AI2000

Hardware Installation and Maintenance Guide

DDN Infinia 1.1 and later | 96-00605-001 | Revision A0

December 2024

Table of Contents

Preface

Audience

This document contains information regarding features and functions of the supported hardware platforms for the DDN Infinia software. It gives you step-by-step instructions on how to install and maintain the hardware and is intended for field engineers, system administrators, and technicians.

The level of content presented assumes the reader has experience with rack installations and knowledge of network configuration and system administration in a Linux environment.

About this Guide

This guide provides an overview of the hardware and contains procedures for hardware installation and maintenance.

The hardware platforms described in this guide are compatible to run the DDN Infinia software. The features and functionality of the DDN Infinia software are documented in the *DDN Infinia Installation and Administration Guide*.

Portions of this guide were taken from the *Tyan GC68A Service Engineer's Manual*. For additional information about the hardware, refer to these documents available at:

https://www.tyan.com/Barebones_GC68AB8056_B8056G68AE12HR-2T

Related Documentation

The following documents are sources of information for the DDN Infinia software:

- DDN Infinia Installation and Administration Guide
- DDN Infinia Product Release Notes
- DDN Infinia CLI Reference
- DDN Infinia REST API Reference

The latest version of the documentation is available on the Customer Support Portal at:

https://community.ddn.com/login

ESD Precautions

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

- Use a grounded wrist strap designed to prevent static discharge when handling electronic components.
- Handle a printed circuit board 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 motherboard, add-on cards, and peripherals back into their anti-static bags when not in use and ensure that you are grounded before removing any component from its anti-static bag.
- For grounding purposes, ensure the chassis provides excellent conductivity between the power supply, the case, the mounting fasteners, and the motherboard.

- Under normal operation, do not open the system's top cover. Maintenance must be performed by a trained technician only and all ESD precautions must be followed.
- Turn off all power and disconnect the power cords from your system before performing any installation or servicing. A sudden surge of power could damage sensitive electronic components.

1. Overview

1.1 DDN Infinia Software

DDN Infinia supports on-premise and cloud deployments through an easy-to-use Command Line Interface (CLI), Graphical User Interface (GUI), or Rest API. Deployment is fast, taking less than 10 minutes after the hardware is provisioned.

DDN Infinia is a software-based solution that applies to many applications. However, it is especially suited for Enterprise computing where ease of installation, ease of management, and ease of cluster growth (space and performance) are paramount.

1.2 DDN Infinia Hardware Platforms

1.2.1 Reference Architecture

A DDN Infinia Reference Architecture (RA) comprises specific servers and storage enclosure configurations from a specific server vendor. There is flexibility in choosing your SSDs accordingly to match capacity and performance requirements. The main components of a reference architecture are:

- Controllers: Servers with specific Central Processing Unit (CPU), memory, Networking Interface Cards (NICs), and Host Bus Adapters (HBAs)
- Storage enclosures with specific Solid State Drives (SSDs)
- DDN Infinia software

The detailed list of components for each partner-specific RA configurations start in Section 2 on page 8.

1.2.2 Minimum Hardware Requirements

Requirement	Specification
RAM free	32 GB + CAT Memory for Instance 32 GB + 4 GB per S3 Thread
Min RAM per CAT	4 GB
Cores	4 + 2 cores/CAT + REDS3 cores
FS Space	20 GB
Minimum OS Free Disk Space	20 GB + “server RAM”
Network Hardware	Ethernet/Infiniband
Network Speed	10 Gbps
Network Latency	10 ms between nodes
Platform	x86_64/aarch64

1.3 DDN Infinia Networking Configurations

DDN Infinia supports onboard 2x 10GbE ports per node for the management network and 1x 1GbE port for the IPMI functionalities.

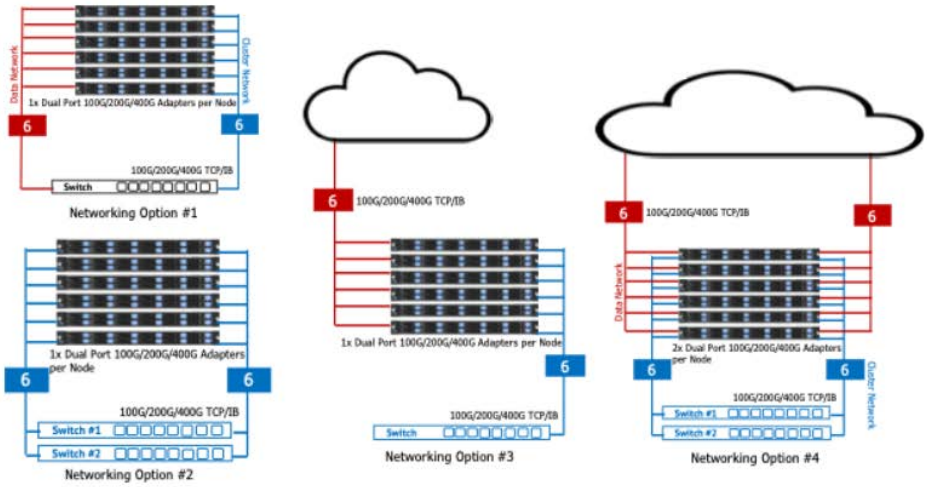
The default network configuration for DDN Infinia is Ethernet.

The physical network options available include the following:

- Data/cluster network
- Management network (control plane)
- IPMI network
- Front-end Internet network used to access services such as S3/Block

The graphic in Figure 1 illustrates the supported DDN Infinia network configurations with up to two 100/200Gb Eth/IB networking adapters for data/cluster network ports and front-end network.

Figure 1. Supported network configurations



Minimum Capacity Configuration

The minimum capacity for DDN Infinia includes the following configuration:

- 6 nodes x 12x NVMe SSDs (U.2 per node), 1x 100/200Gb networking adapter.

Moderate Configuration

A moderate configuration for DDN Infinia includes the following:

- 6 nodes x 12x NVMe U.2 SSDs (per node) 1x or 2x 100/200Gb networking adapter.
-

Supported Networking Card Minimum Firmware Requirements

Model	Part Number	Version
ConnectX6	MCX623106AN-CDAT	20.42.1000
ConnectX7	MCX755106AS-HEAT	28.42.1000
BCM57508	BCM57508-P2100G	227.1.111.0

1.4 NVMe Requirements

- NVMe devices must be configured with a single namespace.
- NVMe devices must be formatted with a 4K blocksize.
- NMVe devices must not be formatted with T10 protection.
  DDN Infinia does not support T10 protection.
- DDN Infinia requires a minimum capacity of 16 GB for all devices.

2. AI2000 Hardware

2.1 Specifications

The following sections are the specifications for the AI2000 platform.

IMPORTANT: Specifications are subject to change without notice.

2.1.1 Processing, I/O, and Capacity

Processing, I/O, and Capacity Specifications	
Processing capability	Single AMD EPYC™ 9004 Series Processor
Input/Output	(1) 1 GbE port, dedicated for IPMI (3) USB 3.0 ports (1) COM port (1) VGA port (2) 10 GbE ports, used for management network
Supported storage technology	(12) Hot-swap 2.5” U.2 NVMe drive bays (default)

2.1.2 Physical

Physical Specifications		
Enclosure	Height:	1.7" (43mm) 1U rack mount
	Depth:	26.77” (680mm)
	Width:	17.26" (438.5mm)
	Weight:	50.5lbs (22.9kg) without drives 55.3lbs (29.6kg) with drives

2.1.3 Power Supply Unit AC Input

IMPORTANT:	The AI2000 server features a redundant 850W power supply consisting of two hot-swappable power modules.

Input Parameter	Value
AC Input Voltage	100 - 240VAC auto-range
Rated Input Frequency	50 - 60Hz
Rated Input Current	12 - 6A (100 - 240VAC)

2.1.4 Temperature and Humidity

Parameter	Operating	Non-operating
Temperature range	10°C to 35°C (50°F to 95°F)	-40°C to 70°C (-40°F to 158°F)
Relative humidity	8% to 90% non-condensing	5% to 95% non-condensing

2.2 System Hardware

2.2.1 Chassis

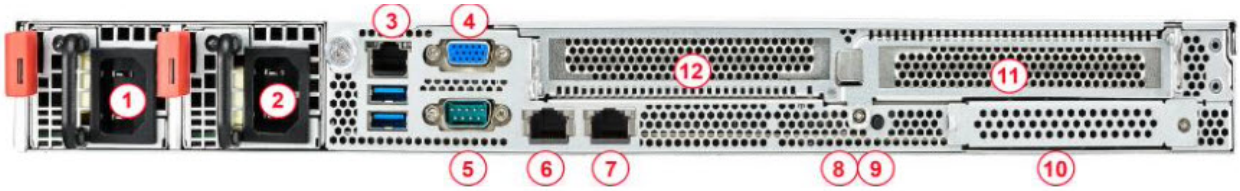
The AI2000 server is a standard 1U commodity storage server modified to add high-throughput NVMe SSDs and ultra low-latency network connectivity. Figure 2 shows a front view of the enclosure without the front bezel. The control panel, one USB 3.0 port, and 12 drive slots are at the front of the enclosure.

Figure 2. Front View (without front bezel)

Item	Feature	Description
1	USB	(1) USB 3.0 port
2	Drive bays	(12) 2.5” tool-less thin profile hot-swap drive bays
3	Power button	Power button with green and red LED lights
4	ID button	ID button with blue LED light

At the rear, the enclosure contains redundant power supply modules, I/O ports (IPMI LAN, USB 3.0, COM, and VGA) ID LED/switch, and host ports (IB, Ethernet, or Intel OPA) (Figure 3).

Figure 3. Rear view



Item	Features	Description
1	Power supply	Power supply module, PWS0
2	Power supply	Power supply module, PWS1
3	LAN	LAN1 (dedicated for IPMI) + USB 3.0 Gen1 ports
4	VGA	Video port
5	COM	Serial port
6	LAN	RJ45 LAN (10Gbs)
7	LAN	RJ45 LAN (10Gbs)
8	ID LED	ID indicator
9	ID button	ID button to toggle the ID indicators
10	OCP	OCP card area
11	PCIe Slot	PCIe x16 half-height/half-length slots
12	PCIe Slot	PCIe x16 half-height/half-length slots

2.2.2 LED Definitions

2.2.2.1 Front Panel LED

The AI2000 server includes power control and ID buttons on the right corner at the front of the enclosure. (Figure 4).

Figure 4. Power and ID button

Feature	Status [note1]	
Power button/LED	The main power switch applies or removes primary power from the power supply to the server but maintains standby power	
	Solid green	Power is being supplied to the power supply modules. When DDN Infinia is operating normally, the LED should be lit.
	Sold red	A system warning is present.
	Off	No power is being supplied to the power supply modules.
ID button/ LED	Solid blue	ID has been activated locally to locate the server in a rack environment.

1. Depending on the DDN Infinia software version installed, some LEDs may not be implemented. For details about supported features, refer to the *DDN Infinia Product Release Notes*.

2.2.2.2 Drive Module LED

Each drive module on the AI2000 server includes a status and an activity LED. (Figure 5).

Figure 5. Drive module LED locations

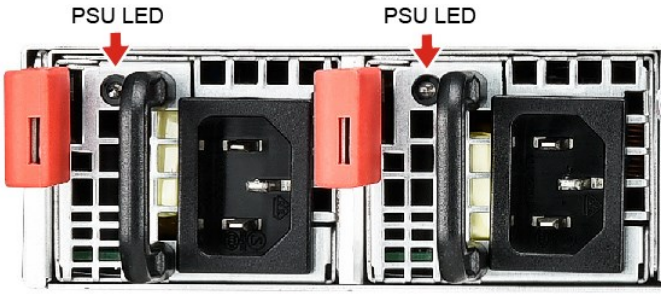
Feature	Status [note1]	
Activity LED	Solid green	Drive present, no activity
	Blinking green	Drive present with activity
Status LED	Solid red	Drive fail
	Blinking red (1Hz)	Drive is identified
	Blinking red (4Hz)	Drive is in rebuild

1. Depending on the DDN Infinia software version installed, some LEDs may not be implemented. For details about supported features, refer to the *DDN Infinia Product Release Notes*.

2.2.2.3 Power Supply Module LED

The AI2000 server includes power supply LEDs that indicate the status of each power supply module. (Figure 6).

Figure 6. Power supply LED.

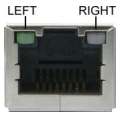


Feature	Status note1	
Power supply LED	Off	Both power supplies and power cords are installed and the power system is on.
	Solid amber	One power system is in redundancy fail and one power system is on.

1. Depending on the DDN Infinia software version installed, some LEDs may not be implemented. For details about supported features, refer to the *DDN Infinia Product Release Notes*.

2.2.2.4 LAN Port LED

Figure 7. LAN Port LED



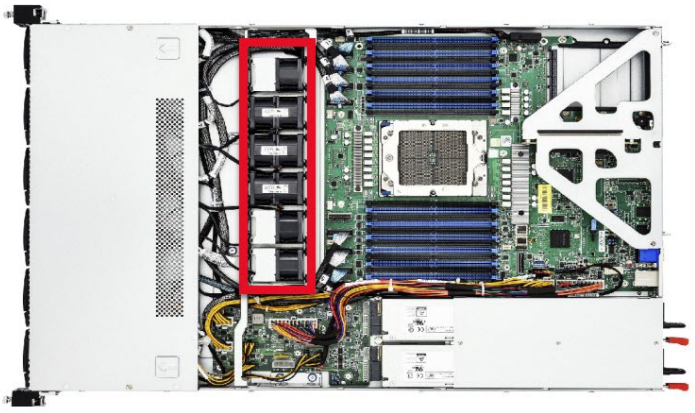
10Mbps/100Mbps/1Gbps/10Gbps LAN Link/Activity LED Scheme			
		Left LED	**Right LED**
No Link		Off	Off
10Mbps	Link	Green	Off
	Active	Blinking Green	Off
100Mbps	Link	Green	Solid Green
	Active	Blinking Green	Solid Green
1Gbps	Link	Green	Solid Yellow
	Active	Blinking Green	Solid Yellow
10Gbps	Link	Yellow	Solid Yellow
	Active	Blinking Yellow	Solid Yellow

2.2.3 Fans

The AI2000 server includes six 4-cm, counter-rotating fans inside the enclosure for cooling. Fan speed is controlled by system temperature via IPMI. (Figure 8)

IMPORTANT:	Ensure that the chassis top cover makes a good seal so the cooling air circulates properly through the chassis.

Figure 8. Fans Internal to AI2000 server.



If a fan fails, the remaining fans will ramp up to full speed, enabling the AI2000 server to continue operating without interruption.

At your earliest convenience, contact DDN Support to replace any failed fan with the same type and model. Fans are field replaceable units, and it is recommended that DDN or Partner Support personnel perform these replacements. The presence of the faulty fan ensures proper airflow and cooling for the enclosure. Do not remove it until a replacement is available.

2.2.4 Drive Modules

In the front of the enclosure are 12 drive slots, which house drives for data.

In addition to the 12 drive slots, the AI2000 supports an internal M.2 SSD.

A drive module comprises a single low-profile, 2.5" small form factor drive mounted in a carrier. Drives are mounted in carriers to simplify their installation and removal from the chassis and to help promote proper airflow for the drive slots. All slots must contain a carrier, even if it is empty.

When a drive module is installed correctly in a drive slot, the corresponding Activity LED is lit indicating that the drive is present.

IMPORTANT:	Except for short periods of time while swapping drives, do not operate AI2000 without the carriers in the drive slots.

For instructions to identify and replace a failed drive module, see Section 2.5.2.2 on page 25.

2.2.4.1 Drive Bay Numbering

2.2.5 Power Supply Modules

The AI2000 server includes a redundant power supply consisting of two hot-swappable power supply modules. Each power supply module has an auto-switching capability, which enables it to automatically sense the input voltage and operate with an input voltage range of 100-240 VAC. The power supply modules have 80 Plus certification at Titanium Level (96%) high efficiency. Each power supply module also includes a cooling fan.

For instructions to identify and replace a failed power supply module, see Section 2.5.2.1 on page 23.

2.3 Supported Networking Options and Adapters

The AI2000 server supports the following networking options:

- Data/Cluster and Front-end network—Using 100Gb/200Gb interconnects.
  - Fibre Optics connectivity using AOC (Active Optical Cable)
  - Copper connectivity using DAC (Direct Attached Cable)
  - Splitter cables for both optical and copper connectivity
- Management and IPMI network—using (2) 10GbE ports for management and (1) 1GbE port for IPMI network.

2.3.1 Supported Networking Cards

All networking adapters are shipped without transceiver modules.

Option	Description
MCX623106AN-CDAT	Dual-Port Adapter 100Gb/s Ethernet
MCX755106AS-HEAT	Dual-Port Adapter 200Gb/s Ethernet
BCM957508-P2100G	Dual-Port 100 Gb/s QSFP56 Ethernet PCI Express 4.0 x16 Network Interface Card

2.3.2 Supported Networking Switches

Option	Description
SWETH-100-WSFP28-32-CL	**MSN3700-CS2FC**—Switch with 32x 100GbE QSFP28 ports, connector-side exhaust, 2 power supplies, Cumulus Linux
SWETH-100-QSFP28-64-CL	**MSN4600-CS2FC**—Switch with 64x 100GbE QSFP28 ports, connector-side exhaust, 2 power supplies, Cumulus Linux
SWETH-200-QSFP56-32-CL	**MSN3700-VS2FC**—Switch with 32x 200GbE QSFP56 ports, connector-side exhaust, 2 power supplies, Cumulus Linux
SWETH-200-QSFP56-64-CL	**MSN4600-VS2FC**—Switch with 64x 200GbE QSFP56 ports, connector-side exhaust, 2 power supplies, Cumulus Linux
SWETH-400-QSFPDD-32-CL	**MSN4700-WS2FC**—Switch with 32x 400GbE QSFPDD ports, connector-side exhaust, 2 power supplies, Cumulus Linux
	QFX5240-64OD—Switch with 64x 800GbE QSFP-DD ports, front-to-back airflow, 2 power supplies, Junos OS Evolved
	DCS-7060X6-64PE-F—Switch with 64x OSFP 800Gbe ports, front-to-back airflow, 2 power supplies, Arista EOS

2.3.3 Supported Networking Cables

Ethernet active optical straight and splitters cable options for Mellanox switches

Link Speed	Interface/Form Factor	Part Number	Lengths
400Gb/s	QSFP56-DD	MFA1W00-W003 MFA1W00-W005 MFA1W00-W010	Proposed to qualify 3M, 5M, 10M Also available - 15M, 20M, 50M, 100M
200Gb/s	QSFP56	MFS1S00-V003E MFS1S00-V005E MFS1S00-V010E	Proposed to qualify 3M, 5M, 10M Also available - 15M, 20M, 30M, 50M, 100M
100Gb/s	QSFP28	MFA1A00-C003 MFA1A00-C005 MFA1A00-C010	Proposed to qualify 3M, 5M, 10M Also available - 15M, 20M, 30M, 50M, 100M
200Gb/s to dual 100Gb/s	QSFP56 to 2x QSFP56	MFS1S50-V003E MFS1S50-V005E MFS1S50-V010E	Proposed to qualify 3M, 5M, 10M Also available - 15M, 20M, 30M

Ethernet direct attach straight and splitters cable options for Mellanox switches

Link Speed	Interface/Form Factor	Part Number	Lengths
400Gb/s	QSFP56-DD	MCP1660-W002E26	Proposed to qualify 2M Also available - .5M, 1M, 1.5M, 2.5M, 3M
200Gb/s	QSFP56	MCP1650-V002E26	Proposed to qualify 2M Also available - .5M, 1M, 1.5M, 2.5M, 3M
100Gb/s	QSFP28	MCP1600-C002E30N	Proposed to qualify 2M Also available - .5M, 1M, 1.5M, 2.5M, 3M, 5M
400Gb/s to dual 200Gb/s	QSFP56-DD to 2x QSFP56	MCP7H60-W002R26	Proposed to qualify 2M Also available - 1M, 1.5M, 2.5M, 3M
200Gb/s to dual 100Gb/s	QSFP56 to 2x QSFP56	MCP7H50-V002R26	Proposed to qualify 2M Also available - 1M, 1.5M, 2.5M, 3M

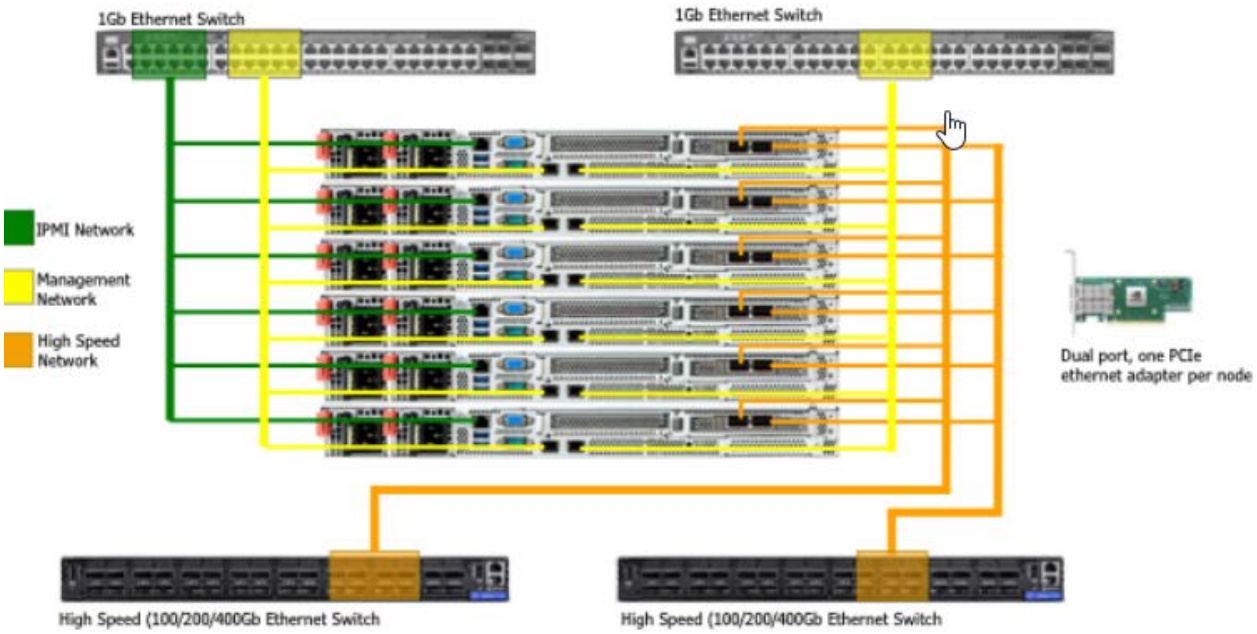
2.4 Network Cabling

Cabling with a single PCIe networking adapter per server.

In a system where a single PCIe networking card is installed per server, one high speed port can be dedicated to the inter-cluster network while the other port is dedicated for front-end network traffic (Figure 9).

The single adapter configuration does not support high-availability for the networking ports.

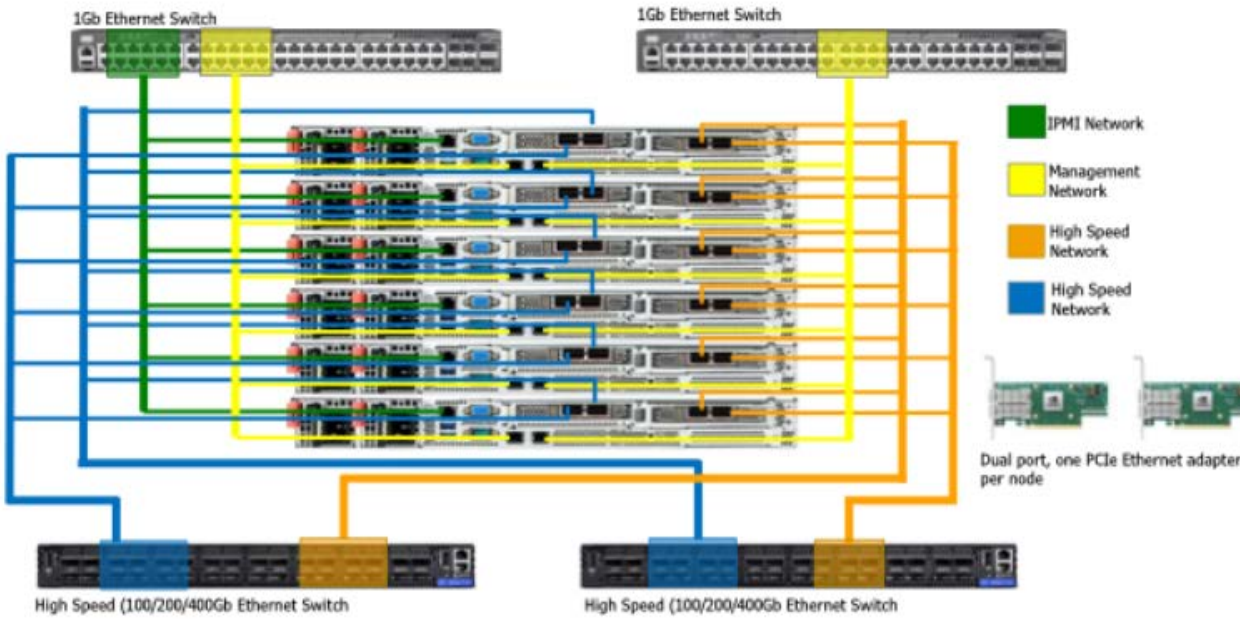
Figure 9. Network cabling for single high speed dual port networking adapter.



Cabling with two PCIe networking adapters per server.

In a system where two PCIe networking cards are installed per server, the networking configuration provides a high-availability configuration for high speed network traffic (Figure 10).

Figure 10. Network cabling for two high speed dual port networking adapters.



Cabling with no dedicated management

Cabling with no dedicated management occurs when in-band management shares bandwidth with data networks and removes the need for separate in-band management network.

Figure 11. 1x dual-port 200Gb/s NIC dedicated out-of-band single-port 1Gb/s NIC.

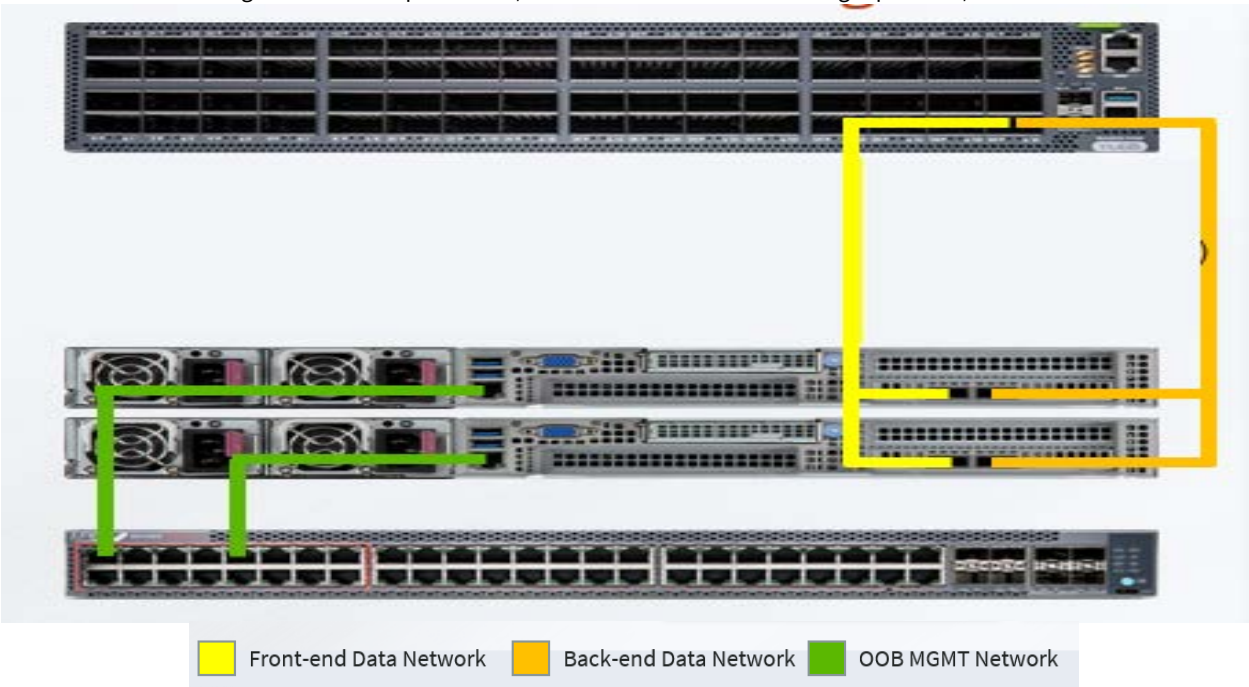
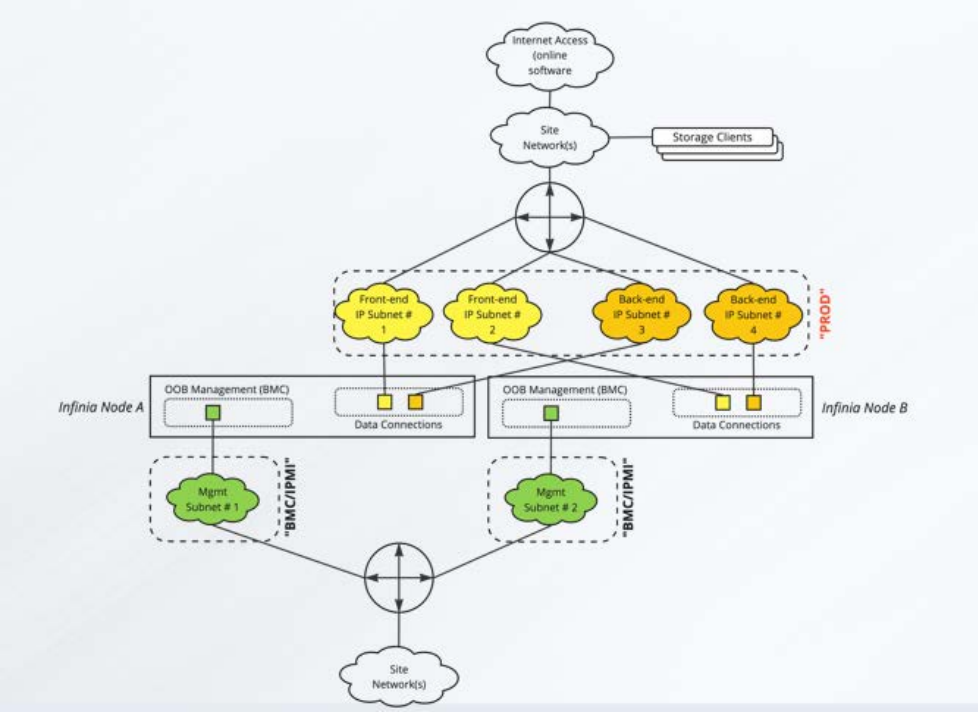


Figure 12. Logical topology per data hall. 1x dual-port 200Gb/s NIC dedicated out-of-band single-port 1Gb/s NIC.



2.5 Maintenance

This section provides instructions for spare parts.

Observe all conventional ESD precautions when handling the plug-in modules and components. Avoid contact with backplane components and module connectors. Electrostatic discharge can damage the circuit boards.

NOTE: If you need to upgrade the firmware for a specific component included in the AI2000 node, contact DDN Support (via Support Portal) to create a support ticket to begin the upgrade planning process.

2.5.1 Equipment Repairs and Servicing

- The installation of internal options and routine maintenance and service of this product must be performed by skilled person who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy levels.
- Do not exceed the level of repair specified in the procedures in the product documentation. Improper repairs can create a safety hazard.
- Allow the product to cool before removing covers and touching internal components.
- Remove all watches, rings, or loose jewelry when working before removing covers and touching internal components.
- Do not use conductive tools that could bridge live parts.
- Use gloves when you remove or replace system components; they can become hot to the touch.
- If the product sustains damage requiring service, disconnect the product from the AC electrical outlet and refer servicing to an authorized service provider. Examples of damage requiring service include:
  - The power cord, extension cord, or plug has been damaged.
  - Liquid has been spilled on the product or an object has fallen into the product.
  - The product has been exposed to rain or water.
  - The product has been dropped or damaged.
  - The product does not operate normally when you follow the operating instructions.
- Retain all screws or other fasteners when removing access cover(s). Upon completion of accessing inside the product, refasten access cover with original screws or fasteners.

2.5.2 Replaceable Units

IMPORTANT:	Use caution when replacing failed units and observe all conventional ESD precautions. Ensure that you do not cause any physical damage, as any damage will disqualify the system from future warranty services. If you have any questions, contact DDN or Partner Support personnel prior to replacing a failed unit.

AI2000 Server Replaceable Parts	
Description	**Units per Enclosure**
Rail kit	1
Chassis	1
Networking adapters	X
M.2 drives	1
Drives	12
Power supply	2
Fans	6

2.5.2.1 Replacing a Power Supply Module

If a power supply module fails, the power supply LED will light amber and the power LED on the front bezel will be solid red. The remaining module will take the full load, enabling AI2000 to continue operating without interruption.

At your earliest convenience, replace any failed power supply module with the same type and model. Presence of the faulty module ensures proper airflow and cooling for the enclosure. Do not remove it until a replacement is available.

Procedure

To replace a failed power supply, complete the following:

1. Unplug the AC power cord from the failed power supply module. The power supply modules have a hot-swap capability and can be replaced without powering down the server.
2. Depress the release tab (1) on the failed power supply.
3. Using the handle (2), pull the failed power supply straight out of the chassis.

Figure 13. Remove a Power Supply

4. Push the new power supply into the power bay until it clicks.

Figure 14. Install a power supply

5. Plug the AC power cord into the new power supply.

6. Verify the power supply LED light is off.

2.5.2.2 Repairing and Replacing a Drive Module

DDN Infinia constantly monitors the status of all the drives present in its inventory list. For details about monitoring the instance log, see the *DDN Infinia Installation and Administration Guide*.

When a drive reports a failed status, DDN Infinia generates an event that is sent to the instance log. Administrators can monitor the instance log to watch for events or configure monitoring applications to generate alerts, call home, or email.

At that time, the user must initiate the failure recovery process to repair the failed drive or replace it with a new drive. The drive modules can be replaced without powering down the system, unless instructed otherwise.

DDN Infinia Drive Failure Recovery

When DDN Infinia detects that a drive has failed or has been removed, it starts a replan timer for the failure recovery process. If the drive comes back online before the replan timer expires, DDN Infinia automatically rebuilds any missing data on the repaired drive. If the replan timer has expired or the failed drive is replaced with a new drive, DDN Infinia will start a replan operation and the data on the failed drive will be migrated to other drives. The default replan timer is 10 minutes.

Drives that are repaired after a replan operation has started or replaced with a new drive will not be rebuilt. Instead, the administrator will be notified that a new drive was discovered by the instance. The new drive must be added to the instance as a new CAT before it can be used. Adding a new CAT requires action from the administrator. For instructions on adding a new CAT, see the *DDN Infinia Installation and Administration Guide*.

Repairing a Failed Drive

1. Locate the failed drive using the indicator LED.
2. After receiving notification of a failed drive, try to bring the failed drive back online using one or more of the following methods:
   - Reseat the drive.
   - Reset the drive through the GUI or using the CLI command:

     ```
     redcli drive power <hostname> <drive-id> -a reset
     ```

     For details on the supported CLI flags, see the *DDN Infinia CLI Reference*.

     If the request returns with **`success`**, the drive can be repaired.
3. If the drive comes back before the replan timer expires, DDN Infinia automatically rebuilds any missing data on the original repaired drive. No further action is required.

   If the drive comes back after the replan timer expires, DDN Infinia does not automatically reuse the drive. The administrator must add it to the instance as a new CAT. For instructions on adding a new CAT, see "Add One or More CATs to DDN Infinia" in the *DDN Infinia Installation and Administration Guide*.

Replacing a Failed Drive

1. Locate the failed drive using the indicator LED.
2. If the drive cannot be repaired, initiate the request to take the failed drive offline through the GUI or using the CLI command:

   ```
   redcli drive power <hostname> <drive-id> -a replace
   ```

   For details on the supported CLI flags, see the *DDN Infinia CLI Reference*.

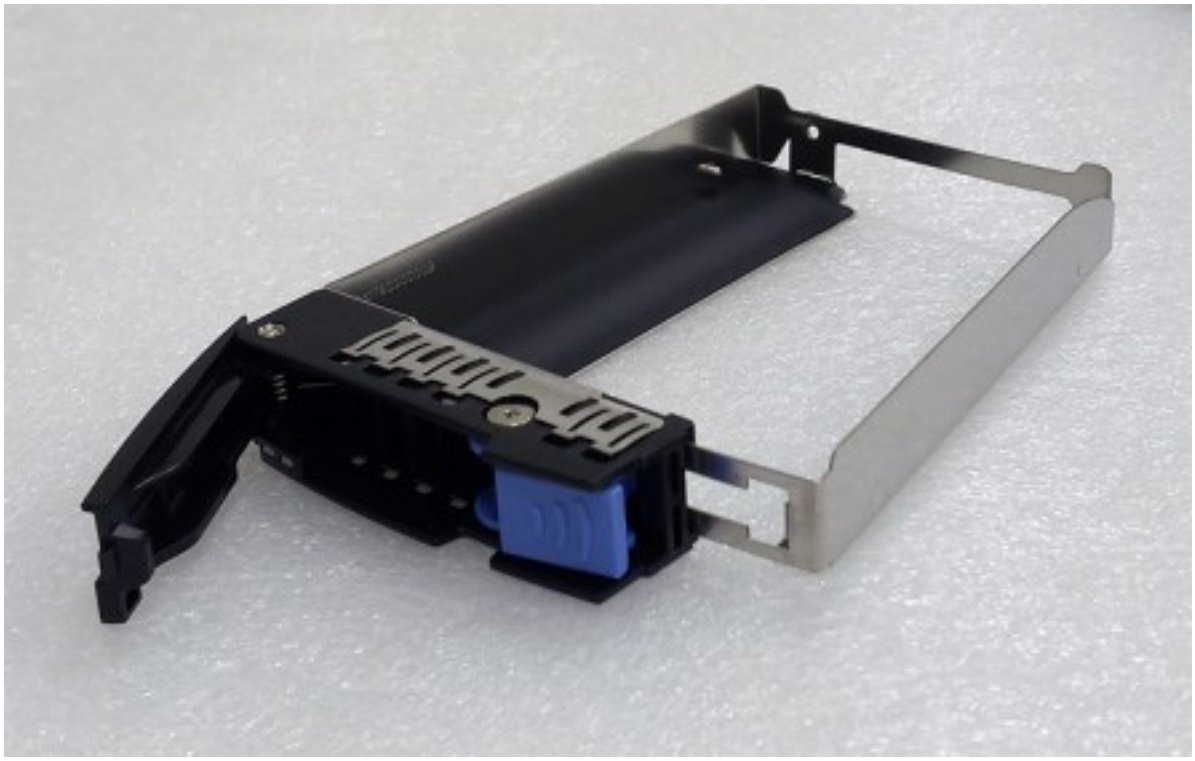
   If the request returns with **`success`**, the drive can be replaced.
3. Physically replace the failed drive with a new drive in the SAME slot as the failed one.

a. Remove the failed drive and tray from the chassis by pressing the release button on the drive carrier to extend the drive tray handle.

b. Use the drive carrier handle to pull the drive out of the chassis.

c. Depress the locking tab on the drive tray to pull the side rail open.

Figure 15. Depress the locking tab on the drive carrier.

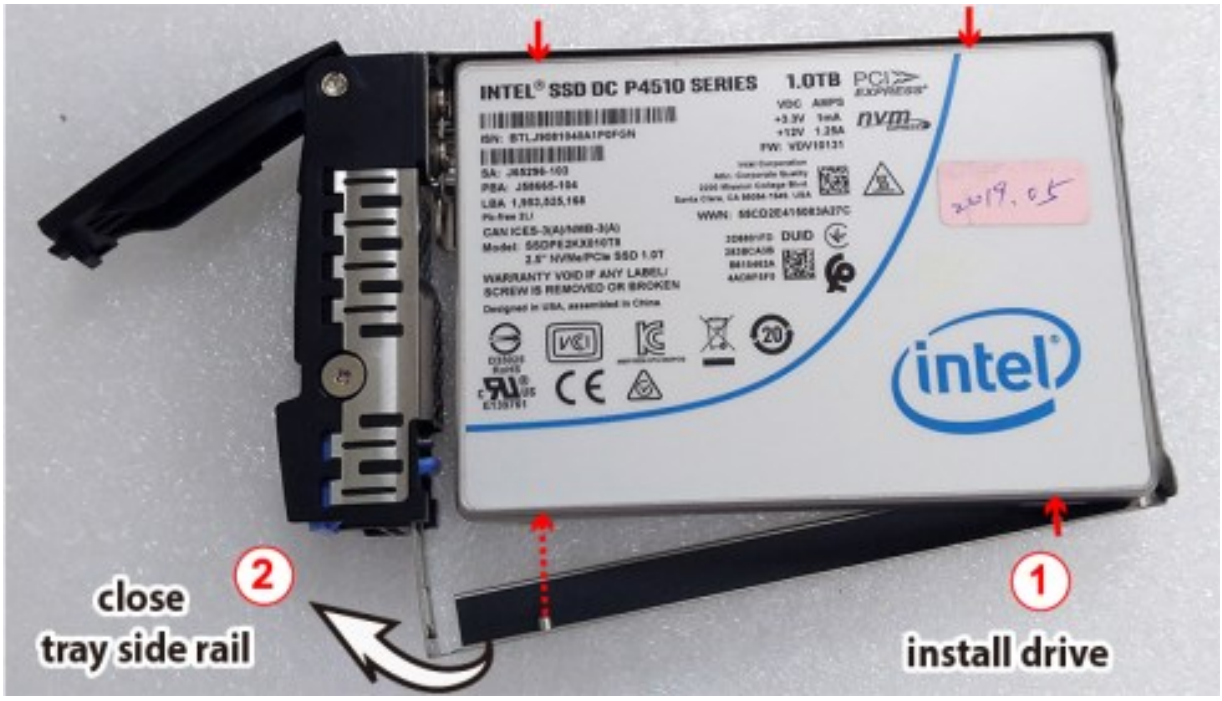


d. Remove the failed drive from the drive tray.

e. Align the hard drive with the guide pins and insert a drive into the carrier (1).

f. Close the side rail of the drive tray (2).

Figure 16. Install drive into drive tray



g. Insert the drive tray into the chassis (1), and then close the handle until it clicks into its locked position.

Figure 17. Install drive tray into chassis.

4. DDN Infinia continuously runs discovery to monitor new hardware that is available to incorporate into the cluster and aggregates these components into the inventory. When it discovers a new drive, DDN Infinia will test the drive to verify that it is healthy and available for use by DDN Infinia. If the drive passes, the indicator LED will turn off and an event will be added to the instance log.

5. Before the new drive can be used, the administrator must add the replaced drive to the instance as a new CAT. For instructions on adding a new CAT, see "Add One or More CATs to DDN Infinia" in the *DDN Infinia Installation and Administration Guide*.

2.5.2.3 Replacing a Fan

If a fan fails, the remaining fans will ramp up to full speed, enabling the server to continue operating without interruption. The presence of the faulty fan ensures proper airflow and cooling for the enclosure. Do not remove it until a replacement is available.

IMPORTANT:	Use caution when removing the top chassis cover to replace a failed fan and observe all conventional ESD precautions. Ensure that you do not cause any physical damage internally, as any damage will disqualify the system from future warranty services. If you have any questions, contact DDN or Partner Support personnel prior to replacing a failed fan.

As a safety precaution, ensure that you power down the server and disconnect the power supply cables before replacing a failed fan. Replace any failed fan with the same type and model.

Procedure

To replace a failed fan, complete the following:

1. Slide the chassis out of the rack.
2. While the system is still powered on, remove the rear top chassis cover to determine which fan failed.
   a. Use a screw driver to loosen the captive screw on the rear of the chassis.

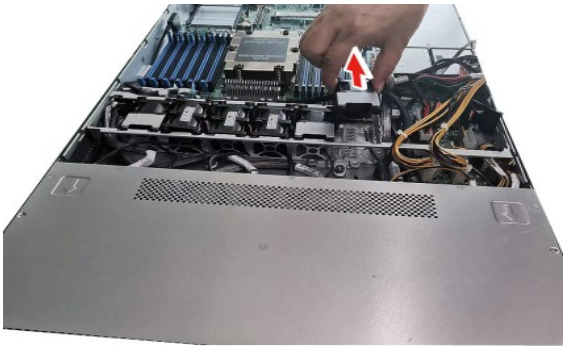
Figure 18. Loosen captive screw

b. Slide the cover towards the back of the chassis (1), and then lift the rear top cover up (2).

Figure 19. Remove the rear top cover

3. Determine which fan is no longer rotating.
4. Remove power from the system as described in Powering Off (Section 4.2 on page 46).
5. Disconnect the fan cable from the motherboard.
6. Lift up on the fan module to remove it from the chassis.

Figure 20. Remove the fan module



7. Release the rubber screws and push pins from the old fan module, and then insert the same rubber screws and push pins on the new fan.

Figure 21. Install rubber screws on new fan module

8. Place the new fan into the vacant space in the housing.
9. Reconnect the fan cables to the same fan headers on the motherboard.

   Remember to tie the cables after fan replacement.
10. Power on the system as described in Powering On (Section 4.1 on page 46).
11. Verify that the fan is working properly.
12. Replace the top chassis cover.
13. Slide the enclosure back into the rack.

2.6 AI2000 Safety and Regulatory Information

2.6.1 Safety Compliance Information

Multiple power connections. Prior to servicing, disconnect all power cords.

CAUTION: Risk of fire or explosion if the battery is replaced by an incorrect type.

本設備包括多個電源連接，在進行維修之前，應斷開所有電源線。

警告: 若置換不同型式之電池有起火或爆炸風險。

確保將電源線連接到具有接地連接的插座 裝或使用於住宅環境。

連絡方式

製造商: 神雲科技股份有限公司

הקפידו לחבר את כבל החשמל לשקע עם חיבור הארקה.

Raccordements de puissance multiples. Avant toute intervention sur l’appareil, débranchez tous les cordons d'alimentation.

ATTENTION : Risque d'incendie ou d'explosion si la batterie est remplacée par une batterie de type incorrect.

זהירות: לפני טיפול בציוד, נתק את כל כבלי המתח כדי להפחית את סכנת ההתחשמלות.

זהירות: אל תשתמש בציוד המורכב על גררת החלקה כארון או כמשטח עבודה.

Trennen Sie vor der Reparatur alle Netzkabel.

ACHTUNG: Wenn die Batterie durch den falschen Typ ersetzt wird, bestehen Brand- und Stromschlaggefahr.

Antes de realizar tareas de mantenimiento, desconecte todos los cables de alimentación.

PRECAUCIÓN: Hay riesgo de incendio o explosión si la pila se reemplaza por otra de tipo incorrecto.

Koppel alle voedingskabels los voordat u onderhoud uitvoert.

LET OP: Er bestaat een risico op brand of explosie wanneer de batterij door een onjuist type wordt vervangen.

Prima di eseguire interventi di manutenzione, scollegare tutti i cavi di alimentazione.

ATTENZIONE: rischio di incendio o di esplosione se la batteria viene sostituita utilizzandone una di tipo non idoneo.

Ensure to connect the power cord to a socket-outlet with earthing connection.

Veillez à cordon d'alimentation connecté à un socle de prises de courant avec connexion à la terre.

Stellen Sie sicher, dass das Netzkabel an eine Steckdose mit Erdungsanschluss angeschlossen ist.

Asegúrese de conectar el cable de alimentación a una toma de corriente con conexión a tierra.

Zorg ervoor dat u de voedingskabel aansluit op een stopcontact met aardaansluiting.

Assicurarsi di collegare il cavo di alimentazione a una presa con collegamento a terra.

2.6.2 Potential for Radio Frequency Interference

USA Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

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

European Regulations

This product conforms to the following European Directive(s) and Standard(s):
Application of Council Directive: 2014/35/EU, 2014/30/EU, 2011/65/EU

Standards to which Conformity is declared:
EN55032, EN55035, EN IEC 61000-3-2, EN61000-3-3, EN62368-1

This is a class A product.

Canadian Regulations

ICES-003 Class A Notice - Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

VCCI (Japan)

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI).

Operation of this equipment in a residential environment could cause radio interference. In such a case, the user may be required to take corrective actions.

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

2.6.3 Regulatory Compliance

Electromagnetic Emissions: FCC Class A, EN 55032 Class A, EN IEC 61000-3-2/EN 61000-3-3, CISPR 32 Class A

Electromagnetic Immunity: EN 55035/CISPR 35, (EN 61000-4-2, EN IEC 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN IEC 61000-4-11)

VCCI-CISPR 32 and AS/NZS CISPR 32

Environmental: Directive 2011/65/EU and Delegated Directive (EU) 2015/863 and Directive 2012/19/EU

Safety: CSA/EN/IEC/UL 62368-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. “Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

2.6.4 Agency Certifications

FCC, ICES, CE, VCCI, RCM, UKCA, NRTL, CB

2.6.5 RoHS Compliance

BSMI限用物質含有情況標示聲明

BSMI Declaration of the Presence Condition of the Restricted Substances

設備名稱：伺服應用機　　型號（型式）：　RM-GOSHAWK-12

Equipment name: Server appliance　　Type designation (Type): RM-GOSHAWK-12

單元Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機殼 Chassis Unit	○	○	○	○	○	○
機架滑軌總成 RAIL ASSY	—	○	○	○	○	○
電路板總成 PCBA	—	○	○	○	○	○
中央處理器 CPU	○	○	○	○	○	○
儲存裝置 Storage Device	—	○	○	○	○	○
電源線及VGA連接器 Cable and VGA connector	—	○	○	○	○	○
電源供應器 Power Supply	—	○	○	○	○	○
風扇 Fan	—	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note 1：“Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note 2：“o” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝—〞係指該項限用物質為排除項目

Note 3：The “–” indicates that the restricted substance corresponds to the exemption.

3. Hardware Installation

For instructions to prepare and mount your server in a rack, follow the appropriate link:

1. Review the Safety and Compliance information (Section 3.1 on page 35).
2. Unpack the server (Section 3.2 on page 37).
3. Prepare for setup (Section 3.3 on page 38).
4. Rackmount the server (Section 3.4 on page 42).
5. Connect the cables (Section 3.6 on page 45).

Read this chapter in its entirety before beginning the installation procedure.

3.1 Safety and Compliance Information

Before installing and using the server, take note of the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Do not block the slots and opening on the unit, which are provided for ventilation.
- Only use the power source indicated on the marking label. If you are not sure, contact the power company.
- The unit uses a three-wire ground cable, which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace your obsolete outlet.
- Do not place anything on the power cord. Place the power cord where it will not be in the way of foot traffic.
- Follow all warnings and cautions in this manual and on the unit case.
- Do not push objects in the ventilation slots as they may touch high voltage components and result in shock and damage to the components.
- When replacing parts, ensure that you use parts specified by the manufacturer.
- When service or repairs have been done, perform routine safety checks to verify that the system is operating correctly.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- Cover the unit when not in use.
- Connect the equipment protective earthing conductor to the installation protective earthing conductor. (for example, by means of a power cord connected to a socket-outlet with earthing connection).

3.1.1 Safety Information

- Retain and follow all product safety and operating instructions provided with your equipment. In the event of a conflict between the instructions in this guide and the instructions in equipment documentation, follow the guidelines in the equipment documentation.

- Observe all warnings on the product and in the operating instructions. To reduce the risk of bodily injury, electric shock, fire and damage to the equipment, observe all precautions included in this guide.
- You must become familiar with the safety information in this guide before you install, operate, or service DDN products.

3.1.2 Symbols on Equipment

The symbols in the following table are commonly used, but the symbols used on your server might be different.

	**Caution**. This symbol indicates a potential hazard. The potential for injury exists if cautions are not observed. Consult equipment documentation for specific details.
	**Caution.** Slide-mounted equipment is not to be used as a shelf or a work space.
	**Warning.** This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.
	**Warning.** This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists. To reduce risk of injury from a hot component, allow the surface to cool before touching.
	**CAUTION:** Multiple power connections. Prior to servicing, disconnect all power cords. **ATTENTION:** Raccordements de puissance multiples. Avant l'entretien, vous devez débranchez tous les cordons d'alimentation.

3.2 Unpack the Server

Before you unpack, inspect the shipping containers for damage. If you detect damage, report it to your carrier. Retain all boxes and packing materials in case you need to store or ship the server in the future.

To install your server, you will need the following:

- One server enclosure assembly with bezel
- Two power cables
- One Ethernet cable
- Up to two host cables
- Up to 12 drives for data
- Rackmount rail kit

IMPORTANT: For IB host connections, use active optical host cables.

Observe all conventional ESD precautions when handling the plug-in modules and components. Avoid contact with backplane components and module connectors. Electrostatic discharge can damage the circuit boards.

3.3 Preparing for Setup

Decide on a suitable location for the rack unit that will hold your server.

The location should

- be a clean, dust-free area that is well-ventilated and climate controlled.
- be a restricted access location, such as a dedicated equipment room or a service closet.
- have a nearby grounded power outlet.
- have at least 25 inches clearance in front of the rack to open the front door completely.
- have approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and access for servicing.
- provide a power source with the voltage and frequency that matches the voltage and frequency inscribed on the electrical rating label of the equipment.
- not be in or near a plenum, air duct, radiator, or heat register.

Avoid areas where heat, humidity, electrical noise, and electromagnetic fields are generated.

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

3.3.1 Equipment Modifications

Do not make mechanical modifications to the system. DDN is not responsible for the regulatory compliance of DDN equipment that has been modified.

3.3.2 Warnings and Precautions

The following sections are important warnings and precautions.

3.3.2.1 Rack Precautions

- Observe local occupational health and safety requirements and guidelines for manual materials handling.
- Do not attempt to move a rack by yourself; a minimum of two people are needed to move a rack.
- Do not attempt to move a fully loaded rack. Remove equipment from the rack before moving it.
- Do not attempt to move a rack on an incline that is greater than 10 degrees from the horizontal.
- Make sure the rack is properly secured to the floor or ceiling.
- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single-rack installations, ensure that stabilizers are attached to the rack. In multiple rack installations, ensure that the racks are coupled together.

- Ensure the rack is stable before pulling a component out of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
- Extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.
- A reliable ground must be maintained at all times. To ensure this requirement is met, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit, such as the use of power strips.
- Slide rail mounted equipment is not to be used as a shelf or a work space.

3.3.2.2 Server Precautions

- Do not block or cover the openings to the system.
- Never push objects of any kind through openings in the equipment. Dangerous voltages might be present.
- Conductive foreign objects can produce a short circuit and cause fire, electric shock, or damage to your equipment.
- Lift equipment using both hands and with your knees bent.
- Determine the placement of each component in the rack before you install the rails.
- Install the heaviest components on the bottom of the rack first, and then work upwards. If it is the only unit in the rack, this unit should be mounted at the bottom of the rack. When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- Use a regulating uninterruptable power supply (UPS) to protect the server from power surges and voltage spikes and to keep your system operating in case of a power failure.
- Allow the drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

3.3.2.3 Equipment Damage Warnings

- The rack width and depth must allow for proper serviceability and cable management.
- Ensure that there is adequate airflow in the rack. Improper installation or restricted airflow can damage the equipment. Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.
- The rack cannot have solid or restricted airflow doors. You must use a mesh door on the front and back of the rack or remove the doors to ensure adequate air flow to the system.
- If you install the system in a rack, do not place equipment on top of the unit. It will cause restricted airflow and might cause damage to the equipment.
- Make sure the product is properly matted with the rails. Products that are improperly matted with the rails might be unstable. Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.
- Verify that the AC power supply branch circuit that provides power to the rack is not overloaded. Avoiding an overload reduces the risk of personal injury, fire, or damage to the equipment. The total rack load should not

exceed 80 percent of the branch circuit rating. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.

- Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on over-current protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

3.3.2.4 Equipment Power Cord Warnings

- Use only the power cords and power supply units provided with your system. The system might have one or more power cords.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- In all European electrical environments, you must ground the Green/Yellow tab on the power cord. If you do not ground the Green/Yellow tab, it can cause an electrical shock due to high leakage currents.
- Do not place objects on AC power cords or cables. Arrange them so that no one might accidentally step on or trip over them.
- Do not pull on a cord or cable. When unplugging from the electrical outlet, grasp the cord by the plug.
- To reduce the risk of electrical shock, disconnect all power cords before servicing the appliance.

3.3.2.5 Equipment Battery Warnings

- The system battery contains lithium manganese dioxide. If the battery pack is not handled properly, there is risk of fire and burns.
- Do not disassemble, crush, puncture, short external contacts, or dispose of the battery in fire or water.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- The system battery is not replaceable. If the battery is replaced by an incorrect type, there is danger of explosion. Replace the battery only with a spare designated for your product.
- Do not attempt to recharge the battery.
- Dispose of used batteries according to the instructions of the manufacturer. Do not dispose of batteries with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to DDN, your authorized DDN partner, or their agents.

CAUTION:	Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions.

3.4 Rackmount the Server

This section gives instructions to install the server into a rack unit with the rack rails provided. The rack rails will fit a rack between 25.6" and 33" deep. Since there are a variety of rack units available, your assembly procedure may differ slightly. Refer to the installation instructions that came with your rack.

Warning

Mounting the server into the rack requires at least two people to support the chassis during installation. Please follow safety recommendations printed on the rails.

Do not pick up the chassis by the front pulls. They are designed to pull the enclosure assembly from a rack only.

Procedure

To mount the enclosure assembly in your rack, complete the following:

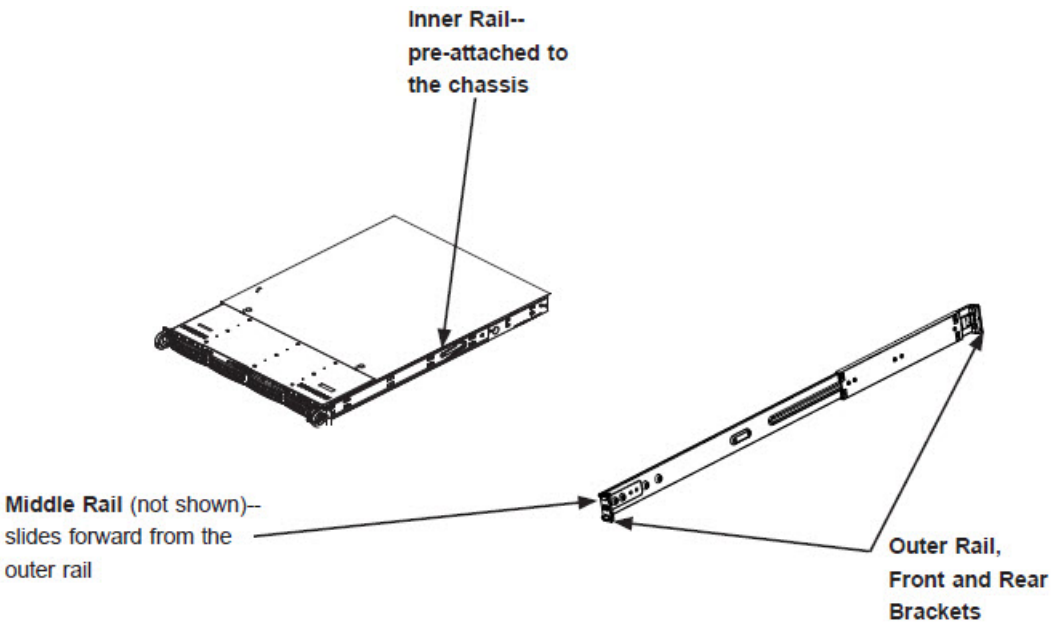
1. Identifying the sections of the rack rails. (Figure 22)

The AI2000 is shipped with (2) rail assemblies. Each assembly consists of three sections:

- Inner rail that secures directly to the chassis
- Outer rail with front and rear brackets that secure to the rack
- Middle rail that extends from the outer rail

These assemblies are specifically designed for the left and right side of the chassis.

Figure 22. Identify Sections of the Rack Rails (right rail assembly shown)



2. Install the inner rails onto the chassis.

a. On the inner rails, push the white tab to extend the inner rail.

b. Attach the inner rails to both sides of the chassis, and then push the inner rails backward to lock them into place.

3. Install the outer rails onto the rack. (Figure 23)

Each end of the assembled outer rail includes a bracket with square pegs to fit into your rack holes. If you have an older rack with round holes, these brackets must be removed, and you must use screws to secure the rail to the rack.

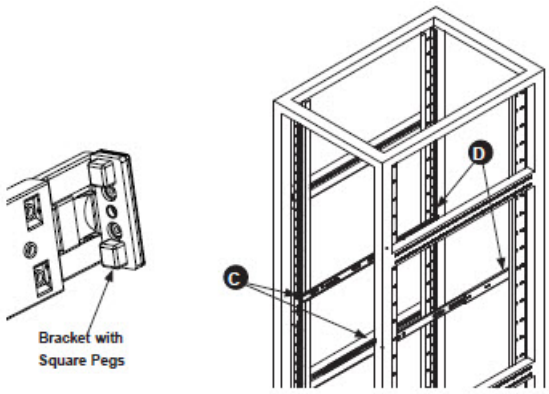
a. Align the square pegs on the front end of the rail with the square holes on the front of the rack (C). Push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack. Keep the rail horizontal.

b. Adjust the rail to reach just past the full depth of your rack.

c. Align the square pegs on the rear end of the rail to the holes on the rack (D) and push the rail into the rack until the quick release bracket snaps into place, securing the rail to the rack. Press upward on the locking tab at the rear end of the middle rail.

d. Repeat for the other outer rail.

Figure 23. Install Outer Racks



4. Install the chassis into the rack, installing from the bottom to top of the rack. (Figure 24)

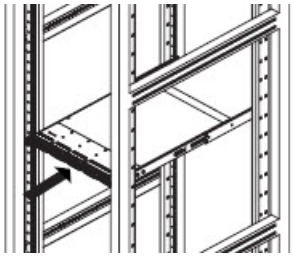
a. Pull the middle rail out of the front of the outer rail. Ensure the ball bearing shuttle is locked at the front of the middle rail during installation.

b. Align the rear of the chassis rails with the middle rails and then push evenly on both sides of the chassis until it clicks into the fully extended position.

c. Depress the blue locking tabs on both sides of the chassis and push it fully into the rack. The locking tabs should “click”.

d. Use thumb screws to secure the front of the chassis to the rack.

Figure 24. Install Chassis



The figure is for illustrative purposes only.
Install servers from the bottom upwards.

Before you slide the unit out for servicing, the rack stabilizing mechanism must be in place or the rack must be bolted to the floor. Failure to stabilize the rack can cause the rack to tip over.

3.5 Remove the Server

Warning

Removing the server from the rack requires at least two people to support the chassis. Be sure to have sufficient assistance supporting the chassis when removing it from the rack. Use a lift, if needed.

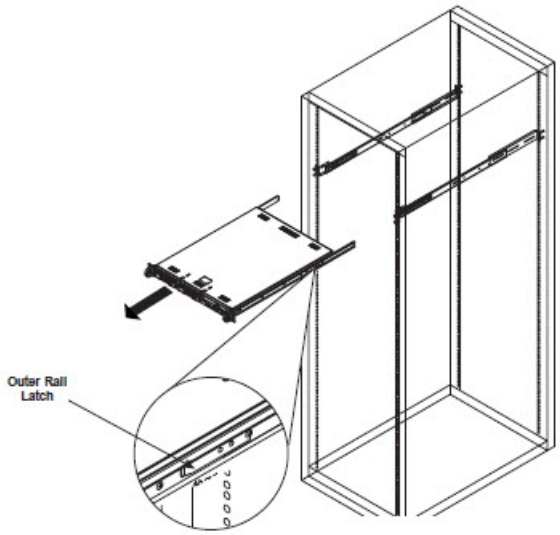
Do not pick up the chassis by the front pulls. They are designed to pull the enclosure assembly from a rack only.

Procedure

To remove the enclosure assembly from your rack, complete the following (Figure 25):

1. If installed, loosen the thumb screws on the front of the chassis that hold it in the rack.
2. Pull the chassis forward out of the front of the rack until it stops.
3. Press the release latches on each of the inner rails downward simultaneously and continue to pull the chassis forward and out of the rack.

Figure 25. Remove Chassis



3.6 Connect the Cables

Connect your network cable to the 10GBase-T LAN ports.

For more information on cabling, see Network Cabling (Section 2.4 on page 19).

CAUTION: Ensure that there is no strain on any of the connectors.

4. System Power On and Off

This section provides instructions to apply power to and remove power from your server.

4.1 Powering On

To apply power to your server, complete the following:

1. Verify all power distribution unit (PDU) power switches are in the OFF position.
2. Connect the power cables from the two power supply modules to the appropriate PDUs. For maximum redundancy, connect the power supplies to different AC circuits. Only use the power cables that are provided with the system.
3. Turn on the PDUs to the enclosure.
4. On the front panel, press the Power button and verify the Power LED is green.

4.2 Powering Off

To remove power from your server, complete the following:

1. Use the operating system to power down the server. Always perform an orderly shutdown when there is a need to power off.
2. After the server has completely shut-down, disconnect the AC power cords from the power strip or outlet and from all power supply modules.

The power button turns off the main power from the server power supply modules; however, the standby power remains on. Before servicing the server, turn off the PDU to the enclosure and disconnect the power supply cables between the enclosure and PDU.

Contacting DDN Support

If you have questions or require assistance, contact DDN Support:

Web

DDN Community Support Portal	https://support.ddn.io
Portal Registration	https://support.ddn.io/DDNUserRegistration
Portal Assistance	portalsupport@ddn.com

Telephone

DDN Worldwide Directory	https://www.ddn.com/support/global-services-overview

Email

Support Email	support@ddn.io

Bulletins

Support Bulletins	http://www.ddn.com/support/technical-support-bulletins
End-of-Life Notices	http://www.ddn.com/support/end-of-life-notices
Bulletin Subscription Request	support-tsb@ddn.com

Corporate Headquarters · 9351 Deering Avenue, Chatsworth, CA 91311 · ddn.com · +1.818.700.4000 · info@ddn.com