XCubeSAN Series
Hardware Manual

Applicable Models:
XS5224D, XS5224S, XS5216D, XS5216S, XS5212D, XS5212S
XS5226D, XS5226S, XS3224D, XS3224S, XS3216D, XS3216S
XS3212D, XS3212S, XS3226D, XS3226S, XS1224D, XS1224S
XS1216D, XS1216S, XS1212D, XS1212S, XS1226D, XS1226S

QSAN Technology, Inc.
www.QSAN.com

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Notices

This XCubeSAN hardware owner's manual is applicable to the following XCubeSAN models:

XCubeSAN Storage System 4U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5224D	Dual Controller	LFF 24-disk 4U Chassis
XS5224S	Single Controller	LFF 24-disk 4U Chassis
XS3224D	Dual Controller	LFF 24-disk 4U Chassis
XS3224S	Single Controller	LFF 24-disk 4U Chassis
XS1224D	Dual Controller	LFF 24-disk 4U Chassis
XS1224S	Single Controller	LFF 24-disk 4U Chassis

XCubeSAN Storage System 3U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5216D	Dual Controller	LFF 16-disk 3U Chassis
XS5216S	Single Controller	LFF 16-disk 3U Chassis
XS3216D	Dual Controller	LFF 16-disk 3U Chassis
XS3216S	Single Controller	LFF 16-disk 3U Chassis
XS1216D	Dual Controller	LFF 16-disk 3U Chassis
XS1216S	Single Controller	LFF 16-disk 3U Chassis

XCubeSAN Storage System 2U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5212D	Dual Controller	LFF 12-disk 2U Chassis
XS5212S	Single Controller	LFF 12-disk 2U Chassis
XS3212D	Dual Controller	LFF 12-disk 2U Chassis
XS3212S	Single Controller	LFF 12-disk 2U Chassis
XS1212D	Dual Controller	LFF 12-disk 2U Chassis
XS1212S	Single Controller	LFF 12-disk 2U Chassis
XS5226D	Dual Controller	SFF 26-disk 2U Chassis
XS5226S	Single Controller	SFF 26-disk 2U Chassis
XS3226D	Dual Controller	SFF 26-disk 2U Chassis

XS3226S	Single Controller	SFF 26-disk 2U Chassis
XS1226D	Dual Controller	SFF 26-disk 2U Chassis
XS1226S	Single Controller	SFF 26-disk 2U Chassis

Information contained in this manual has been reviewed for accuracy. But it could include typographical errors or technical inaccuracies. Changes are made to the document periodically. These changes will be incorporated in new editions of the publication. QSAN may make improvements or changes in the products. All features, functionality, and product specifications are subject to change without prior notice or obligation. All statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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.

Regulatory Statements

FCC Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: FCC Part 15 Class A

IC ICES-003

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

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCC1-A

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

CE Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: EMC DIRECTIVE 2014/30/EU

                                       (EN55022 / EN55024)

UL Statement

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading – Careful consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

QSAN

> ⚠️ **CAUTION:**
> The main purpose of the system left and right ears are for 19" rack use only. Do NOT use those ears to carry or transport the system.

The ITE is not intended to be installed and used in a home, school or public area accessible to the general population, and the thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

Warning: Always remove all power supply cords before service

This equipment intended for installation in restricted access locations.

- Access should only be allowed by qualified SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.
- Recommended operation temperature: 0 ~ 40°C (31.99 ~ 103.99°F); operation rating (100-127 Vac, 50-60Hz, 10.0A; 200-240 Vac, 50-60Hz, 5.0A)

> ⚠️ **CAUTION: (English)**
> Risk of explosion if battery is replaced by incorrect type. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.
>
> **ATTENTION: (French)**
> IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACEE PAR UNE BATTERIE DE TYPE INCORRECT. METTRE AU REBUT LES BATTERIES USAGEES CONFORMEMENT AUX INSTRUCTIONS.
>
> **VORSICHT: (German)**
> Explosionsgefahr bei unsachgemasem Austausch der Batterie. Entsorgung gebrauchter Batterien nach Anleitung.
>
> **ADVERTENCIA: (Spanish)**
> Las baterias pueden explotar si no se manipulan de forma apropiada. No desmonte ni tire las baterias al fuego. Siga las normativas locales al desechar las baterias agotadas.
>
> **警告: (Simplified Chinese)**
> 电池如果更换不正确会有爆炸的危险，请依制造商说明处理用过之电池。

警告: (Traditional Chinese)

電池如果更換不正確會有爆炸的危險，請依製造商說明處理用過之電池。

CAUTION:

Replacing incorrect type of battery will have the risk of explosion. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.

CAUTION: Restricted Access Location

This system is intended for installation only in restricted access locations as defined where both these conditions apply:

- Access can only be gained by service persons or by users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.

- Access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Warning

- Electric shock hazard

- The system may have one or more power supply unit (PSU) cords. To avoid serious injuries, it is recommended that all PSU power cords must be disconnected by trained service technicians before installing or replacing system components.

INFORMATION:

QSAN provides limited warranty for QSAN-branded hardware products:

- System hardware and peripheral product (s): **3** years limited warranty from date of original purchase.

- Battery Backup Module or super capacitor module (applies for cache-to-flash module): **1** year limited warranty from date of original purchase.

For more detail warranty policy, please refer to QSAN official web site:

https://www.qsan.com/warranty

Preface

About This Manual

This manual provides technical guidance for designing and implementing QSAN XCubeSAN series SAN system, and it is intended for use by system administrators, SAN designers, storage consultants, or anyone who has purchased these products and is familiar with servers and computer networks, network administration, storage system installation and configuration, storage area network management, and relevant protocols.

> **CAUTION:**
> Do NOT attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this owner's manual.

Related Documents

There are related documents which can be downloaded from the website.

- [XCubeSAN QIG (Quick Installation Guide)](#)
- [XCubeSAN Hardware Manual](#)
- [XCubeSAN Configuration Worksheet](#)
- [XCubeSAN SANOS 4.0 Software Manual](#)
- [Compatibility Matrix](#)
- [White Papers](#)
- [Application Notes](#)

Technical Support

Do you have any questions or need help trouble-shooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: https://www.qsan.com/technical_support

- Via Telephone: +886-2-7720-6355
  (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
  (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: support@qsan.com

Information, Tip, and Caution

This manual uses the following symbols to draw attention to important safety and operational information.

	INFORMATION: INFORMATION provides useful knowledge, definition, or terminology for reference.

	TIP: TIP provides helpful suggestions for performing tasks more effectively.

	CAUTION: CAUTION indicates that failure to take a specified action could result in damage to the system.

Conventions

The following table describes the typographic conventions used in this manual.

Conventions	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click the **OK** button.
<Italic>	Indicates a variable, which is a placeholder for actual text provided

	by the user or system.
	Example: copy *<source-file> <target-file>*.
[ ] square brackets	Indicates optional values.
	Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values.
	Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments.
/ Slash	Indicates all options or arguments.
underline	Indicates the default value.
	Example: [<u>a</u> | b]

1. Overview

Thank you for purchasing QSAN Technology, Inc. products. The QSAN XCubeSAN series is a high-performance SAN storage solutions combining outstanding performance with high availability, reliability, flexibility, and simple management.

1.1. XCubeSAN Series Product Overview

QSAN XCubeSAN series is a SAN storage system, the system is composed of system hardware and the SANOS operating system, the system hardware is a modular design and FRU (Field Replacement Unit) optimized. All the hardware modules are inside the rack mount chassis including: system controllers, front panel, rear panel, redundant power supply and fan modules, cache-to-flash module (by using battery backup module or super capacitor module), and expansion slots for optional Fibre Channel or 10GbE / 1GbE iSCSI host cards. This manual will direct you step by step to familiarize you with the XCubeSAN hardware components, how to install the system, carry out the initial configuration, and provide you with some quick maintenance guidelines.

> **INFORMATION:**
> For how to use the SANOS operating system, please refer to the
> [XCubeSAN SANOS 4.0 Software Manual](#).

XCubeSAN series supports several standard form factors:

- LFF (Large Form Factor): 12-bay 19" rack mount 2U chassis, 16-bay 19" rack mount 3U chassis, and 24-bay 19" rack mount 4U chassis.
- SFF (Small Form Factor): 26-bay 19" rack mount 2U chassis.

24-bay 4U 19" rack mount chassis   16-bay 3U 19" rack mount chassis

12-bay 2U 19" rack mount chassis   26-bay 2U 19" rack mount chassis
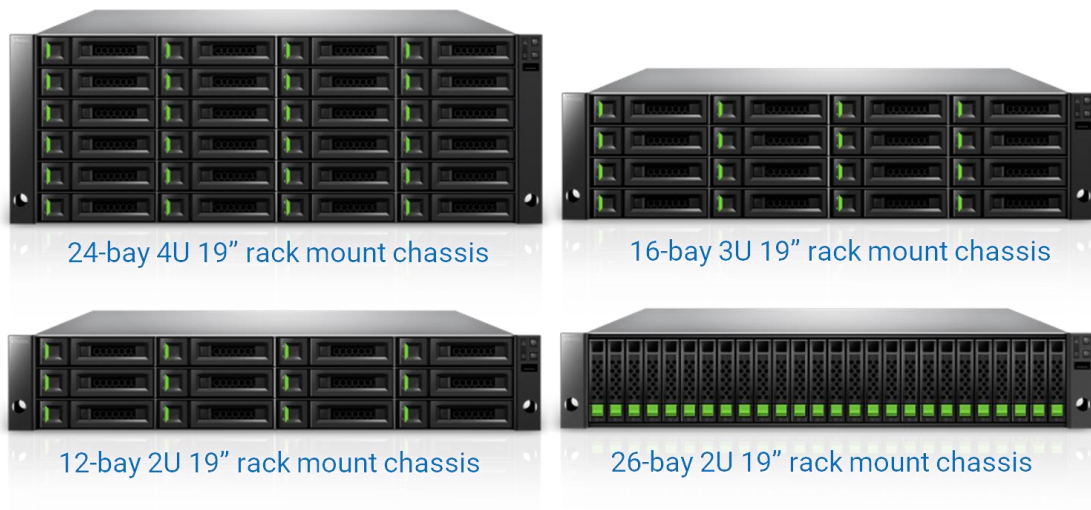
Figure 1-1   *Form Factors of All XCubeSAN Series Models*

The following tables provide detailed information about all XCubeSAN Series models arranged by form factors.

Table 1-1   *XCubeSAN Series Storage System 4U 19" Rack Mount Models*

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5224D	Dual Controller	LFF 24-bay 4U Chassis
XS5224S	Single Controller	LFF 24-bay 4U Chassis
XS3224D	Dual Controller	LFF 24-bay 4U Chassis
XS3224S	Single Controller	LFF 24-bay 4U Chassis
XS1224D	Dual Controller	LFF 24-bay 4U Chassis
XS1224S	Single Controller	LFF 24-bay 4U Chassis

Table 1-2   *XCubeSAN Series Storage System 3U 19" Rack Mount Models*

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5216D	Dual Controller	LFF 16-bay 3U Chassis
XS5216S	Single Controller	LFF 16-bay 3U Chassis
XS3216D	Dual Controller	LFF 16-bay 3U Chassis
XS3216S	Single Controller	LFF 16-bay 3U Chassis
XS1216D	Dual Controller	LFF 16-bay 3U Chassis

XS1216S	Single Controller	LFF 16-bay 3U Chassis

Table 1-3   XCubeSAN Series Storage System 2U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XS5212D	Dual Controller	LFF 12-bay 2U Chassis
XS5212S	Single Controller	LFF 12-bay 2U Chassis
XS3212D	Dual Controller	LFF 12-bay 2U Chassis
XS3212S	Single Controller	LFF 12-bay 2U Chassis
XS1212D	Dual Controller	LFF 12-bay 2U Chassis
XS1212S	Single Controller	LFF 12-bay 2U Chassis
XS5226D	Dual Controller	SFF 26-bay 2U Chassis
XS5226S	Single Controller	SFF 26-bay 2U Chassis
XS3226D	Dual Controller	SFF 26-bay 2U Chassis
XS3226S	Single Controller	SFF 26-bay 2U Chassis
XS1226D	Dual Controller	SFF 26-bay 2U Chassis
XS1226S	Single Controller	SFF 26-bay 2U Chassis

1.2.   XCubeSAN Series Hardware Features

The following is a list of the key hardware components and optional components of the XCubeSAN series for reference.

- Dual-Active (Active/Active) controller design architecture
- Processor

    XS5200 series: Intel Xeon 4-core processor (8-core processor models are also available)
    ◦ XS3200 series: Intel 4-core processor
    ◦ XS1200 series: Intel 2-core processor

- Standard system memory capacity

    ◦ XS5200 series: DDR4 8GB (2 x 4GB), and up to 128GB (4 x 32GB) per controller
    ◦ XS3200 series: DDR4 4GB (1 x 4GB), and up to 128GB (4 x 32GB) per controller
    ◦ XS1200 series: DDR4 4GB (1 x 4GB), and up to 32GB (2 x 16GB) per controller

- SAS 3.0 backplane board
- Built-in two 10GbE iSCSI ports per controller
- Redundant power supply units
- Redundant fan modules

- Storage capacity expansion with XCubeDAS XD5300 series 12Gb SAS RAID expansion enclosures
- Each controller has two host card slots allowing you to select your desired host cards configuration. Optional host cards are on the following.
  - 2 x 32Gb Fibre Channel (SFP28) ports (Slot 2 provides 20Gb bandwidth)
  - 4 x 16Gb Fibre Channel (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 2 x 16Gb Fibre Channel (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 2 x 25GbE iSCSI (SFP28) ports (Slot 2 provides 20Gb bandwidth)
  - 4 x 10GbE iSCSI (SFP+) ports (Slot 2 provides 20Gb bandwidth)
  - 2 x 10GBASE-T iSCSI (RJ45)
  - 4 x 1GBASE-T iSCSI (RJ45)
- A Cache-to-Flash module is also available for the protection of the system cache data in your XCubeSAN system
  - BBM (Battery Backup Module) + flash module (to protect all memory capacity)
  - SCM (Super Capacitor Module) + flash module (to protect up to 16GB memory per controller)
- You can also use SSDs to boost your overall system speed. If you purchase SATA SSDs for your dual controller XCubeSAN system; you have to purchase 6G MUX board from QSAN channel partners. Because there are different LFF and SFF disk drive trays, 6G MUX board is needed to adapt to the type of bracket:
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into LFF 3.5" disk drive tray
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into SFF 2.5" disk drive tray

1.3. XCubeSAN Series Hardware Specifications

Following tables are hardware specifications of XCubeSAN series.

Table 1-4   XS5200 Series Hardware Specifications

Model name	XS5224D (Dual) XS5224S (Single)	XS5216D (dual) XS5216S (Single)	XS5212D (Dual) XS5212S (Single)	XS5226D (Dual) XS5226S (Single)
Form Factor	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
RAID Controller	Dual-active or Single-upgradable controller			
Processor	Intel Xeon 4-core processor (8-core processor models are also available)			

Memory (per Controller)	DDR4 ECC 8GB, up to 128GB (four DIMM slots, insert two DIMMs or more will boost performance)			
Host Connectivity (per Controller)	Optional Host Cards at Slot 1 (PCIe Gen3 x 8) • 2 x 32Gb FC (SFP28) ports • 4 x 16Gb FC (SFP+) ports • 2 x 16Gb FC (SFP+) ports • 2 x 25GbE iSCSI (SFP28) ports • 4 x 10GbE iSCSI (SFP+) ports • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports Optional Host Cards at Slot 2 (PCIe Gen2 x 4) • 2 x 32Gb FC (SFP28) ports[1] • 4 x 16Gb FC (SFP+) ports[1] • 2 x 16Gb FC (SFP+) ports[1] • 2 x 25GbE iSCSI (SFP28) ports[1] • 4 x 10GbE iSCSI (SFP+) ports[1] • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports			
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port			
Expansion Connectivity (per Controller)	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
Drive Type	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA[2] SSD			2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA[2] SSD
Expansion Capabilities	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure • XD5324 (4U 24-bay, LFF) • XD5316 (3U 16-bay, LFF) • XD5312 (2U 12-bay, LFF) • XD5326 (2U 26-bay, SFF) Up to 4 expansion units using third party (LFF 102-bay) 12Gb SAS expansion enclosure			
Max. Drives Supported	432	424	420	434
Dimension (H x W x D)	19" Rack mount	19" Rack mount	19" Rack mount	19" Rack mount

	170.3 x 438 x 515 mm	130.4 x 438 x 515 mm	88 x 438 x 515 mm	88 x 438 x 491 mm
Memory Protection	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)			
LCM (LCD Module)	USB LCM (optional)			
Power Supply	770W/850W 1+1 redundant 80 PLUS Platinum			
Fan Module	2 x hot pluggable / redundant fan modules			
Temperature	Operating temperature 0°C to 40°C Shipping temperature -10°C to 50°C			
Relative Humidity	Operating relative humidity 20% to 80% non-condensing Non-operating relative humidity 10% to 90%			

[1] Slot 2 provides 20Gb bandwidth.

[2] 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

Table 1-5   XS3200 Series Hardware Specifications

Model name	XS3224D (Dual) XS3224S (Single)	XS3216D (Dual) XS3216S (Single)	XS3212D (Dual) XS3212S (Single)	XS3226D (Dual) XS3226S (Single)
Form Factor	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
RAID Controller	Dual-active or Single-upgradable controller			
Processor	Intel 4-core processor			
Memory (per Controller)	DDR4 ECC 4GB, up to 128GB (four DIMM slots, insert two DIMMs or more will boost performance)			
Host Connectivity (per Controller)	Optional Host Cards at Slot 1 (PCIe Gen3 x 8) • 2 x 32Gb FC (SFP28) ports • 4 x 16Gb FC (SFP+) ports • 2 x 16Gb FC (SFP+) ports • 2 x 25GbE iSCSI (SFP28) ports • 4 x 10GbE iSCSI (SFP+) ports • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports Optional Host Cards at Slot 2 (PCIe Gen2 x 4) • 2 x 32Gb FC (SFP28) ports[1] • 4 x 16Gb FC (SFP+) ports[1]			

	• 2 x 16Gb FC (SFP+) ports[1] • 2 x 25GbE iSCSI (SFP28) ports[1] • 4 x 10GbE iSCSI (SFP+) ports[1] • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port

Expansion Connectivity (per Controller)	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
Drive Type	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA[2] SSD			2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA[2] SSD
Expansion Capabilities	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure • XD5324 (4U 24-bay, LFF) • XD5316 (3U 16-bay, LFF) • XD5312 (2U 12-bay, LFF) • XD5326 (2U 26-bay, SFF) Up to 4 expansion units using third party (LFF 102-bay) 12Gb SAS expansion enclosure			
Max. Drives Supported	432	424	420	434
Dimension (H x W x D)	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm
Memory Protection	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)			
LCM (LCD Module)	USB LCM (optional)			
Power Supply	770W/850W 1+1 redundant 80 PLUS Platinum			
Fan Module	2 x hot pluggable / redundant fan modules			
Temperature	Operating temperature 0°C to 40°C Shipping temperature -10°C to 50°C			
Relative Humidity	Operating relative humidity 20% to 80% non-condensing			

	Non-operating relative humidity 10% to 90%

[1] Slot 2 provides 20Gb bandwidth.

[2] 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

Table 1-6   XS1200 Series Hardware Specifications

Model name	XS1224D (Dual) XS1224S (Single)	XS1216D (Dual) XS1216S (Single)	XS1212D (Dual) XS1212S (Single)	XS1226D (Dual) XS1226S (Single)
Form Factor	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
RAID Controller	Dual-active or Single-upgradable controller			
Processor	Intel 2-core processor			
Memory (per Controller)	DDR4 ECC 4GB, up to 32GB (two DIMM slots, insert two DIMMs will boost performance)			
Host Connectivity (per Controller)	Optional Host Cards at Slot 1 (PCIe Gen3 x 8) • 2 x 32Gb FC (SFP28) ports • 4 x 16Gb FC (SFP+) ports • 2 x 16Gb FC (SFP+) ports • 2 x 25GbE iSCSI (SFP28) ports • 4 x 10GbE iSCSI (SFP+) ports • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports Optional Host Cards at Slot 2 (PCIe Gen2 x 4) • 2 x 32Gb FC (SFP28) ports[1] • 4 x 16Gb FC (SFP+) ports[1] • 2 x 16Gb FC (SFP+) ports[1] • 2 x 25GbE iSCSI (SFP28) ports[1] • 4 x 10GbE iSCSI (SFP+) ports[1] • 2 x 10GbE iSCSI (RJ45) ports • 4 x 1GbE iSCSI (RJ45) ports			
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port			
Expansion Connectivity (per Controller)	Built-in 2 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
Drive Type	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA[2] SSD			2.5" SAS, NL-SAS, SED HDD

					2.5" SAS, SATA[2] SSD
Expansion Capabilities	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure • XD5324 (4U 24-bay, LFF) • XD5316 (3U 16-bay, LFF) • XD5312 (2U 12-bay, LFF) • XD5326 (2U 26-bay, SFF) Up to 4 expansion units using third party (LFF 102-bay) 12Gb SAS expansion enclosure				
Max. Drives Supported	432	424	420	434	
Dimension (H x W x D)	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm	
Memory Protection	Cache-to-Flash module (optional) Battery backup module + Flash module (to protect all memory capacity) Super capacitor module + Flash module (to protect up to 16GB memory per controller)				
LCM (LCD Module)	USB LCM (optional)				
Power Supply	770W/850W 1+1 redundant 80 PLUS Platinum				
Fan Module	2 x hot pluggable / redundant fan modules				
Temperature	Operating temperature 0°C to 40°C Shipping temperature -10°C to 50°C				
Relative Humidity	Operating relative humidity 20% to 80% non-condensing Non-operating relative humidity 10% to 90%				

[1] Slot 2 provides 20Gb bandwidth.

[2] 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

1.4. XCubeSAN Series Package Contents

Following list are the package contents for the XCubeSAN series models.

• System Chassis (x1)
• Disk Drive Trays

  ◦ XS5224 / XS3224 / XS1224 (4U 24-bay, LFF): 3.5" Disk Drive Tray (x24)

- XS5216 / XS3216 / XS1216 (3U 24-bay, LFF): 3.5" Disk Drive Tray (x16)
- XS5212 / XS3212 / XS1212 (2U 12-bay, LFF): 3.5" Disk Drive Tray (x12)
- XS5226 / XS3226 / XS1226 (2U 26-bay, SFF): 2.5" Disk Drive Tray (x26)

- AC Power Cords (x2)
- RS-232 Console Cable (x2) for Dual Controller Model; (x1) for Single Controller Model
- Screws Pack for Disk Drives
- Quick Installation Guide

1.5. XCubeSAN Series Optional Accessories

Following list are optional components for all XCubeSAN series models. If you want to purchase these optional components, please contact your nearest local reseller or visit QSAN official web site: https://qsan.com/location

Table 1-7   XCubeSAN Series Accessories

Model Name	Picture	Description	Applied Models
DIM-D44GB		DDR4 ECC 4GB Memory Module	XS5200 Series XS3200 Series XS1200 Series
DIM-D48GB		DDR4 ECC 8GB Memory Module	
DIM-D416GB		DDR4 ECC 16GB Memory Module	
DIM-D432GB		DDR4 ECC 32GB Memory Module	XS5200 Series XS3200 Series
C2F-BM128G		Cache-to-Flash Module : C2F-BBMD + C2F-FLHMD	XS5200 Series XS3200 Series XS1200 Series
C2F-SP128G		Cache-to-Flash Module : C2F-SP16G + C2F-FLHMD (Protect up to 16GB memory per controller)	
C2F-BBMD		Battery Backup Module for Cache-to-Flash	
C2F-SP16G		Super Capacitor Module for Cache-to-Flash (Protect up to 16GB memory per controller)	
C2F-FLHMD		Flash Module for Cache-to-	

		Flash	
RHCF32P2		2-port 32Gb Fibre Channel Host Card (SFP28)	
HQ-16F4S2		4-port 16Gb Fibre Channel Host Card (SFP+)	
HQ-16F2S2		2-port 16Gb Fibre Channel Host Card (SFP+)	
RHCE25P2		2-port 25GbE iSCSI Host Card (SFP28)	
HQ-10G4S2		4-port 10GbE iSCSI Host Card (SFP+)	
HQ-10G2T		2-port 10GBASE-T iSCSI Host Card (RJ45)	
HQ-01G4T		4-port 1GBASE-T iSCSI Host Card (RJ45)	
RGBF32P0		32G Fibre Channel SFP28 Optical Transceiver	
GBC-SFP+16Gb-J		16G Fibre Channel SFP+ Optical Transceiver	
RGBE25P0		25GBASE-SR SFP28 Optical Transceiver	
GBC-SFP+10Gb-F		10GBASE-SR SFP+ Optical Transceiver	
GBC-SFP+8Gb-F		8G Fibre Channel SFP+ Optical Transceiver	
CBL-OPL500		Optical FC Cable, LC-LC, 5 Meters	
CBL-OPL200		Optical FC Cable, LC-LC, 2 Meters	
CBL-CNL		Console Cable, Phone-jack, 1 Meter	

CBL-UPS		UPS Cable, Phone-jack, 1 Meter	
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	
LCM-U162		Portable USB LCM	
SLR-RM3640		Slide Rail	
HDT-351		3.5" Disk Drive Tray	XS5224 XS5216 XS5212 XS3224 XS3216 XS3212 XS1224 XS1216 XS1212
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	
HDT-251		2.5" Disk Drive Tray	XS5226 XS3226 XS1226
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

2. System Components Overview

This chapter outlines the key hardware components or modules of the XCubeSAN system. After reading this chapter, you will have a basic understanding of each part of the XCubeSAN hardware and give you the ability to be able to successfully configure and operate your system. Following is the list of key components or modules of XCubeSAN:

- Front Panel
- System Disk Drive Numbering
- Supported Disk Drives and SSDs
- Rear Panel
- Power Unit
- Fan Module
- Cache-to-Flash Module

2.1. Front Panel

The XCubeSAN Series features a unique design: the system controls and indicators is located on the right ear. The system controls and indicators module integrates functional buttons and system state indicators, which can be easily operated and read by user. The figure below contains detailed information about the button and indicators module. For a greater understanding of the related colors and behaviors of each indicator on the front panel, please refer to the chapter 5.1, Front Panel section in the Descriptions of LEDs and Buttons chapter.

System Controls and Indicators
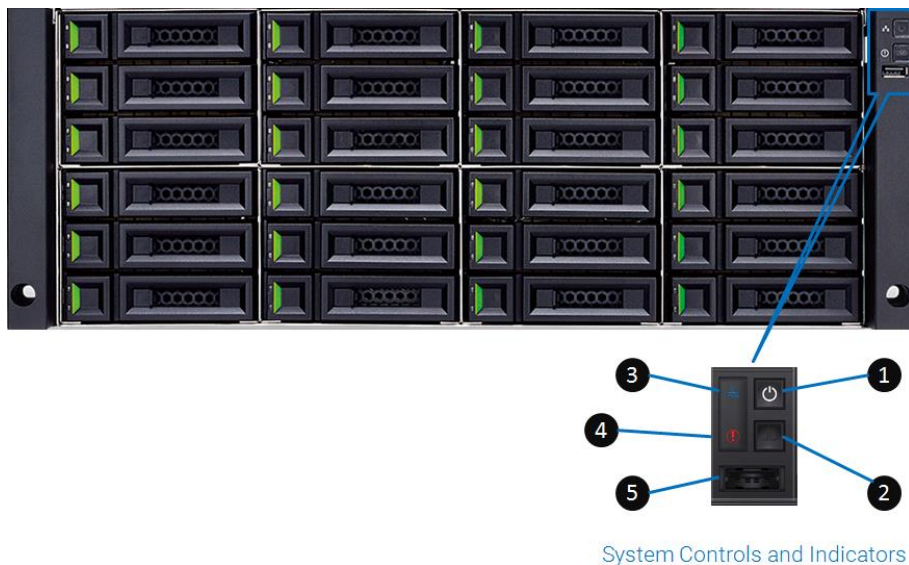
Figure 2-1   System Controls and Indicators

Table 2-1   Descriptions of System Controls and Indicators

Number	Description
1	System Power Button/LED
2	UID (Unique Identifier) Button/LED
3	System Access LED
4	System Status LED
5	USB Port (for USB LCM module)

Figures and the table below illustrate LFF & SFF system front panel components.

Figure 2-2   LFF & SFF System Front Panel Components

Table 2-2   LFF & SFF System Front Panel Components

Number	Description
1	System Left Ear
2	Disk Drive Tray
3	System Right Ear
4	The System Controls and Indicators

- Disk Drive Tray Indicators: figures and the table below illustrate LFF and SFF disk drive tray indicators.

LFF Disk Drive Tray   SFF Disk Drive Tray
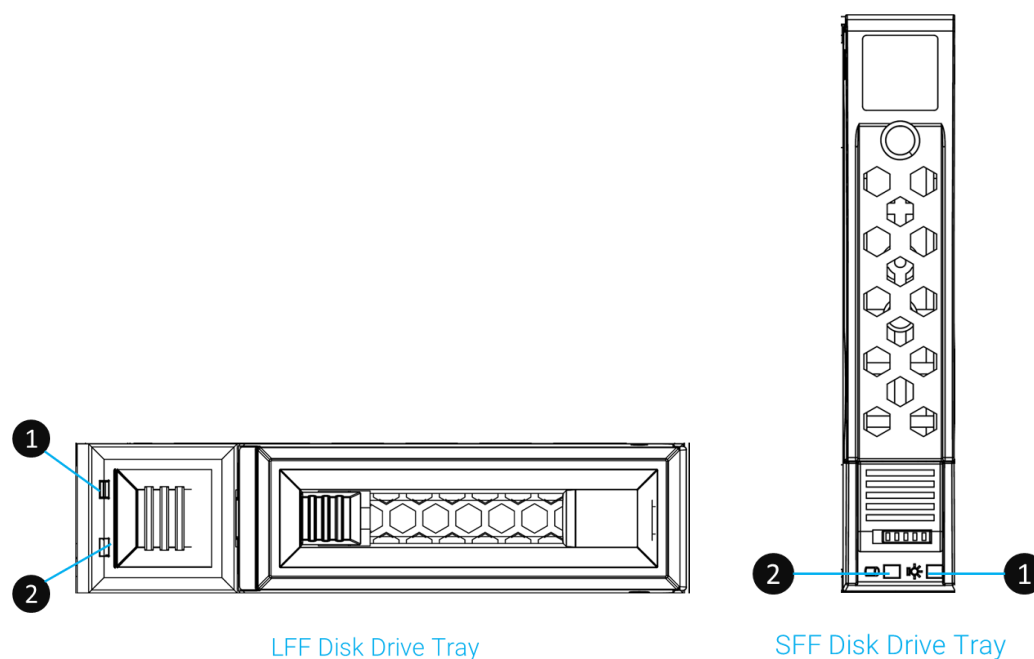
Figure 2-3   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 2-3   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Number	Description
1	Disk Drive Power LED
2	Disk Drive Status LED

For a greater understanding of the related color and the behavior of the disk drive, please refer to the chapter 5.1, Front Panel section in the Descriptions of LEDs and Buttons chapter.

2.2.   System Disk Drive Numbering

Figures below illustrate the XCubeSAN system disk drive numbering. The disk drive numbering for LFF system starts from the top of first row in left column; this kind of disk drive numbering rule helps to balance the system weight distribution and enable easy management of disk drives zoning. The SFF system disk drive numbering is single row from left to right. If you want to check the disk drive numbering rule while installing the disk drives into the system, for LFF, you can find a disk drive numbering sticker on the right side of the system chassis top cover; for SFF system, the disk drive numbering is printed on the lower part of the system front.
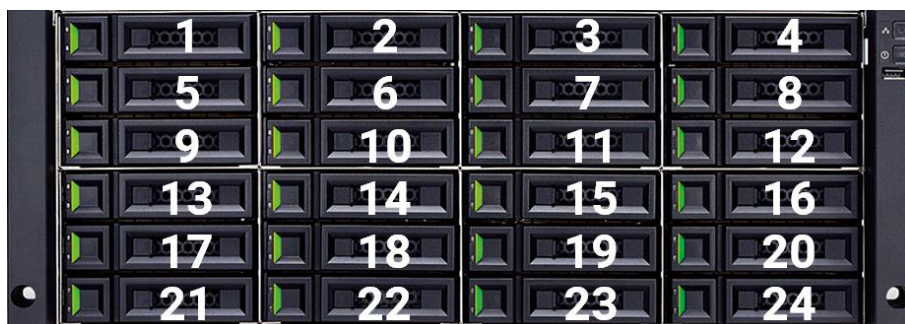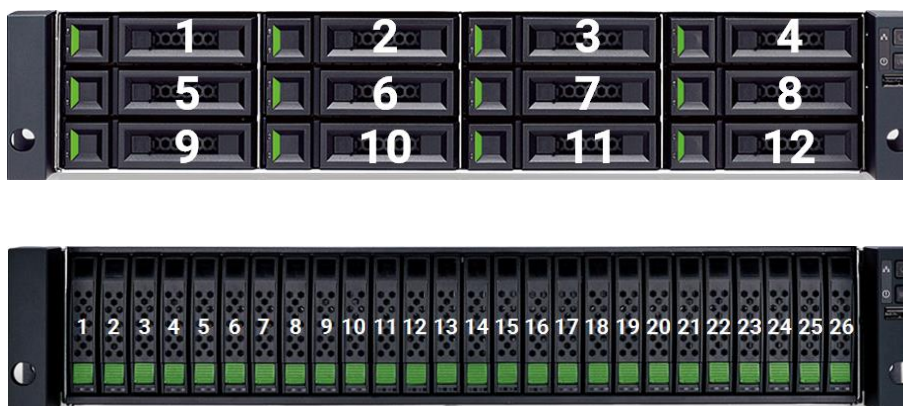
Figure 2-4   System Disk Drive Numbering for the XCubeSAN Series

> **TIP:**
> Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved.

2.3.   Supported Disk Drives and SSDs

The table below shows supported disk drives and SSDs for all XCubeSAN series models. This can be a reference for you to purchase suitable disk drives or SSDs for your system.

QSAN has qualified the popular SAS HDDs and SAS/SATA SSDs available in the market; to ensure that you have the highest level of flexibility in choosing the most advanced HDDs or SSDs available from the manufacturers or purchase the best cost/performance SAS HDDs or SAS/SATA SSDs from the market, to suit your budget/performance. We hope that this will significantly reduce your IT infrastructure investment cost. If you want to check the compatible HDDs or SSDs for your XCubeSAN system, please refer to the Compatibility Matrix table.

Table 2-4   Supported Disk Drive Types

Form Factor of Disk Drive Tray	Drive Type	Connection Interface
LFF 3.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA[3]
SFF 2.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA[4]

2.4.   Rear Panel

The following content outlines the detail of the XCubeSAN series rear panel and components. In this section, you will learn the name and location of the key components and modules in the rear panel.

2.4.1.   Rear Panel Layout

Figures and the table below illustrate the LFF and SFF system rear panel layout.
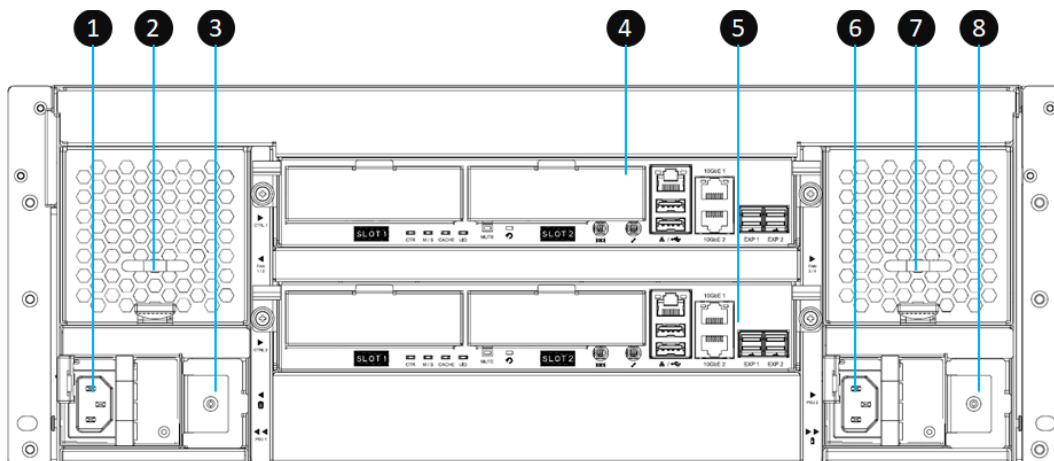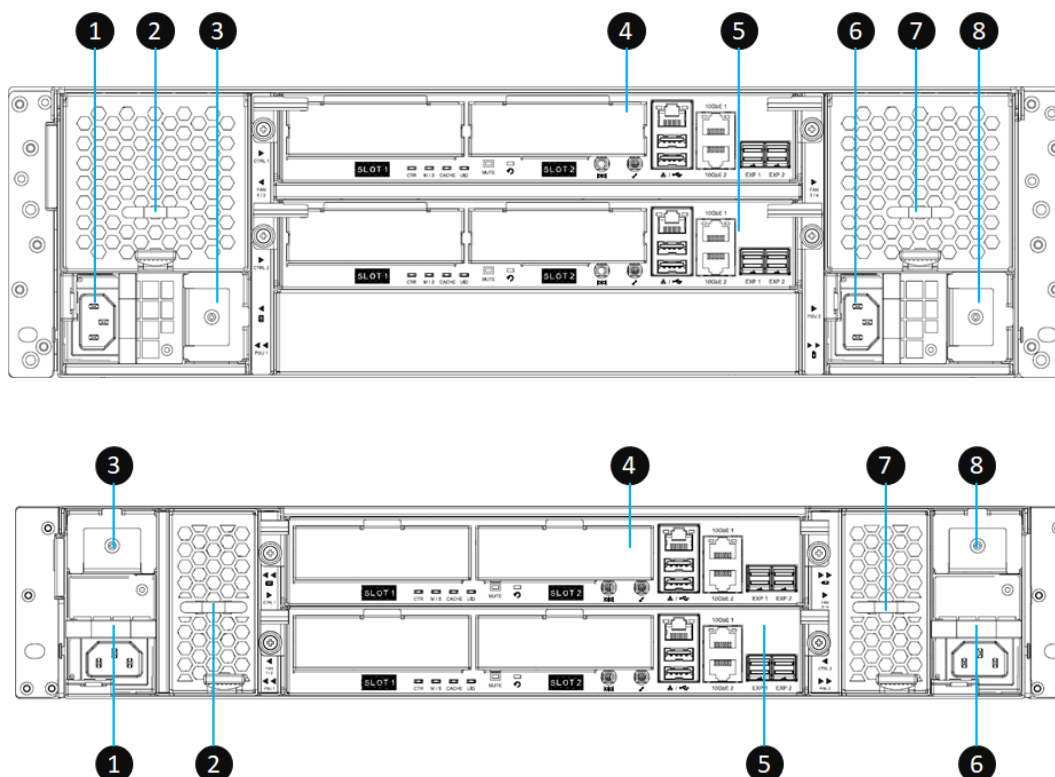
Figure 2-5   LFF & SFF Rear Panel Layout

Table 2-5   LFF & SFF Rear Panel Layout

Number	Description
1	Power Supply Unit 1
2	Fan Module 1
3	Slot for Cache-to-Flash Module: Flash Module
4	Controller Module 1[5]
5	Controller Module 2
6	Power Supply Unit 2
7	Fan Module 2
8	Slot for Cache-to-Flash Module: Power Module

INFORMATION:

[5] If the XCubeSAN chassis is configured with a single controller module, the controller module MUST be installed in the upper slot.

2.4.2. Controller Module

The following image and table illustrate each component of a controller module. In this section, you will learn the name and location of each port, LED and host cards (optional parts).
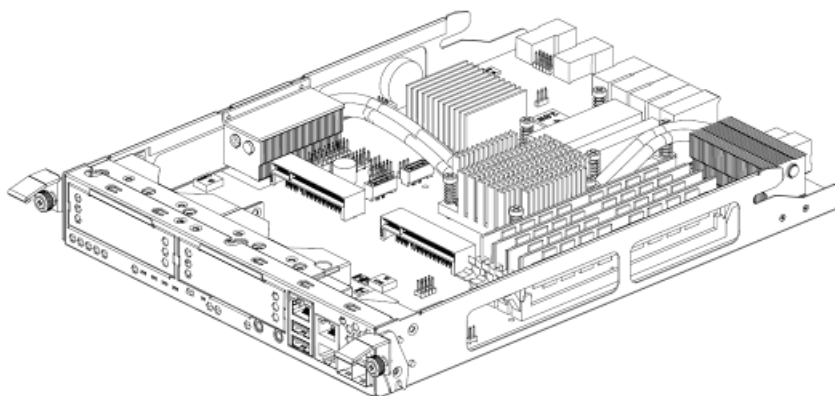
Figure 2-6   General View of the Controller Module

CTR = Controller Status LED   CACHE = Dirty Cache LED

M/S = Master/Slave LED   UID = Unique Identifier LED
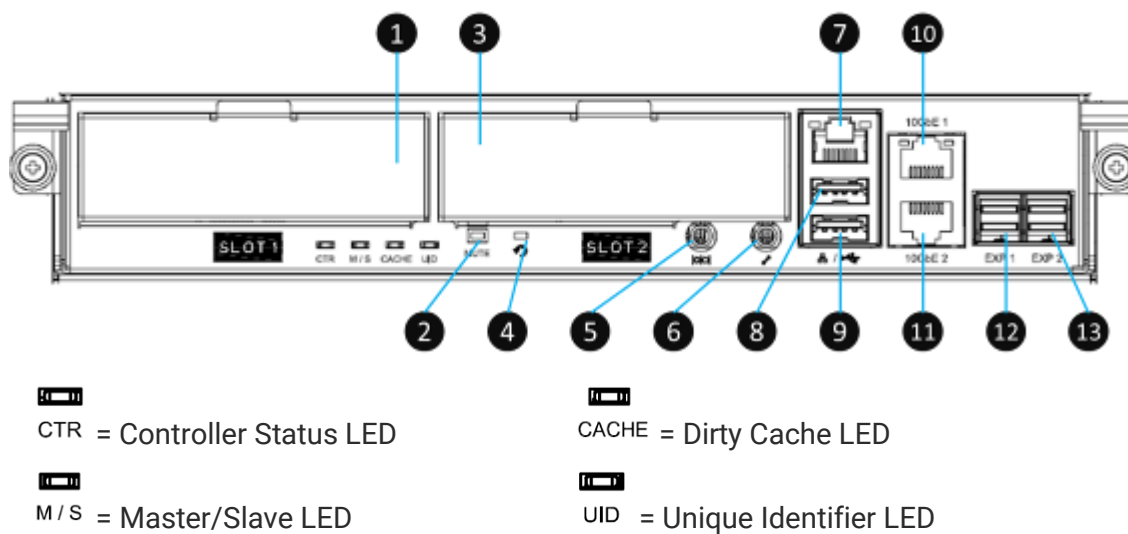
Figure 2-7   Components of the Controller Module

Table 2-6   Description of the Controller Module Components

Number	Description
1	Host Card Slot 1 (host card is an optional part)
2	Buzzer Mute Button
3	Host Card Slot 2 (host card is an optional part)

4	Reset Button[6]
5	Console Port (3.5mm jack to RS232)[7]
6	Service Port (UPS)[8]
7	Management Port
8	USB Port 1
9	USB Port 2
10	10GbE iSCSI (RJ45) Port 1
11	10GbE iSCSI (RJ45) Port 2
12	12Gb/s SAS Wide Port 1 (SFF8644)
13	12Gb/s SAS Wide Port 2 (SFF8644)

INFORMATION:

[6] Press the button for 3 seconds to progress reset the management port IP and admin's password immediately. The default settings are:

- Reset **Management Port** IP address to DHCP, and then fix IP address: 169.254.1.234/16. It is recommended to confirm the IP address obtained by DHCP through the optional USB LCM.
- Reset admin's **Password** to 1234.

[7] Console cable (NULL modem cable) to connect from console port of the storage system to a RS 232 port on the management PC. The console settings are on the following: Baud rate: 115,200, 8 data bit, no parity, 1 stop bit, and no flow control; terminal Type: vt100.

[8] XCubeSAN series supports traditional UPS via a serial port and network UPS via SNMP. If using the UPS with a serial port, connect the system to the UPS via the included cable for communication. (The cable plugs into the serial cable that comes with the UPS.) Then set up the shutdown values for when the power goes out.

For a greater understanding of the related color and the behavior of the controller module, please refer to the chapter 5.2, Rear Panel section in the Descriptions of LEDs and Buttons chapter.

2.5.   Power Supply Unit

All XCubeSAN series models are equipped with two redundant and hot swappable PSUs (Power Supply Units). The PSU for 3U/4U systems and 2U systems are the same, but the installation direction is different. (If you pull out the PSU from the system chassis, for 4U/3U system, the sticker on the PSU will be at down side; for 2U system, the sticker will be at right side). The images and the table below illustrate the location of PSU in the LFF or SFF system.
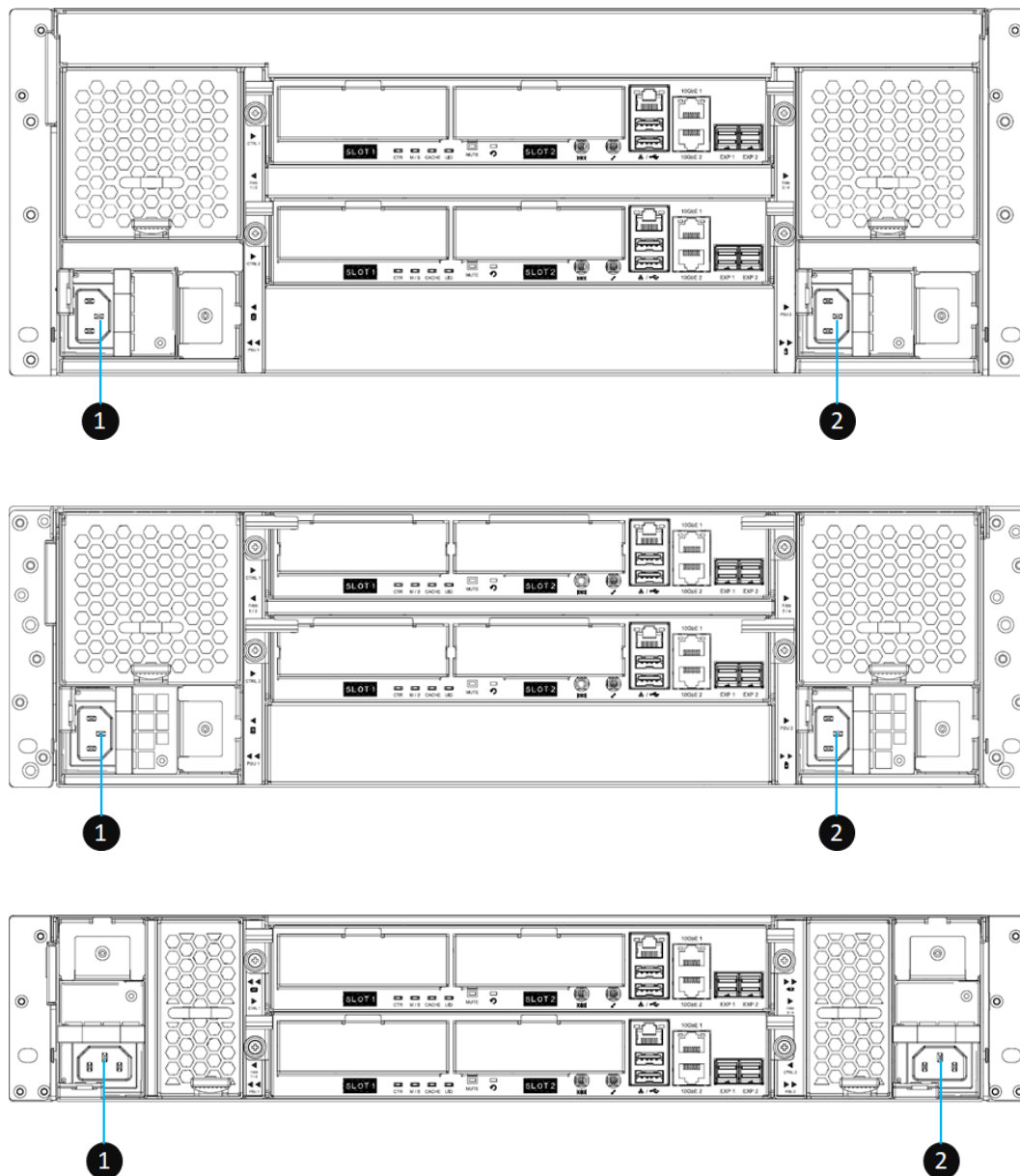
Figure 2-8   Location of the Power Supply Unit in the LFF or SFF System

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Table 2-7   Location of the Power Supply Unit in the LFF or SFF System

Number	Description
1	PSU 1
2	PSU 2
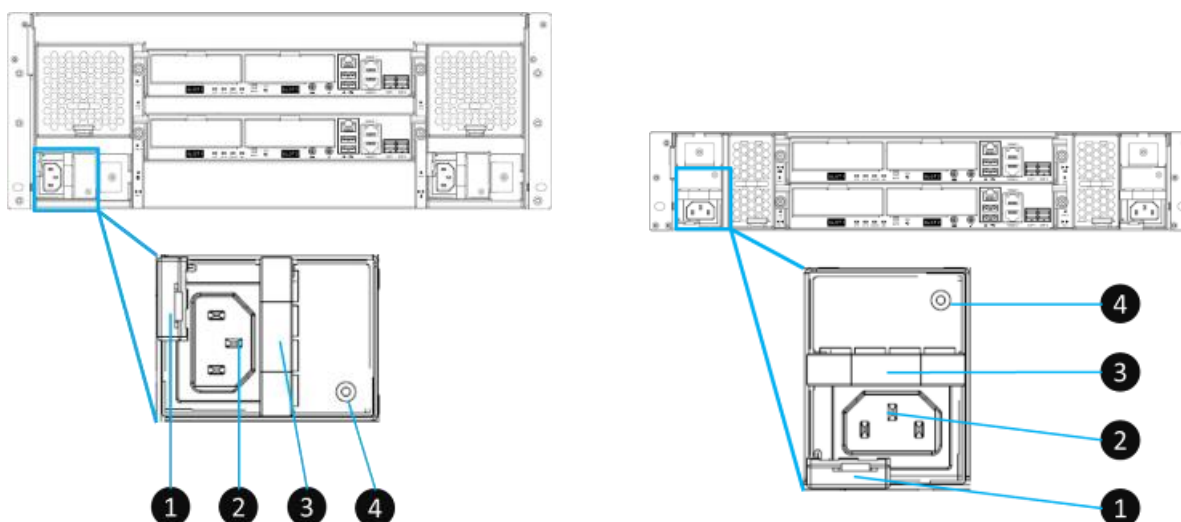
Figure 2-9   Components of the Power Supply Unit

Table 2-8   Components of the Power Supply Unit

Number	Description
1	PSU Release Tab
2	PSU Power Cord Connect
3	PSU Handle
4	PSU LED Indicator

If you want to learn more about the related color and behavior of the PSU LED, please refer to the chapter 5.2, Rear Panel section in the Descriptions of LEDs and Buttons chapter.

2.6.   Fan Module

All XCubeSAN series models are equipped with two redundant and hot swappable fan modules. The fan module for 4U/3U systems are the same, however 2U systems are different. Each fan module includes two fans. Images and tables below illustrate the

location and mechanical components of the fan module that is installed in the LFF and SFF system.
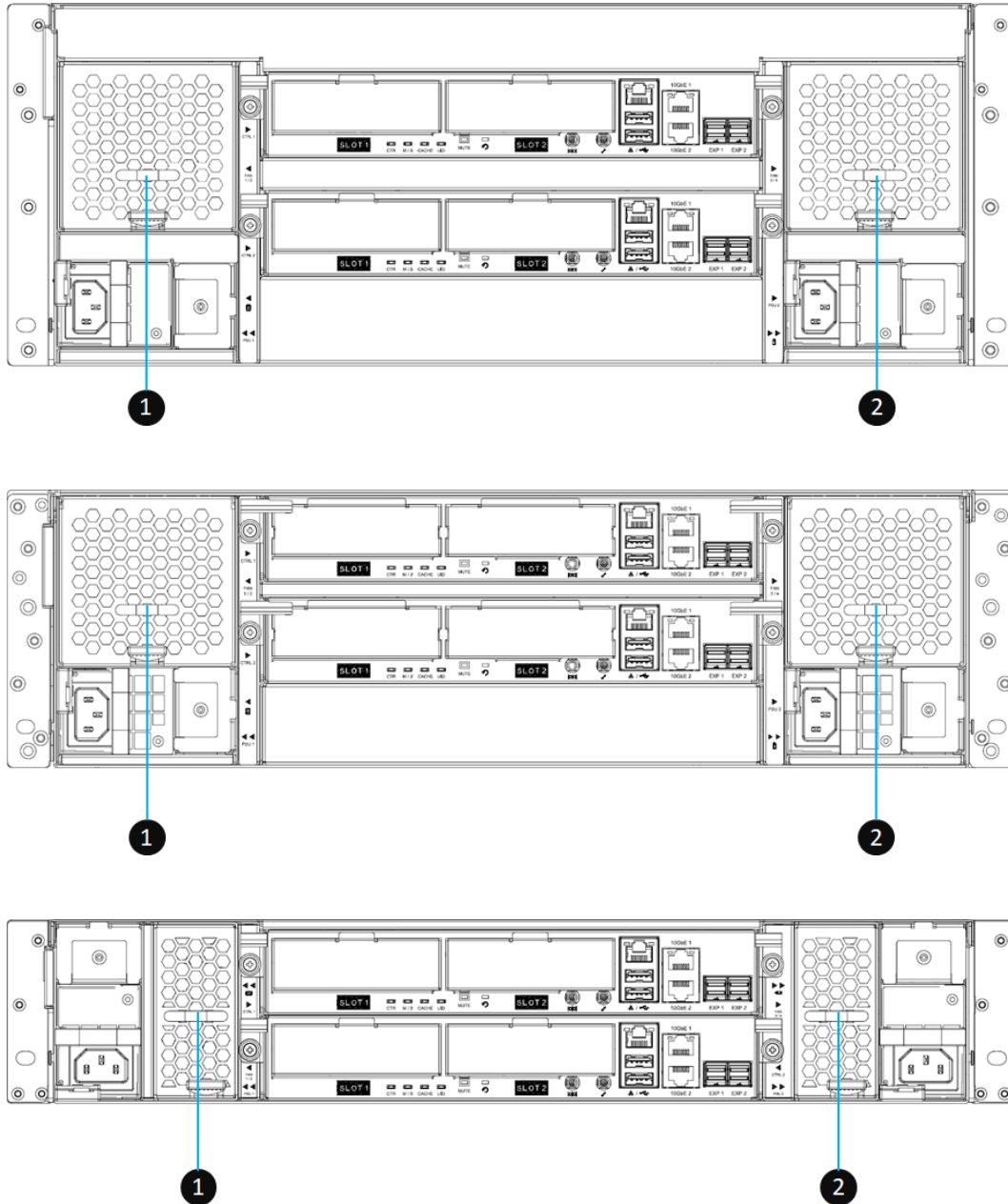
Figure 2-10   Location of Each Fan Module Installed in the LFF or SFF System

Table 2-9   Location of Each Fan Module Installed in the LFF or SFF System

Number	Description
1	Fan 1 and Fan 2
2	Fan 3 and Fan 4
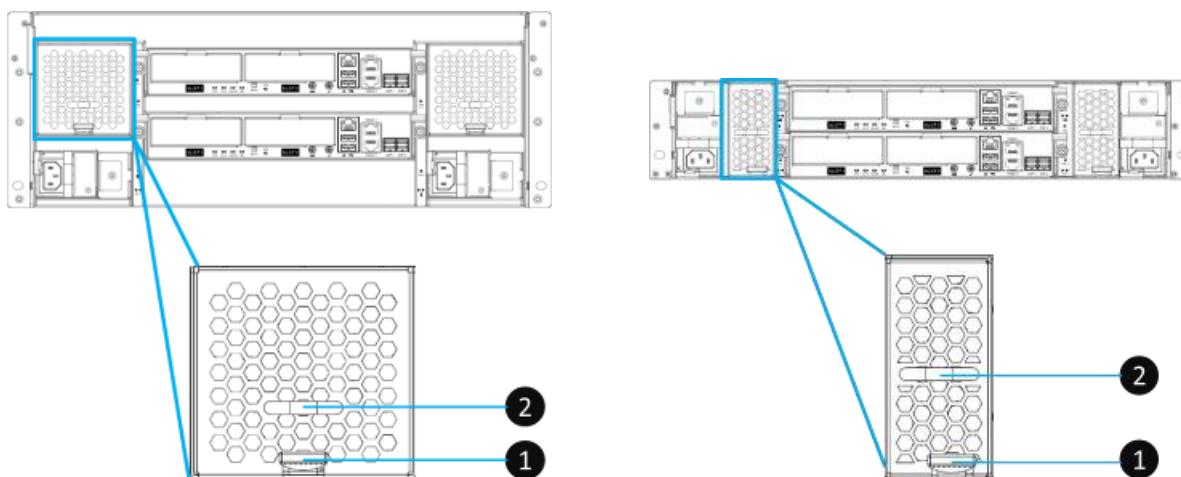
Figure 2-11   Mechanical Components of the Fan Module

Table 2-10   Mechanical Components of the Fan Module

Number	Description
1	Fan Module Release Tab
2	Fan Module Handle

2.7.   Cache-to-Flash Memory Protection

In the event of power loss, the I/O cache data stored in the volatile memory will be lost; this can cause data inconsistency especially in database applications. The XCubeSAN series can provide an optional Cache-to-Flash memory protection function that will safely transfer the memory cache data to a non-volatile flash device for permanent preservation. The optional Cache-to-Flash module comes with an M.2 flash module and either a BBM (Battery Backup Module) or a SCM (Super Capacitor Module).
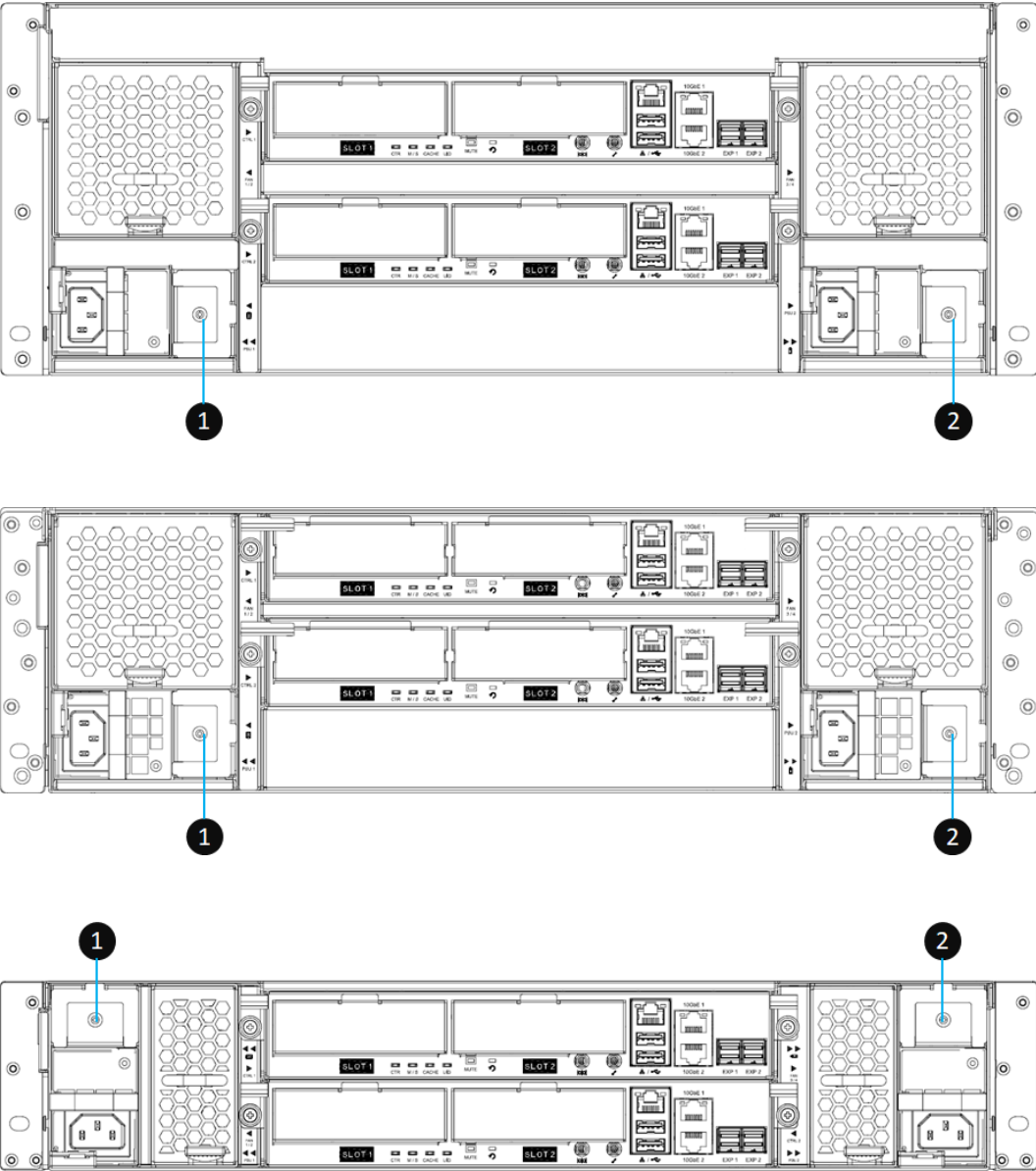
Figure 2-12   Location of the Cache-to-Flash Module

Table 2-11   Location of the Cache-to-Flash Module

Number	Description
1	Slot for Flash Module
2	Slot for Power Module

Figure 2-13   The Cache-to-flash Module – BBM (Battery Backup Module) Pack
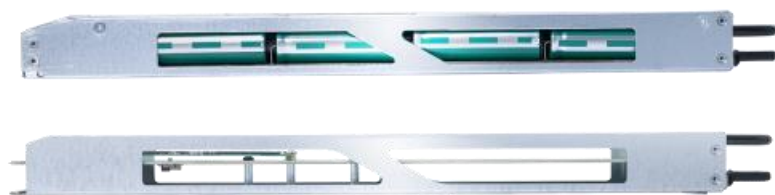
Figure 2-14   The Cache-to-flash Module – SCM (Super Capacitor Module) Pack

2.7.1.   Mechanism of Cache Data Protection

The following image is the working sequence of QSAN Cache-to-Flash workflow.
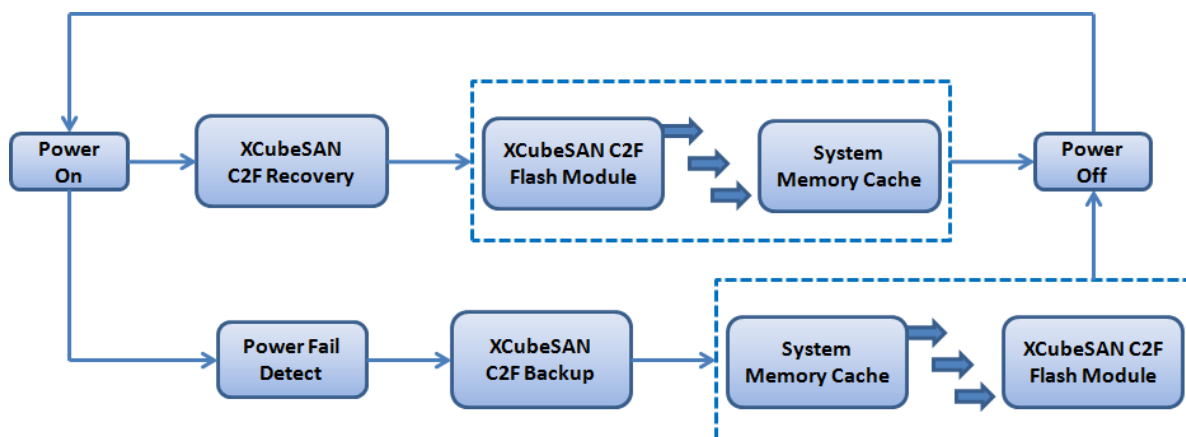
Figure 2-15   Cache-to-Flash Workflow

Cache-to-Flash technology will first flush CPU cache to memory RAM, then flush memory RAM to M.2 flash module to maintain the upmost data consistency. It leverages the strength of both BIOS and CPU to quickly backup memory RAM data to the flash module. In order to quickly move data from memory RAM to flash module, M.2 PCI-Express interface

flash module is selected for better performance and less power consumption. In Cache-to-Flash recovery phase, BIOS will check C2F flag status. If C2F flag is ON, I/O cache data will be recovered from the M.2 flash module and then continue normal booting. If C2F flag is OFF, the normal booting process continues. Compared with traditional BBM solution of 72 hours standard, Cache-to-Flash technology is more efficient, less risky and consumes less power.

2.7.2. Features of the Cache-to-Flash Module

The optional Cache-to-Flash module comes with a M.2 flash module and either a BBM or a SCM. All modules are hot pluggable with zero system downtime for extra availability and reliability. M.2 flash module can be plugged in on the left hand side from the rear of the chassis. Power module can be plugged in on the right hand side from the rear of the chassis.

Please be noted that the BBM can protect all memory capacity. But the SCM can protect up to 16GB memory per controller. If your controller memory is higher than 16GB, please select BBM solution.

Table 2-12   Protection Memory Capacity by Different Cache-to-Flash Module

Device	Protection Memory Capacity
Battery Backup Module + Flash Module	Protect all memory capacity
Super Capacitor Module + Flash Module	Protect up to 16GB memory per controller

3. Installing the System Hardware

This chapter will show you the detailed procedure of the XCubeSAN series hardware installation and initial configuration.

3.1. Installation Checklist

To ensure a successful system installation and initial configuration, you can follow the procedures in the checklist below by order.

Table 3-1   Installation Checklist

Step	Task	Where to Find the Detail Procedure
1	Installing disk drives into the trays	Chapter 3.2
2	Installing the optional host cards	Chapter 3.3
3	Installing the optional memory modules	Chapter 3.4
4	Installing the optional cache-to-flash modules	Chapter 3.5
5	Installing the optional slide rails	Chapter 3.6
6	Installing the trays into the system	Chapter 3.7
7	Connecting the system to a host	Chapter 3.8
8	Connecting power cords and powering on the system	Chapter 3.9
9	Connecting a UPS	Chapter 3.12
10	Connecting the optional USB LCM	Chapter 3.13
11	Discover and carry out the initial configure for the system	Chapter 3.14

3.2. Installing Disk Drives into the Trays

Key Components of the Disk Drive Tray

The following content illustrates the key components of both LFF and SFF disk drive trays.
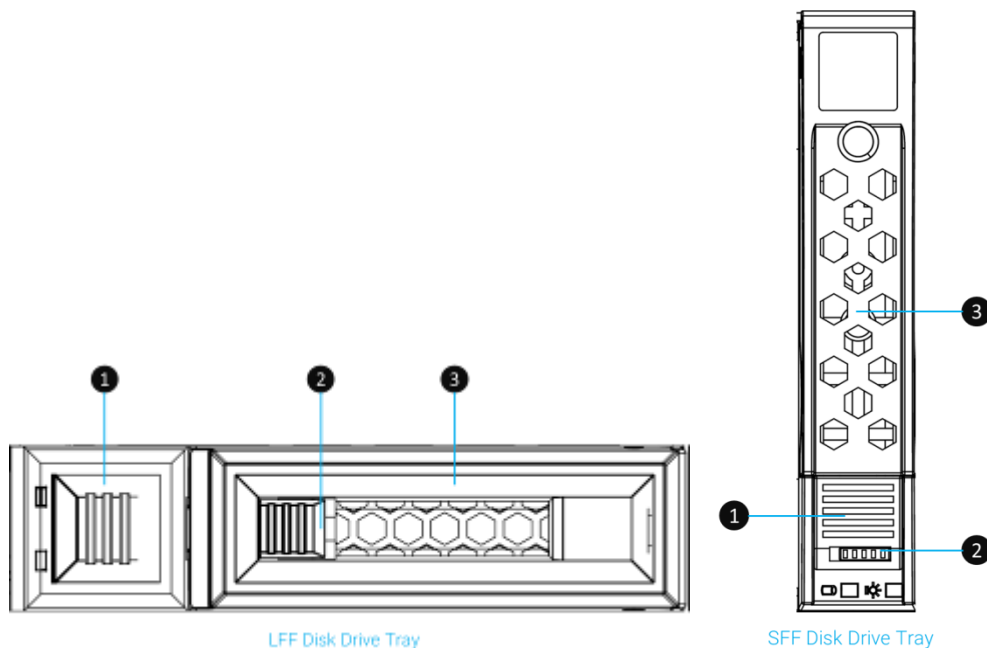
Figure 3-1   Front Side Components of LFF & SFF Disk Drive Trays

Table 3-2   Front Side Components of LFF & SFF Disk Drive Trays

Item Number	Description
1	Carrier Handle Release Button
2	Release Button Lock
3	Carrier Handle

Unlock the Disk Drive Tray and Remove from the System

The standard position of the disk drive tray is locked to prevent damage during transport. You must unlock disk drive trays before starting to install drives into the system chassis. The following content is the detailed steps for removing a disk drive tray from the system:

- Unlock release button lock: shift the lock from left to right. (LFF and SFF trays)
- Procedure of opening the LFF disk drive tray carrier handle: shift the carrier handle release button from right to left; then carrier handle will automatically pop out.
- Procedure of opening the SFF disk drive tray carrier handle: shift the carrier handle release button from up to down; then carrier handle will automatically pop out.
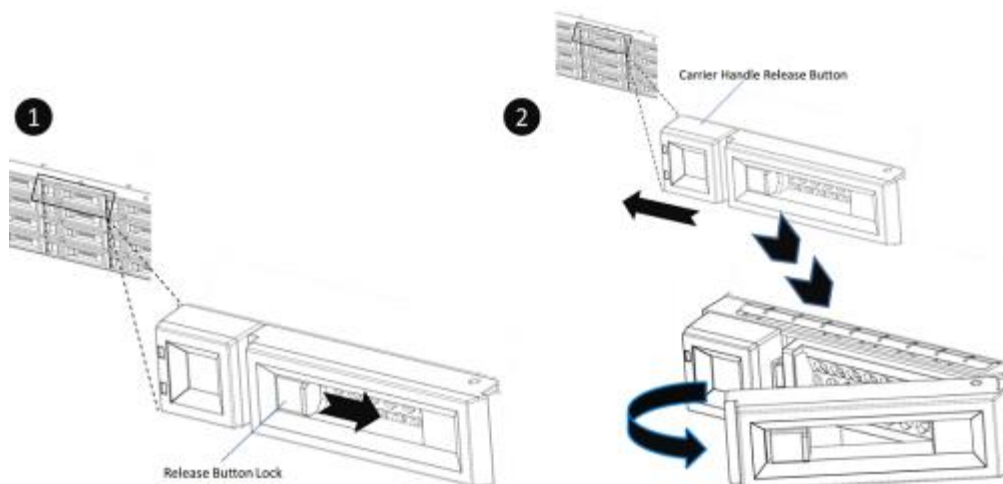
Figure 3-2   Unlock and Open the Carrier Handle of a Disk Drive Tray (LFF)
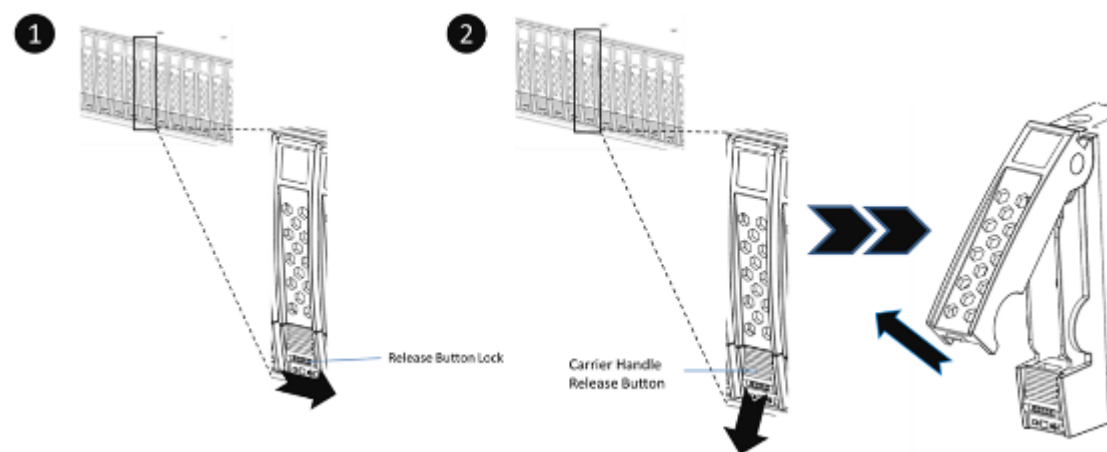
Figure 3-3   Unlock and Open the Carrier Handle of a Disk Drive Tray (SFF)

- The following content is the procedure for removing disk drive trays from the system:
    - Hold the carrier handle and pull the disk drive tray out until it is free of the disk drive bay.
    - Repeat steps above for another empty disk drive trays that you would like to remove.
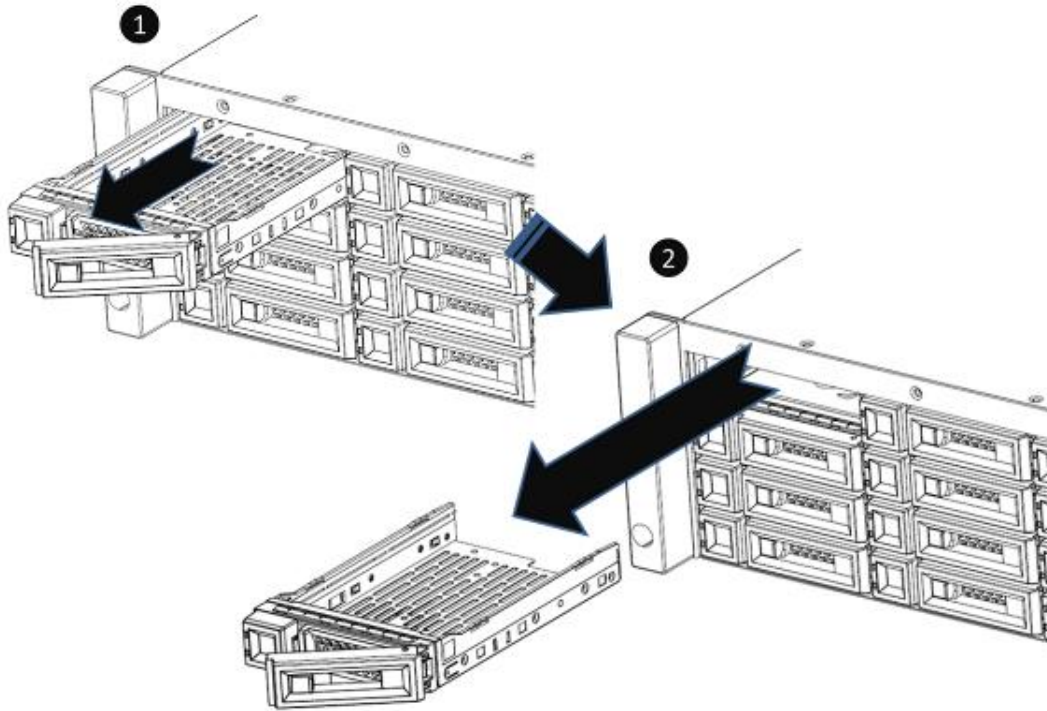
Figure 3-4   Hold the Carrier Handle and Pull out the Disk Drive Tray (LFF)
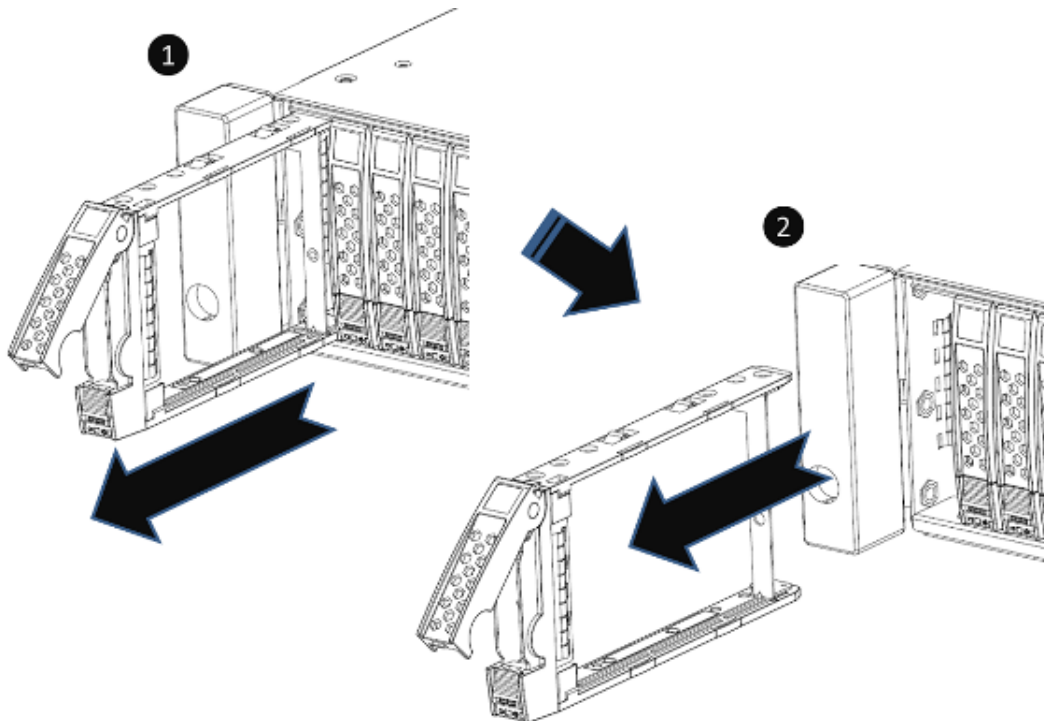
Figure 3-5   Hold the Carrier Handle and Pull out the Disk Drive Tray (SFF)

Installing a Disk Drive into a Tray

Following contents and figures are detail steps of installing a disk drive into the tray.

- For installing an LFF disk drive into an LFF tray

  - Place a disk drive tray onto a stable surface.
  - Align the disk drive to the tray (with disk connector facing away from carrier handle) and align four disk drive tray screw holes located on both sides of the hard drive
  - Install and tighten all four screws to secure the disk drive within the tray.
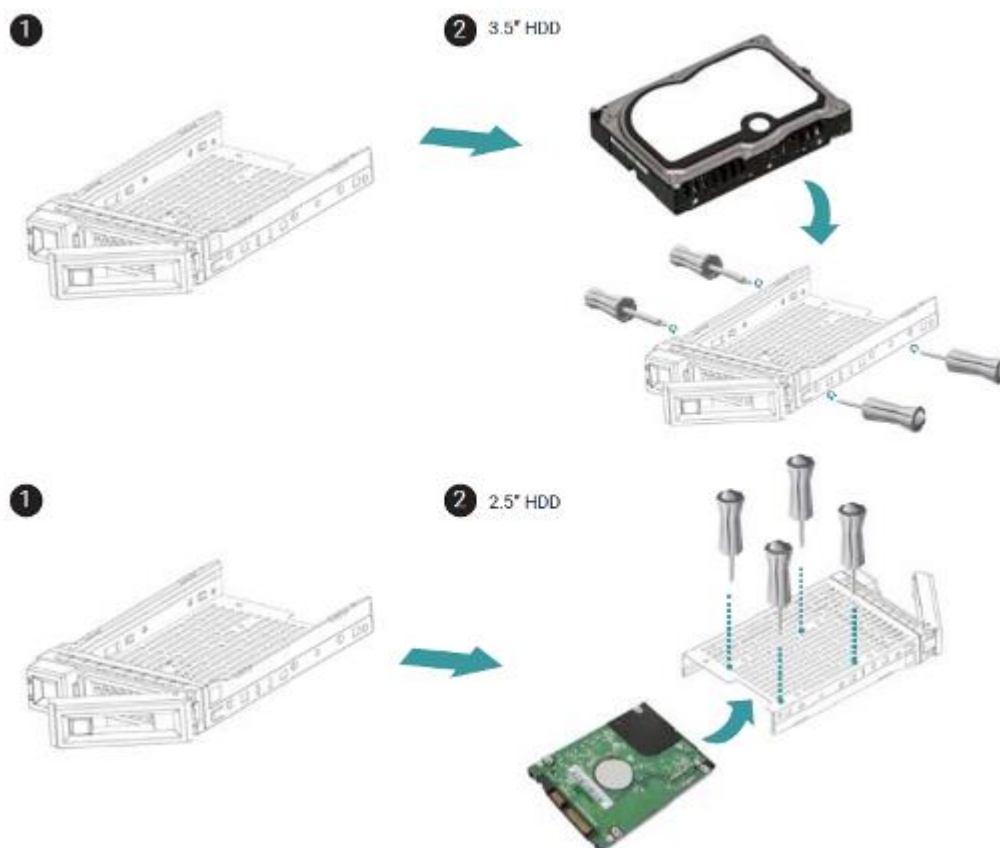
Figure 3-6   Align a Disk Drive & Install into a Tray (LFF-to-LFF)

- For installing an SFF disk drive into an LFF tray

  - Place a disk drive tray onto a stable surface.
  - Align the disk drive to the tray with the connector facing away from the carrier handle.
  - Align four disk drive tray screw holes (front row at the bottom side of the tray for SAS interface disk drive; a rear row for SATA interface SSD) to the disk drive.

○ Install and tighten all four screws to secure disk drive.
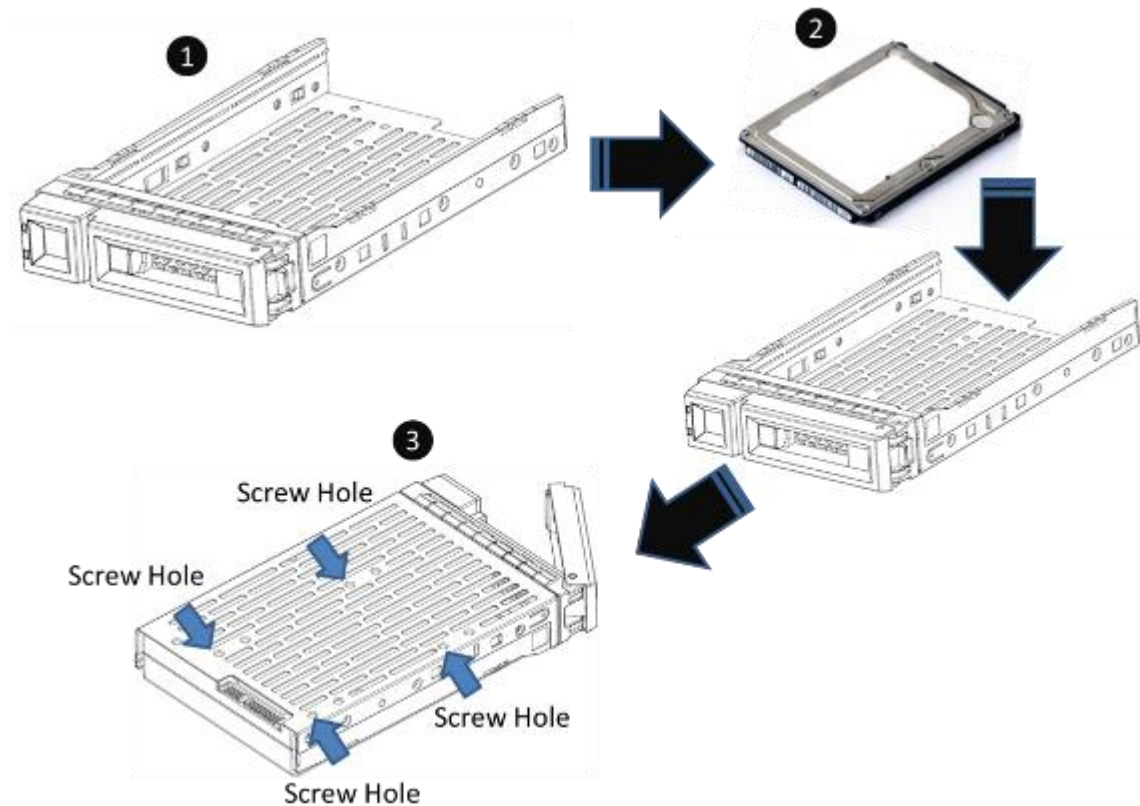
Figure 3-7   Align a Disk Drive & Install into a Tray (SFF-to-LFF)

• For installing an SFF disk drive into an SFF tray

　○ Place a disk drive tray onto a stable surface.
　○ Remove the supporting bracket. Then align the disk drive with the connector facing away from the carrier handle.
　○ Align four disk drive tray screw holes on both sides of the disk tray.
　○ Install and tighten all four screws to secure disk drive within the tray.
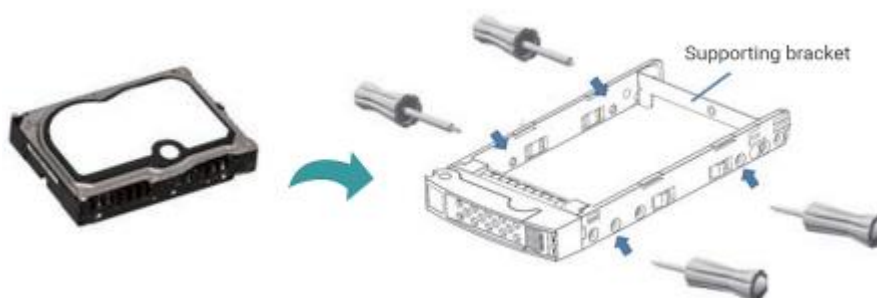
Figure 3-8   Align a Disk Drive & Install into a Tray (SFF-to-SFF)

💡 **TIP:**
Please plug-in any of the first four hard drives, then event logs can be saved and displayed in next system boot up. Otherwise, the event logs cannot be saved.

The table below shows the available disk drive trays, MUX board with bracket, and their descriptions.

Table 3-3   Available Disk Drive Trays for XCubeSAN Series

Model Name	Picture	Description	Applied Models
HDT-351		3.5" Disk Drive Tray	XS5224 XS5216 XS5212 XS3224 XS3216 XS3212 XS1224 XS1216 XS1212
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	
HDT-251		2.5" Disk Drive Tray	XS5226 XS3226 XS1226
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

3.3. Installing the Optional Host Cards

The XCubeSAN series comes with two on-board 10GbE iSCSI ports on each controller. If you want to expand the number of host ports, purchase QSAN host cards (optional components) will be the fastest and most cost-efficiency choice.

There are several types of host cards that are available for selection. You can configure a Fibre Channel SAN by using QSAN 16Gb Fibre Channel host cards; you can choose a iSCSI SAN by using 10GbE via SFP+, 10GBASE-T, or 1GBASE-T iSCSI host cards. The table below shows the available host card types, model names, and their descriptions.

Table 3-4   Available Host Cards for XCubeSAN Series

Model Name	Picture	Description	Applied Models
RHCF32P2		2-port 32Gb Fibre Channel Host Card (SFP28)	XS5200 Series XS3200 Series XS1200 Series
HQ-16F4S2		4-port 16Gb Fibre Channel Host Card (SFP+)	
HQ-16F2S2		2-port 16Gb Fibre Channel Host Card (SFP+)	
RHCE25P2		2-port 25GbE iSCSI Host Card (SFP28)	
HQ-10G4S2		4-port 10GbE iSCSI Host Card (SFP+)	
HQ-10G2T		2-port 10GBASE-T iSCSI Host Card (RJ45)	
HQ-01G4T		4-port 1GBASE-T iSCSI Host Card (RJ45)	

> ⚠️ **CAUTION:**
> You must remove the controller module from the system chassis before starting the host card installing procedures.
>
> Host card can NOT hot plug in the controller module. Hot plug in the host card might cause system hang up. You should remove the controller module from the system chassis before installing / removing host card. Please DO NOT attempt to hot plug in the host card.

Following figure is the overview of the host card installation slots.
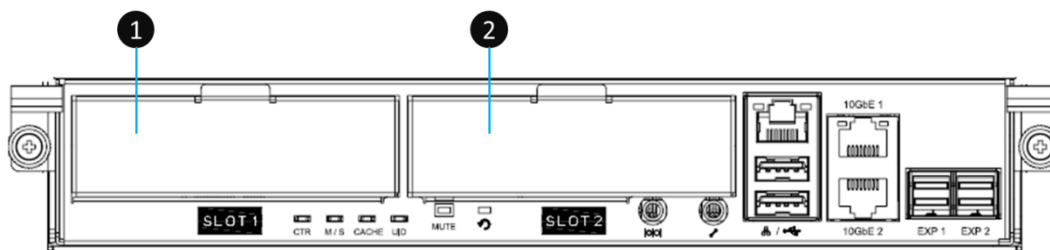
Figure 3-9   Host Card Installation Slots

Table 3-5   Host Card Installation Slots of a Controller

Item Number	Description
1	Host Card Slot 1
2	Host Card Slot 2

Please refer to following tables for supported installing location and combination of host cards to keep the optimized system performance and prevent any unexpected incidents.

Table 3-6   *Supported Installing Location and Combination of the Host Cards*

Connection Type	Model Type	Controller Number	Slot 1	Slot 2
FC SAN 32Gb FC (SFP28) or 16Gb FC (SFP+)	Single Controller	CTRL 1	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	Empty or RHCF32P2[9] or HQ-16F4S2[9] or HQ-16F2S2[9]
		N/A		
	Dual Controller	CTRL 1	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	Empty or RHCF32P2[9] or HQ-16F4S2[9] or HQ-16F2S2[9]
		CTRL 2	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	Empty or RHCF32P2[9] or HQ-16F4S2[9] or HQ-16F2S2[9]
iSCSI SAN 25GbE (SFP28) or 10GbE (SFP+) or 10GBASE-T (RJ45) or 1GBASE-T (RJ45)	Single Controller	CTRL 1	RHCE25P2 or HQ-10G4S2 or HQ-10G2T or HQ-01G4T	Empty or RHCE25P2[9] or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T
		N/A		
	Dual Controller	CTRL 1	RHCE25P2 or HQ-10G4S2	Empty or RHCE25P2[9]

			or HQ-10G2T or HQ-01G4T	or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T
		CTRL 2	RHCE25P2 or HQ-10G4S2 or HQ-10G2T or HQ-01G4T	Empty or RHCE25P2[9] or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T
Mix SAN 32/16Gb FC + 25/10/1GbE	Single Controller	CTRL 1	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	RHCE25P2[9] or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T
			N/A	
	Dual Controller	CTRL 1	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	RHCE25P2[9] or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T
		CTRL 2	RHCF32P2 or HQ-16F4S2 or HQ-16F2S2	RHCE25P2[9] or HQ-10G4S2[9] or HQ-10G2T or HQ-01G4T

[9] Slot 2 provides 20Gb bandwidth.

CAUTION:

If you change the host card type in the same slot, the system needs to be reset to factory default to make the host card change effective. If you want to learn more about how to reset your system to factory, please refer to the chapter 6.5.5, Rest to Factory Default section in the [XCubeSAN SANOS 4.0 Software Manual](#).

All dual controller XCubeSAN series models must have installed the same type of host cards into the same slot number to keep the optimized system performance.

INFORMATION:

Due to the total bandwidth of slot 2 is 20Gb. It CAN NOT satisfy four ports of 10GbE iSCSI with full speed, we strongly recommend combining two ports by enabling link aggregation for failover. Such as combining port 1 and port 2 as LAG (Link Aggregation Group) 1, port 3 and port4 as LAG 2. If you want to learn more about how to setup link aggregation, please refer to the chapter 7.3.1, Configure iSCSI Ports section in the [XCubeSAN SANOS 4.0 Software Manual](#).

Procedures of the Host Card Installation

The following content and images are detailed steps for installing a host card into the system.

- Remove the controller from the system chassis.

  The following image and table are the introduction of the mechanical components of a controller module.
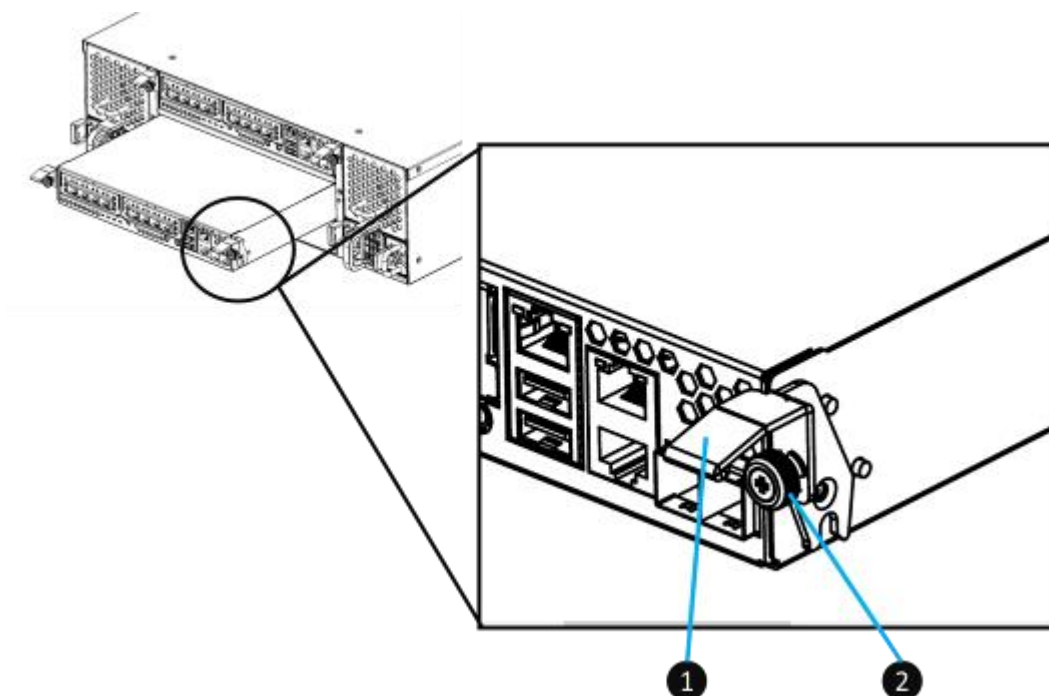
Figure 3-10   Mechanical Components of the Controller Module

Table 3-7   Mechanical Components of a Controller Module

Number	Description
1	Release Lever
2	Screw

- The following content and images are detailed steps for removing the controller module from the system chassis.
- Use a Phillips screwdriver to loosen the thumb screws on each release levers.
- Pull down both levers at the same time and then pull out about half length of the controller module by holding two release levers.
- Use one hand to hold one end of the controller module (the side with release levers) and the other hand hold the bottom of the controller; pull out the controller module until it is free from the system chassis.
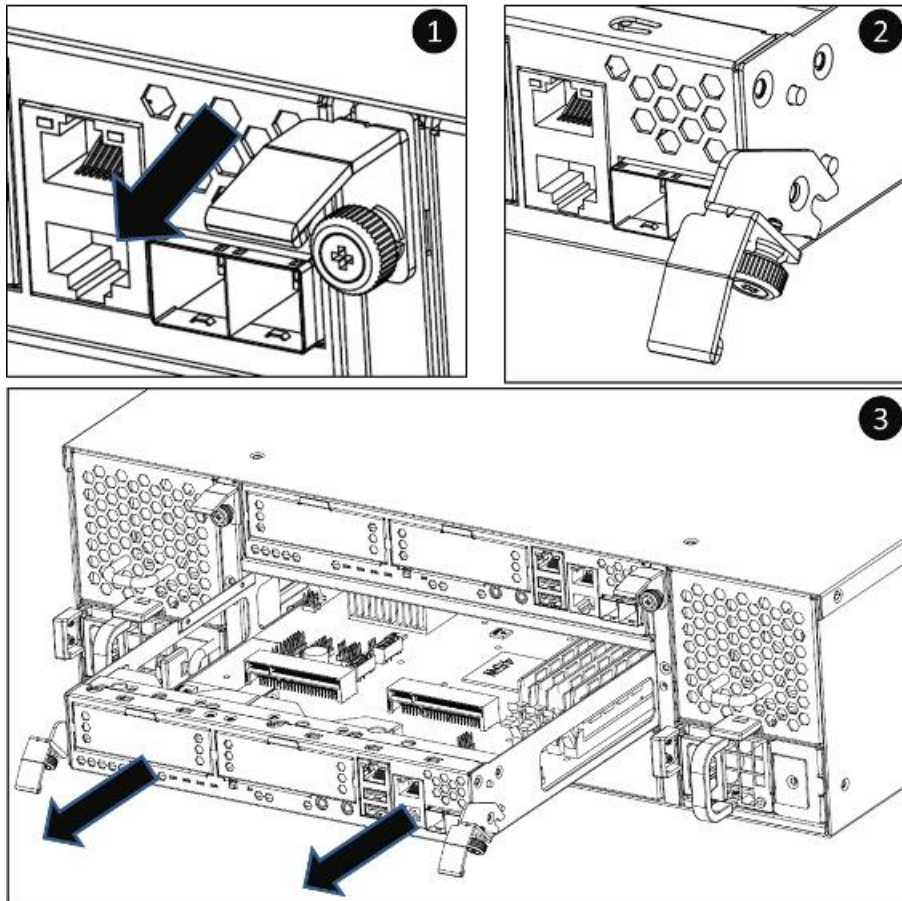
Figure 3-11   Steps of Removing the Controller Module

- Remove the dummy host card cage by loosening two screws of the dummy host card cage and then take dummy host card cage from controller module.
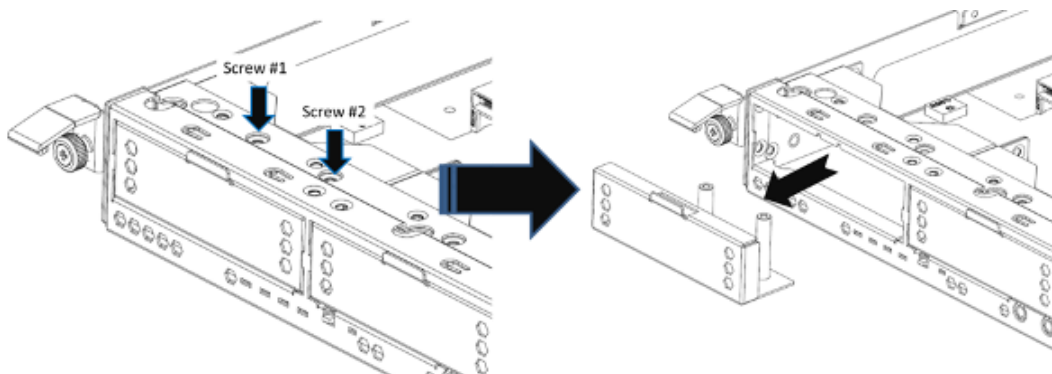
Figure 3-12   Procedures of Removing the Host Card Dummy Cage

- Align the host card to the slot to be installed and then push all the way into the controller cage until hear a "click" sound and make sure the host card is well connected with the connector in the controller module.
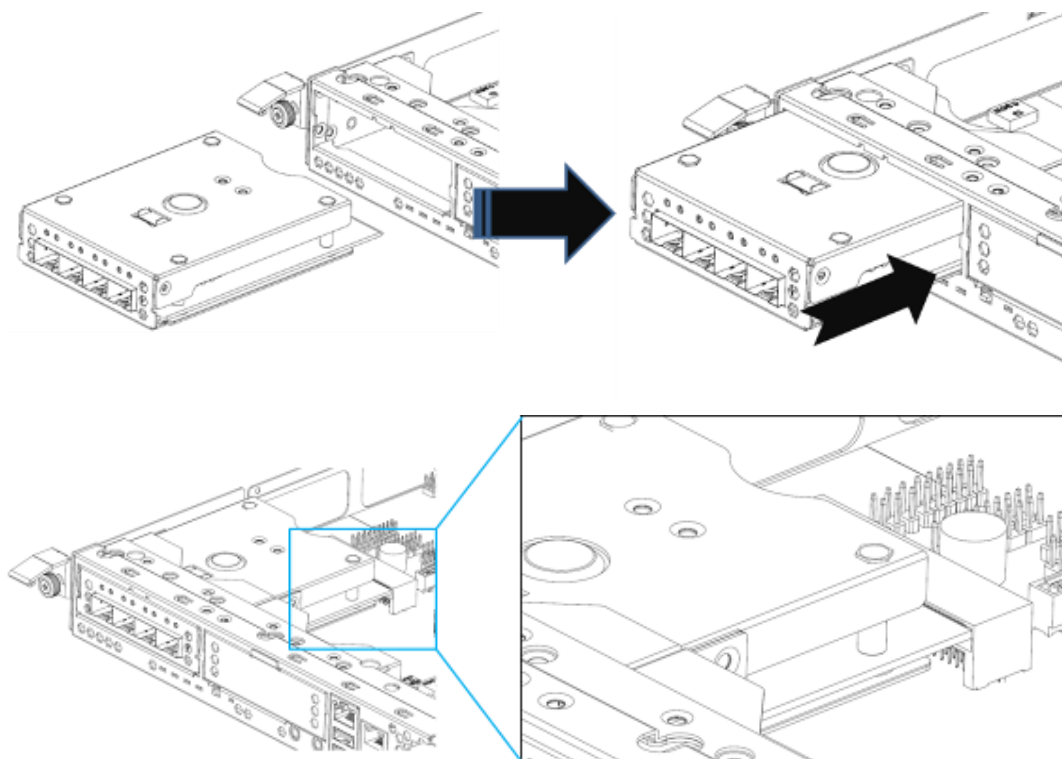
Figure 3-13   Procedures of Installing the Host Card

- Repeat procedures above if there are other host adapter cards need to be installed.
- You must install GBIC (s) for the Fibre Channel or 10GbE host cards before connecting the cables from the storage system to the host sides.
- Install the controller module into the system chassis if the host card installation completed.

Confirm the Host Card Installation

If the host card is installed properly, you can check the host card connections status in SANOS UI -> **HOST CONNECTIVITY** -> **Overview**. If your host cards are properly installed, the status column will show the connection speed.

Controller 1

Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	Down	00:13:78:ff:88:02
Onboard	LAN2 (10Gb)	Down	00:13:78:ff:88:03
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:ff:88:04
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:ff:88:05
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:ff:88:06
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:ff:88:07
Slot1	FC1 (16Gb)	16Gb/s	2100001378FF8800
Slot1	FC2 (16Gb)	16Gb/s	2200001378FF8800
Slot1	FC3 (16Gb)	16Gb/s	2300001378FF8800
Slot1	FC4 (16Gb)	16Gb/s	2400001378FF8800

Controller 2

Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	Down	00:13:78:ff:88:0c
Onboard	LAN2 (10Gb)	Down	00:13:78:ff:88:0d
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:ff:88:0e
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:ff:88:0f
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:ff:88:10
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:ff:88:11
Slot1	FC1 (16Gb)	16Gb/s	2900001378FF8800
Slot1	FC2 (16Gb)	16Gb/s	2A00001378FF8800
Slot1	FC3 (16Gb)	16Gb/s	2B00001378FF8800
Slot1	FC4 (16Gb)	16Gb/s	2C00001378FF8800

Figure 3-14   Connection and Status of the Host Cards

3.4.   Installing the Optional Memory Modules

Standard system memory capacity for XCubeSAN series models: 4GB DDR4 for XS3200 / XS1200 and 8GB DDR4 for XS5200. If you purchase additional optional memory module for your storage system, please refer to the following image and table for the suggested sequence of memory module installation. It is requested that the installation slot and capacity of the memory module MUST be exactly the same for both controller.

The table below shows the available memory modules and their descriptions.

Table 3-8   Memory Modules for XCubeSAN Series

Model Name	Picture	Description	Applied Models
DIM-D44GB		DDR4 ECC 4GB Memory Module	XS5200 Series XS3200 Series XS1200 Series
DIM-D48GB		DDR4 ECC 8GB Memory Module	
DIM-D416GB		DDR4 ECC 16GB Memory Module	
DIM-D432GB		DDR4 ECC 32GB Memory Module	XS5200 Series XS3200 Series

In XS3200 and XS5200, there are four DIMM slots for expansion of memory capacity. The installation sequence for the memory module with the same capacity should be: #3 ➔ #2 ➔ #4 due to slot #1 and #2 are memory bank 1; slot #3 and #4 are bank 2. Balance the memory size of two banks will keep the optimized system performance. The installation sequence is applicable for dual or single controller module.
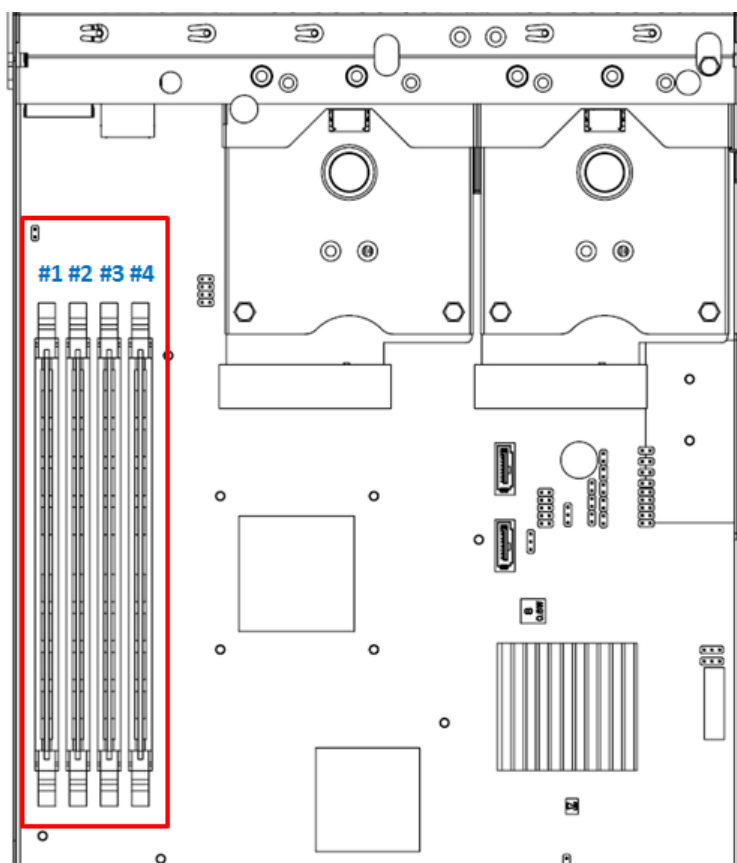
Figure 3-15   The Installation Sequence of the Memory Module in XS3200 and XS5200

The following table is the suggested installation sequence for optional memory module.

Table 3-9   The Installation Sequence for Optional Memory Module in XS3200 and XS5200

Bank 1		Bank 2		Total Memory
Slot #1	Slot #2	Slot #3	Slot #4	
4GB	-	-	-	4GB
4GB	-	4GB	-	8GB
4GB	-	8GB	-	12GB
4GB	-	8GB	8GB	20GB
4GB	-	16GB	-	20GB
4GB	-	16GB	16GB	36GB
4GB	4GB	4GB		12GB
4GB	4GB	4GB	4GB	16GB
4GB	4GB	8GB		16GB
4GB	4GB	8GB	8GB	24GB
4GB	4GB	16GB	-	24GB
4GB	4GB	16GB	16GB	40GB
8GB	-	-	-	8GB
8GB	-	8GB	-	16GB
8GB	-	16GB	-	24GB
8GB	-	16GB	16GB	40GB
8GB	8GB	8GB	-	24GB
8GB	8GB	8GB	8GB	32GB
8GB	8GB	16GB	-	32GB
8GB	8GB	16GB	16GB	48GB
16GB	-	-	-	16GB
16GB	-	16GB	-	32GB
16GB	16GB	16GB	-	48GB
16GB	16GB	16GB	16GB	64GB
32GB	-	-	-	32GB
32GB	-	32GB	-	64GB
32GB	32GB	32GB	-	96GB
32GB	32GB	32GB	32GB	128GB

In XS1200, there are two DIMM slots for expansion of memory capacity. The installation sequence is also applicable for dual or single controller module.
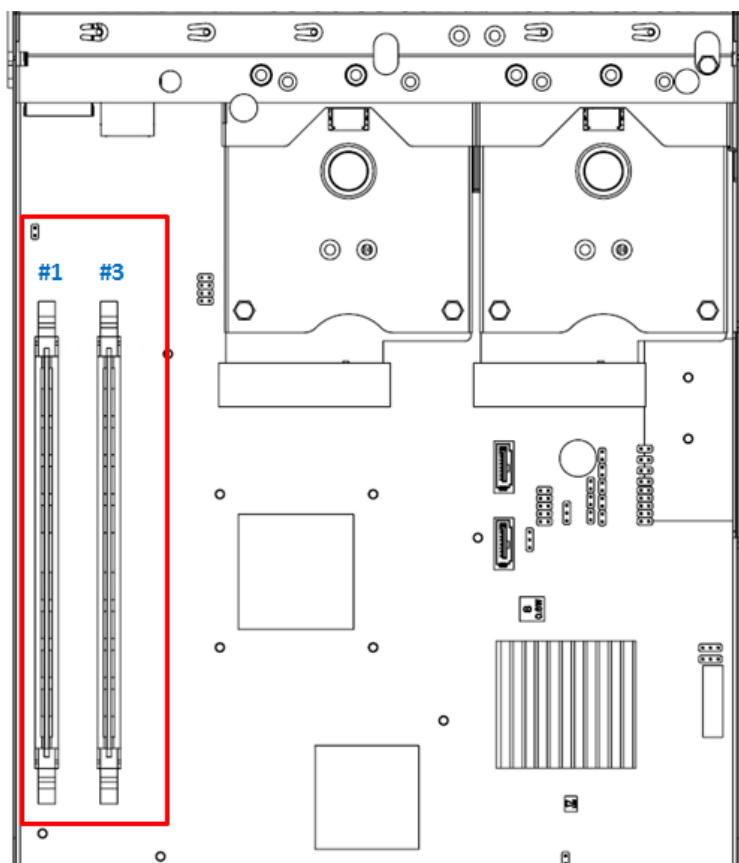
Figure 3-16   The Installation Sequence of the Memory Module in XS1200

The following table is the suggested installation for optional memory module.

Table 3-10   The Installation Sequence for Optional Memory Module in XS1200

Bank 1 / Slot #1	Bank 2 / Slot #3	Total Memory
4GB	-	4GB
4GB	4GB	8GB
4GB	8GB	12GB
4GB	16GB	20GB
8GB	8GB	16GB
8GB	16GB	24GB
16GB	-	16GB
16GB	16GB	32GB

3.5.   Installing the Optional Cache-to-Flash Modules

The Cache-to-Flash module is a combination of a flash memory and a power module for write-back data protection in the event of a sudden and unexpected power loss. The table below is the available Cache-to Flash module list. If you want to purchase cache-to-flash module, please contact your nearest local reseller or visit QSAN official web site: https://qsan.com/location

The table below shows the available cache-to-flash modules and their descriptions.

Table 3-11   Available Cache-to-flash Modules for XCubeSAN Series

Model Name	Picture	Description	Applied Models
C2F-BM128G		Cache-to-Flash Module : C2F-BBMD + C2F-FLHMD	XS5200 Series XS3200 Series XS1200 Series
C2F-SP128G		Cache-to-Flash Module : C2F-SP16G + C2F-FLHMD (Protect up to 16GB memory per controller)	
C2F-BBMD		Battery Backup Module for Cache-to-Flash	
C2F-SP16G		Super Capacitor Module for Cache-to-Flash (Protect up to 16GB memory per controller)	

C2F-FLHMD		Flash Module for Cache-to-Flash	

⚠️ **CAUTION:**
The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 5.2.4, Cache-to-Flash Module LEDs and Button section and the chapter 6.5, Removing the Cache-to-Flash Modules section.

Installing Cache-to-Flash Modules

The following content and images are steps for installing cache-to-flash modules.

- Install locations for the cache-to-flash modules

Slot for Flash Module   Slot for Power Module
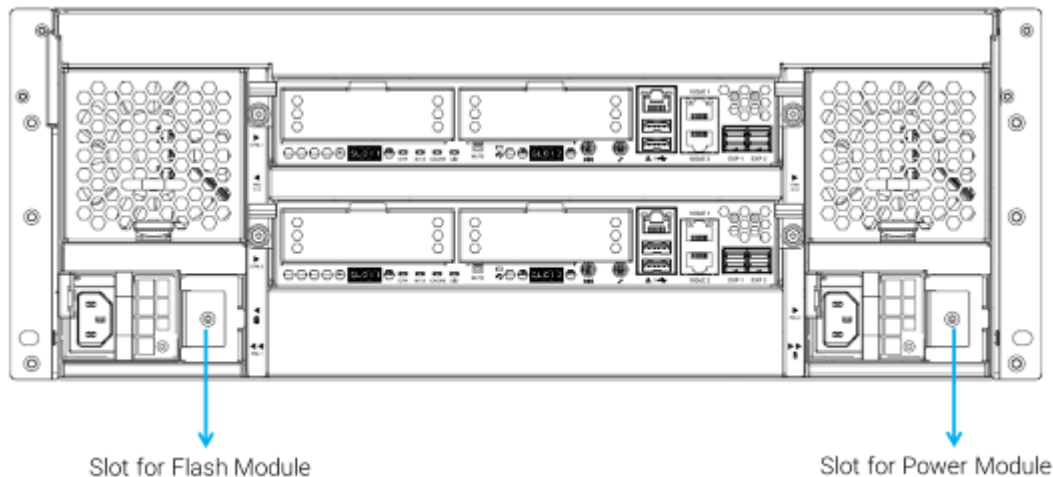
Figure 3-17   Location of the Cache-to-Flash Module

- Components of the cache-to-flash modules
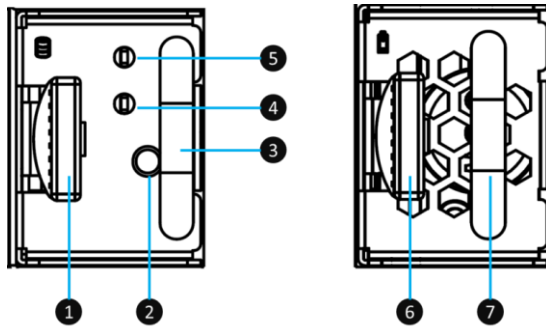
Figure 3-18   Components of the Cache-to-Flash Modules

Table 3-12   Components of the Cache-to-Flash Modules

Item	Number	Description
Flash Module	1	Flash Module Release Tab
	2	Flash Module Attention Button
	3	Flash Module Handle
	4	Flash Module Status LED
	5	Flash Module Power LED
Power Module	6	Power Module Release Tab
	7	Power Module Handle

- Remove the dummy cache-to-flash cage by losing the screw on it and then remove the dummy cage from the system chassis. Follow the same procedure for both sides.

Dummy Cage Screw   Dummy Cage Screw
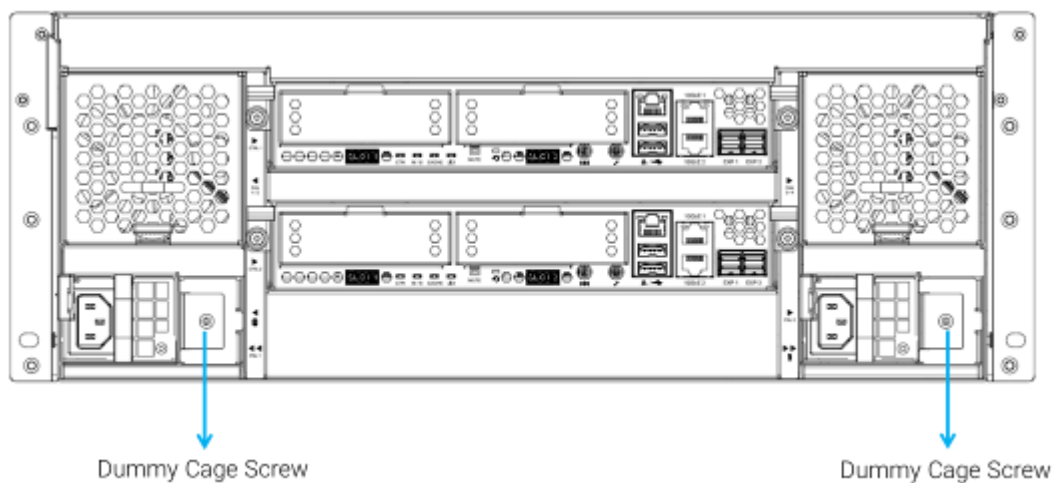
Figure 3-19   The Dummy Cage Screw Location of the Cache-to-Flash Module

- Align the flash module cage to the slot and then push it all the way into the system chassis until hear a "click" sound (for 4U/3U chassis, release tabs of both flash and power modules are facing left hand side while installing into the system; 2U chassis release tabs of both flash and power modules are facing upward while installing into the system).
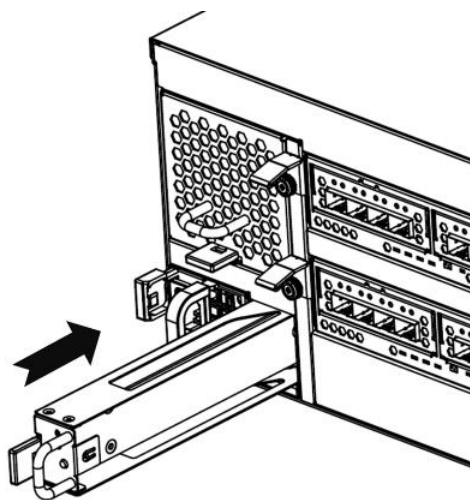
Figure 3-20   Installing the Flash Module

- Align the power module cage to the slot and then push it all the way into the system chassis until hear a "click" sound.
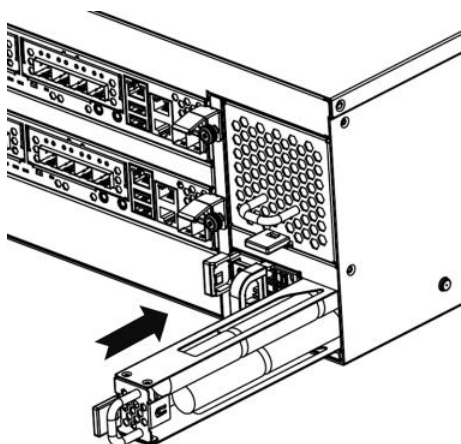
Figure 3-21   Installing the Power Module

Confirm the Cache-to-Flash Module Installation

After the cache-to-flash modules are installed, you can check the status and information about cache-to-flash module in the SANOS UI -> **SYSTEM SETTINGS** -> **Power** -> **Cache to Flash**. If the flash module and power module are properly installed, the status will display Good.

Power Module

Item	Information
Status	Good
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module

Item	Information
Status	Good

Figure 3-22   Status and Information of Cache-to-Flash Module

3.6.   Installing the Optional Slide Rails

If you did not purchase QSAN qualified slide rails, please skip this section. The table below shows the available slide rail, model name, and its description.

Table 3-13   Available Slide Rails for XCubeSAN Series

Model Name	Picture	Description	Applied Models
SLR-RM3640		Slide Rail	XS5200 Series XS3200 Series XS1200 Series

INFORMATION:
Slide rails is an optional part of all XCubeSAN series models, if you did not purchase QSAN qualified slide rails, you can skip the fourth step of the system installation tasks. If you want to purchase QSAN qualified slide rails: full extension and thin slide with tool-less bracket: AA612508 series, please contact QSAN authorized reseller.

CAUTION:
The populated XCubeSAN system can be very heavy, to avoid any potential injury or harm to installers, or damage to the system, we strongly recommend at least two certified operators or engineers perform the system installation.

TIP:
Install the disk drive trays into the system after the system chassis is mounted in the rack. Doing this can reduce the loading of the overall weight when you mount the system chassis in the rack.

1. First step of the slide rails installation

   ◦ Take the slide rails from the carton.
   ◦ Pull the inner rail out and slide the intermediate rail back.

1) Pull the inner rail out and slide the intermediate rail back.

Pull tab forward
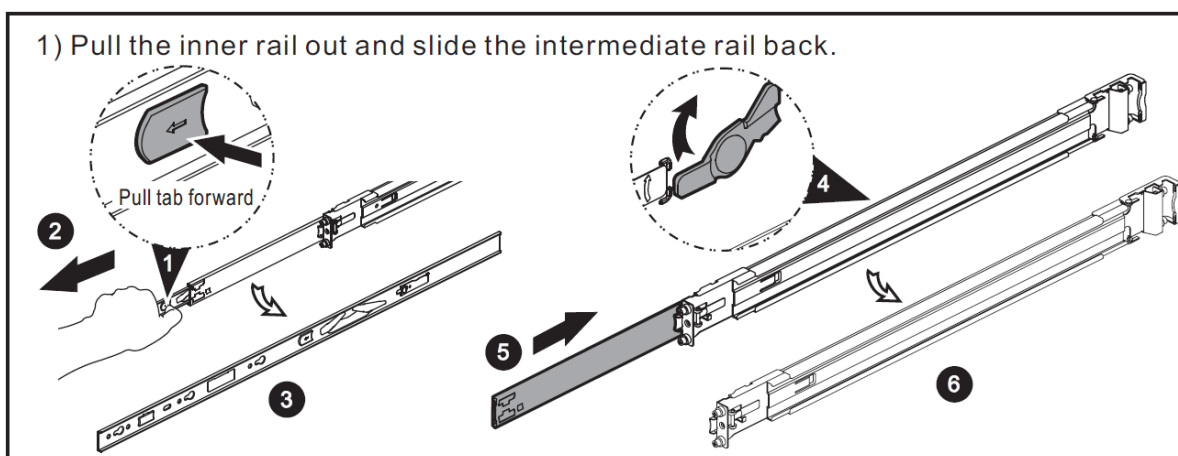
Figure 3-23   First Step of the Slide Rails Installation

2. Second step of the slide rails installation

   ◦ Install the inner member onto the chassis.

2) Install the inner rail onto the chassis.

Click!
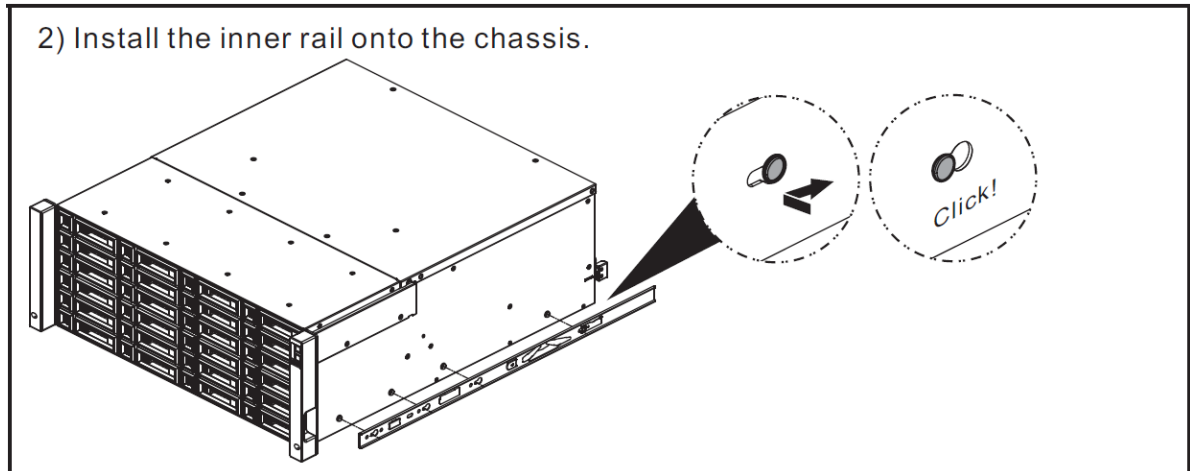
Figure 3-24   Second Step of the Slide Sails Installation

3. Third step of the slide rails installation

   ◦ Install the outer rail/bracket assembly to the frame.
   ◦ Repeat this installation step for the other side.

3) Install the outer rail/bracket assembly to the frame.

Rear Bracket

Click!

1

2

2

1

Click!

Front bracket

Note:
Please repeat the installation steps for the other side.
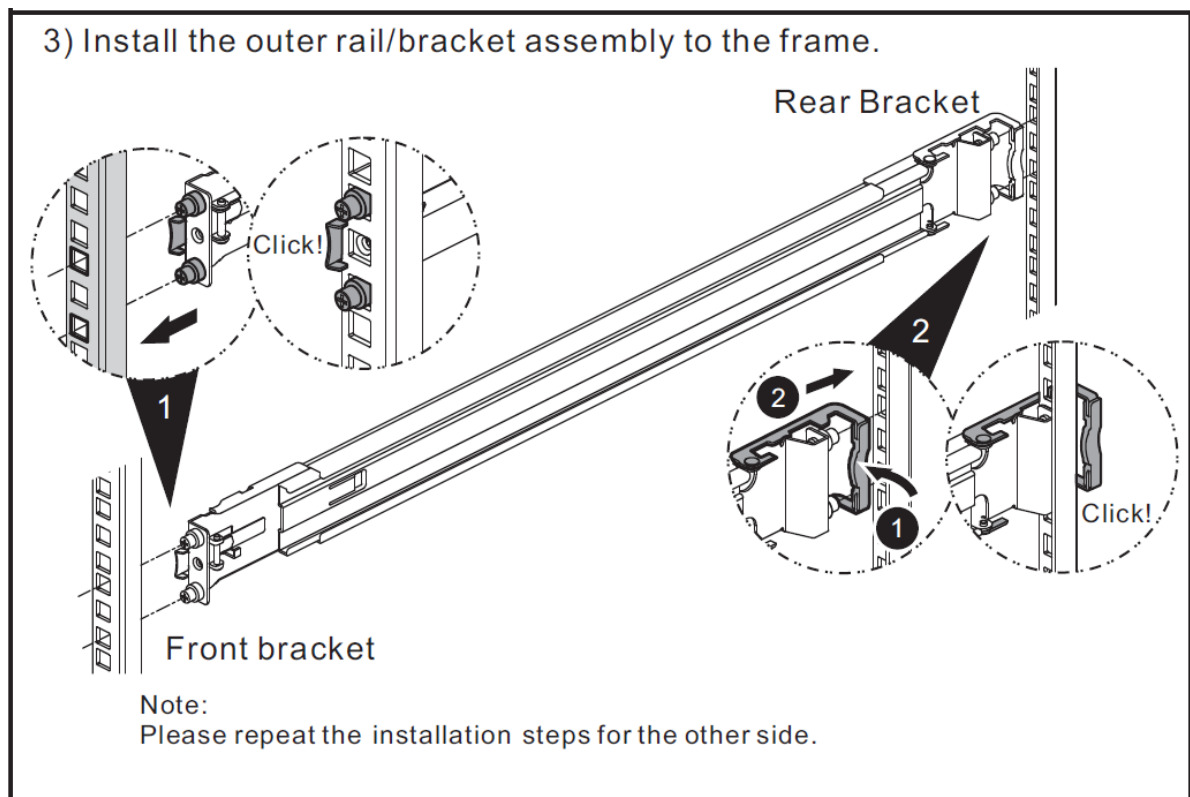
Figure 3-25   Third Step of the Slide Rails Installation

4. Fourth step of the slide rails installation

- ◦ Pull the middle member fully extended in locked position.
- ◦ Ensure ball bearing retainer is located at the front of the middle member.
- ◦ Insert chassis into middle-outer member.
- ◦ When hitting the stop, pull/push release tab to unlock and retract chassis into rack.
- ◦ Use M5x20 screws to fasten the chassis ear.[10]

> **INFORMATION:**
> [10] If you purchase optional slide rails, M5x20 screws that are dedicated for optional slide rails are packed in the screws pack.

4) Insert the chassis to complete the installation.
Step 1.
Pull the middle rail fully extended in locked position.
Step 2.
Ensure ball bearing retainer is located at the front of the middle rail.
Step 3.
Insert chassis into middle-outer rail.
Step 4.
When hit the stop, pull / push release tab to unlock and retract chassis into rack.
Step 5.
Use M5x20 screws to fasten the chassis ear.

Click!

M5x20

Figure 3-26   Fourth Step of the Slide Sails Installation

3.7.   Installing the Trays into the System

Before installing, please check if the carrier handle is at the open position. The following procedure is for installing a tray into both LFF and SFF systems.

The following content and images are detailed steps for installing a tray into the system.

- Align a disk drive with the tray to the empty bay you would like to install and then push it all the way into the disk drive bay until the carrier handle is at closed position.
- Lock the release button lock by pushing the lock from right to left.

- Refer to the label on the system chassis for disk drive numbering. (Disk drive numberings of 2U 26-bay are printed on the chassis.)
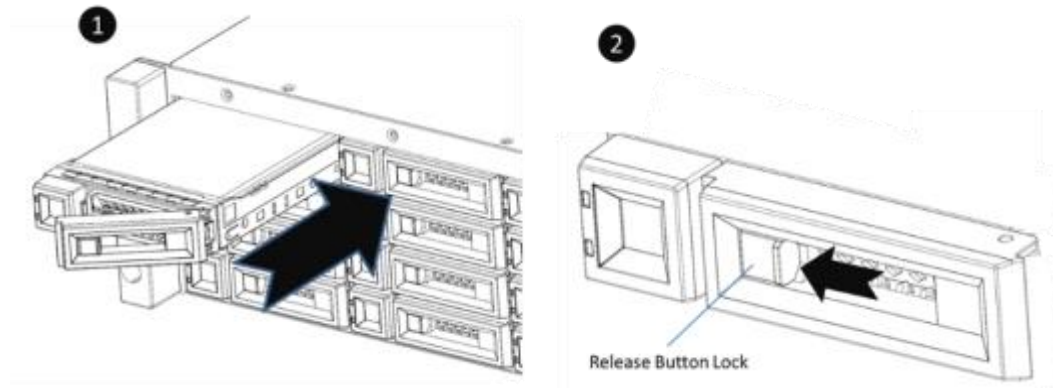
Figure 3-27   Install a Tray into the System and Lock the Release Button Lock (LFF)
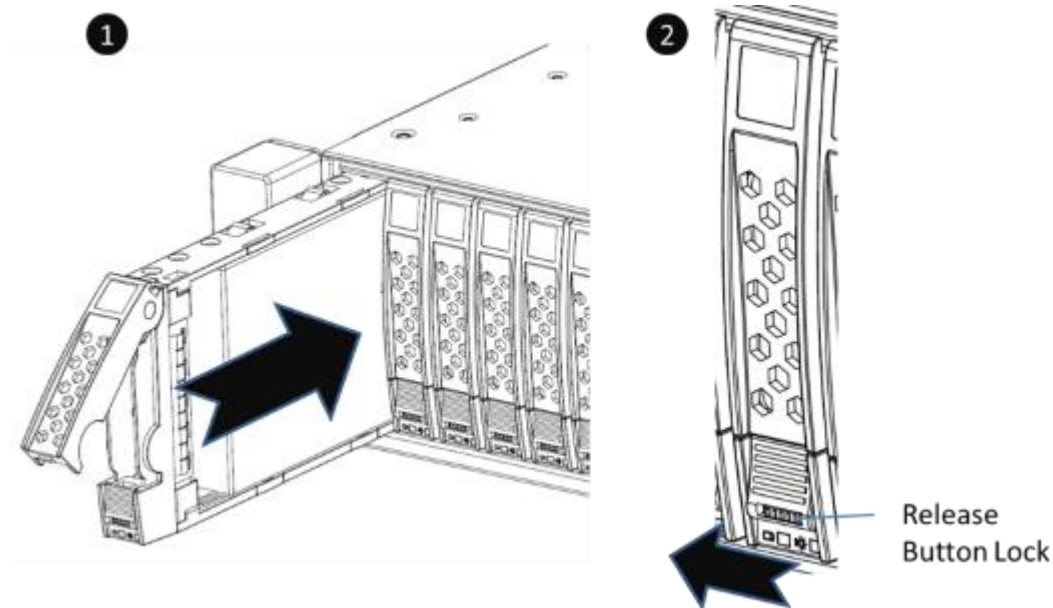
Figure 3-28   Install a Tray into the System and Lock the Release Button Lock (SFF)

3.8.   Connecting the System to a Host

The XCubeSAN series products are equipped with two on-board 10GbE iSCSI (RJ45) ports per controller for data host connections and dual SAS3 expansion ports for expansion by adding up to nine XCubeDAS series enclosures. To learn more about advanced types of cabling, please refer to the chapter 4, <u>Deployment Types and Cabling</u>.

3.8.1. Connecting to the Management Ports

XCubeSAN series models are equipped with one 1Gb BASE-T (RJ45) management port onboard per controller to allow access to the web based SANOS management system. The following image is the example of the cabling for the XCubeSAN management ports.
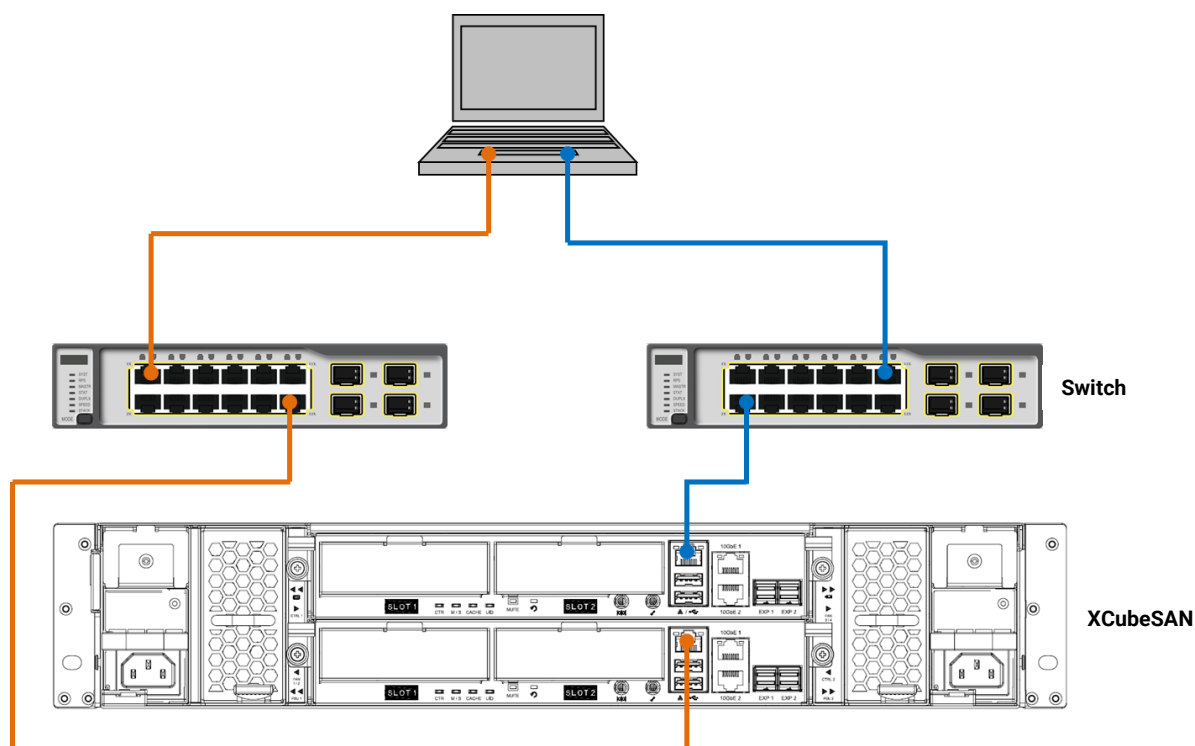
Figure 3-29   Cabling Example of the Administrator to the XCubeSAN Management Port

3.8.2. Dual Path (MPIO) Deployment

The following images illustrate some examples of deployment types for dual controller XCubeSAN series. MPIO (MultiPath I/O) configurations are designed to provide HA (High Availability) data connections to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage via switches. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables.
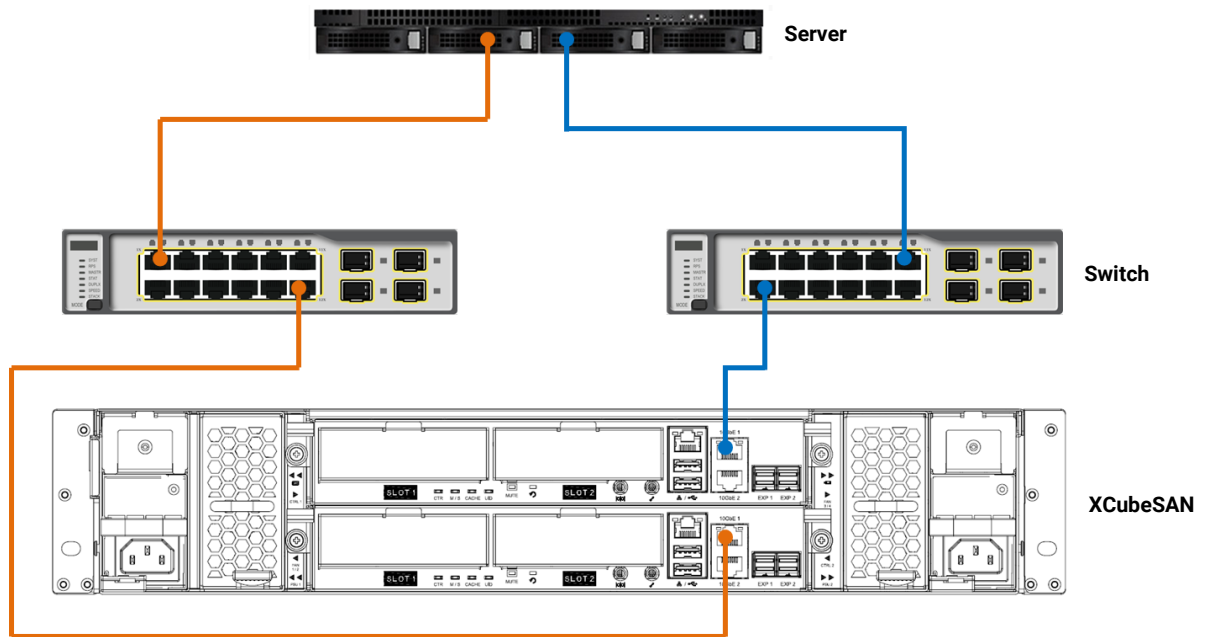
Figure 3-30   One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

3.8.3. Expansion Deployment

One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables. And a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
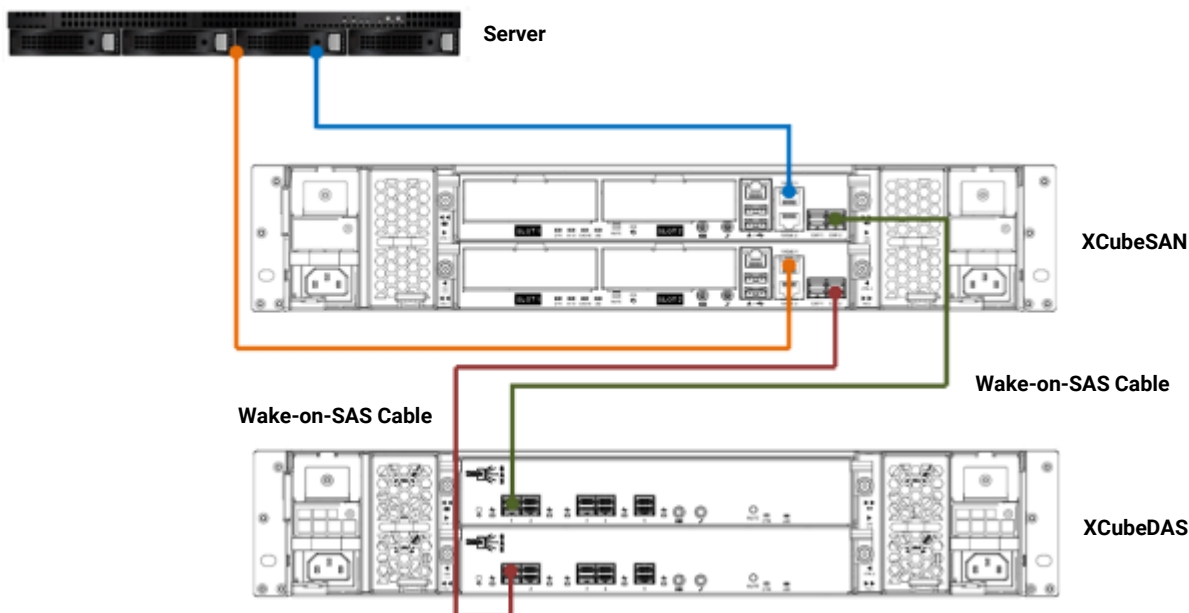
Figure 3-31   One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

3.9.   Connecting Power Cords and Powering ON the System

Before you power on your XCubeSAN system for the first time, please make sure following tasks are done:

- Check the power cord type. The power cords for the XCubeSAN series will vary depending on your country/region. If you find the power cords included with your XCubeSAN system doesn't match your current country/region, you may need to buy an adapter for each power cord to connect the power outlet.
   Power cord ratings:

  - 100 – 127V~ 10A
  - 200 – 240 V~ 5A

- Install all disk drives in the system so the controllers can identify and configure them at power-up.
- Connect cables that connect the management port and data ports to your network, and then power cords to the system; finally press the power button once to power on the XCubeSAN.
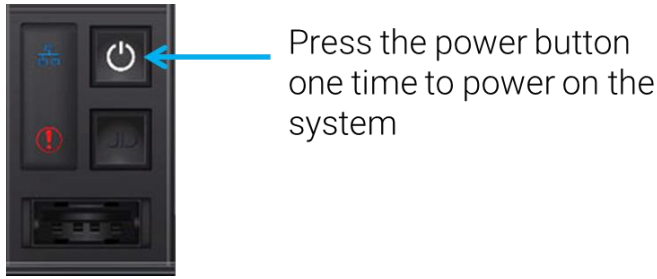
Press the power button
one time to power on the
system

Figure 3-32   Press the Power Button One Time to Power on the System

---

INFORMATION:
The power cord rating is the minimum requirement. The rating of the
power cord that you purchase must equal to or higher than the minimum
requirement to ensure the system safety and reliability.

Power Cord Connect (left)   Power Cord Connect (right)
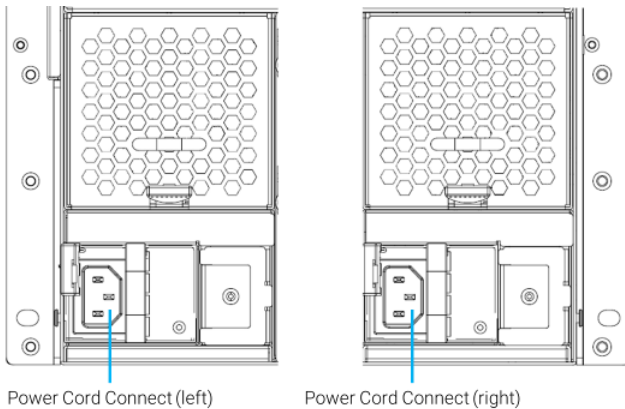
Figure 3-33   PSU Power Cord Connects

INFORMATION:
The Following are the operational conditions for all XCubeSAN series
models:

Temperature:

- Operating temperature 0°C to 40°C

- Shipping temperature -10°C to 50°C

Relative Humidity:

- Operating Relative Humidity 20% to 80% non-condensing

- Non-Operating Relative Humidity 10% to 90%

> **TIP:**
> The XCubeSAN series will remember the current power state when the power failed by accent. If the system is online state, after power is recovered, the system will power on automatically. If the system is offline, the system will keep power off.

3.10. Powering OFF the System

To power off the system, please follow the steps outlined below:

- Stop all I/O from all hosts to the SAN systems.
- Shut down the SAN system by one of the methods that are described below:
  - Press and hold the power button for **4 seconds**.

Press and hold the power button for **4 seconds** to power off the system

Figure 3-34   Power off the System by Power Button

  - Via SANOS UI to shut down the system power. If you want to power off the system via Web UI, please go to **SYSTEM SETTINGS** -> **Maintenance** -> **Reboot / Shutdown**; click Shutdown to power off the system.
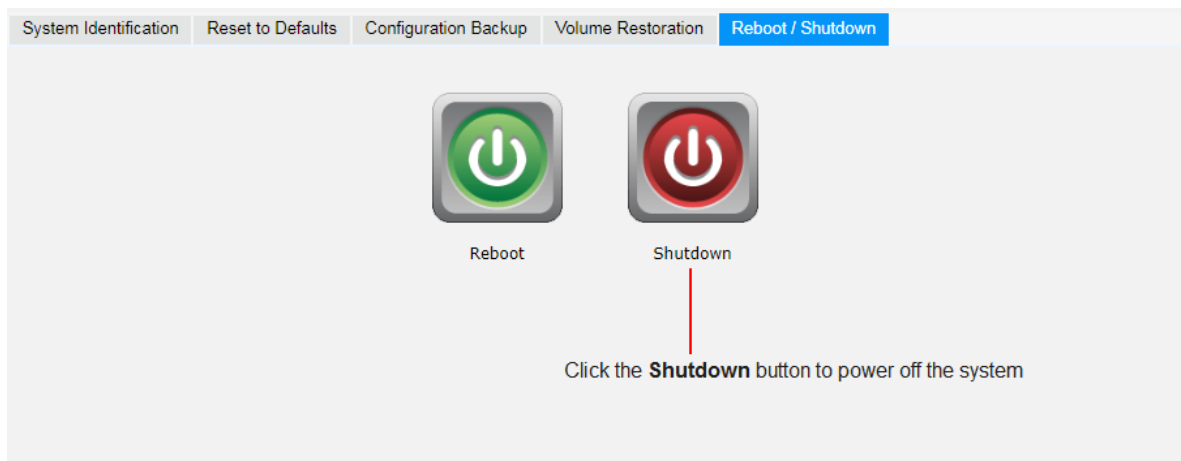
Figure 3-35   Power off the System via Web UI

3.11. Wake-on-LAN / Wake-on-SAS to Power ON / OFF the System

QSAN's Wake-on-SAS technology allows you to remotely power on/off all cascaded XD5300 expansion enclosures by using QSAN proprietary SAS cables. You can power on the XCubeSAN system remotely using the Wake-on-LAN feature. The XCubeSAN can work with any available Wake-on-LAN freeware and shareware. Wake-on-SAS ensures that expansion enclosures will not run idly, consuming electricity after the SAN storage system is shut down for maintenance or other purposes. Wake-on-SAS can avoid unnecessary electricity waste by allowing your devices to be on only when it is necessary. A further advantage of Wake-on-SAS is that when you turn on the SAN, the expansion enclosures will wake automatically, so there is no need to worry about degrading a volume if you forget to turn them on first.

The table below shows the available expansion cable, model name, and its description.

Table 3-14   Available Expansion Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XS5200 Series XS3200 Series XS1200 Series

The following diagram shows that after the XCubeSAN storage receives the magic packet being sent from the client's computer, it powers on automatically and uses Wake-on-SAS functionality to power-on the attached XD5300 expansion enclosures.
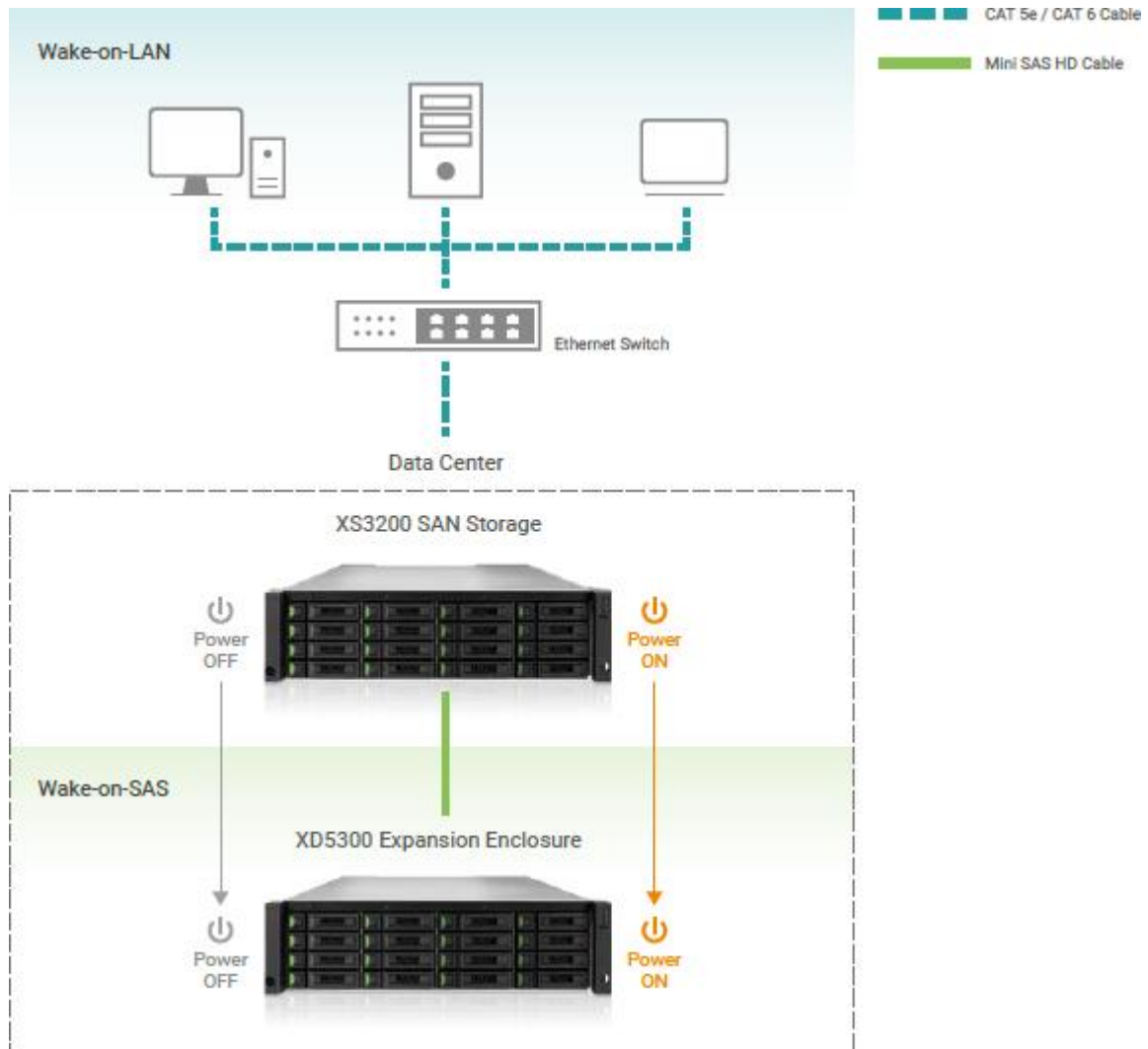
Figure 3-36   Wake-on-LAN and Wake-on-SAS Technology

3.12. Connecting a UPS

If users want to install a UPS (uninterruptible power supply) to provide clean power and also offer protection against mains power failures, please follow the following instructions.

- Before you purchase a UPS system, please check QSAN XCubeSAN series supported UPS interfaces and communication types.

- Supported types ➔ UPS via SNMP, Serial UPS with COM port, and USB UPS.
- Communication types ➔ network UPS via SNMP, Serial UPS with COM port, and USB UPS. Serial communication is the only supported type.
- Connect the UPS to the XCubeSAN.
    The following image is the location for the UPS connection.

Service Port (UPS)
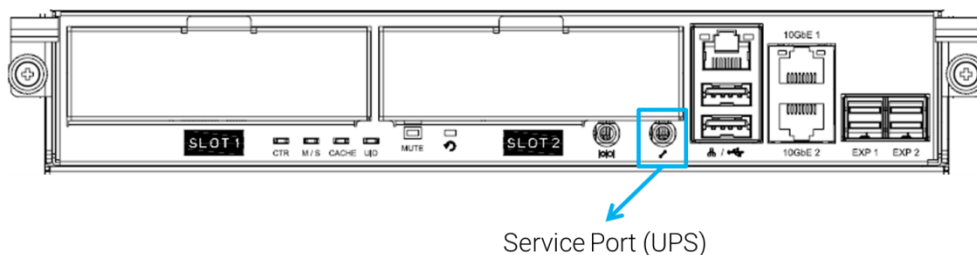
Figure 3-37 Location for the UPS System Connection

The table below shows the available UPS cable, model name, and its description.

Table 3-15 Available UPS Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-UPS		UPS Cable, Phone-jack, 1 Meter	XS5200 Series XS3200 Series XS1200 Series

For checking the UPS connection and status, please refer to the chapter 6.3.3, UPS Settings and Status in the XCubeSAN SANOS 4.0 Software Manual.

3.13. Connecting the Optional USB LCM

If you purchased the USB LCM, please use the enclosed USB extension cable (A-male to A-female) to connect to the system. The Following procedures are for the USB LCM connection:

- Connect the USB LCM to the female side of the USB extension cable.
- Connect the male side of the USB extension cable to the USB port on the system front pillar.

The table below shows the available USB LCM, model name, and its description.

Table 3-16   Available USB LCM for XCubeSAN Series

Model Name	Picture	Description	Applied Models
LCM-U162		Portable USB LCM	XS5200 Series XS3200 Series XS1200 Series

To learn more how to use USB LCM, please refer to the chapter 4.4, Accessing the Management USB LCM in the XCubeSAN SANOS 4.0 Software Manual.

3.14. Discover and Carry Out the Initial Configuration for the System

After powering on the system, the next step is to discover the system on the network and start the initial configuration. To discover the system, we suggest downloading our QFinder application from the QSAN web site; this will hunt the network for your new SAN and allow you to access it via the SANOS GUI. For more information about discovering your system and the initial configuration, please refer to the chapter 3, Getting Started in the XCubeSAN SANOS 4.0 Software Manual.

4. Deployment Types and Cabling

This chapter will show detailed deployment types and cabling for the XCubeSAN series. You can start to build up a deployment plan for your Fibre channel or iSCSI storage environment by deploying your XCubeSAN systems to your desired host. For expansion you can also attach the XCubeDAS series RAID expansion enclosures.

4.1. Deployment Types

XCubeSAN series supports following deployment types:

Table 4-1   Deployment Types

Deployment Type	Description
Single Path (for single or dual controller models)	In a single path deployment, one path is connected from the host/server to the XCubeSAN system. In this deployment, only one controller in the enclosure is used.
Dual Path (for dual controller models)	In a dual path deployment, two paths are connected from the host/server to the XCubeSAN system. In this deployment, both controllers in the system are used. Because dual path deployments provide two paths to the XCubeSAN system for redundancy even in the event of device, cable, or power failure. In dual-path deployment environment, disk drives must support dual paths I/O (SAS interface).
Server Attached (for single or dual controller models)	In multi-server attached deployment, more than one server is connected to the XCubeSAN system. In multi-server attached deployment, both single and dual path deployment modes are supported.

For more detail deployment type and cabling, please refer following sections.

4.2.   Cabling the System

The following examples illustrate how to configure the cabling for the XCubeSAN series. Recommended SAS cable length for the host connection is less than 3 meters. If you want to enable wake on SAS for the XCubeDAS enclosures, the QSAN genuine SAS cable with sideband is required to enable this feature. The XCubeSAN supports a maximum of up to 626 drives for the system storage space expansion; both single and dual path cabling are supported.

The table below shows the available cable, model name, and its description.

Table 4-2   The List of Available Cable for XCubeSAN Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XS5200 Series XS3200 Series XS1200 Series
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	

4.2.1.   Expansion Configuration Rules

The table below shows the rule of configuration for the XCubeSAN series and XCubeDAS expansion enclosures. You can refer the table below for maximum number of extension enclosures and disk drives prior to performing system deployment.

Table 4-3   SAN System and Expansion Enclosure Configuration Rules

SAN Models	Expansion Enclosures	Max. No. of Expansion Units	Max. No. of Disk Drives	Max. Raw Capacity	
				(LFF 10TB, SFF 2.4TB)	(LFF 16TB, SFF 15.36TB)
XS5212 / XS3212 / XS1212 (2U 12-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	12 + 10 x 12 = 132	1,320TB	2,112 TB
	XD5316 (3U 16-bay, LFF)	10	12 + 10 x 16 = 172	1,720TB	2,752TB
	XD5324 (4U 24-bay, LFF)	10	12 + 10 x 24 = 252	2,520TB	4,032TB
	XD5326 (2U 26-bay, SFF)	10	12 + 10 x 26 = 272	744TB	4,185.6TB
	3rd Party (4U 60-bay, LFF)	4	12 + 4 x 60 = 252	2,520TB	4,032TB
	3rd Party (4U 102-bay, LFF)	4	12 + 4 x 102 = 420	4,200TB	6,720TB
XS5216 / XS3216 / XS1216 (3U 16-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	16 + 10 x 12 = 136	1,360TB	2,176TB
	XD5316 (3U 16-bay, LFF)	10	16 + 10 x 16 = 176	1,760TB	2,816TB
	XD5324 (4U 24-bay, LFF)	10	16 + 10 x 24 = 256	2,560TB	4,096TB
	XD5326 (2U 26-bay, SFF)	10	16 + 10 x 26 = 276	784TB	4,249.6TB
	3rd Party (4U 60-bay, LFF)	4	16 + 4 x 60 = 256	2,560TB	4,096TB
	3rd Party (4U 102-bay, LFF)	4	16 + 4 x 102 = 424	4,240TB	6,784TB
XS5224 / XS3224 / XS1224 (4U 24-bay, LFF)	XD5312 (2U 12-bay, LFF)	10	24 + 10 x 12 = 144	1,440TB	2,304TB
	XD5316 (3U 16-bay, LFF)	10	24 + 10 x 16 = 184	1,840TB	2,944TB
	XD5324 (4U 24-bay, LFF)	10	24 + 10 x 24 = 264	TB	4,224TB
	XD5326 (2U 26-bay, SFF)	10	24 + 10 x 26 = 284	864TB	4,377.6TB
	3rd Party (4U 60-bay, LFF)	4	24 + 4 x 60 = 264	2,640TB	4,224TB

	3rd Party (4U 102-bay, LFF)	4	16 + 4 x 102 = 432	4,320TB	6,912TB
XS5226 / XS3226 / XS1226 (2U 26-bay, SFF)	XD5312 (2U 12-bay, LFF)	10	26 + 10 x 12 = 146	1,262.4TB	2,319.36TB
	XD5316 (3U 16-bay, LFF)	10	26 + 10 x 16 = 186	1,662.4TB	2,959.36TB
	XD5324 (4U 24-bay, LFF)	10	26 + 10 x 24 = 266	2,462.4TB	4239.36TB
	XD5326 (2U 26-bay, SFF)	10	26 + 10 x 26 = 286	686.4TB	4,392.96TB
	3rd Party (4U 60-bay, LFF)	4	26 + 4 x 60 = 266	2,462.4TB	4,239.36TB
	3rd Party (4U 102-bay, LFF)	4	26 + 4 x 102 = 434	4,142.4TB	6,927.36TB

4.2.2. Single Path Deployment

The following images illustrate some examples of deployment types for single controller XCubeSAN series.

One Server / One XCubeSAN / Single Path

The following figure shows an example of a single controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to the built-in 10GBASE-T iSCSI port in a single controller XCubeSAN series using CAT 6 network cable.
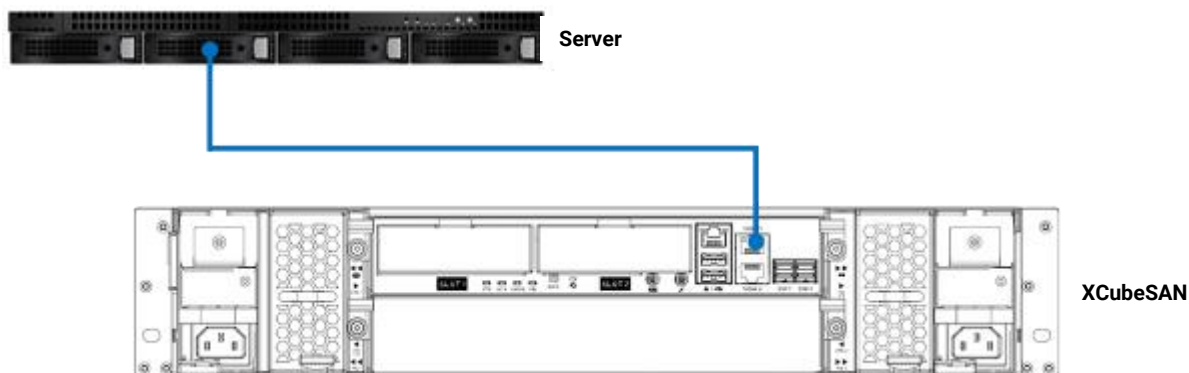
Figure 4-1   One Server / One XCubeSAN / Single Path

One Server / One XCubeSAN / One XCubeDAS / Single Path

The following figure shows an example of a single controller XCubeSAN series connected to a single controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

Figure 4-2   One Server / One XCubeSAN / One XCubeDAS / Single Path

4.2.3. Dual Path (MPIO) Deployment

The following images illustrate some examples of deployment types for dual controller XCubeSAN series. MPIO (MultiPath I/O) configurations are designed to provide HA (High Availability) data connections to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage via switches. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables.
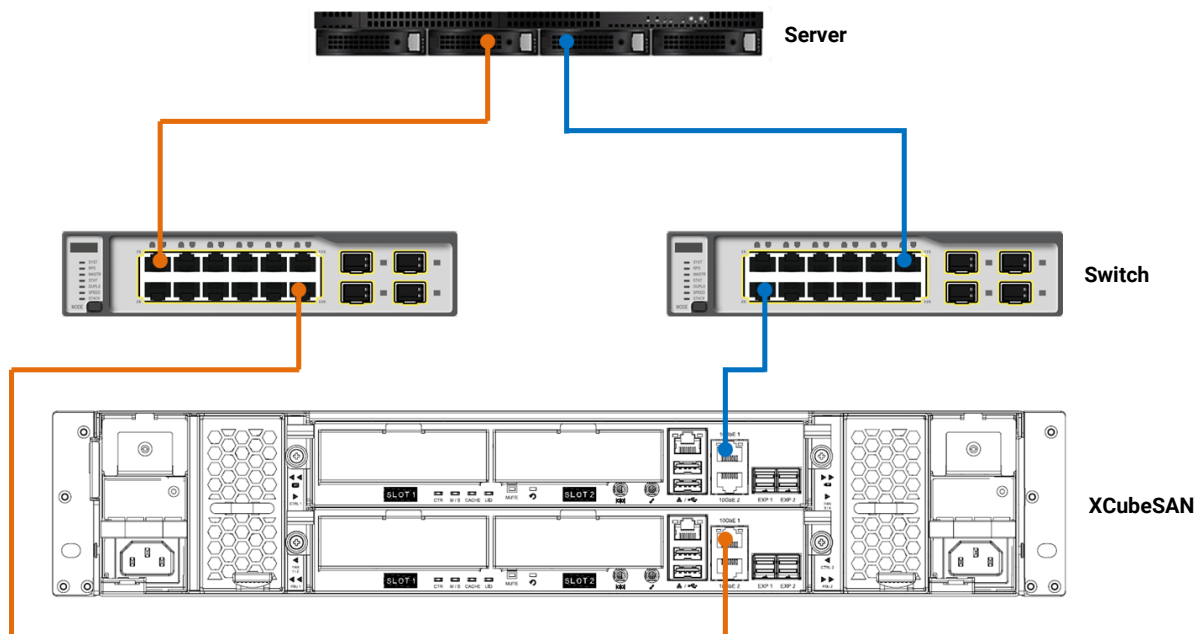
Figure 4-3   One Server / One HBA / Two Switches / One XCubeSAN / Dual Path

One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller, connect enclosure configuration with one server accessing the storage. One server is connected to a dual controller XCubeSAN series using CAT 6 network cables. And a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
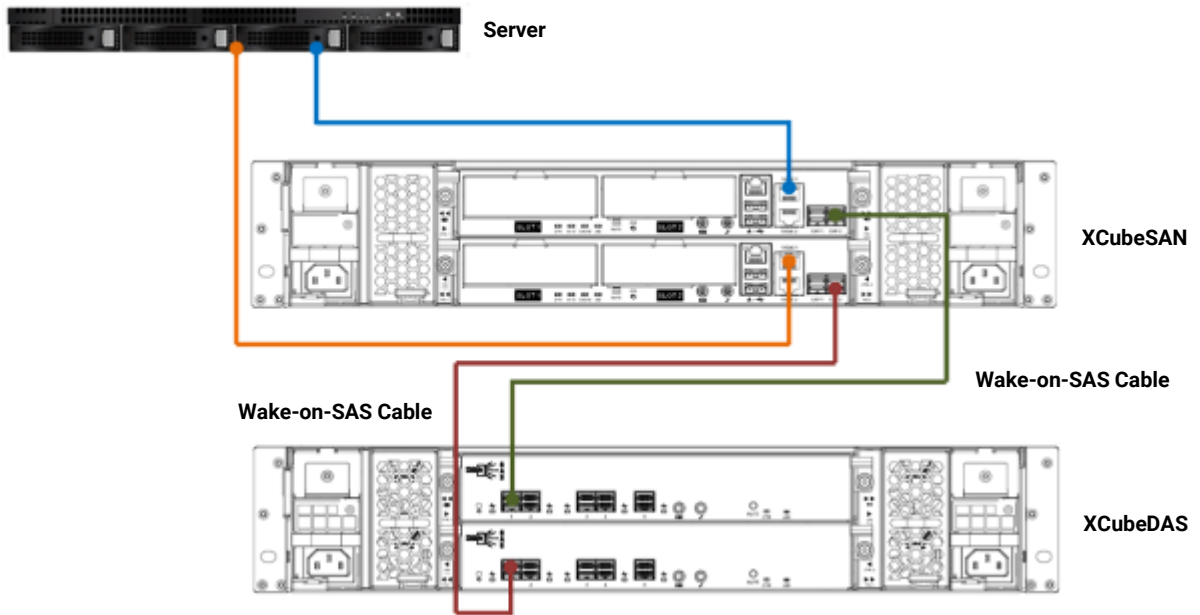
Figure 4-4   One Server / One HBA / One XCubeSAN / One XCubeDAS / Dual Path

4.2.4. Multi-server Attached Cabling Deployment

The following images illustrate some examples of multi-server deployment types.

Two Servers / One HBA per Server / One XCubeSAN / Single Path
The following figure shows an example of a single controller, direct connect enclosure configuration with two servers accessing the storage. Two servers are direct connected to the built-in 10GBASE-T iSCSI port in a single controller XCubeSAN series using CAT 6 network cables.
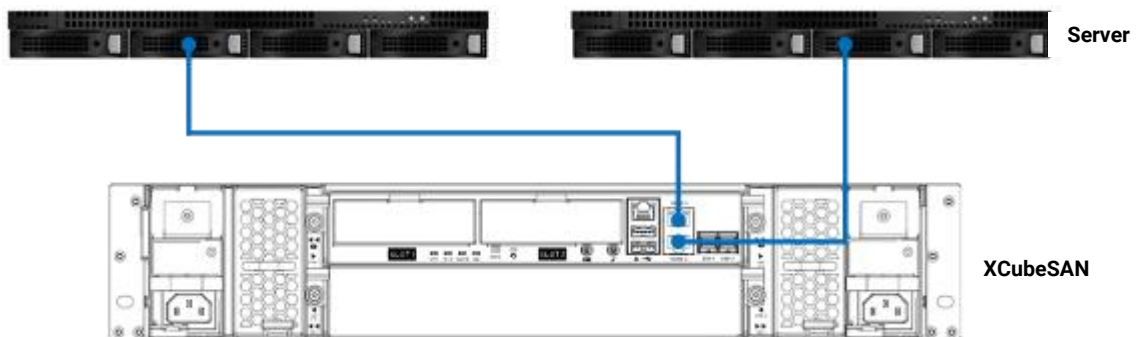

Figure 4-5   Two Servers / One HBA per Server / One XCubeSAN / Single Path

Two Servers / One HBA per Server / Two Switches / One XCubeSAN / Dual Path

The following figure shows an example of a dual controller, connect enclosures configuration with two servers accessing the storage via switches. Two servers are connected to a dual controller XCubeSAN series using CAT 6 network cables.
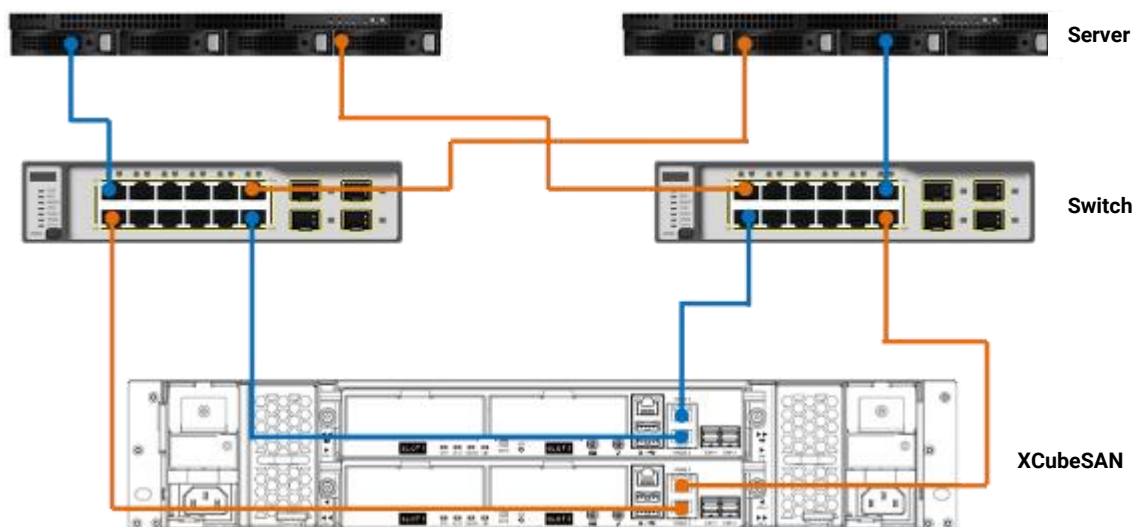
Figure 4-6   Two Servers / One HBA per Server / Two Switches / One XCubeSAN / Dual Path

Ten Servers / One HBA per Server / One XCubeSAN / Dual Path

If customers purchase optional host cards, the following is the cabling example. The following figure shows an example of a dual controller, direct connect enclosure configuration with ten servers accessing the storage. Two servers connect to the on-board 10GbE iSCSI (RJ45) ports. Eight servers connect to the optional host cards. To learn more about host cards support and installation, please refer to the chapter 3.3, <u>Installing the Optional Host Cards</u>.
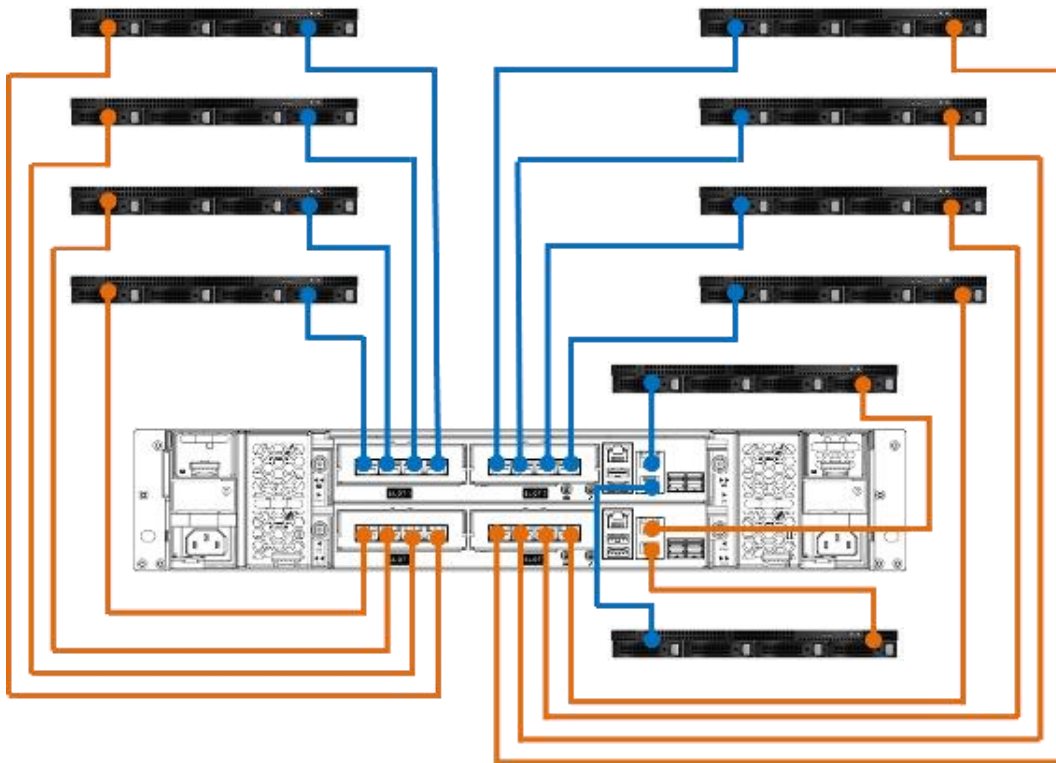
Figure 4-7   Ten Servers / One HBA per Server / One XCubeSAN / Dual Path

4.2.5. Expansion Topology and Deployment

The following images illustrate some examples of expansion topology and deployment types for dual controller XCubeSAN series.

Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
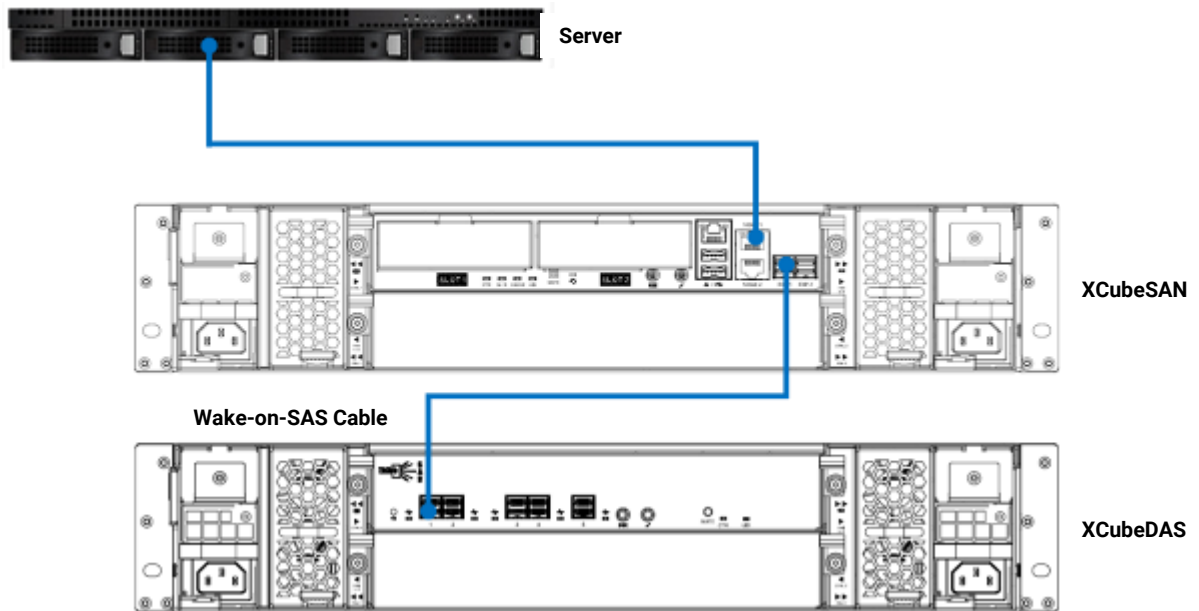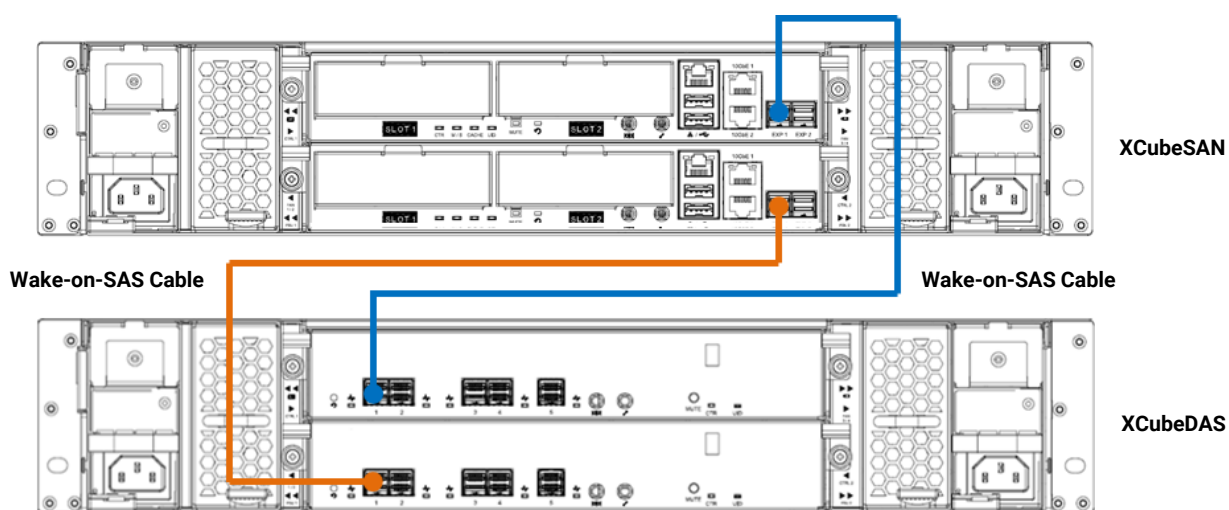

Figure 4-8   Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
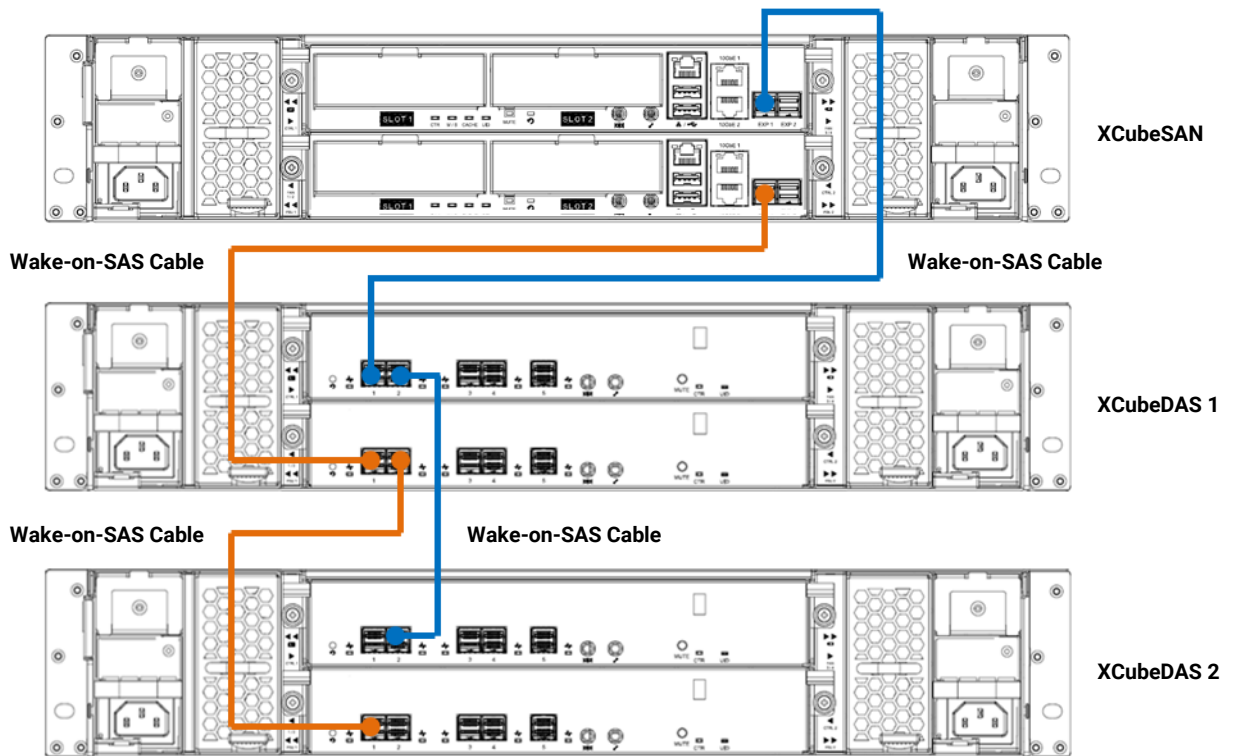
*Figure 4-9   Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path*

Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The XCubeDAS can be connected in redundant connection mode based on forward direction and backward direction. This provides the optimal networking reliability.

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644). The connection in forward direction is shown as blue cables. The connection in backward direction is shown as orange cables.
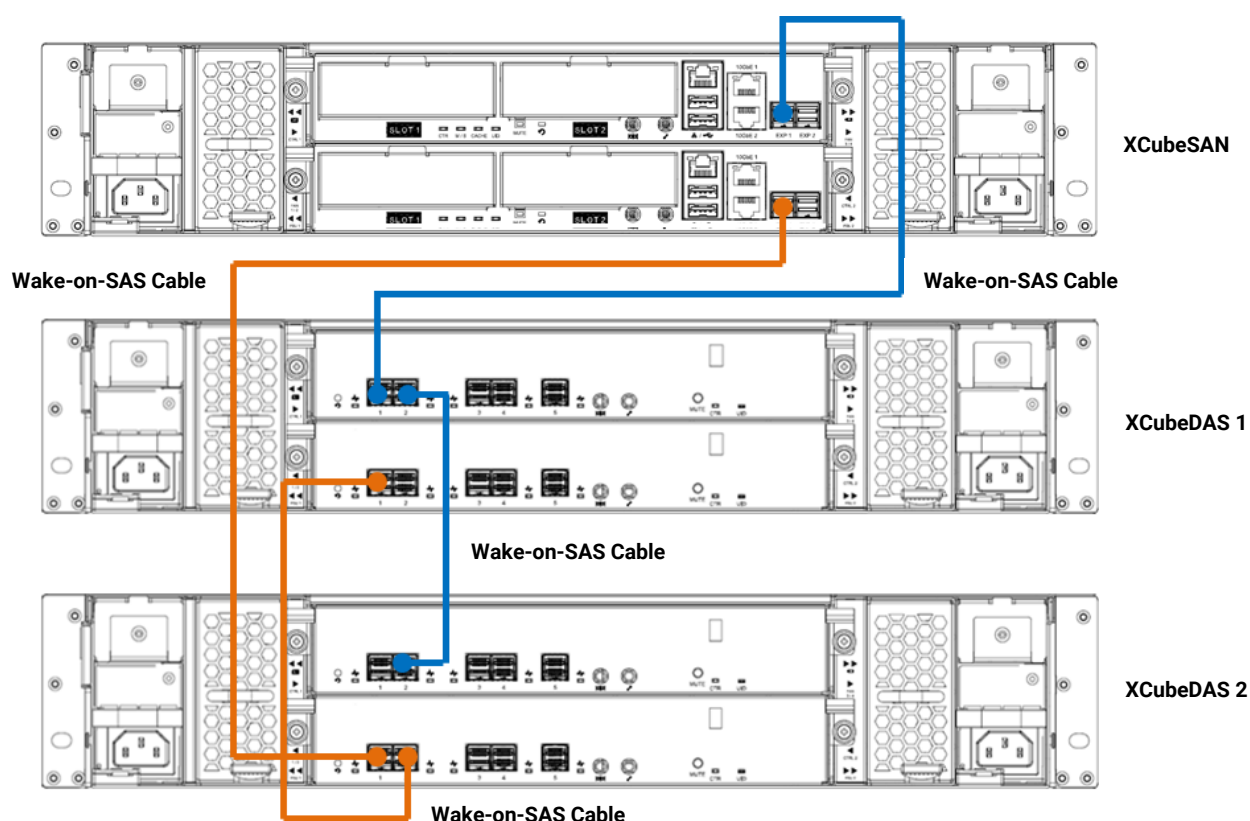
Figure 4-10   Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path

> **INFORMATION:**
> Reverse topology is available in SANOS firmware 1.1.0.

Tree Topology: One Server / Two XCubeDAS

The XCubeDAS can be connected in tree topology to reduce the latency.

The following figure shows an example of a dual controller XCubeSAN series connected to two dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
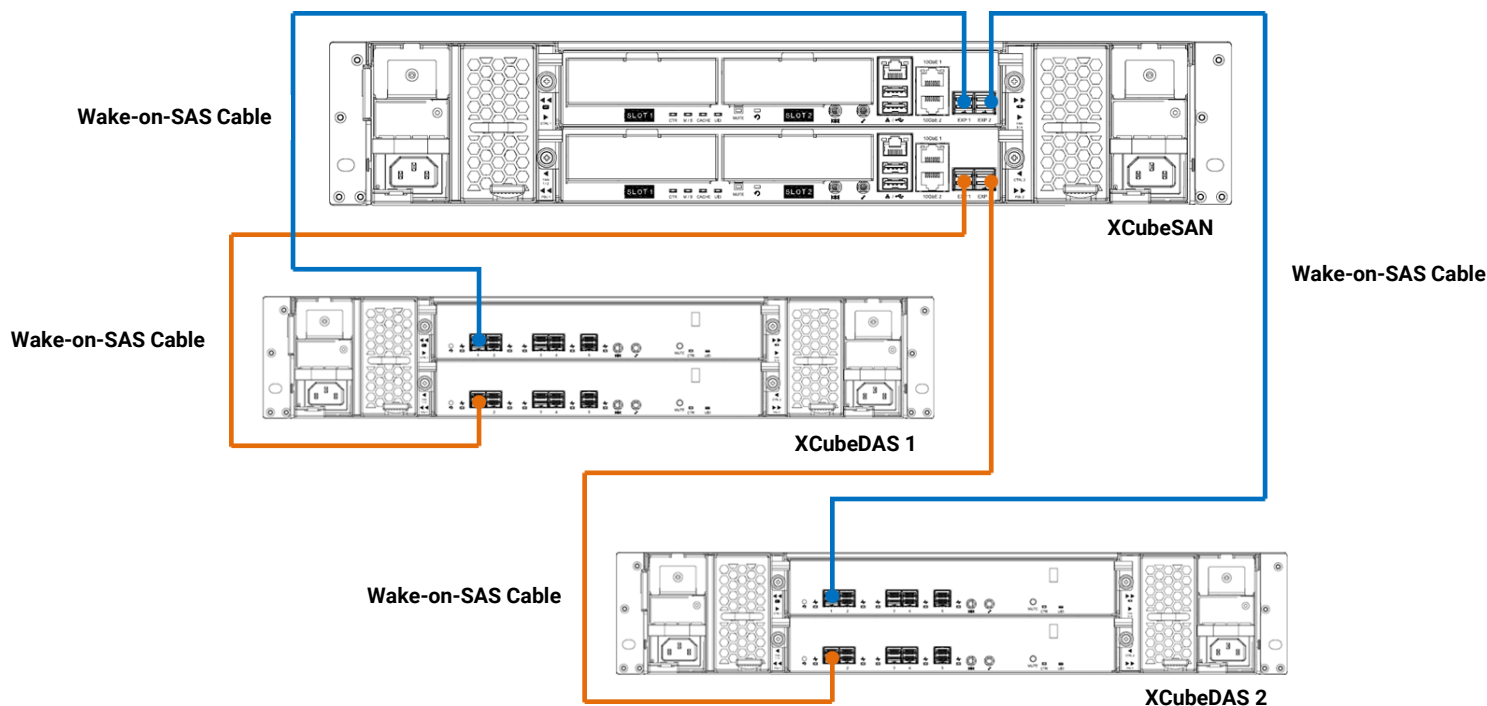
Figure 4-11   Tree Topology: One XCubeSAN / Two XCubeDAS / Dual Path

> **INFORMATION:**
> Tree topology is available in SANOS firmware 1.1.0.

4.2.6. Introduction of Remote Replication

If users purchase two or more XCubeSAN series systems and plan to deploy them in different locations, the **Remote Replication** function in QSAN SANOS supports multiple topologies to suit various disaster recovery configurations. The following remote replication topologies are possible using native replication:

One-Directional

Figure 4-12   One-Directional Remote Replication

A Source Volume (S) in Site A is replicating to a Target Volume (T) in Site B. This is the most basic remote replication topology.

Bi-Directional
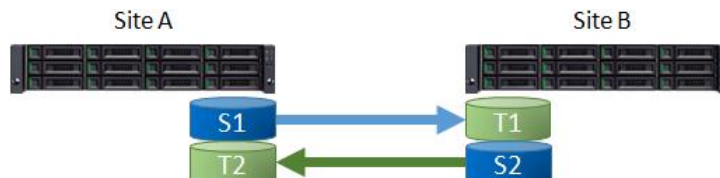
Figure 4-13   Bi-Directional Remote Replication

Each system in a two system topology acts as a replication target for the other's production data. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. And a Source Volume (S2) in Site B is replicating to a Target Volume (T2) in Site A.

One-to-Many
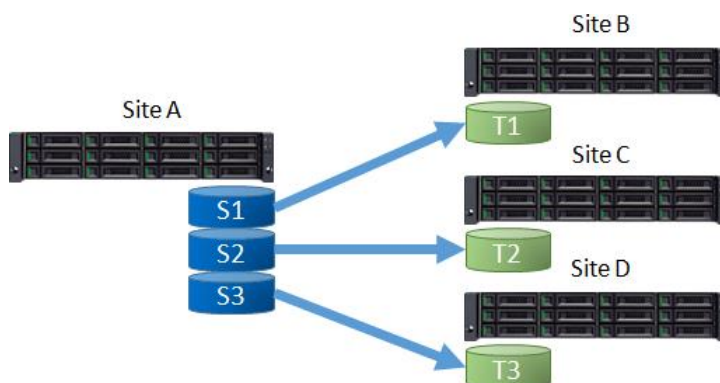
Figure 4-14   One-to-Many Remote Replication

A single source system replicates different storage resources to multiple target systems. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. At the same time, a Source Volume (S2) in Site A is replicating to a Target Volume (T2) in Site C. So does S3 in Site A to T3 in Site D.

Many-to-One
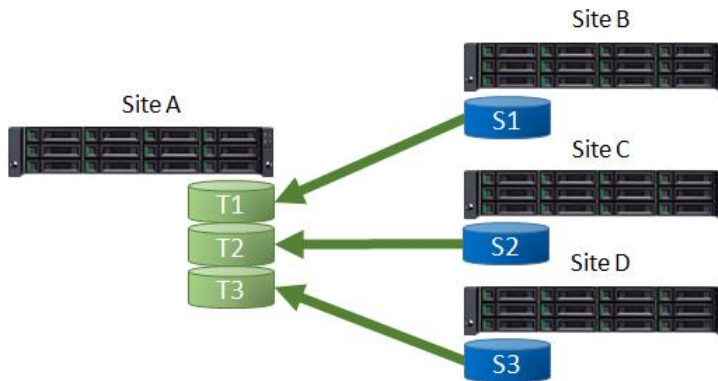
Figure 4-15   Many-to One Remote Replication

Multiple source systems replicate to a single target system. A Source Volume (S1) in Site B is replicating to a Target Volume (T1) in Site A. At the same time, a Source Volume (S2) in Site C is replicating to a Target Volume (T2) in Site A. So does S3 in Site D to T3 in Site A.

Many-to-Many
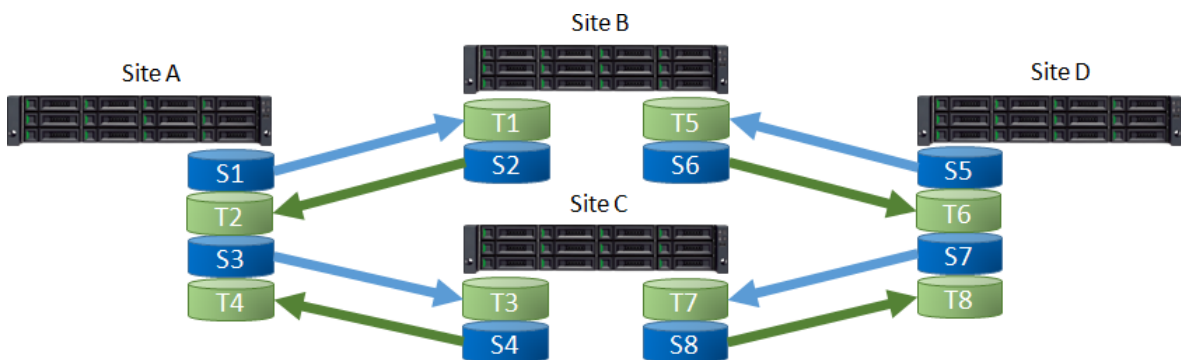
Figure 4-16   Many-to Many Remote Replication

Combination with bi-Directional, one-to-many, and many-to-one, remote replication also supports Many-to-Many topology. Multiple source systems replicate to multiple target

systems. A Source Volume (S1) in Site A is replicating to a Target Volume (T1) in Site B. At the same time, a Source Volume (S2) in Site B is replicating to a Target Volume (T2) in Site A. And does S3 to T3, S4 to T4, …, S8 to T8.

TIP:
Note that all supported topologies have a 1-to-1 configuration for each individual replication session in the topology.

The maximum replication task quantity per system is 32. It means that 32 systems are the maximum quantity of any many-to-one or one-to-many replication configuration.

If you want to learn more about the operations on remote replication, please refer to the Chapter 12.3, Managing Remote Replications in the XCubeSAN SANOS 4.0 Software Manual.

5. Descriptions of LEDs and Buttons

In this chapter, you can find all LED definitions and button behaviors of the XCubeSAN series models. By reviewing this chapter, you will have a basic understanding about the current status of the system or specific components by recognizing the LED status.

5.1. Front Panel

In this session, we will describe the system controls and indicators, and the disk drive LEDs in the front panel.

5.1.1. System Controls and Indicators

XCubeSAN features the button and indication module on the right ear. Please refer to the following content for definitions of LED behaviors.

System Controls and Indicators
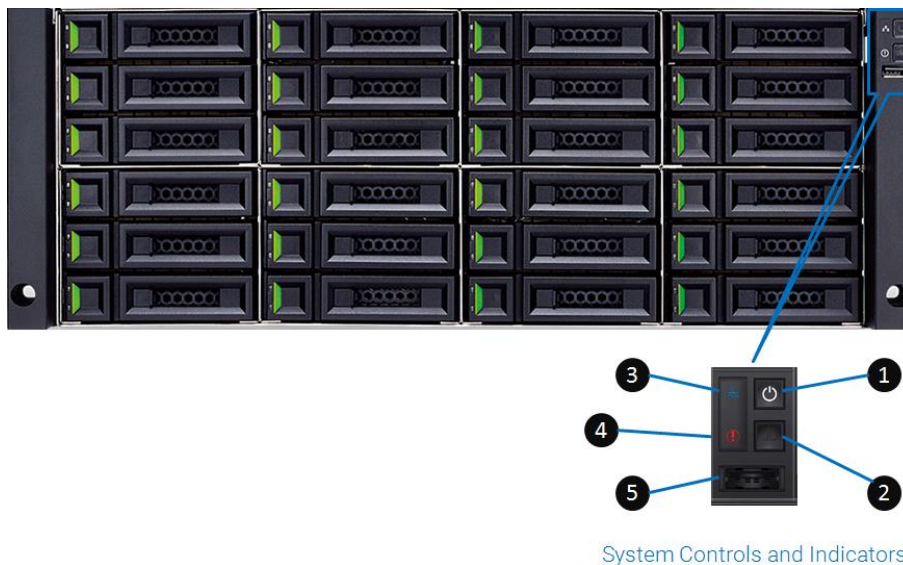
Figure 5-1   System Controls and Indicators

Table 5-1   Descriptions of the System Controls and Indicators LEDs

Number	Description	Definition
1	Enclosure Power Button/LED	**Power Button** • Press the button one time to turn ON the system power and keep pressing for 4 seconds to turn OFF the system power. **Power LED** • Solid White: Power is ON (at least one power supply unit is supplying power to the system). • Blinking White: The system is in the stage of boot or shutdown. • Off: The system is shutdown.
2	UID Button/LED	**UID (Unique Identifier) button** • Press the button one time to turn it ON; press it again to turn it OFF. **UID (Unique Identifier) LED** • Press the button to turn it ON, and press it again to turn it OFF. • Solid Blue: The system has been identified. • Off: The system has not been identified.
3	Enclosure Access LED	**Enclosure Access LED** (Indicate the host interface connectivity.) • Blinking Blue: The host interface activity is on-going. • Off: There is no host interface activity.
4	Enclosure Status LED	**Status LED** (Indicate current health status of the system.) • Solid Amber: System has errors including PSU failure, abnormal voltage, abnormal temperature, any fan module failed or removed, controller degraded, pool degraded, pool failure, SSD cache pool degraded, or SSD cache pool failure. • Off: The system is healthy.
5	USB Port	The USB port can be plug in the LCM (LCD Module).

5.1.2. Disk Drive LEDs

Please refer to the following content for definitions of LED behaviors.

LFF Disk Drive Tray
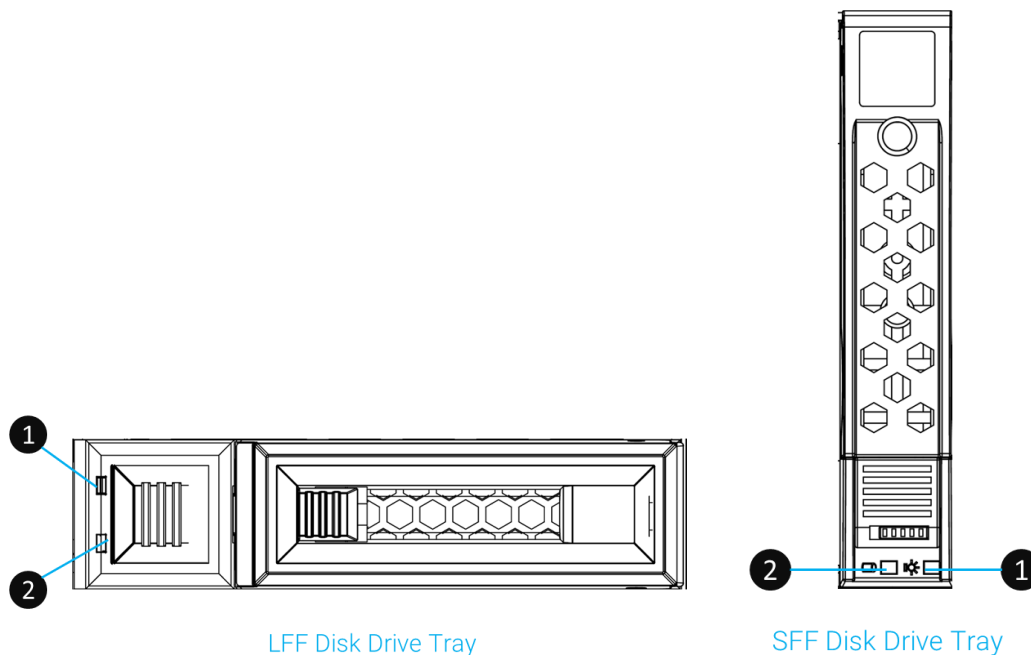
SFF Disk Drive Tray

Figure 5-2   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 5-2   Descriptions of Disk Drive LEDs

Number	Description	Definition
1	Disk Drive Power LED	• Solid Blue: The disk drive is inserted and no data access. • Blinking Blue: The disk drive is accessing data. • Off: There is no disk drive inserted.
2	Disk Drive Status LED	• Solid Amber: There is disk drive error. • Blinking Amber (interval of 0.5 sec): The disk drive is rebuilding. • Blinking Amber (interval of 0.05 sec): Identify the disk drive. • Off: The disk drive is healthy.

5.2. Rear Panel

In this session, we will describe the system control LEDs, PSU LEDs, host card LEDs, and the cache-to-flash module LED in the rear panel.

5.2.1. Controller LEDs

Please refer to the following content for definitions of the LED behaviors.
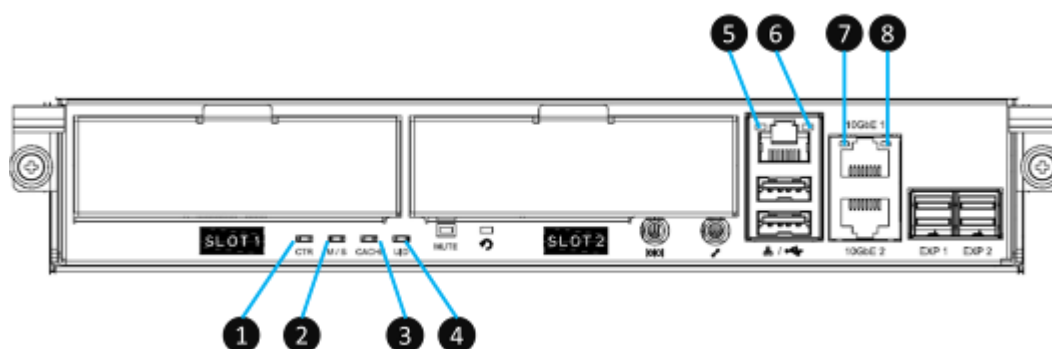
Figure 5-3   The Controller LEDs

Table 5-3   Descriptions of XCubeSAN Series Controller LEDs

Number	Description	Definition
1	Controller Status LED	• Solid Green: Controller status is normal. • Solid Red: System is booting or the controller is failed.
2	Master / Slave LED (only for dual controllers)	• Solid Green: This is the Master controller. • Off: This is the Slave controller.
3	Dirty Cache LED	• Solid Amber: Data on the cache is waiting for flush to disks. • Off: There is no data on the cache.
4	UID (Unique Identifier) LED	• Solid Blue: The enclosure has been identified. • Off: The enclosure is not being identified.
5	Management Port Connection LED	• Solid Green: The connection is built and normal. • Off: No connection is built.

6	Management Port Accessing LED	• Blinking Amber: Data is accessing.
7	10GbE iSCSI Port 1 LED	• Blinking Amber: Data is accessing.
8	10GbE iSCSI Port 2 LED	• Blinking Amber: Data is accessing.

5.2.2. Power Supply Unit LED

Please refer to the following content for definitions of the LED behaviors.
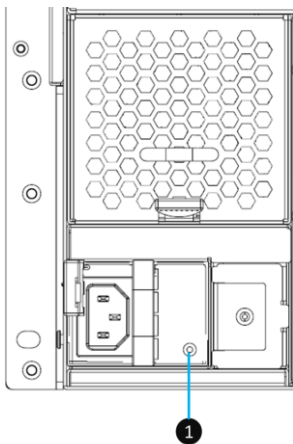
Figure 5-4   The Power Supply Unit LED

Table 5-4   Descriptions of the Power Supply Unit LED

Number	Description	Definition
1	PSU LED	• Solid Green: The PSU is on and normal. • Blinking Green: The PSU is off, +5VSB (Standby) is on. • Solid Amber: There is critical event caused shutdown. • Blinking Amber: There are PSU warning events including high temperature, high power, high current, slow fan, or under input voltage.

5.2.3. Host Card LEDs

Please refer to the following content for definitions of the LED behaviors.

2-port 32Gb Fibre Channel Host Card (SFP28) LEDs

Figure 5-5   2-port 32Gb Fibre Channel Host Card (SFP28) LEDs

Table 5-5   Descriptions of 2-port 32Gb Fibre Channel Host Card (SFP28) LEDs

Number	Description	Definition
1	Activity LED	• Solid Green: Asserted when the link is establish (Link OK without I/O). • Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Blue: Asserted when a 32G link is established and maintained. • Solid Amber: Asserted when a 16G link is established and maintained. • Solid White: Asserted when an 8G and below link is established and maintained • Off: No link is detected or link fails.

4-port 16Gb Fibre Channel Host Card (SFP+) LEDs
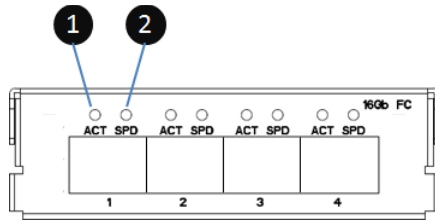
Figure 5-6   *4-port 16Gb Fibre Channel Host Card (SFP+) LEDs*

Table 5-6   *Descriptions of 4-port 16Gb Fibre Channel Host Card (SFP+) LEDs*

Number	Description	Definition
1	Activity LED	• Solid Green: Asserted when the link is establish (Link OK without I/O). • Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Blue: Asserted when a 16G link is established and maintained. • Solid Amber: Asserted when an 8G link is established and maintained. • Solid White: Asserted when a 4G and below link is established and maintained • Off: No link is detected or link fails.

2-port 16Gb Fibre Channel Host Card (SFP+) LEDs
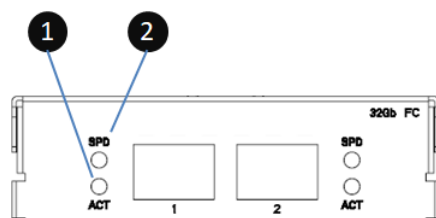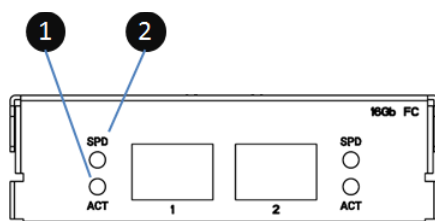

Figure 5-7   2-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Table 5-7   Descriptions of 2-port 16Gb Fibre Channel Host Card (SFP+) LEDs

Number	Description	Definition
1	Activity LED	• Solid Green: Asserted when the link is establish (Link OK without I/O). • Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Blue: Asserted when a 16G link is established and maintained. • Solid Amber: Asserted when an 8G link is established and maintained. • Solid White: Asserted when a 4G and below link is established and maintained • Off: No link is detected or link fails.

2-port 25GbE iSCSI Host Card (SFP28) LEDs

Figure 5-8   2-port 25GbE iSCSI Host Card (SFP28) LEDs

Table 5-8   Descriptions of 2-port 25GbE iSCSI Host Card (SFP28) LEDs

Number	Description	Definition
1	Activity LED	• Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Blue: Asserted when a 25G link is established and maintained. • Solid Amber: Asserted when not a 25G link is established and maintained. • Off: No link is detected or link fails.

4-port 10GbE iSCSI Host Card (SFP+) LEDs
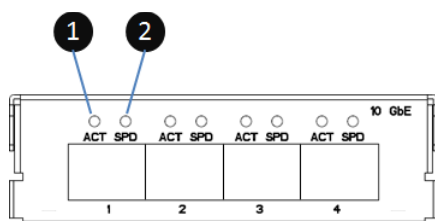
*Figure 5-9   4-port 10GbE iSCSI Host Card (SFP+) LEDs*

Table 5-9   Descriptions of 4-port 10GbE iSCSI Host Card (SFP+) LEDs

Number	Description	Definition
1	Activity LED	• Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Blue: Asserted when a 10G link is established and maintained. • Solid Amber: Asserted when a 1G link is established and maintained. • Off: No link is detected or link fails.

2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs
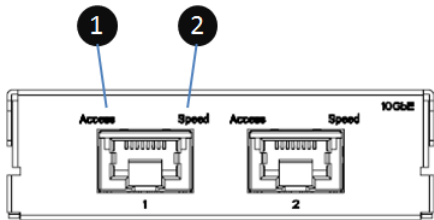
Figure 5-10   2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs

Table 5-10   Descriptions of 2-port 10GBASE-T iSCSI Host Card (RJ45) LEDs

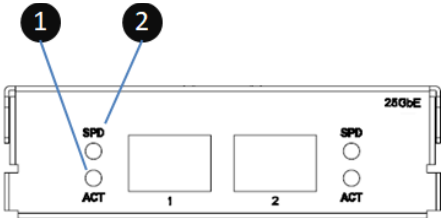| Number	Description	Definition
1	Access LED	• Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Green: Asserted when a 10G link is established and maintained. • Solid Amber: Asserted when a 1G link is established and maintained. • Off: No link is detected or link fails.

4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs
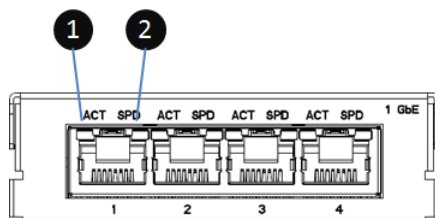
Figure 5-11   4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs

Table 5-11   Descriptions of 4-port 1GBASE-T iSCSI Host Card (RJ45) LEDs

Number	Description	Definition
1	Activity LED	• Blinking Green: Asserted when the link is established and packets are being transmitted along with any receive activity (Access). • Off: No link is detected or link fails.
2	Speed LED	• Solid Amber: Asserted when a 1G link is established and maintained. • Solid Green: Asserted when a 100M link is established and maintained. • Off: No link is detected or link fails.

5.2.4. Cache-to-Flash Module LEDs and Button

Please refer to the following content for definitions of the LED and button behaviors.
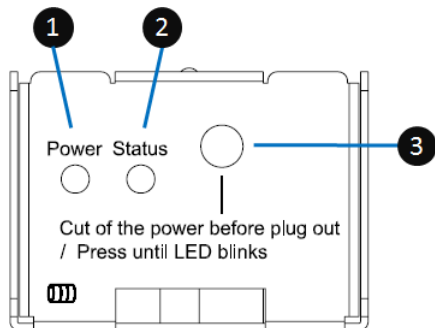
Figure 5-12   Flash Module LEDs and Button

Table 5-12   Descriptions of Flash Module LEDs and Button

Number	Description	Definition
1	Power LED	• Solid Green: Power is good at flash module. • Off: There is no power at flash module.
2	Status LED	• Solid Blue: The status of flash module is good. • Blinking Blue and Amber Interlaced: Installing or removing the flash module. • Solid Amber: The flash module is failed or wrong PCIe connection speed.
3	Attention Button	Used to prompt system that the flash module can be removed later.

CAUTION:

The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 3.5, Installing the Optional Cache-to-Flash Modules section and the chapter 6.5, Removing the Cache-to-Flash Modules section.

6. Quick Maintenance

This chapter provides quick maintenance and instruction of removing / installing FRU (Field Replaceable Unit) or optional components of all the XCubeSAN series models. All of the XCubeSAN models feature the HA design, any of the FRU components can be hot swapped and replaced with zero downtime in the rare event of a component failure. If you encounter any issues caused by FRU components while operating the XCubeSAN, please refer to related section and follow the quick troubleshooting procedures step by step.

> ⚠️ **CAUTION:**
> We recommend that all maintenance is carried out by a certified technician. Do not attempt to carry out any maintenance outside of those outlined in the following section of this guide. System damage due to incorrect maintenance or FRU replacement can affect your product warranty. If you are unsure of the problem related to your XCubeSAN series system, we strongly recommend you to contact or get help from QSAN support team:
>
> - Via the Web: https://www.qsan.com/technical_support
> - Via Telephone: +886-2-7720-6355
>   (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
> - Via Skype Chat, Skype ID: qsan.support
>   (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
> - Via Email: support@qsan.com

6.1. Removing / Installing the Controller Module

This section outlines how to check the status of your controller module and the procedure of removing / installing the controller module when encountering problems.

Removing the Controller Module

⚠️ **CAUTION:**
- The controller module is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.

- For single controller model, the controller must be installed into slot 1 (the top slot of the system in rear view) and you must install the dummy controller cage provided for the empty slot to ensure the proper system cooling.

If you see the system health becomes Controller Degraded in the SANOS UI **Dashboard** -> **System Information** or the controller status LED shows solid red color, which means your controller module is encountering an issue or a hardware configuration mismatch (different memory size or different types of host cards are installed in the same slot number of different controllers) and need to be replaced immediately. You need to follow the procedures below to remove problematic controller module and install a healthy one.

System Information

Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	Controller Degraded

More...

Figure 6-1   Warning Message of Failed Controller Module in the SANOS UI
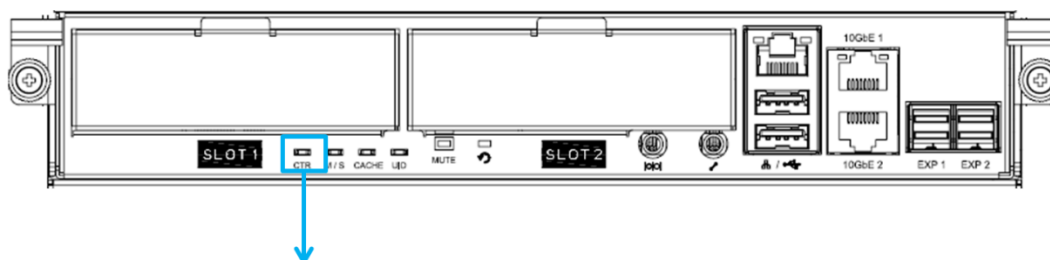
If controller status LED shows solid red, it means the controller module encounters some sort of issues or hardware configuration mismatch.

Figure 6-2   Warning Message of Controller Module by the Status LED

- The following images illustrate mechanical components of the controller module.
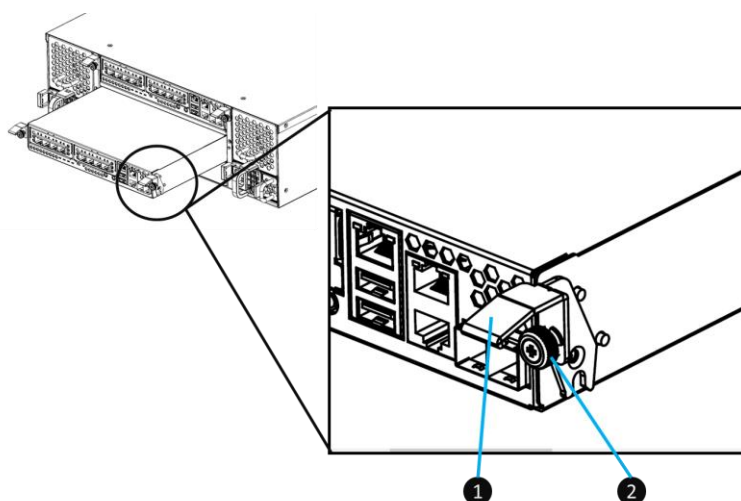
Figure 6-3   Mechanical Components of the Controller Module

Table 6-1   Mechanical Components of the Controller Module

Number	Description
1	Release Lever
2	Thumb Screw

The following are detailed steps for removing the controller module from the system chassis.

- Use a Phillips screwdriver to loosen the thumb screws on each release levers.
- Pull down both release levers at the same time and then pull out about half length of the controller module by holding two release levers.

- Use one hand to hold one end of the controller module (the side with release levers) and the other hand hold the bottom of the controller; pull out the controller module until it is free from the system chassis.
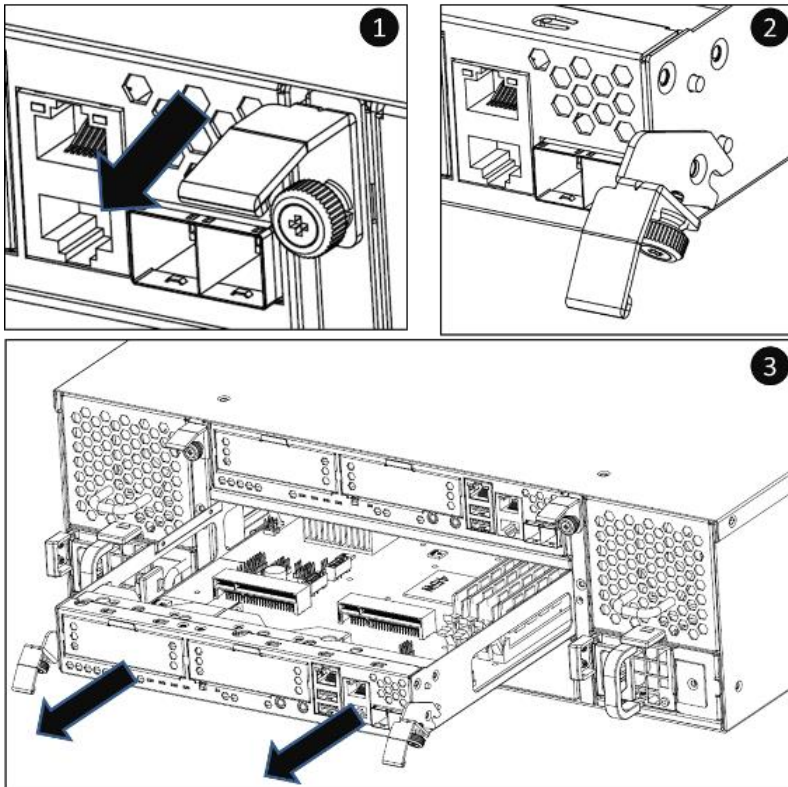
Figure 6-4   Procedures of Removing the Controller Module

Installing the Controller Module

The following content and images are the detail steps of installing the controller module into the system chassis.

- Make sure the position of both release levers of the controller is at downward.
- Align and place the controller to the empty controller slot.
- Push the controller module all the way into the controller slot until the position of two release levers move upward automatically.
- Pull up both release leavers at the same time until they totally parallel with the controller cage and then use a Phillips screw driver to tighten both screws.
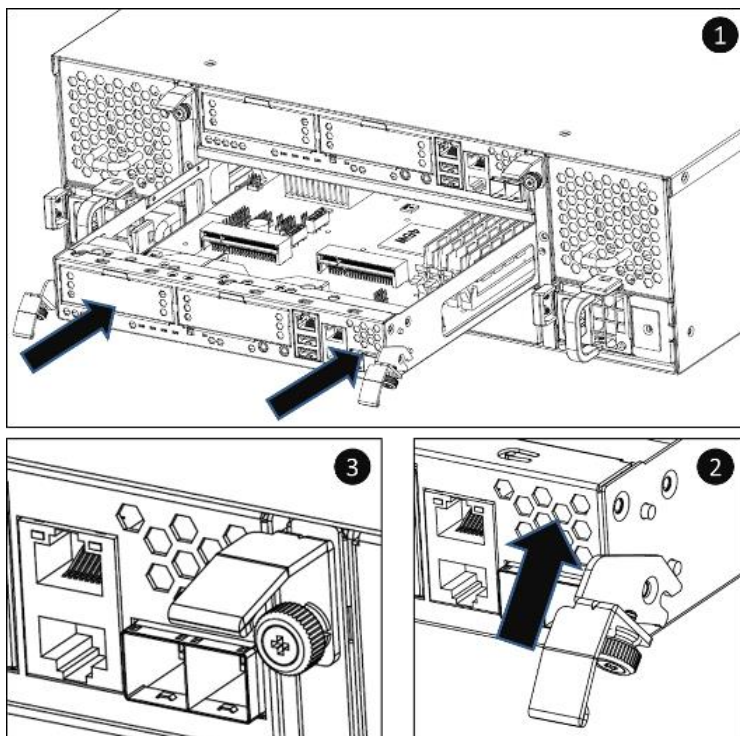
Figure 6-5   Detailed Procedures of the Controller Module installation

- After about 150 seconds from the time you have installed the controller module into the system chassis, the status LED will show solid green color if controller module is successfully installed, then the web UI will show figure 6-6: System Healthy is Good.

Figure 6-6   Screenshot of the Controller Module Successfully Installed in SANOS UI

6.2. Removing / Installing the Power Supply Unit

The standard XCubeSAN series system comes with two redundant PSUs (Power Supply Units) that allow users to hot swap it when one of the PSUs is not functioning.

All XCubeSAN models are fitted with the same PSU, but the installation direction came differ. Please refer to the following content for the PSU removal / installation guide.

⚠	**CAUTION:**
	The power supply unit is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.

If you see the "System Health" showing PSU Fault, or the PSU LED shows solid or blinking amber color which means your PSU has encountered an issue and need to be replaced immediately. You need to follow the procedure of how to remove problematic PSU module and install a healthy one.

Figure 6-7   Warning Message of Failed PSU in SANOS UI

Removing the Power Supply Unit
The images and the table below provide description of mechanical components of the PSU. Please note that the PSU installed in 4U/3U or 2U system chassis are the same but the installation direction is different (If you pull out the PSU from the system chassis, for 4U/3U

systems, the sticker on the PSU will be facing downwards; for 2U system, the sticker will be on the right hand side). Please be sure to use the correct installation direction of the PSU to prevent any potential damage by improper installation.
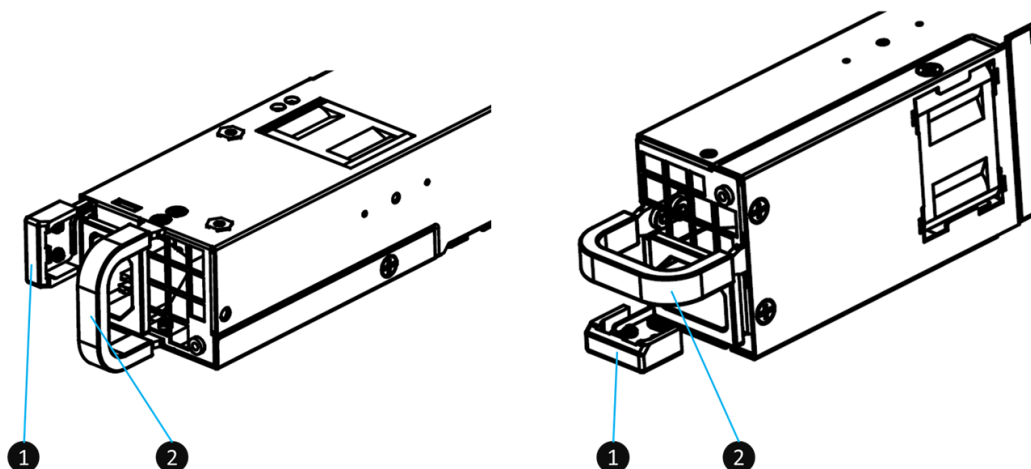
PSU Installed in 4U/3U System Chassis   PSU Installed in 2U System Chassis

Figure 6-8   Mechanical Components of the PSU

Table 6-2   Mechanical Components of the PSU

Number	Description
1	PSU Release Tab
2	PSU Handle

Before removing the PSU, disconnect the power cord from the wall outlet; then remove the other end that is connected to the PSU.

The following are detailed steps of removing a PSU from the system chassis.

- Hold the PSU handle first, and then press the release tab.
- Pull out the power supply about half of the total PSU length.
- Use one hand to hold one end of the PSU (the side with release tab) and the other hand hold the bottom of the power supply unit; pull out the power supply unit until it is free from the system chassis.
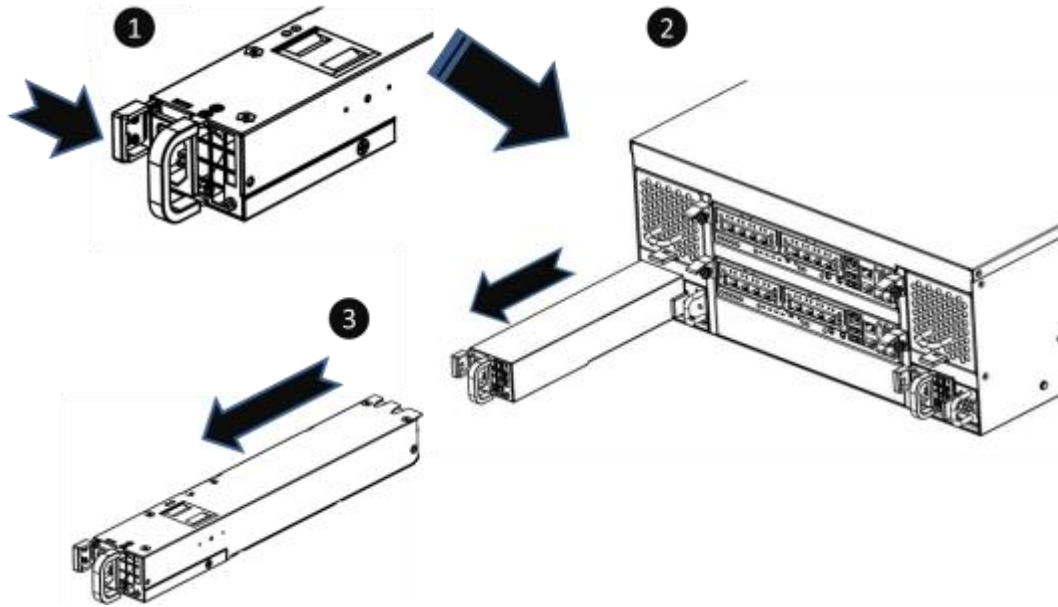
Figure 6-9   Procedures of Removing the Power Supply Unit

Installing the Power Supply Unit

The following are detailed steps of installing the PSU into the system chassis.

- Use one hand to hold one end of the power supply unit (the side with release tab and handle) and the other hand hold the bottom of the power supply unit; then align the PSU with the empty PSU slot.
- Push the PSU all the way into the empty slot until you hear the "click" sound from the release tab.
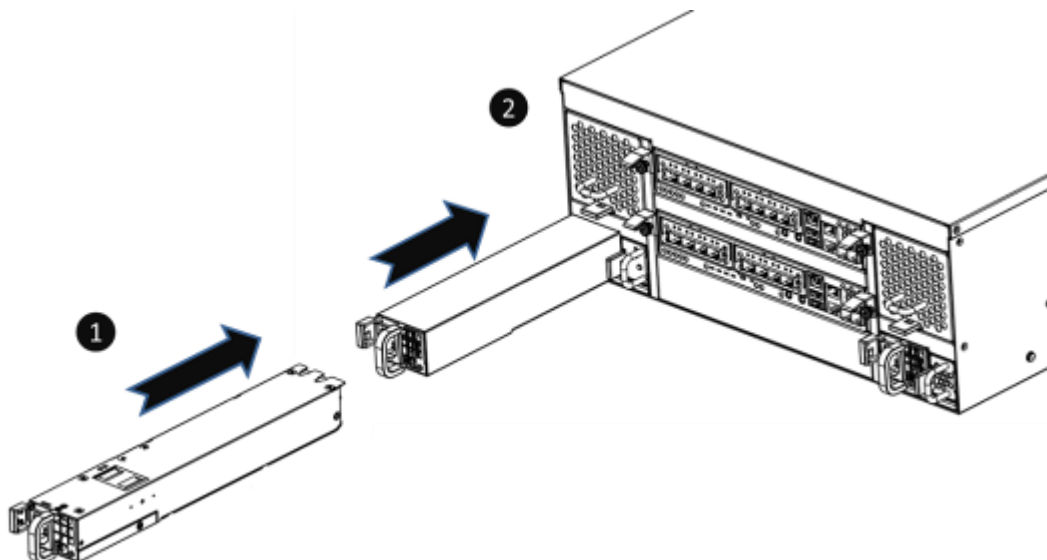
Figure 6-10   Installing the Power Supply Unit in the System Chassis

If the PSU is successfully installed, the status LED will show solid green color (if no other malfunction is encountered), then web UI will show Figure 6-11: System Health is Good and no warning message on the upper right side of the SANOS UI.

Figure 6-11   Screenshot of the PSU Successfully Installed in the SANOS UI

6.3.   Removing / Installing the Fan Module

The standard XCubeSAN system comes with two redundant fan modules that allow you to hot swap it when one of the fan modules encounters an issue. In the event that the fan module fails, it can be hot-swapped. The XCubeSAN series utilizes two types of fan module

for 4U/3U and 2U system chassis. Please refer to the following information for the fan module removing / installing procedures.

⚠️ **CAUTION:**
The fan module is heavy; please use both hands while removing, holding, or carrying the fan module. The fan module is hot swappable, but power off the system to do the fan module installing or removing is highly recommended. Recommended place for installing / removing a fan module: the system is on the well secured rack or onto stable surface.

If you see the System Health showing Fan Fault, that means your fan module has encountered an issue and needs to be immediately replaced. You need to follow the procedures below to remove problematic fan module and install a healthy one.

Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW316016010021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	Fan Fault

Figure 6-12   Warning Message of Failed Fan Module in the SANOS UI

Removing the Fan Module

Figures below are fan modules for 4U/3U or 2U system chassis.
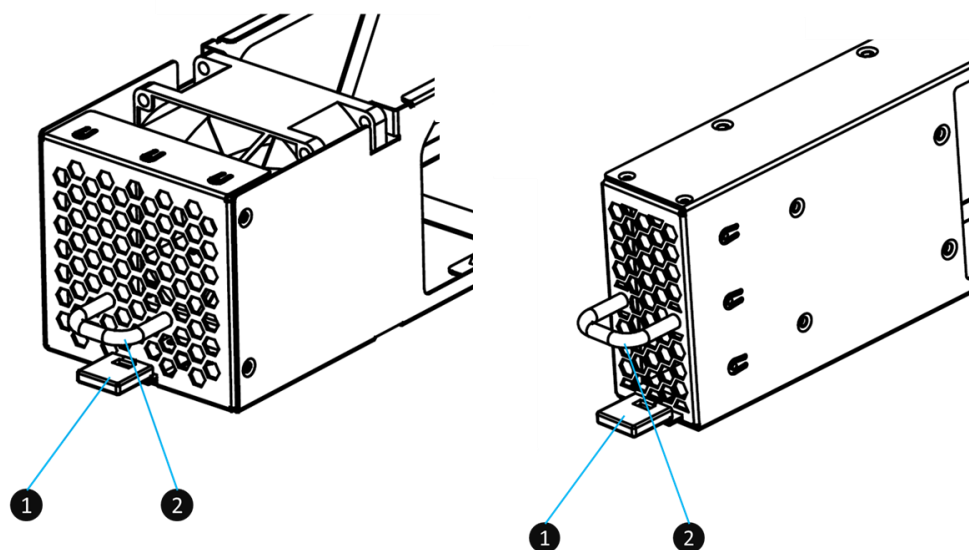
Fan Module for 4U/3U System Chassis   Fan Module for 2U System Chassis

Figure 6-13   Mechanical Components of the Fan Module

Table 6-3   Mechanical Components of the Fan Module

Number	Description
1	The Fan Module Release Tab
2	The Fan Module Handle

The following details the steps of removing the fan module from the system chassis.

- Hold the fan module handle first, and then press the release tab.
- Pull out the fan module around half of the total fan module length.
- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; pull out the module until it is free from the system chassis.
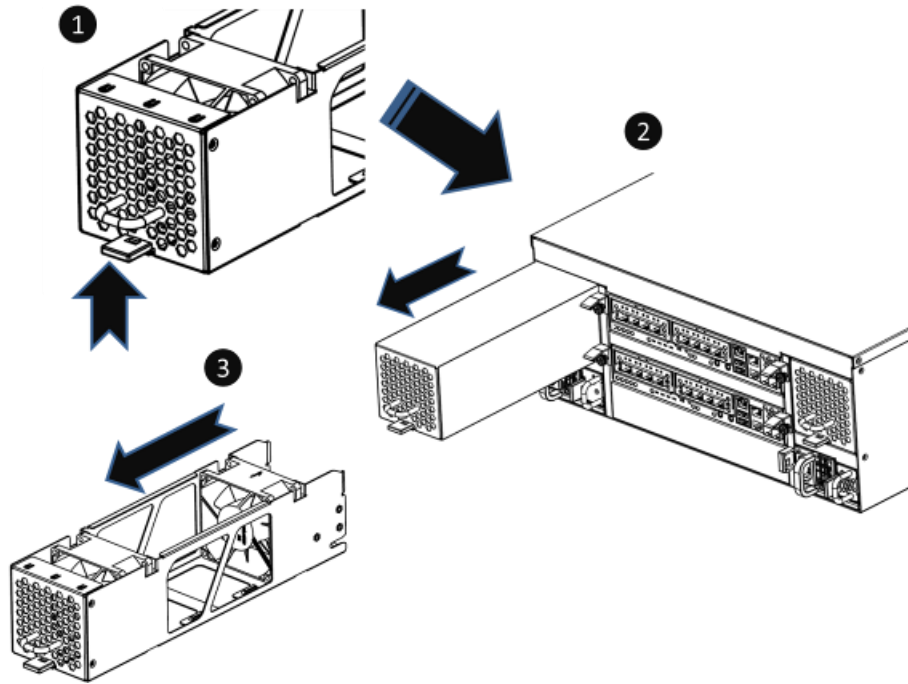
Figure 6-14   Procedures of Removing the Fan Module

Installing the Fan Module

The following details the steps of installing the fan module into the system chassis.

- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; then align it with the empty slot. Installation direction of LFF and SFF systems is the same.
- Push the fan module all the way into the empty slot until hear the "click" sound from the release tab.
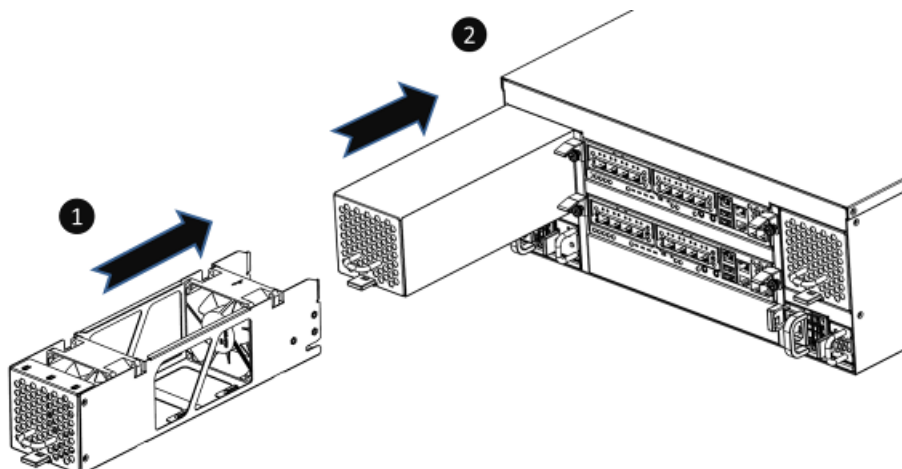
Figure 6-15   Procedures of Installing the Fan Module

If the fan module is successfully installed, the SANOS UI -> **DASHBOARD** -> **System Information** will show as figure 6-16: System Health is Good and no warning message on the upper right side of the SANOS UI.

Item	Information
System Name	XS5216-D40000
Model Name	XS5216
Backplane ID	QW316
System Serial Number	QW3160160I0021001
Firmware Version	1.2.0
System Controller Status	Dual Controller, Active-Active
System Health	Good

More...

Figure 6-16   Screenshot of the Fan Module Successfully Installed in the SANOS UI

6.4.   Removing the Host Card

If you encounter data connection problems from the host's side but you don't know which port or which host card is with problem, please go to SANOS UI -> **HOST CONNECTIVITY** -> **Overview**, it will show all host cards you have installed. If the host card has fault, all of the ports will have a fault and will show as **Down**.

The following figure is the example of one port failed of the 10GbE iSCSI host card.

Controller 1			
Location	Name	Status	MAC Address/WWPN
Onboard	LAN1 (10Gb)	10 Gb/s	00:13:78:d3:02:72
Onboard	LAN2 (10Gb)	10 Gb/s	00:13:78:d3:02:73
Slot1	LAN1 (10Gb)	10 Gb/s	00:13:78:d3:02:74
Slot1	LAN2 (10Gb)	10 Gb/s	00:13:78:d3:02:75
Slot1	LAN3 (10Gb)	10 Gb/s	00:13:78:d3:02:76
Slot1	LAN4 (10Gb)	Down	00:13:78:d3:02:77
Slot2	LAN1 (1Gb)	1 Gb/s	00:13:78:d3:02:78
Slot2	LAN2 (1Gb)	1 Gb/s	00:13:78:d3:02:79
Slot2	LAN3 (1Gb)	1 Gb/s	00:13:78:d3:02:7a
Slot2	LAN4 (1Gb)	1 Gb/s	00:13:78:d3:02:7b

Figure 6-17   Example of a Failed Port on the 10GbE iSCSI Host Card

The following content and images are detailed steps of removing a host card from the system.

- Remove the controller module first. For detailed steps of removing a controller module; please refer to the chapter 6.1, Removing / Installing the Controller Module section.
- Press the host card release button and disconnect the host card with the connector in the controller cage.
- Pull the host card out until it is free from the controller cage.
- Install the substitute host card. The detailed steps of installing a host card; please refer to the chapter 3.3, Installing the Optional Host Cards section.
- Install the dummy host card cage in the empty host card slot and tighten two screws.
- Repeat the procedures above if there are other host cards need to be removed.
- To ensure the system cooling, please install all dummy host adapter card cages if host cards are removed.
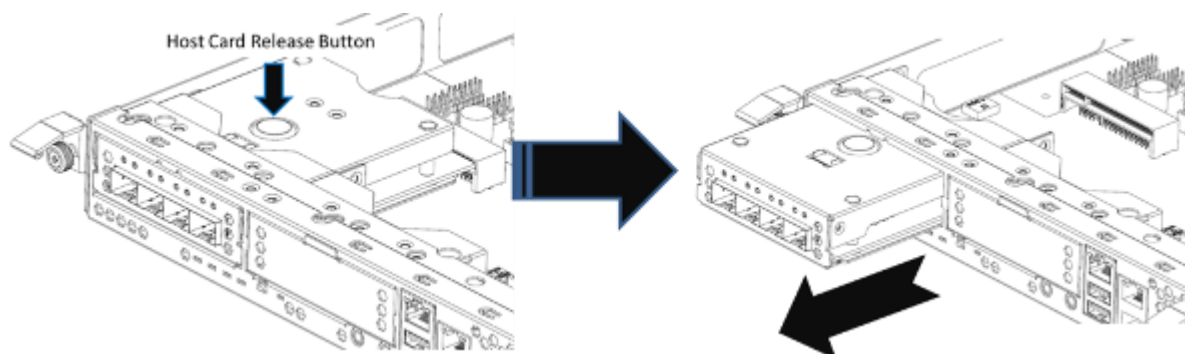
Figure 6-18   Procedures of Removing the Host Card from the Controller Cage
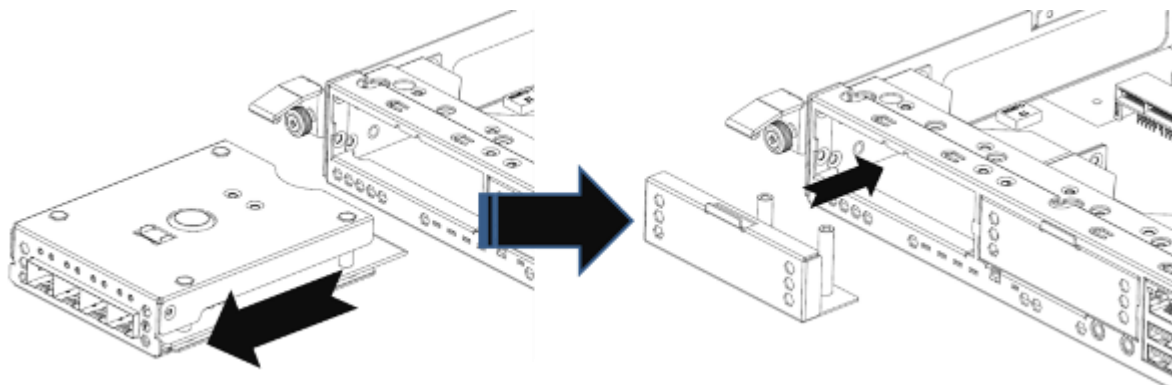
Figure 6-19   Procedures of Pull out the Host Card and Install Dummy Host Card Cage
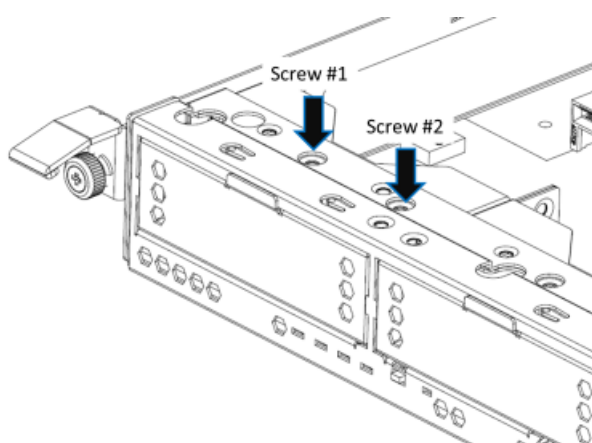
Figure 6-20   The Finished Installed Dummy Host Card Cage

6.5.   Removing the Cache-to-Flash Modules

Navigate to the SANOS UI -> **SYSTEM SETTINGS** -> **Power** -> **Cache to Flash** and view the status of the power module or flash module. If it shows Failed, that means your power module or flash is not functioning correctly and can't provide real time data protection anymore. You may need to replace the power module or flash to ensure continued protection. The following figure is the example of a failed flash module.

Power Module

Item	Information
Status	Failed
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module

Item	Information
Status	Good

Figure 6-21   Example of a Failed Power Module

Power Module

Item	Information
Status	Good
Type	BBM
Power Level	100%
Temperature	+32.0(C)

Flash Module

Item	Information
Status	Failed

Figure 6-22   Example of a Failed Flash Module

> **CAUTION:**
> The flash module of Cache-to-Flash is hot swappable because it is a PCIe device. Before removing the flash module from the system chassis, you must press the attention button until the flash module status LED finished blinking. Otherwise, the flash module maybe damage. For more information about Cache-to-Flash modules, please refer to the chapter 3.5, Installing the Optional Cache-to-Flash Modules section and the chapter 5.2.4, Cache-to-Flash Module LEDs and Button section.

The following content and image are detail steps of removing the flash module.

- Press the attention button of flash module until the flash module status LED is blinking. After blinking for a while, the LED will light off. At this point, you can safely remove the flash module.
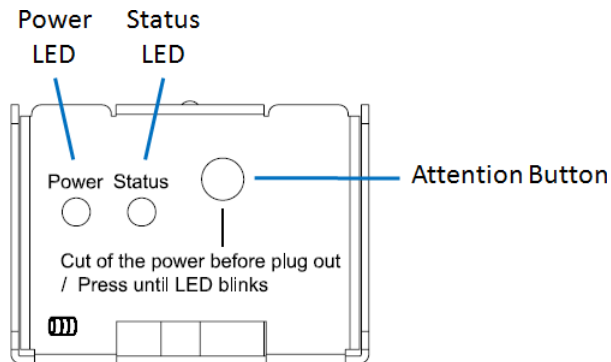
Figure 6-23   Pressing Attention Button of the Flash Module

- Press the release button of flash module and pull it out until it is free from system chassis.
- Install the substitute flash module. The detailed steps of installing the flash module, please refer to the chapter 3.5, Installing the Optional Cache-to-Flash Modules section.
- Install the dummy cache-to-flash cage and then use a Phillips screw driver to tighten it.
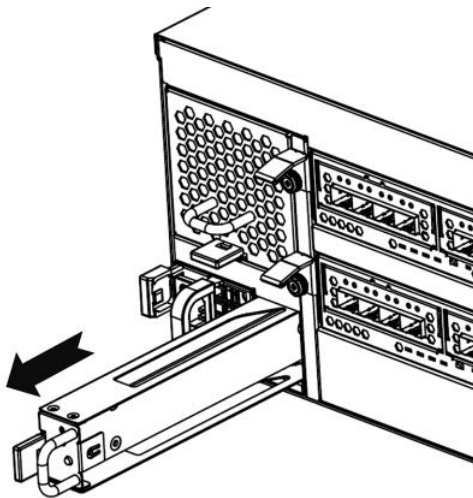
Figure 6-24   The Procedure of Removing the Flash Module from the System Chassis

The following content and image are detail steps of removing the power module.

- Press the release button of power module and pull it out until it is free from system chassis.
- Install the dummy cache-to-flash cage and then use a Phillips screw driver to tighten it.
- To ensure proper cooling of the system, please install all dummy cache-to-flash module cages if the flash or power module is removed.

Figure 6-25   The Procedure of Removing the Power Module from the System Chassis

7. Support and Other Resources

7.1. Getting Technical Support

After installing your device, locate the serial number on the sticker located on the side of the chassis or from the SANOS UI -> **SYSTEM SETTING** -> **Maintenance** -> **System Information** and use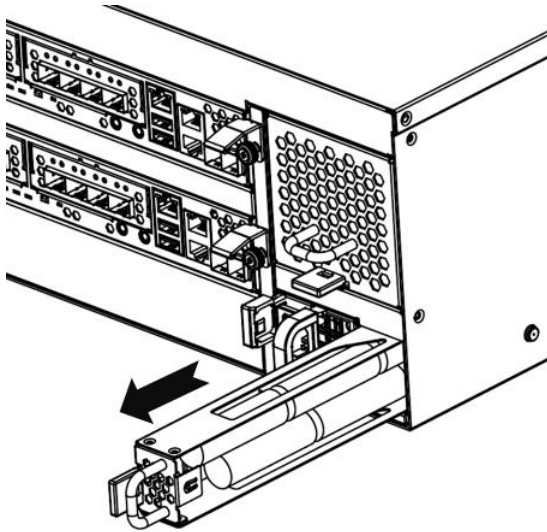 it to register your product at https://www.qsan.com/business_partnership. We recommend registering your product in QSAN partner website for firmware updates, document download, and latest news in eDM. To contact QSAN Support, please use the following information.

- Via the Web: https://www.qsan.com/technical_support
- Via Telephone: +886-2-7720-6355
  (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
  (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: support@qsan.com

Information to Collect
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages or capture screenshots
- Product-specific reports and logs
- Add-on products or components installed
- Third-party products or components installed

Information for Technical Support
The following system information is necessary for technical support, please refer to following for what and where to get the information of QSAN product.

If the technical support requests you to download the Service Package, please navigate in the SANOS UI -> **SYSTEM SETTING** -> **Maintenance** -> **System Information**, and then click the **Download Service Package** button to download. Then the system will automatically generate a zip file the default download location of your web browser.

System

Item	Information
System Name	XS5216-D40000
Model Name	XS5216
System Serial Number	QW3160160I0021001
System Controller Status	Dual Controller, Active-Active
Master Controller	Controller 1

Controller 1

Item	Information
Controller Serial Number	50013780080A0440
CPU	Intel(R) Xeon(R) Processor D-1500 4 Cores
Memory	8 GB
Host Card Slot 1	Empty
Host Card Slot 2	Empty
Firmware Version	1.2.0
SAS IOC Firmware Version	07.00.01.00
SAS Expander Firmware Version	1000

Controller 2

Item	Information
Controller Serial Number	50013780080A0380
CPU	Intel(R) Xeon(R) Processor D-1500 4 Cores
Memory	8 GB
Host Card Slot 1	Empty
Host Card Slot 2	Empty
Firmware Version	1.2.0
SAS IOC Firmware Version	07.00.01.00
SAS Expander Firmware Version	1000

Backplane

Item	Information
Backplane Serial Number	001378D40000
Backplane ID	QW316
MCU Version	1.2.0

Licenses

Item	Information
SSD Cache	Enabled
Auto Tiering	Enabled

Download Service Package

Figure 7-1   Download Service Package in the SANOS UI

7.2. Online Customer Support

For better customer support, QSAN product includes the console cable for online support. Please follow the procedures below to setup the online help environment for QSAN support team.

The following procedure will help you to setup the serial console via the console cable that is enclosed in the shipping carton. The following image is the appearance of the console cable.

Figure 7-2   Appearance of a Console Cable

Procedures to Setup the Serial Console

1. Setup the serial cable between the controller and one server/host like in the below image.
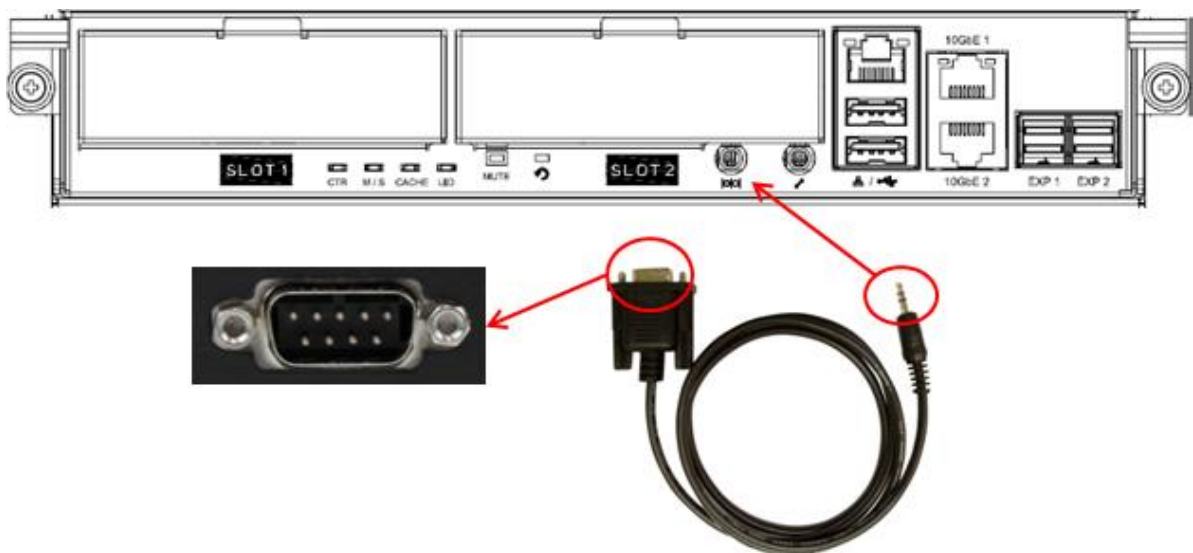

Figure 7-3   Connect the Console Cable

2. You must use terminal software such as HyperTerminal or Putty to open the console after the connection is made.

<table>
<tr>
<td>ℹ</td>
<td>INFORMATION:
For more information about terminal software, please refer to
HyperTerminal: http://www.hilgraeve.com/hyperterminal/
PuTTY: http://www.putty.org/</td>
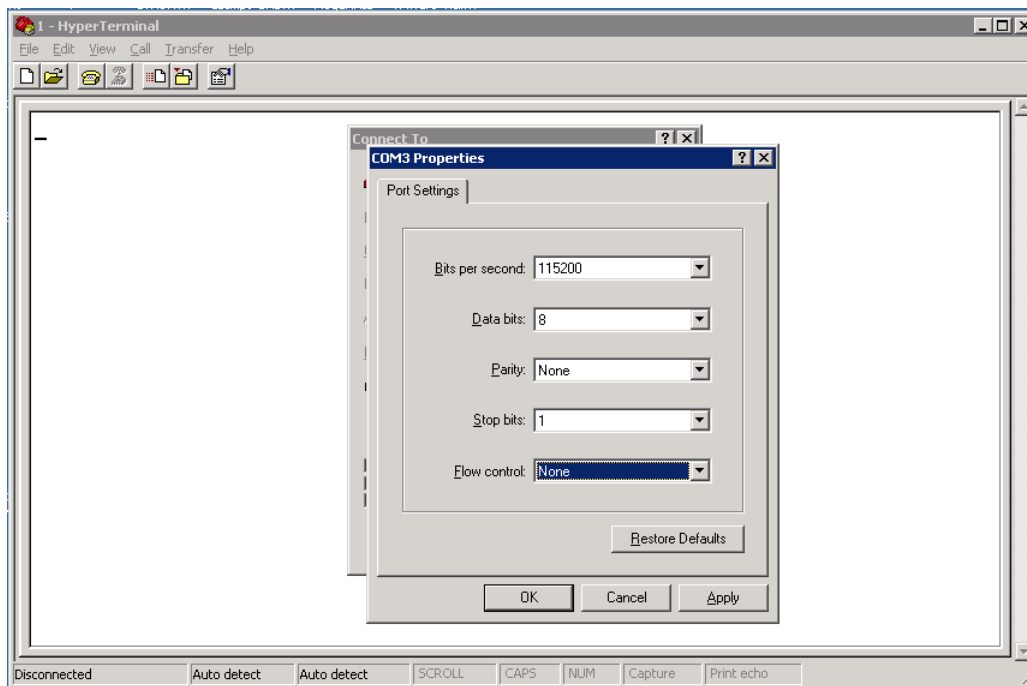</tr>
</table>

3. Here we first demonstrate HyperTerminal. The console settings are on the following.

Baud rate: 115200, 8 data bit, no parity, 1 stop bit, and no flow control
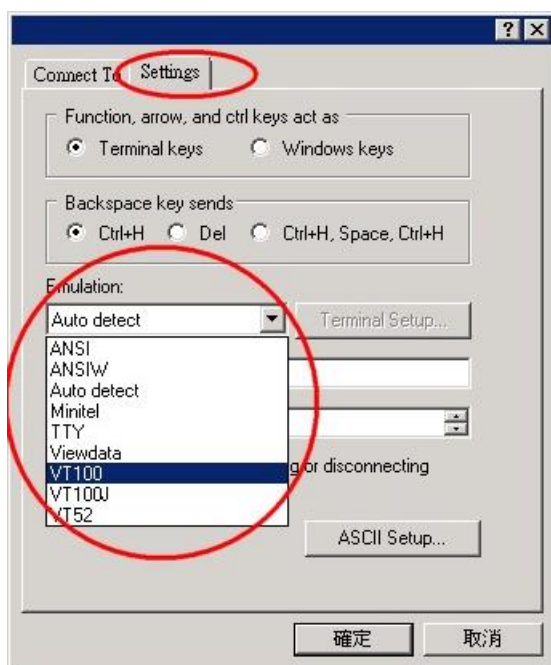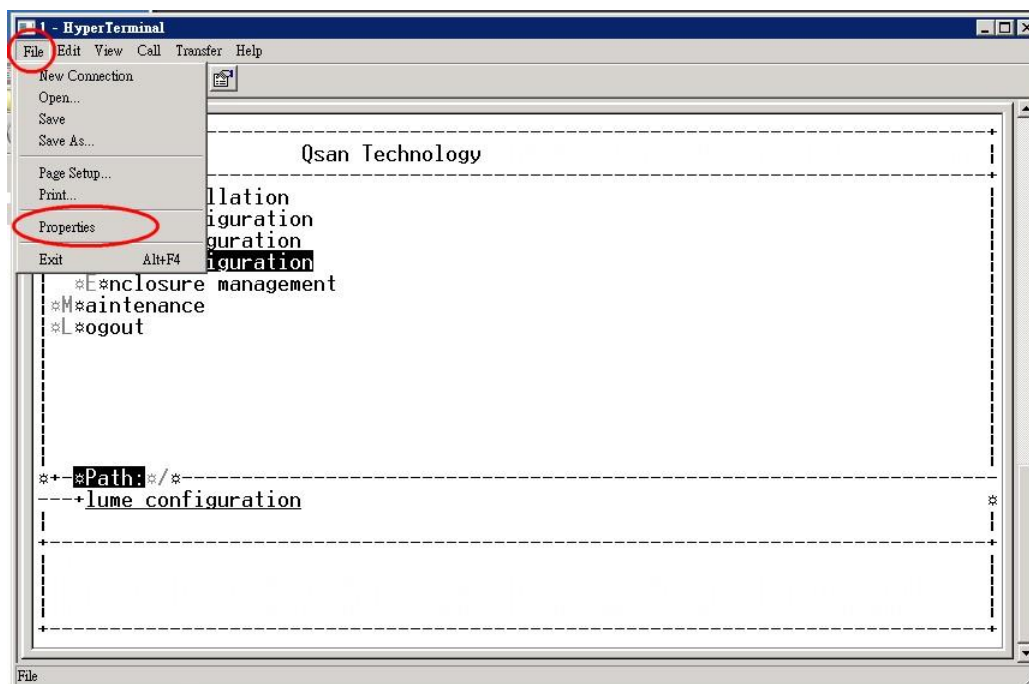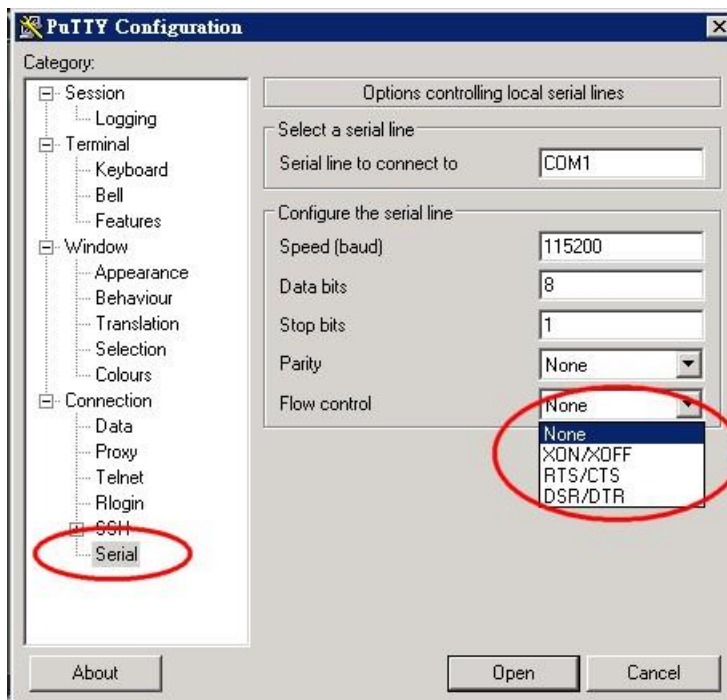
Terminal type: vt100

Figure 7-4   The Procedures of Setup Serial Console by HyperTerminal

4.   If you are using PuTTY instead, please refer to below
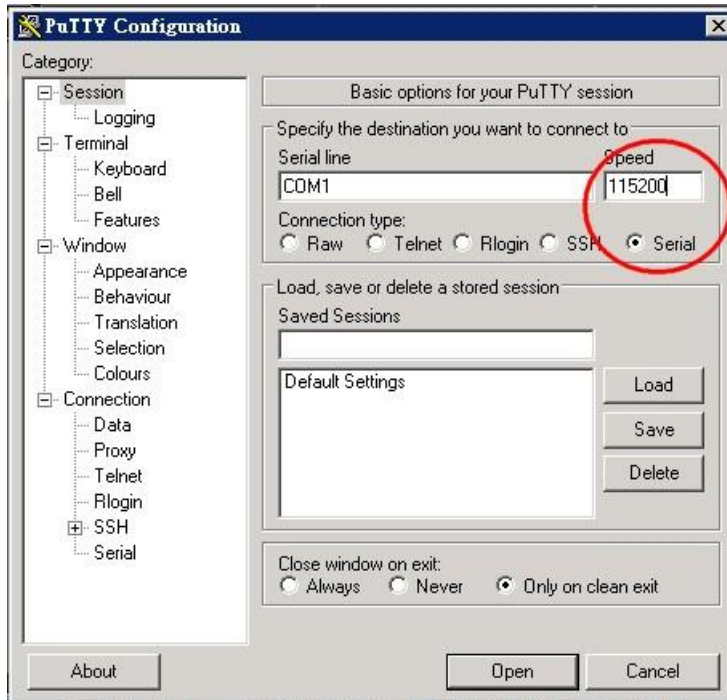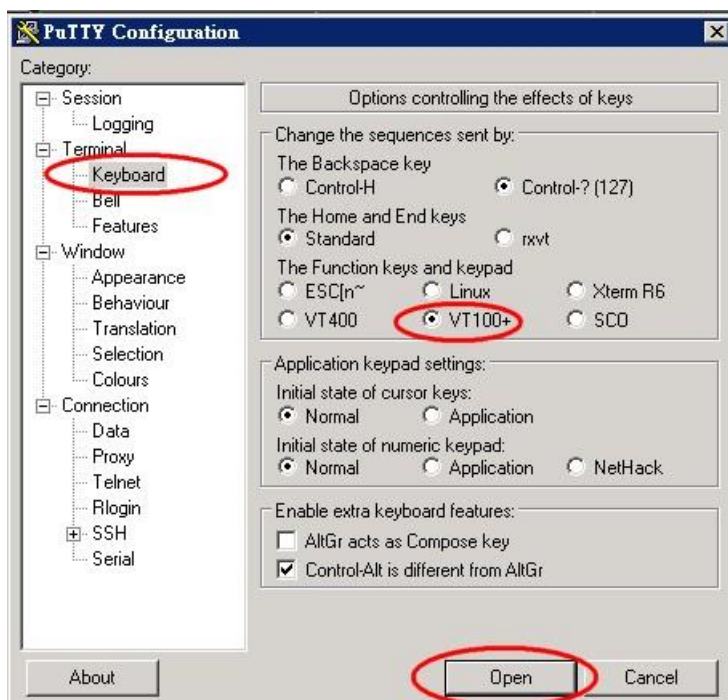
Figure 7-5   The Procedures of Setup Serial Console by PuTTY

5. Users should be able to login the controller system via console cable by following the procedures above.

 Setup the Connection for Online Support
Following is the procedure to setup the connection for online support via TeamViewer:

1. Please download the TeamViewer from following hyper link:
    https://www.teamviewer.com/en/download/
2. Install TeamViewer.
3. Please provide the ID/password showed on the application to QSAN support team member to join the online support session.

7.3.   Accessing Product Updates

To download product updates, please visit QSAN website:

https://www.qsan.com/download_center

7.4. Documentation Feedback

QSAN is committed to providing documentation that meets and exceeds your expectations. To help us improve the documentation, email any errors, suggestions, or comments to docsfeedback@qsan.com.

When submitting your feedback, include the document title, part number, revision, and publication date located on the front cover of the document.

Appendix

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