2-qm9700-series-datasheet-us-nvidia-1751454-r8-web\)](https://nvdam.widen.net/s/k8sqcr6gzb/infiniband-quantum-2-qm9700-series-datasheet-us-nvidia-1751454-r8-web).

Documentation for MTM 5149-S05 switch

- [NVIDIA Spectrum SN3700](#)
- [NVIDIA Spectrum SN3000 Series Switches Datasheet](#)
- [NVIDIA Spectrum-2 SN3000 1U and 2U Switch Systems Hardware User Manual](#)

Documentation for MTM 5149-S54 switch

- [EPS121 AS4625-54T](#)
- [EPS121 \(AS4625-54T\) Datasheet](#)
- [EPS121 \(AS4625-54T\) Quick Start Guide](#)
- [EPS121 \(AS4625-54T\) Safety and Regulatory Information](#)

Accessibility features for the system

Accessibility features help users who have a disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

The following list includes the major accessibility features in IBM Storage Scale RAID:

- Keyboard-only operation
- Interfaces that are commonly used by screen readers
- Keys that are discernible by touch but do not activate just by touching them
- Industry-standard devices for ports and connectors
- The attachment of alternative input and output devices

IBM Documentation, and its related publications, are accessibility-enabled.

Keyboard navigation

This product uses standard Microsoft Windows navigation keys.

IBM and accessibility

See the [IBM Human Ability and Accessibility Center \(www.ibm.com/able\)](http://www.ibm.com/able) for more information about the commitment that IBM has to accessibility.

Glossary

This glossary provides terms and definitions for the IBM Storage Scale System solution.

The following cross-references are used in this glossary:

- *See* refers you from a non-preferred term to the preferred term or from an abbreviation to the spelled-out form.
- *See also* refers you to a related or contrasting term.

For other terms and definitions, see the [IBM Terminology website](http://www.ibm.com/software/globalization/terminology) (opens in new window):

<http://www.ibm.com/software/globalization/terminology>

B

building block

A pair of servers with shared disk enclosures attached.

BOOTP

See *Bootstrap Protocol (BOOTP)*.

Bootstrap Protocol (BOOTP)

A computer networking protocol that is used in IP networks to automatically assign an IP address to network devices from a configuration server.

Bring-your-own management server (BYOMS)

An x86 management server of your choice. See also *management server*.

C

CEC

See *central processor complex (CPC)*.

central electronic complex (CEC)

See *central processor complex (CPC)*.

central processor complex (CPC)

A physical collection of hardware that consists of channels, timers, main storage, and one or more central processors.

cluster

A loosely coupled collection of independent systems, or *nodes*, organized into a network for the purpose of sharing resources and communicating with each other. See also *GPFS cluster*.

cluster manager

The node that monitors node status using disk leases, detects failures, drives recovery, and selects file system managers. The cluster manager is the node with the lowest node number among the quorum nodes that are operating at a particular time.

compute node

A node with a mounted GPFS file system that is used specifically to run a customer job. ESS disks are not directly visible from and are not managed by this type of node.

CPC

See *central processor complex (CPC)*.

D

DA

See *declustered array (DA)*.

datagram

A basic transfer unit associated with a packet-switched network.

DCM

See *drawer control module (DCM)*.

declustered array (DA)

A disjoint subset of the pdisks in a recovery group.

dependent fileset

A fileset that shares the inode space of an existing independent fileset.

DFM

See *direct FSP management (DFM)*.

DHCP

See *Dynamic Host Configuration Protocol (DHCP)*.

drawer control module (DCM)

Essentially, a SAS expander on a storage enclosure drawer.

Dynamic Host Configuration Protocol (DHCP)

A standardized network protocol that is used on IP networks to dynamically distribute such network configuration parameters as IP addresses for interfaces and services.

E**Elastic Storage System (ESS)**

See IBM Storage Scale System.

EMS virtual machine (EMSVM)

Virtual machine of an IBM Storage Scale System management server. See *MS management server* and IBM Storage Scale System.

ESS management server (EMS)

See *management server* and IBM Storage Scale System.

encryption key

A mathematical value that allows components to verify that they are in communication with the expected server. Encryption keys are based on a public or private key pair that is created during the installation process. See also *file encryption key (FEK)*, *master encryption key (MEK)*.

ESS

See *Elastic Storage System (ESS)*.

environmental service module (ESM)

Essentially, a SAS expander that attaches to the storage enclosure drives. In the case of multiple drawers in a storage enclosure, the ESM attaches to drawer control modules.

ESM

See *environmental service module (ESM)*.

F**failback**

Cluster recovery from failover following repair. See also *failover*.

failover

(1) The assumption of file system duties by another node when a node fails. (2) The process of transferring all control of the ESS to a single cluster in the ESS when the other clusters in the ESS fails. See also *cluster*. (3) The routing of all transactions to a second controller when the first controller fails. See also *cluster*.

failure group

A collection of disks that share common access paths or adapter connection, and could all become unavailable through a single hardware failure.

FEK

See *file encryption key (FEK)*.

file encryption key (FEK)

A key used to encrypt sectors of an individual file. See also *encryption key*.

file system

The methods and data structures used to control how data is stored and retrieved.

file system descriptor

A data structure containing key information about a file system. This information includes the disks assigned to the file system (*stripe group*), the current state of the file system, and pointers to key files such as quota files and log files.

file system descriptor quorum

The number of disks needed in order to write the file system descriptor correctly.

file system manager

The provider of services for all the nodes using a single file system. A file system manager processes changes to the state or description of the file system, controls the regions of disks that are allocated to each node, and controls token management and quota management.

fileset

A hierarchical grouping of files managed as a unit for balancing workload across a cluster. See also *dependent fileset*, *independent fileset*.

fileset snapshot

A snapshot of an independent fileset plus all dependent filesets.

flexible service processor (FSP)

Firmware that provides diagnosis, initialization, configuration, runtime error detection, and correction. Connects to the HMC.

FQDN

See *fully qualified domain name (FQDN)*.

FSP

See *flexible service processor (FSP)*.

fully qualified domain name (FQDN)

The complete domain name for a specific computer, or host, on the Internet. The FQDN consists of two parts: the hostname and the domain name.

G**GPFS cluster**

A cluster of nodes defined as being available for use by GPFS file systems.

GPFS portability layer

The interface module that each installation must build for its specific hardware platform and Linux distribution.

GPFS Storage Server (GSS)

A high-performance, GPFS NSD solution made up of one or more building blocks that runs on System x servers.

GSS

See *GPFS Storage Server (GSS)*.

H**Hardware Management Console (HMC)**

Standard interface for configuring and operating partitioned (LPAR) and SMP systems.

HMC

See *Hardware Management Console (HMC)*.

I

IBM Security Key Lifecycle Manager (ISKLM)

For GPFS encryption, the ISKLM is used as an RKM server to store MEKs.

IBM Storage Scale System

A high-performance, IBM Storage Scale NSD solution made up of one or more building blocks. The IBM Storage Scale System software runs on IBM Storage Scale System nodes (management server nodes and I/O server nodes).

independent fileset

A fileset that has its own inode space.

indirect block

A block that contains pointers to other blocks.

inode

The internal structure that describes the individual files in the file system. There is one inode for each file.

inode space

A collection of inode number ranges reserved for an independent fileset, which enables more efficient per-fileset functions.

Internet Protocol (IP)

The primary communication protocol for relaying datagrams across network boundaries. Its routing function enables internetworking and essentially establishes the Internet.

I/O server node

An ESS node that is attached to the ESS storage enclosures. It is the NSD server for the GPFS cluster.

IP

See *Internet Protocol (IP)*.

IP over InfiniBand (IPoIB)

Provides an IP network emulation layer on top of InfiniBand RDMA networks, which allows existing applications to run over InfiniBand networks unmodified.

IPoIB

See *IP over InfiniBand (IPoIB)*.

ISKLM

See *IBM Security Key Lifecycle Manager (ISKLM)*.

J

JBOD array

The total collection of disks and enclosures over which a recovery group pair is defined.

K

kernel

The part of an operating system that contains programs for such tasks as input/output, management and control of hardware, and the scheduling of user tasks.

L

LACP

See *Link Aggregation Control Protocol (LACP)*.

Link Aggregation Control Protocol (LACP)

Provides a way to control the bundling of several physical ports together to form a single logical channel.

logical partition (LPAR)

A subset of a server's hardware resources virtualized as a separate computer, each with its own operating system. See also *node*.

LPAR

See *logical partition (LPAR)*.

M

management hostname

This is the short name that gets associated with the IP address that is tied to the management (mgmt) interface on a given node. The definition is contained within the `/etc/hosts` file (or DNS), and it is typically a subset of the high-speed interface name.

management network

A network that is primarily responsible for booting and installing the designated server and compute nodes from the management server.

management server (MS)

An IBM Storage Scale System node that hosts the IBM Storage Scale System GUI and is not connected to storage. It must be part of an IBM Storage Scale cluster. From a system management perspective, it is the central coordinator of the cluster. It also serves as a client node in an IBM Storage Scale System building block.

master encryption key (MEK)

A key that is used to encrypt other keys. See also *encryption key*.

maximum transmission unit (MTU)

The largest packet or frame, specified in octets (eight-bit bytes), that can be sent in a packet- or frame-based network, such as the Internet. The TCP uses the MTU to determine the maximum size of each packet in any transmission.

MEK

See *master encryption key (MEK)*.

metadata

A data structure that contains access information about file data. Such structures include inodes, indirect blocks, and directories. These data structures are not accessible to user applications.

MS

See *management server (MS)*.

MS virtual machine (MSVM)

Virtual machine of an IBM Storage Scale System management server. See *management server* and *IBM Storage Scale System*.

MTU

See *maximum transmission unit (MTU)*.

N

Network File System (NFS)

A protocol (developed by Sun Microsystems, Incorporated) that allows any host in a network to gain access to another host or netgroup and their file directories.

Network Shared Disk (NSD)

A component for cluster-wide disk naming and access.

NSD volume ID

A unique 16-digit hexadecimal number that is used to identify and access all NSDs.

node

An individual operating-system image within a cluster. Depending on the way in which the computer system is partitioned, it can contain one or more nodes. In a Power Systems environment, synonymous with *logical partition*.

node descriptor

A definition that indicates how ESS uses a node. Possible functions include: manager node, client node, quorum node, and non-quorum node.

node number

A number that is generated and maintained by ESS as the cluster is created, and as nodes are added to or deleted from the cluster.

node quorum

The minimum number of nodes that must be running in order for the daemon to start.

node quorum with tiebreaker disks

A form of quorum that allows ESS to run with as little as one quorum node available, as long as there is access to a majority of the quorum disks.

non-quorum node

A node in a cluster that is not counted for the purposes of quorum determination.

O**OFED**

See *OpenFabrics Enterprise Distribution (OFED)*.

OpenFabrics Enterprise Distribution (OFED)

An open-source software stack includes software drivers, core kernel code, middleware, and user-level interfaces.

P**pdisk**

A physical disk.

PortFast

A Cisco network function that can be configured to resolve any problems that could be caused by the amount of time STP takes to transition ports to the Forwarding state.

R**RAID**

See *redundant array of independent disks (RAID)*.

RDMA

See *remote direct memory access (RDMA)*.

redundant array of independent disks (RAID)

A collection of two or more disk physical drives that present to the host an image of one or more logical disk drives. In the event of a single physical device failure, the data can be read or regenerated from the other disk drives in the array due to data redundancy.

recovery

The process of restoring access to file system data when a failure has occurred. Recovery can involve reconstructing data or providing alternative routing through a different server.

recovery group (RG)

A collection of disks that is set up by ESS, in which each disk is connected physically to two servers: a primary server and a backup server.

remote direct memory access (RDMA)

A direct memory access from the memory of one computer into that of another without involving either one's operating system. This permits high-throughput, low-latency networking, which is especially useful in massively parallel computer clusters.

RGD

See *recovery group data (RGD)*.

remote key management server (RKM server)

A server that is used to store master encryption keys.

RG

See *recovery group (RG)*.

recovery group data (RGD)

Data that is associated with a recovery group.

RKM server

See *remote key management server (RKM server)*.

S**SAS**

See *Serial Attached SCSI (SAS)*.

secure shell (SSH)

A cryptographic (encrypted) network protocol for initiating text-based shell sessions securely on remote computers.

Serial Attached SCSI (SAS)

A point-to-point serial protocol that moves data to and from such computer storage devices as hard drives and tape drives.

service network

A private network that is dedicated to managing Power8 servers. Provides Ethernet-based connectivity among the FSP, CPC, HMC, and management server.

SMP

See *symmetric multiprocessing (SMP)*.

Spanning Tree Protocol (STP)

A network protocol that ensures a loop-free topology for any bridged Ethernet local-area network. The basic function of STP is to prevent bridge loops and the broadcast radiation that results from them.

SSH

See *secure shell (SSH)*.

STP

See *Spanning Tree Protocol (STP)*.

symmetric multiprocessing (SMP)

A computer architecture that provides fast performance by making multiple processors available to complete individual processes simultaneously.

T**TCP**

See *Transmission Control Protocol (TCP)*.

Transmission Control Protocol (TCP)

A core protocol of the Internet Protocol Suite that provides reliable, ordered, and error-checked delivery of a stream of octets between applications running on hosts communicating over an IP network.

V**VCD**

See *vdisk configuration data (VCD)*.

vdisk

A virtual disk.

vdisk configuration data (VCD)

Configuration data that is associated with a virtual disk.

Index

Numerics

5149-n64 [84](#)

A

ac power [17](#), [27](#)
accessibility features [141](#)
adapter cards [44](#)
airflow [100](#), [122](#)
amateur radio [16](#)
antistatic bag [15](#)
audience [xv](#)

B

bandwidth [42](#)
battery [10](#)

C

cable [136](#)
cable configuration [136](#)
cable connections [30](#)
cable disconnection [114](#), [136](#)
cable management [53](#)
cables [42](#), [62](#)
cabling [136](#)
canada [16](#)
canada electromagnetic compatibility [16](#)
canada emc [16](#)
canada emi regulations [16](#)
canada regulations [16](#)
capacity configuration [26](#)
caution [10](#)
caution notices [5](#)
certificate of conformity [19](#)
certification [5](#), [18](#)
certification process [16](#), [18](#)
certification requirements [5](#)
chassis label [82](#)
check [15](#)
checks [15](#)
china [18](#)
china certification [18](#)
china compulsory certification [18](#)
china emc regulations [18](#)
citc [19](#)
class a [17](#), [18](#)
class a devices [17](#)
class a digital device [19](#)
class a equipment [18](#)
clearance [126](#)
cma [62](#)
comments [xvii](#)
compliance [16–19](#)

components [89](#)
configuration [136](#)
Console
 user interfaces [33](#)
contaminants [15](#)
copyright [4](#)
copyright information [4](#)
copyright policies [4](#)
customer replaceable unit [93](#), [113](#), [135](#)
customer replaceable units [93](#), [113](#), [134](#)
customer responsibility [16](#)

D

damage [15](#)
danger notices [5](#)
data cable [94](#)
data cable disconnection [94](#)
data cables [114](#)
data center [85](#), [97](#)
data center layout [29](#)
data center networking [117](#)
data management [42](#)
datasheets [140](#)
dc power [27](#)
decibel [16](#)
decibel level [16](#)
device [15](#)
device certification [16](#)
device installation russia [18](#)
device safety [16](#)
dimensions [84](#)
directive 2014/30/eu [16](#)
documentation
 on web [xv](#)
drive
 overview [26](#)
 requirements [40](#)
drive carrier assembly leds [68](#)
drive slots 3500 [26](#)

E

Edgecore [114](#), [116–118](#), [120–124](#), [126](#), [134](#), [136](#)
Edgecore EPS121 [114](#), [116–118](#), [120–124](#), [126](#), [134](#), [136](#)
electrical equipment [19](#)
electrical hazards [6](#)
electrical power [29](#)
electrical safety [6](#)
electromagnetic [17](#), [19](#)
electromagnetic compatibility [16–19](#)
electromagnetic compliance [17](#)
electromagnetic emissions [19](#)
electromagnetic interference [16](#), [18](#), [19](#)
electronic devices [15–19](#)
electronic devices japan [17](#)
electronic products [18](#)

- electrostatic discharge [15](#)
- emc [16](#), [18](#), [19](#)
- emc 3200 [16](#)
- emc class a [16](#)
- emc compliance [16](#), [18](#)
- emc directive [18](#)
- emc regulations [18](#), [19](#)
- emc regulations china [18](#)
- emc requirements saudi arabia [19](#)
- emc standards [16–18](#)
- emi [13](#), [19](#)
- emi compliance [16](#)
- emi standards [16](#)
- emi testing [18](#)
- emissions reduction [17](#)
- empty carriers [26](#)
- ems [53](#)
- EMS node [28](#)
- ems server [54](#)
- enclosure location guidelines [30](#)
- encryption standards [18](#)
- environmental compliance [3](#), [16](#)
- environmental conditions [29](#), [33](#)
- environmental notices [5](#), [16](#)
- esd [93](#), [113](#), [135](#)
- esd precautions [93](#), [113](#), [135](#)
- esd protection [93](#), [113](#), [135](#)
- ess system [88](#)
- ethernet [71](#), [97](#)
- ethernet adapters [44](#)
- ethernet switch [85](#)
- Ethernet switch [79](#), [93](#), [97–101](#), [105](#), [106](#), [112–114](#), [116–118](#), [120–124](#), [126](#), [134–136](#)
- eu directive [16](#), [17](#)
- external [15](#)
- external covers [15](#)
- external device [15](#)
- external device check [15](#)
- external device safety check [15](#)
- external devices [15](#)

F

- fan module [13](#), [117](#)
- fan module leds [69](#)
- fan module replacement [96](#), [117](#)
- faulty [94](#)
- faulty switch [136](#)
- fcc [19](#)
- FCC certification [16](#)
- fcc class a [19](#)
- fcc rules [19](#)
- field-replaceable unit [93](#), [113](#), [134](#)
- firmware updates [1](#)
- forwarding rate [118](#)

G

- general safety [13](#)
- german emvg [17](#)
- german law [17](#)
- germany [17](#)
- gigabit ethernet l2 [117](#)

- Gigabit Ethernet switch [79](#), [114](#), [116–118](#), [120–124](#), [126](#), [134](#), [136](#)
- grounding [18](#)
- guidelines [4](#)

H

- hardware [15](#), [29](#)
- hardware components [42](#)
- hardware inspection [15](#)
- hardware installation [29](#), [75](#)
- hardware planning [1](#)
- hardware specifications [81](#)
- hardware verification [15](#)
- harmful interference [16](#), [19](#)
- hazardous situations [13](#)
- hearing protection [16](#)
- heavy equipment [6](#)
- high-speed network adapter [42](#)
- homologation statement [5](#)
- host server [33](#)
- hot swappable [98](#)
- hot swappable psus [98](#)
- hot swappable psus [98](#)

I

- ibm [4](#), [5](#), [18](#), [19](#)
- ibm compliance [16](#)
- ibm elastic storage system [53](#)
- ibm ess [88](#)
- ibm international licensing [3](#)
- ibm jaita [17](#)
- ibm licenses [3](#)
- ibm licensing [3](#)
- ibm mtm 5149 s05 [79](#)
- ibm mtm 5149-n64 [80](#), [81](#)
- ibm mtm 5149-n64 switch [80](#)
- ibm power systems [17](#)
- ibm product [16](#)
- ibm product compliance [16](#), [18](#)
- ibm product modifications [16](#)
- ibm products [17–19](#)
- ibm servers [18](#)
- ibm software [3](#)
- ibm spectrum scale [29](#)
- ibm ssr [29](#)
- ibm storage [5](#), [136](#), [138](#)
- ibm storage scale system 3000 [21](#)
- ibm storage scale system 3200 [21](#)
- ibm storage scale system 3500 [13](#), [30](#), [54](#), [79](#)
- IBM Storage Scale System 3500
 - acoustic output of drives [41](#)
 - additional space requirements [39](#)
 - air temperature without redundant AC power [36](#)
 - dimensions and weight [37](#)
 - enclosures
 - acoustic output [41](#)
 - humidity without redundant AC power [36](#)
 - power requirements for each power module [35](#)
 - weight and dimensions [37](#)
- IBM Storage Scale Systems [79](#), [93](#), [97–101](#), [105](#), [106](#), [112–114](#), [116–118](#), [120–124](#), [126](#), [134–136](#)

- ibm system safety notices [5](#)
- ibm systems [5](#), [16](#)
- ibm systems safety notices [5](#)
- ibm taiwan [19](#)
- ibm taiwan contact information [19](#)
- ibm trademarks [4](#)
- industrial equipment [18](#)
- industry canada [16](#)
- infiniband [80](#)
- infiniband bandwidth [80](#)
- infiniband connectx-7 [77](#)
- information [4](#)
- information overview [xv](#)
- inspection [14](#), [15](#)
- inspections, safety
 - external device check [15](#)
- install [89](#)
- install enclosure 3500 [59](#)
- installation [1](#), [29](#), [53](#), [55](#), [62](#), [80](#), [88](#), [89](#), [106](#), [126](#), [140](#)
- installation guide [1](#)
- installation instructions [53](#)
- installation prerequisites [29](#)
- installation worksheet [44](#)
- intellectual property [3](#)
- interfaces [33](#)
- interference [16](#), [19](#)
- interference prevention [16](#), [19](#)
- internal device [15](#)
- internal device check [15](#)
- international availability [3](#)
- ip address [27](#), [41](#), [53](#)
- ip addresses [44](#)

J

- japanese emi [17](#)
- jeita [17](#)
- jeita emc notices [17](#)
- jeita emi compliance [17](#)
- jeita emi guidelines [17](#)
- jeita notice [17](#)
- jeita standards [17](#)

K

- korean radio waves act [18](#)

L

- labeling requirements [18](#)
- led [67](#), [85](#), [101](#)
- led behavior [67](#), [68](#), [70](#)
- led colors [69](#)
- led indicators [85](#)
- led lights [81](#)
- leds [71](#), [85](#), [123](#)
- legal considerations [3](#)
- lenovo thinkpad [17](#)
- lenovo thinkpad laptops [17](#)
- license inquiries [3](#)
- licensing requirements [16](#)
- lifting [10](#), [122](#)
- list [4](#)

- location guidelines
 - enclosure [30](#)

M

- maintenance [13](#)
- management [81](#)
- management interface [27](#)
- management ip [41](#)
- management module [75](#)
- management server [28](#)
- manufacturing regulations [18](#)
- mechanical problems [15](#)
- miit [18](#)
- monitor attachment [16](#)
- monitoring [67](#)
- mtm 5149 [136](#)
- mtm 5149 s05 [1](#), [97](#), [98](#), [105](#), [112](#)
- mtm 5149 s05 switch [98](#), [100](#), [114](#)
- mtm 5149 s54 [117](#), [118](#), [122](#), [124](#), [134](#)
- mtm 5149 s54 switch [117](#), [122](#)
- mtm 5149-091 [53](#)
- mtm 5149-n64 [92](#), [94–96](#)
- MTM 5149-N64 [79](#), [93](#), [113](#), [134](#), [135](#)
- mtm 5149-n64 switch [92](#), [96](#)
- MTM 5149-S05 [79](#), [93](#), [97–101](#), [105](#), [106](#), [112–114](#), [116](#), [134](#), [135](#)
- MTM 5149-S05 air temperature [100](#)
- MTM 5149-S05 components [98](#)
- MTM 5149-S05 CRU [112](#)
- MTM 5149-S05 dimensions [100](#)
- MTM 5149-S05 fans [98](#)
- MTM 5149-S05 features [98](#)
- MTM 5149-S05 FRU [112](#)
- MTM 5149-S05 install [105](#)
- MTM 5149-S05 install procedure [106](#)
- MTM 5149-S05 install steps [106](#)
- MTM 5149-S05 installation [105](#)
- MTM 5149-S05 installing [106](#)
- MTM 5149-S05 labels [99](#)
- MTM 5149-S05 LEDs [101](#)
- MTM 5149-S05 monitoring [101](#)
- MTM 5149-S05 performance [98](#)
- MTM 5149-S05 planning [105](#)
- MTM 5149-S05 ports [98](#)
- MTM 5149-S05 power [100](#)
- MTM 5149-S05 power requirements [100](#)
- MTM 5149-S05 preinstallation [105](#)
- MTM 5149-S05 PSUs [98](#)
- MTM 5149-S05 replace enclosure procedure [114](#)
- MTM 5149-S05 replace enclosure steps [114](#)
- MTM 5149-S05 replace PSU procedure [116](#)
- MTM 5149-S05 replace PSU steps [116](#)
- MTM 5149-S05 replaceable parts [112](#)
- MTM 5149-S05 replacing enclosure [114](#)
- MTM 5149-S05 replacing power supply unit [116](#)
- MTM 5149-S05 replacing PSU [116](#)
- MTM 5149-S05 service [112](#), [114](#), [116](#)
- MTM 5149-S05 service indicators [101](#)
- MTM 5149-S05 specifications [100](#)
- mtm 5149-s05 switch [100](#), [106](#), [116](#), [117](#)
- MTM 5149-S05 TDA [105](#)
- MTM 5149-S05 technical and delivery assessment [105](#)
- MTM 5149-S05 temperature requirements [100](#)

- MTM 5149-S05 weight [100](#)
- MTM 5149-S54 [79](#), [93](#), [113](#), [117](#), [118](#), [120–124](#), [126](#), [134–136](#)
- MTM 5149-S54 air temperature [122](#)
- MTM 5149-S54 components [118](#)
- MTM 5149-S54 CRU [134](#)
- MTM 5149-S54 dimensions [122](#)
- MTM 5149-S54 fans [120](#)
- MTM 5149-S54 features [118](#)
- MTM 5149-S54 FRU [134](#)
- MTM 5149-S54 install [124](#)
- MTM 5149-S54 install procedure [126](#)
- MTM 5149-S54 install steps [126](#)
- MTM 5149-S54 installation [124](#)
- MTM 5149-S54 installing [126](#)
- MTM 5149-S54 labels [121](#)
- MTM 5149-S54 LEDs [123](#)
- MTM 5149-S54 monitoring [123](#)
- MTM 5149-S54 performance [118](#)
- MTM 5149-S54 planning [124](#)
- MTM 5149-S54 ports [120](#)
- MTM 5149-S54 power [122](#)
- MTM 5149-S54 power requirements [122](#)
- MTM 5149-S54 preinstallation [124](#)
- MTM 5149-S54 PSUs [120](#)
- MTM 5149-S54 replace enclosure procedure [136](#)
- MTM 5149-S54 replace enclosure steps [136](#)
- MTM 5149-S54 replaceable parts [134](#)
- MTM 5149-S54 replacing enclosure [136](#)
- MTM 5149-S54 service [134](#), [136](#)
- MTM 5149-S54 service indicators [123](#)
- MTM 5149-S54 specifications [122](#)
- mtm 5149-s54 switch [126](#)
- MTM 5149-S54 TDA [124](#)
- MTM 5149-S54 technical and delivery assessment [124](#)
- MTM 5149-S54 temperature requirements [122](#)
- MTM 5149-S54 weight [122](#)

N

- ndr 200 gb [77](#)
- ndr switch [80](#)
- network [85](#)
- network adapters [42](#)
- network configuration [29](#)
- network diagram [53](#)
- network interfaces [44](#)
- network planning [42](#)
- network switch [81](#), [85](#)
- network topology [42](#)
- networks [5](#)
- noise exposure [16](#)
- noise hazards [16](#)
- noise reduction [16](#)
- notification
 - FCC [16](#)
- notices
 - environmental [16](#)
- nvidia [80](#)
- NVIDIA [97–101](#), [105](#), [106](#), [112](#)
- nvidia mellanox ndr [80](#)
- nvidia mellanox ndr switch [80](#)
- NVIDIA Open Ethernet Spectrum [97–101](#), [105](#), [106](#), [112](#)
- NVIDIA Spectrum SN3000 [97–101](#), [105](#), [106](#), [112](#)

- nvidia switch [79](#)
- nvidia/mellanox ndr switch [80](#)
- nvme attached ssd [21](#)
- nvme ssd [21](#)
- nvme ssd drives [21](#)

O

- operating environment [33](#)
- osfp ports [81](#)
- overview
 - drive [26](#)
 - of information [xv](#)

P

- package [89](#)
- part number [82](#)
- pci express gen 5 [77](#)
- performance configuration [26](#)
- physical inspection [15](#)
- physical planning [29](#)
- physical site [32](#)
- planning [29](#), [88](#)
- ports [42](#), [98](#), [118](#)
- power
 - requirements
 - system [35](#)
- power circuits [32](#)
- power consumption [17](#)
- power cord [14](#)
- power cords [15](#)
- power module leds [70](#)
- power modules [21](#), [27](#)
- power ratings [17](#)
- power requirements [29](#), [33](#)
- power supplies [120](#)
- power supply [17](#), [29](#), [30](#), [85](#), [92](#), [120](#), [123](#)
- power supply unit [21](#), [95](#), [116](#)
- prc emc regulations [18](#)
- precautions [19](#)
- preface [xv](#)
- preinstall tda [105](#)
- preinstallation [88](#)
- prerequisite [42](#)
- procedure [54](#)
- product availability [3](#)
- product recycling [16](#)
- psu [99](#), [100](#), [112](#)
- psu label [121](#)
- psu labels [99](#), [121](#)
- psu power [100](#)
- psu replacement [95](#), [116](#)
- public telecommunications [5](#)
- public telecommunications networks [5](#)

R

- rack [89](#)
- rack alignment [59](#)
- rack installation [54](#)
- rack mounting [106](#)
- rack preparation [53](#)

- rack rails [89](#)
- rack safety [6](#)
- rack space [30](#), [32](#)
- rack specifications [29](#)
- radio [19](#)
- radio apparatus [16](#)
- radio broadcasts [19](#)
- radio equipment compliance [16](#)
- radio frequency [19](#)
- radio frequency emissions [16](#)
- radio frequency energy [19](#)
- radio frequency interference [16](#)
- radio interference [16](#), [18](#)
- radio law korea [18](#)
- radio waves act [18](#)
- radiocommunication act [16](#)
- rails [89](#)
- rdma [42](#)
- rear panel connectors [81](#)
- recycling [16](#)
- registered trademarks [4](#)
- regulations [16](#)
- regulatory [16](#)
- regulatory compliance [16](#)
- regulatory emc [16](#)
- regulatory requirements [18](#)
- release latch [117](#)
- remote code load [1](#)
- remove fan module [96](#)
- remove switch [114](#)
- replace [117](#)
- replace switch [114](#)
- replaceable parts [92](#), [112](#), [134](#)
- replacement [94](#)
- replacement procedure [93](#), [113](#), [135](#), [136](#)
- replacement procedures [93](#), [113](#), [134](#)
- requirements
 - additional space [39](#)
 - drives [40](#)
 - electrical [35](#)
 - environmental [36](#)
 - power [35](#)
 - space [37](#)
- residential areas [19](#)
- residential environment [18](#)
- residential use [18](#)
- resources
 - on web [xv](#)
- rf interference [19](#)
- rfi [18](#)
- roskomnadzor [18](#)
- russia [18](#)
- russia emc regulations [18](#)
- russia emc requirements [18](#)
- russian emc standards [18](#)

S

- safety [13](#), [106](#)
- safety guidelines [13](#)
- safety information [16](#)
- safety inspection [14](#)
- safety notices
 - sound pressure [16](#)

- safety precautions [6](#), [13](#)
- safety warnings [3](#)
- saudi arabia [19](#)
- saudi arabia emc regulations [19](#)
- sensitive devices [15](#)
- serial number [82](#)
- server canisters [21](#), [30](#)
- server handling [6](#)
- server maintenance [15](#)
- server performance [44](#)
- service [15](#), [80](#), [134](#)
- service procedures [112](#), [134](#)
- servicing [13](#)
- shock
 - specifications [41](#)
- signal cable [15](#)
- signal cables [15](#)
- site planning [29](#)
- site preparation [29](#), [54](#)
- slot placement [75](#)
- software updates [81](#), [138](#)
- sound pressure
 - safety notices [16](#)
- sound pressure level [13](#)
- south korea [18](#)
- south korean data residency [18](#)
- space requirements
 - IBM Storage Scale System 3500 [39](#)
- specifications
 - shock [41](#)
 - vibration [41](#)
- ssr access port [27](#)
- standards [18](#)
- static electricity [15](#)
- static-sensitive devices [15](#)
- status [71](#), [101](#), [123](#)
- storage [13](#)
- storage controllers [42](#)
- storage enclosure [1](#), [13](#)
- storage network [42](#)
- storage network planning [42](#)
- storage scale [26](#), [29](#), [53](#)
- storage scale system [13](#), [16](#), [29](#), [41](#), [53](#), [67](#), [69](#), [70](#), [79](#)
- storage scale system 3000 [29](#)
- storage scale system 3200 [53](#)
- storage scale system 3500 [68](#)
- storage system [13](#)
- submitting [xvii](#)
- support rails 3500 [55](#)
- switch [80](#), [84](#), [85](#), [88](#), [89](#), [94](#), [97](#), [106](#), [117](#), [123](#), [126](#), [136](#), [140](#)
- switch chassis [96](#)
- switch CRU [93](#), [113](#), [134](#)
- switch customer replaceable unit [93](#), [113](#), [135](#)
- switch FRU [93](#), [113](#), [134](#)
- switch health [123](#)
- switch identification [121](#)
- switch installation [79](#), [80](#), [88](#), [105](#), [117](#), [122](#), [124](#)
- switch label [82](#)
- switch labels [82](#), [99](#), [121](#)
- switch mounting [89](#)
- switch ports [98](#), [117](#), [120](#)
- switch removal [136](#)
- switch replace CRU [93](#), [113](#), [135](#)

- switch replaceable parts [93](#), [113](#), [134](#), [135](#)
- switch replacement [94](#), [114](#), [136](#)
- switch service [93](#), [113](#), [134](#), [135](#)
- switch specifications [100](#), [122](#)
- switch tier 1 [93](#), [113](#), [134](#)
- switch tier 2 [93](#), [113](#), [134](#)
- switches [136](#), [140](#)
- switching capacity [98](#), [118](#)
- system [14](#)
- system inspection [13–15](#)
- system installation [15](#)
- system status [85](#)
- system status leds [67](#)

T

- taiwan [19](#)
- tda checklist [88](#)
- technical delivery assessment [88](#)
- telecommunications [5](#)
- television [19](#)
- temperature [84](#), [100](#), [122](#)
- temperature range [100](#)
- temperature requirements [122](#)
- tier 1 cru [93](#), [113](#), [134](#)
- trademark [4](#)
- trademark details [4](#)
- trademark guidelines [4](#)
- trademarks [4](#)

U

- uk [19](#)
- unpacking [54](#)
- unsafe [14](#)
- unsafe conditions [13](#), [14](#)
- us export [18](#)
- utility node [29](#), [42](#), [44](#)

V

- vcci-a [18](#)
- vibration
 - specifications [41](#)
- vlan tag [53](#)

W

- warranty [138](#)
- web
 - documentation [xv](#)
 - resources [xv](#)



Product Number: 5765-DME
5765-DAE

SC28-3460-07

