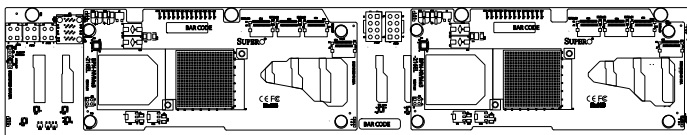# SUPERMICRO®

BPN-NVMe3-216A-N4 Backplane

USER'S GUIDE

Revision 1.0

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Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

Whenever possible, repack the backplane in the original Supermicro box, using the original packaging materials. If these are no longer available, be sure to pack the backplane in an anti-static bag and inside the box. Make sure that there is enough packaging material surrounding the backplane so that it does not become damaged during shipping.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse, or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Notes

Chapter 1

Safety Guidelines

To avoid personal injury and property damage, carefully follow all the safety steps listed below when accessing your system or handling the components.

1-1   ESD Safety Guidelines

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to your system, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

- Use a grounded wrist strap designed to prevent static discharge.

- Touch a grounded metal object before removing a component from the antistatic bag.

- Handle the backplane by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the card and peripherals back into their antistatic bags when not in use.

1-2   General Safety Guidelines

- Always disconnect power cables before installing or removing any components from the computer, including the BPN-NVMe3-216EL series backplane.

- Make sure that the backplane is properly and securely on the motherboard to prevent damage to the system due to power outages.

1-3   An Important Note to Users

All images and layouts shown in this user's guide are based upon the latest back-plane revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this manual.

1-4   Introduction to the BPN-NVMe3-216A-N4 Backplane Assembly

The BPN-NVMe3-216A-N4 backplane assembly has been designed to utilize the most up-to-date technology available, providing your system with reliable, high-quality performance.

This manual reflects BPN-NVMe3-216EL Revision 1.00, the most current release available at the time of publication. Always refer to the Supermicro website at www.supermicro.com for the latest updates, compatible parts, and supported configura-tions.

1-5   Overview of the BPN-NVMe3-216A-N4 Backplane

One BPN-NVMe3-216EB backplane and two BPN-NVMe3-216EL daugh-ter cards combine to form the BPN-NVMe3-216A-N4 backplane assembly. The BPN-NVMe3-216EL backplanes are attached to one another, with the primary components on the right side of the board and the secondary components on the left. The daughter card is mounted onto the backplane as illustrated below.
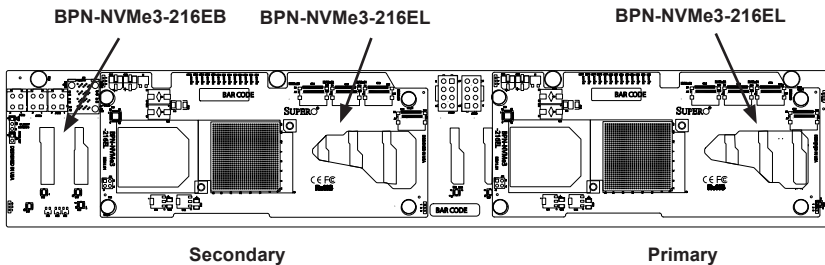

Figure 1-1. BPN-NVMe3-216A-N4 Backplane Assembly

Chapter 2

Connectors, Jumpers, and LEDs

2-1   Rear Connectors

The following connectors are on the side of the backplane that faces the rear of the chassis. They are marked by silkscreen labels.
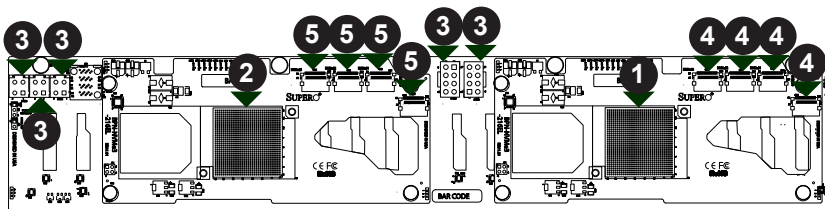

Figure 2-1. BPN-NVMe3-216A-N4 Connectors and Components

1. Primary Expander Chip

2. Secondary Expander Chip

3. Power Connectors: JPWR1 through JPWR3

4. Primary OCuLink Connectors: NVMe#0 through NVMe#3

5. Secondary OCuLink Connectors: NVMe#0 through NVMe#3

2-2   Rear Connector and Pin Definitions

1. - 2. Primary and Secondary Expander Chips

The primary and secondary expander chips allow the backplane to support dual port, cascading, and failover configurations.

3. Backplane Main Power Connectors

The 4-pin connectors, designated JPWR1 through JPWR3, provide power to the backplane. See the table on the right for pin definitions.

Backplane Main Power 4-Pin Connector	
Pin#	Definition
1	+12V
2 and 3	Ground
4	+5V

4. - 5. OCuLink Connectors

The OCuLink connectors on both daughter cards are designated NVMe#0 through NVMe#3. OCuLink connectors contain PCIe lanes.

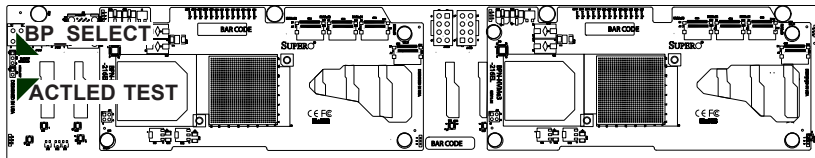## 2-3   Rear Jumper Locations and Settings

Figure 2-2. Rear Jumpers

Explanation of Jumpers

To modify the operation of the backplane, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. Note: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.
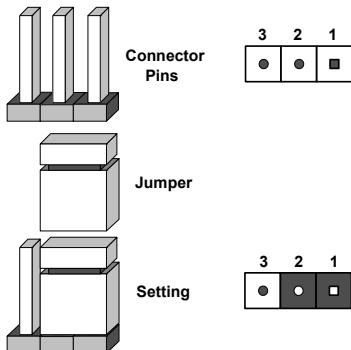
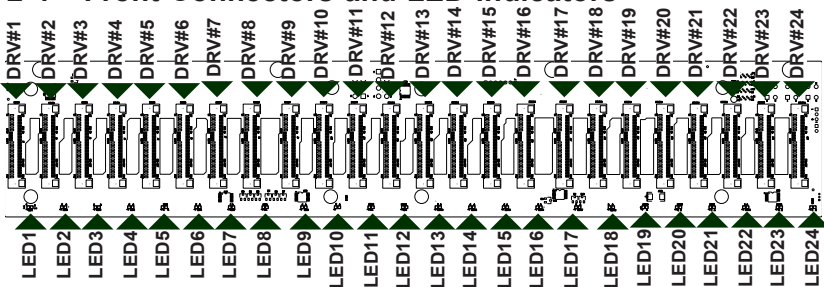| General Jumper Settings		
Jumper	**Jumper Settings**	**Note**
BP_SELECT	Pins 2-3: Enabled (Default) Pins 1-2: Disabled	Backplane select
ACT-LED TEST	Open: Disabled (Default) Closed: Enabled	Activity LED test

2-4   Front Connectors and LED Indicators

Figure 2-3. Front Connectors and LEDs

Front SAS Connectors		
Front Connector	**Front LED**	**SAS Drive Number**
DRV#1	LED1	HDD#1
DRV#2	LED2	HDD#2
DRV#3	LED3	HDD#3
DRV#4	LED4	HDD#4
DRV#5	LED5	HDD#5
DRV#6	LED6	HDD#6
DRV#7	LED7	HDD#7
DRV#8	LED8	HDD#8
DRV#0	LED9	HDD#9
DRV#10	LED10	HDD#10
DRV#11	LED11	HDD#11
DRV#12	LED12	HDD#12
DRV#13	LED13	HDD#13
DRV#14	LED14	HDD#14
DRV#15	LED15	HDD#15
DRV#16	LED16	HDD#16
DRV#17	LED17	HDD#17
DRV#18	LED18	HDD#18
DRV#19	LED19	HDD#19
DRV#20	LED20	HDD#20
DRV#21	LED21	HDD#21
DRV#22	LED22	HDD#22
DRV#23	LED23	HDD#23
DRV#24	LED24	HDD#24

Chapter 3

Dual Port and Cascading Configurations

3-1 Single and Dual Port Expanders

OcuLink connectors NVMe#0 through NVMe#3 are bidirectional and can be treated as input or output.

Single Port Option

The BPN-NVMe3-216A-N4 may be used as a single port expander that accesses all of the drives and supports cascading.
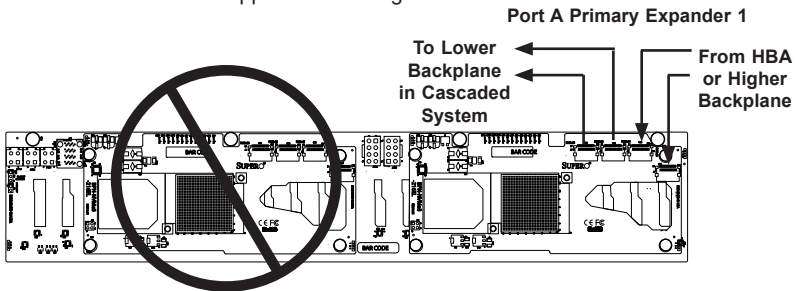

Figure 3-1. BPN-NVMe3-216A-N4 Single Port Configuration

Dual Ports

BPN-NVMe3-216A-N4 backplane assemblies have dual-port expanders that access all of the hard drives. These dual-port expanders support cascading, failover, and recovery.
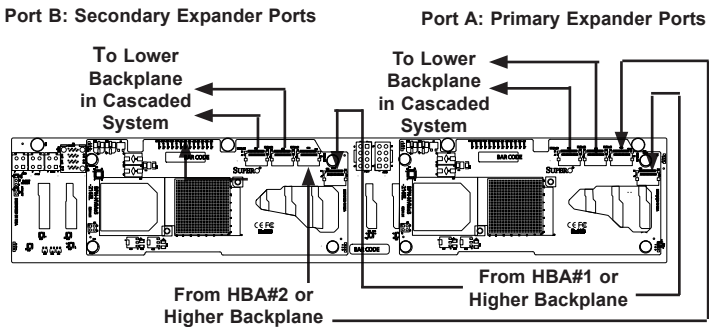
Figure 3-2. BPN-NVMe3-216A-N4 Dual Port Configuration

3-2   Failover

The BPN-NVMe3-216A-N4 backplane assembly has two expanders which enable effective failover and recovery.

Single Host Bus Adapter

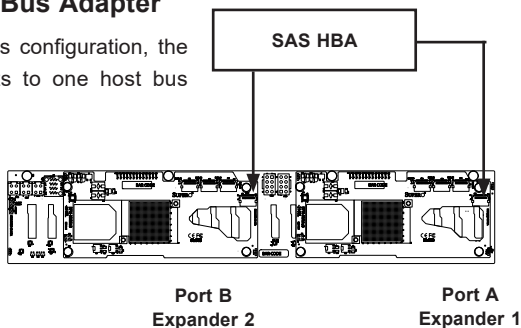In a single host bus configuration, the backplane connects to one host bus adapter.

SAS HBA

Port B
Expander 2

Port A
Expander 1

Figure 3-3. Single HBA

Single Host Bus Adapter Failover

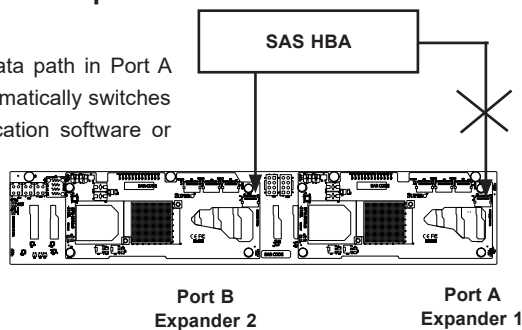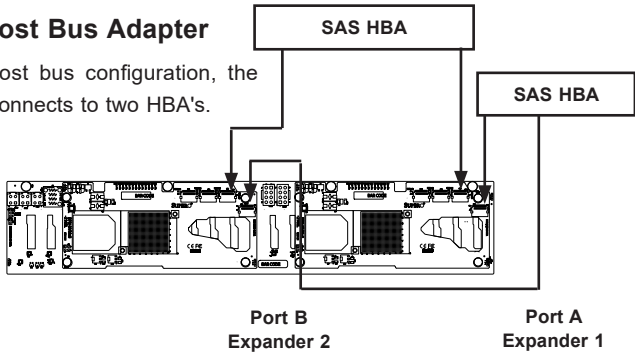If the expander or data path in Port A fails, the system automatically switches to Port B with application software or failover support.

SAS HBA

Port B
Expander 2

Port A
Expander 1

Figure 3-4. Single HBA Failover

3-3   Failover with RAID Cards and Multiple HBAs

The BPN-NVMe3-216A-N4 backplane assembly may be configured for failover with multiple HBAs using either RAID controllers or HBAs to acheive failover protection.

RAID Controllers: If RAID controllers are used, then the failover is accomplished through port failover on the same RAID card.

HBAs: If multiple HBAs are used to achieve failover protection and load balancing, **Linux MPIO software must be installed and correctly configured to perform the load balancing and failover tasks.**

Dual Host Bus Adapter

In a dual host bus configuration, the backplane connects to two HBA's.

Port B
Expander 2

Port A
Expander 1

Figure 3-5. Dual HBA

Dual Host Bus Adapter Failover

If the expander or data path in Port A fails, the system automatically switches to Port B. This maintains a full connection to all drives.
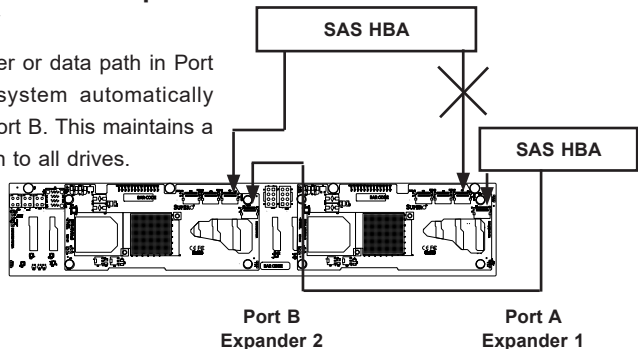

Port B
Expander 2

Port A
Expander 1

Figure 3-6. Dual HBA Failover

IMPORTANT: For RAID controllers, redundancy is achieved through port failover. For multiple HBAs MPIO software is required to achieve failover protection.

3-4   Connecting HBAs to the Backplane

Connecting an Internal HBA to the Backplane

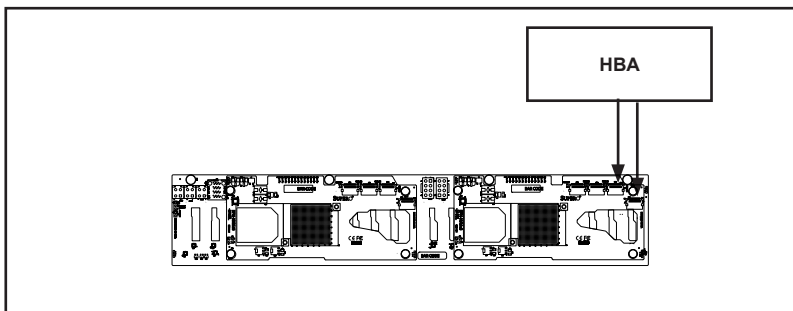The following section lists the most common cables used to connect the HBA to the backplane.
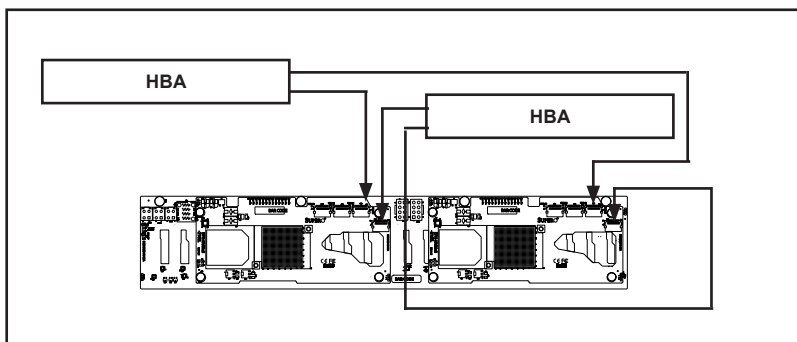

Figure 3-7. Single Internal Host Bus Adapter

Figure 3-8. Dual Internal Host Bus Adapter

Supported Internal HBA Cables

Use the following cables to create connections between the internal HBA and BPN-NVMe3-216A-N4 backplane. The cables required depend upon the HBA connector.

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Cable Name: Internal iPass (Mini-SAS) to HD (Mini-SAS)

Part #: CBL-SAST-0508-01   **Length:** 50 cm (19 inches)

Part #: CBL-SAST-0507-01   **Length:** 80 cm (31 inches)

Description: This cable has an iPass (SFF-8087/Mini-SAS) connector (36-pin) at one end and a Mini-SAS HD (SFF-8643) connector at the other end. It connects from the SAS2 HBA to the BPN-NVMe3-216A-N4 backplane.

Cable name: Internal HD (Mini-SAS) to HD (Mini-SAS)

Part #: CBL-SAST-0568   **Length:** 35 cm (13 inches)

Part #: CBL-SAST-0593   **Length:** 60 cm (23 inches)

Part #: CBL-SAST-0531   **Length:** 80 cm (31 inches)

Description: This cable has a Mini-SAS HD (SFF-8643) connector at both ends. It connects from the SAS3 HBA to the BPN-NVMe3-216A-N4 backplane.

Connecting an External HBA to the Backplane

This backplane supports external host bus adapters. In this configuration, the HBA and the backplane are in different physical chassis. This allows a JBOD (Just a Bunch Of Drives) configuration from an existing system.
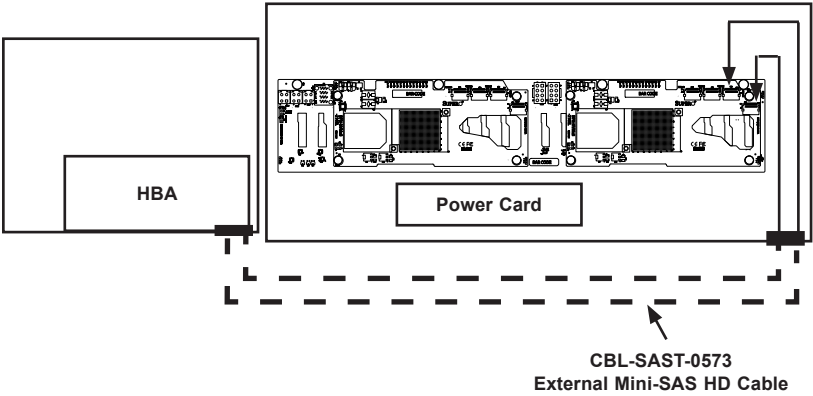
Single External Host Bus Adapter

CBL-SAST-0573
External Mini-SAS HD Cable

Figure 3-9. Single External Host Adapter

Dual External Host Bus Adapter

CBL-SAST-0573
External Mini-SAS HD Cable
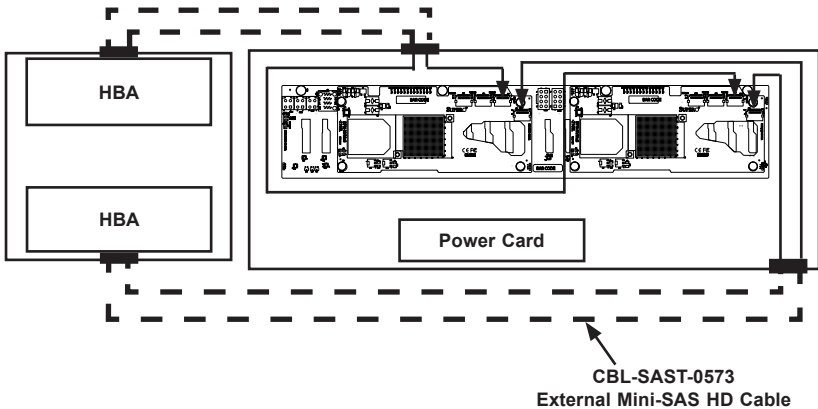
Figure 3-10. Dual External Host Bus Adapter

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Connecting Multiple Backplanes in a Single Channel Environment

This section describes the cables used when cascading from a single HBA. These connections use CBL-SAST-0531 internal cables and CBL-SAST-0573 external cables.
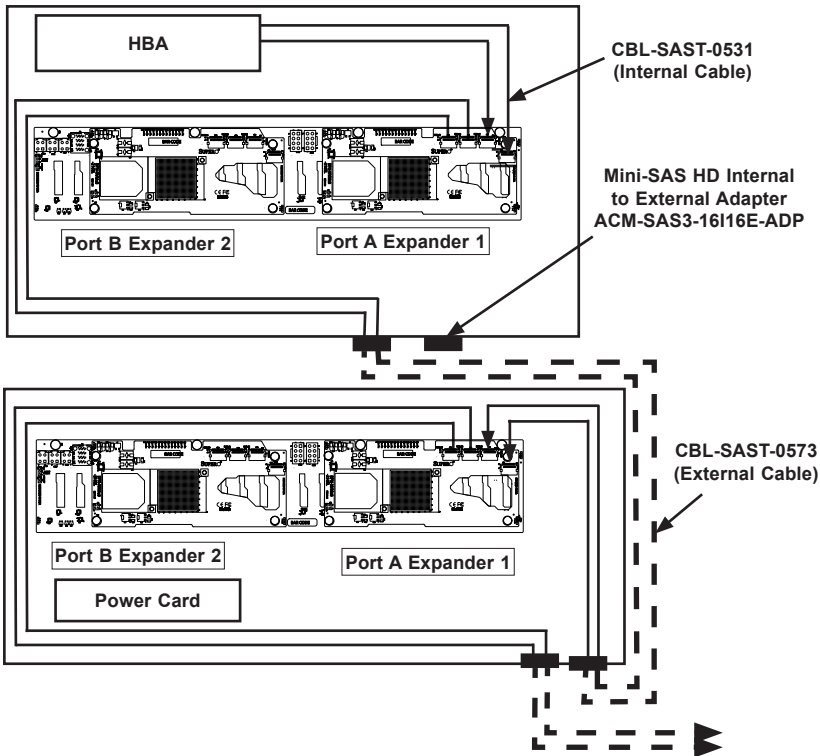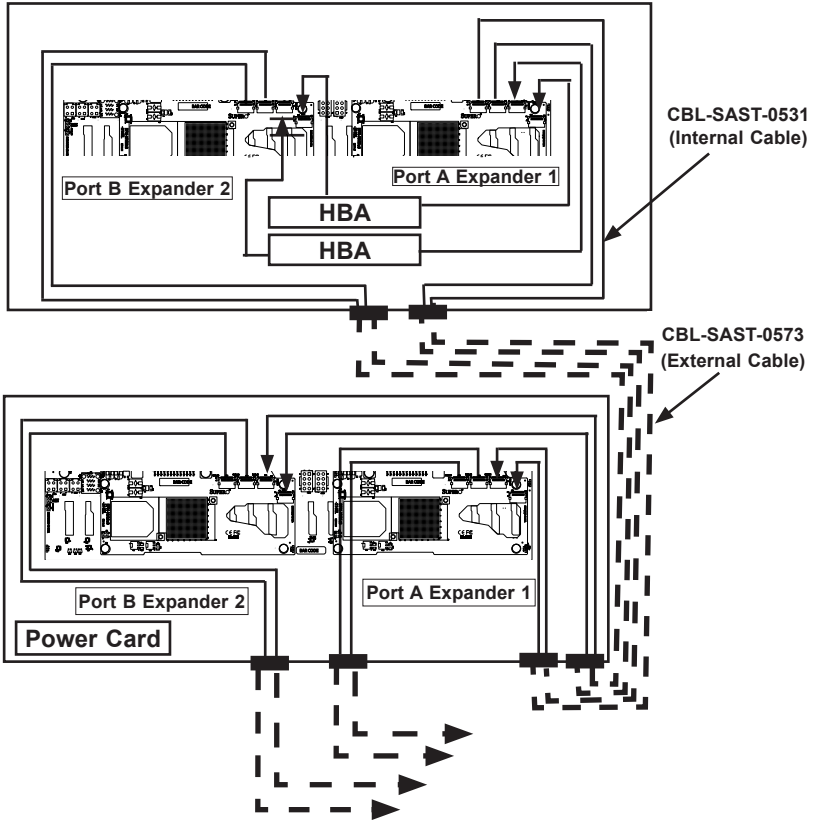

Figure 3-11. Single HBA Configuration

Single HBA Configuration Cables

Figure 3-12. External Mini-SAS HD to External Mini-SAS HD Cable

Cable Name: 1 Meter External Mini-SAS HD to External Mini-SAS HD Cable

Part #: CBL-SAST-0573
Ports: Single
Placement: External Cable
Description: External cascading cable, connects ports between servers and JBODs.
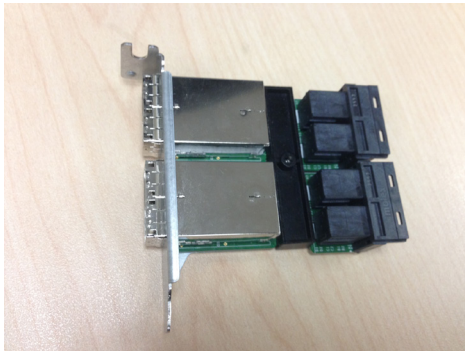
Figure 3-13. Mini-SAS HD Internal to External Adapter

Cable Name: 16-port Mini-SAS HD Internal to External Cable Adapter with LP Bracket

Part #: AOM-SAS3-16I16E-LP
Ports: Four wide ports (sixteen ports total)
Placement: Internal cable with adapter
Description: Internal cable, connects the SAS3 backplane to external ports.

Connecting Multiple Backplanes in a Dual Channel Environment

This section describes the cables used when cascading from dual HBAs. These connections use CBL-SAST-0531 internal cables and CBL-SAST-0573 external cables.

Figure 3-14. Dual HBA Configuration

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Disclaimer (cont.)