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DD2200 system features

This table summarizes the system features of the DD2200.

Table 1 DD2200 system features

Feature	DD2200 (Base configuration)	DD2200 (Expanded configuration)
Rack height	2U, supported in four-post racks only	2U, supported in four-post racks only
Rack mounting	Rack mount kit included with each system. Adjustable between 18 - 36 in. (45.7–76.2 cm).	Rack mount kit included with each system. Adjustable between 18 - 36 in. (45.7–76.2 cm).
Power	1 +1 redundant, hot-swappable power units	1 +1 redundant, hot-swappable power units
Processor	One 6-core processor	One 6-core processor
NVRAM	System memory-BBU module-hard disk drive combination for data integrity during a power outage.	System memory-BBU module-hard disk drive combination for data integrity during a power outage.
BBU module	One BBU module for data integrity during a power outage. Not hot-swappable.	One BBU module for data integrity during a power outage. Not hot-swappable.
Fans	Seven fan assemblies. Not hot-swappable.	Seven fan assemblies. Not hot-swappable.
Memory	2 x 4 GB DIMM (8 GB)	4 x 4 GB DIMM (16 GB)
Internal drives	Seven 2-TB HDD hot-swappable drives.	Twelve 2-TB HDD hot-swappable drives.
I/O module slots	Two replaceable I/O module (FC and Ethernet) slots. Not hot-swappable.	Two replaceable I/O module (FC and Ethernet) slots. Not hot-swappable.

DD2200 system specifications

Model	Watts	BTU/ hour	Power (VA) (120V/230V)	Size (U)	Power connectors	Weight	Width	Depth	Height
DD2200 with 7 drives	394	1345	406 (3.38A/ 1.76A)	2	2 x grounded	65 lb / 29.5 kg	19 in / 48.3 cm	29.5 in / 74.9 cm	3.5 in / 8.9 cm
DD2200 with 12 drives	487	1662	502 (4.18A/ 2.18A)	2	2 x grounded	73 lb / 33.1 kg	19 in / 48.3 cm	29.5 in / 74.9 cm	3.5 in / 8.9 cm

Table 2 System operating environment

Operating Temperature	50° to 95° F (10° to 35° C), derate 1.1° C per 1,000 feet, above 7500 feet up to 10,000 feet
Operating Humidity	20% to 80%, non-condensing
Non-operating Temperature	-40° to +149° F (-40° to +65° C)
Operating Acoustic Noise	Sound power, LWAd: 7.52 bels. Sound pressure, LpAm: 56.4 dB. (Declared noise emission per ISO 9296.)

DD2200 storage capacity

The table lists the capacities of the DD2200 system. The Data Domain system internal indices and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Note

The system commands compute and display amounts of disk space or data as decimal multiples of certain powers of two (2^{10}, 2^{20}, 2^{30}, and so forth). For example, 7 GiB of disk space = 7 x 2^{30} bytes = 7 x 1,073,741,824 bytes. This process is referred to as Base 2 calculation.

Table 3 DD2200 storage capacity

System/ Installed Memory	Internal Disks	Data Storage Space (Base 2 Calculation)	Data Storage Space (Base 10 Calculation)	External Storage
DD2200 2 x 4 GB DIMM	Seven 3.5 in. 2 TB SAS HDDs	7 drives: 7012 GiB	7 drives: 7531 GB	NA
DD2200 4 x 4 GB DIMM	Seven or twelve 3.5 in. 2 TB SAS HDDs	7 drives: 7012 GiB 7+5 drives: 12,356 GiB 12 drives: 16,100 GiB	7 drives: 7531 GB 7+5 drives: 13,270 GB 12 drives: 17,291 GB	NA

Note

For information about Data Domain expansion shelves, see the *Data Domain ES30 Expansion Shelf Hardware Guide* and *Data Domain DS60 Expansion Shelf Hardware Guide*.

Front panel

Figure 1 Front panel components

Disk drives

The system contains up to 12 hot-swappable 3.5" HDD SAS disk drives, located in the front of the chassis. Left to right, drives are numbered 0-3 in the top row, 4-7 in the middle row, and 8-11 in the bottom row.

- The base configuration contains 7 disk drives in locations 0 through 6. Drive bays 7-11 contain bay blanks.
- The expanded configuration contains 12 disk drives.

Front LED indicators

The front of the system contains 12 disk drive status LEDs that are normally blue and blink when there is activity on the disk. The LEDs are shaped like triangles, and the apex of the triangle points either left or right toward the disk whose status it represents. If the disk drive has a failure, the disk's status LED turns from blue to amber.

There are two square-shaped system LEDs. A blue system power LED is on whenever the system has power. An amber system fault LED is normally off and is lit amber whenever the chassis or any other FRU in the system requires service.

Figure 2 Disk and system LEDs

1. System fault LED (square shaped).
2. System power LED (square shaped).
3. Disk drive LEDs (triangular shaped).

Table 4 Indicator states

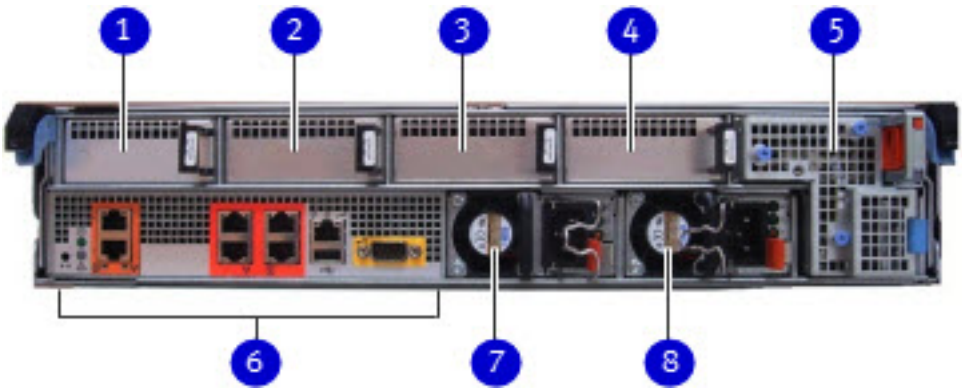
Part	State
System fault	Normally unlit. Amber indicates fault.
System power	Steady blue indicates normal power.
Disk drive status	Steady blue or blinking blue indicates normal operation. Amber indicates fault or failure.

When the bezel is affixed, the blue system power LED can be seen through the bezel.

Figure 3 Bezel showing lighted system power LED

Back panel

Figure 4 Features on rear of chassis



1. Slot 0.
2. Slot 1.
3. Slot 2.
4. Slot 3.
5. Slot 4, NVRAM-BBU combination module.
6. Onboard interfaces.
7. Power supply, number 0.
8. Power supply, number 1.

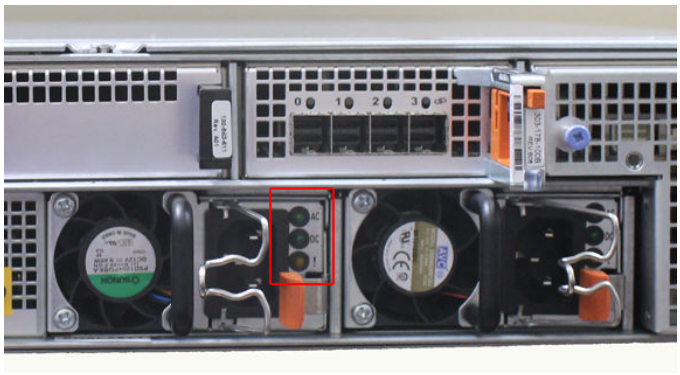
Power supply units

A system has two power supply units, numbered 0 and 1 from left to right. Each power unit has LEDs (shown in the photo) that indicates the following states:

- AC LED (top): Glows green when AC input is good.
- DC LED (middle): Glows green when DC output is good.

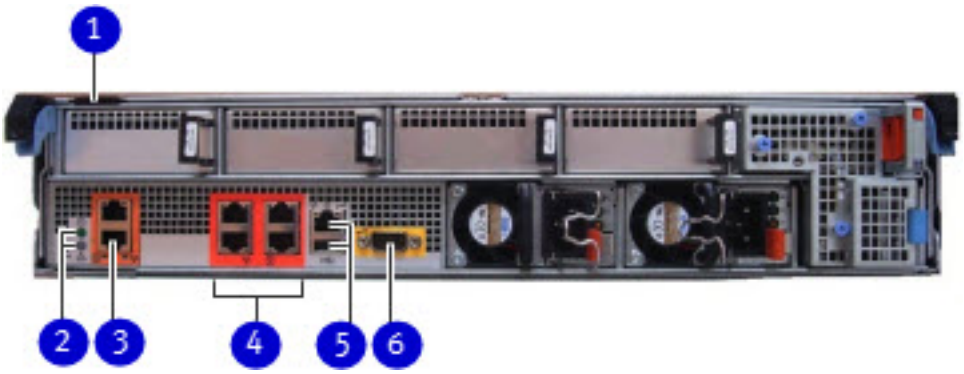
- Symbol “!” (lower): Glows solid amber for fault or attention.

Figure 5 Power supply unit LEDs



Onboard interfaces and LEDs

Figure 6 Onboard interfaces and LEDs



1. Serial number label.
2. SP power LED (top); SP service LED (bottom).
3. Dual-port 10GBaseT.
4. Quad-port Gigabit Ethernet.
5. Service network port (top); USB port (bottom).
6. Serial port.

The onboard interfaces and LEDs are located at the far lower left side of the back of the system. The onboard interfaces enable you to check system status and connect to the system through a serial console or Ethernet connections. The dual-port 10GBaseT and quad-port Gigabit Ethernet interfaces allow connectivity to the data host.

A USB port enables the system to boot from a USB flash device.

Rear LED status summary

Table 5 Indicator status

Part	State
SP service	Blue indicates normal operation. Amber indicates fault.
SP power	Steady green indicates normal power. Dark indicates no power.

Table 5 Indicator status (continued)

Part	State
I/O module	Steady green indicates normal operation. Amber indicates fault or failure.
Power supply AC	Glows green when AC input is operational.
Power supply DC	Glows green when DC output is operational.
Power supply symbol “!”	Glows solid amber for fault or attention.

I/O modules and slot assignments

Table 6 slot assignments

Slot Number	System
0	FC, Ethernet or emptyEmpty
1	FC, Ethernet or emptyEmpty
2	FC, Ethernet or emptyEmpty
3	SAS or empty
4	NVRAM-BBU

When a system is upgraded, the newly inserted I/O module must go into slot position three. No other slot positions should be used. Existing modules should not be removed and reinserted into different slots.

When a system is upgraded, the newly inserted I/O module should go into the next available slot position. The following slot loading rules apply:

- For mixed populations, populate all Ethernet I/O modules first, then populate the FC I/O modules.
- For Ethernet I/O modules, populate the leftmost (slot 0) slot first, if empty, then slot 1 and so on.
- Slot 3 is reserved for SAS I/O modules only.

FC I/O module option

The FC I/O module is a dual-port Fibre Channel module. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Three FC I/O module slots are available for use.

Ethernet I/O module options

The following Ethernet I/O modules are available:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2-port 1000Base-T Copper (RJ-45)/2-port 1000Base-SR Optical

You can use up to three I/O module slots for Ethernet connectivity.

Internal system components

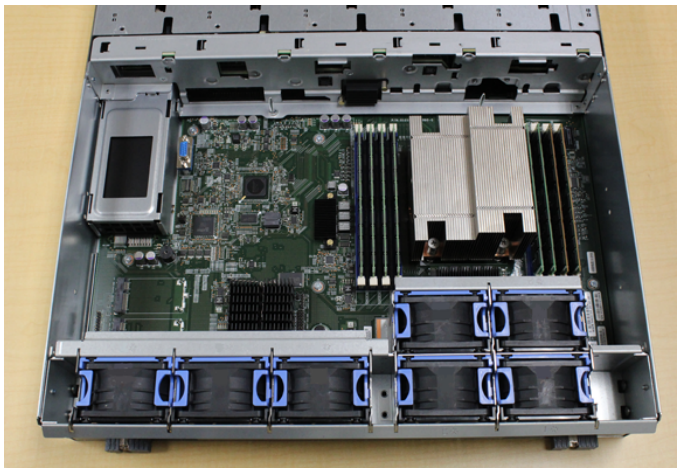
The photo shows the system with the storage processor (SP) module removed from the chassis. The top of the photo shows the rear of the system.

Figure 7 Top view of SP module (system shown)

Cooling fans

A system processor module contains seven cooling fans. The fans provide cooling for the processor, DIMMs, and I/O modules. A system can run with one fan module faulted.

Figure 8 Top view of SP module with air ducts removed



DIMM modules

DD2200 systems can contain either 2 x 4 GB or 4 x 4 GB memory DIMMs.

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DD2500 system features

The table summarizes the features of the DD2500 system.

Table 7 DD2500 system features

Feature	DD2500 (Base configuration)	DD2500 (Expanded configuration)
Rack height	2U, supported in four-post racks only	2U, supported in four-post racks only
Rack mounting	Rack mount kit included with each system. Adjustable between 18 - 36 in. (45.7–76.2 cm).	Rack mount kit included with each system. Adjustable between 18 - 36 in. (45.7–76.2 cm).
Power	1 +1 redundant, hot-swappable power units	1 +1 redundant, hot-swappable power units
Processor	One 8-core processor	One 8-core processor
NVRAM	One 2-GB NVRAM-BBU combination module for data integrity during a power outage. Not hot-swappable.	One 2-GB NVRAM-BBU combination module for data integrity during a power outage. Not hot-swappable.
BBU module	BBU module is combined with the NVRAM module.	BBU module is combined with the NVRAM module.
Fans	Seven fan assemblies. Not hot-swappable.	Seven fan assemblies. Not hot-swappable.
Memory	4 x 8 GB DIMM (32 GB)	8 x 8 GB DIMM (64 GB)
Internal drives	Seven 3-TB HDD hot-swappable drives.	Twelve 3-TB HDD hot-swappable drives.
External storage	1 x 30-TB SAS shelf adding up to 30 TB of external raw capacity	4 x 30-TB SAS shelves or 3 x 45-TB SAS shelves adding up to 135 TB of external raw capacity
I/O module slots	Four replaceable I/O module (FC, Ethernet, and SAS) slots. Not hot-swappable.	Four replaceable I/O module (FC, Ethernet, and SAS) slots. Not hot-swappable.

System specifications

Table 8 Fundamental features

Model	Watts	BTU / hour	Power (VA) (120V/230V)	Size (U)	Power connectors	Weight	Width	Depth	Height
with 7 drives	394	1345	406 (3.38A/ 1.76A)	2	2 x grounded, 120 VAC, NEMA 15P/R	65 lb. / 29.5 kg.	19 in. / 48.3 cm.	29.5 in. / 74.9 cm	3.5 in. / 8.9 cm.
with 12 drives	487	1662	502 (4.18A/ 2.18A)	2	2 x grounded, 120 VAC, NEMA 15P/R	73 lb. / 33.1 kg.	19 in. / 48.3 cm.	29.5 in. / 74.9 cm.	3.5 in. / 8.9 cm.

- Operating temperature: 50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet.
- Operating humidity: 20% to 80%, non-condensing.
- Non-operating temperature: -40° to +149° F (-40° to +65° C).
- Operating acoustic noise: Sound power, LWAd, is 7.52 bels. Sound pressure, LpAm, is 56.4 dB. (Declared noise emission per ISO 9296.)

DD2500 storage capacity

The table lists the capacities of the DD2500 system. The Data Domain system internal indices and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Note

The system commands compute and display amounts of disk space or data as decimal multiples of certain powers of two (2^{10}, 2^{20}, 2^{30}, and so forth). For example, 7 GiB of disk space = 7 x 2^{30} bytes = 7 x 1,073,741,824 bytes. This process is referred to as Base 2 calculation.

Table 9 DD2500 storage capacity

System/ Installed Memory	Internal Disks	Raw Storage (Base 10)	Data Storage Space (Base 2 Calculation)	Data Storage Space (Base 10 Calculation)	External Storage
4 x 8 GB DIMM	Seven or twelve 3.5 in. 3 TB SAS HDDs	21 TB or 36 TB	7 drives: 10,671 GiB 7+5 drives: 18,763 GiB	7 drives: 11,458 GiB 7+5 drives: 20147 GiB1	1 x 30-TB SAS shelf; up to 30 TB of raw capacity.

Table 9 DD2500 storage capacity (continued)

System/ Installed Memory	Internal Disks	Raw Storage (Base 10)	Data Storage Space (Base 2 Calculation)	Data Storage Space (Base 10 Calculation)	External Storage
			12 drives: 24,334 GiB	12 drives: 26,129 GiB	
8 x 8 GB DIMM	Seven or twelve 3.5 in. 3 TB SAS HDDs	21 TB or 36 TB	7 drives: 10,671 GiB 7+5 drives: 18,763 GiB 12 drives: 24,334 GiB	7 drives: 11,458 GiB 7+5 drives: 20,147 GiB 12 drives: 26,129 GiB	Up to a maximum of 4 x 30-TB SAS shelves or 3 x 45-TB SAS shelves and up to 135 TB of raw capacity.

Note

For information about Data Domain expansion shelves, see the *Data Domain ES30 Expansion Shelf Hardware Guide* and *Data Domain DS60 Expansion Shelf Hardware Guide*.

Front panel

Figure 9 Front panel components

Disk drives

The system contains up to 12 hot-swappable 3.5" HDD SAS disk drives, located in the front of the chassis. Left to right, drives are numbered 0-3 in the top row, 4-7 in the middle row, and 8-11 in the bottom row.

- The base configuration contains 7 disk drives in locations 0 through 6. Drive bays 7-11 contain bay blanks.
- The expanded configuration contains 12 disk drives.

Front LED indicators

The front of the system contains 12 disk drive status LEDs that are normally blue and blink when there is activity on the disk. The LEDs are shaped like triangles, and the apex of the triangle points either left or right toward the disk whose status it represents. If the disk drive has a failure, the disk's status LED turns from blue to amber.

There are two square-shaped system LEDs. A blue system power LED is on whenever the system has power. An amber system fault LED is normally off and is lit amber whenever the chassis or any other FRU in the system requires service.

Figure 10 Disk and system LEDs

1. System fault LED (square shaped).
2. System power LED (square shaped).
3. Disk drive LEDs (triangular shaped).

Table 10 Indicator states

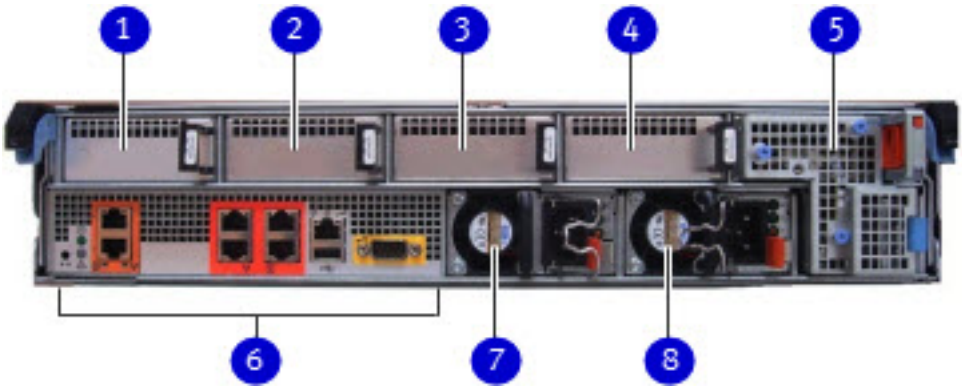
Part	State
System fault	Normally unlit. Amber indicates fault.
System power	Steady blue indicates normal power.
Disk drive status	Steady blue or blinking blue indicates normal operation. Amber indicates fault or failure.

When the bezel is affixed, the blue system power LED can be seen through the bezel.

Figure 11 Bezel showing lighted system power LED

Back panel

Figure 12 Features on rear of chassis



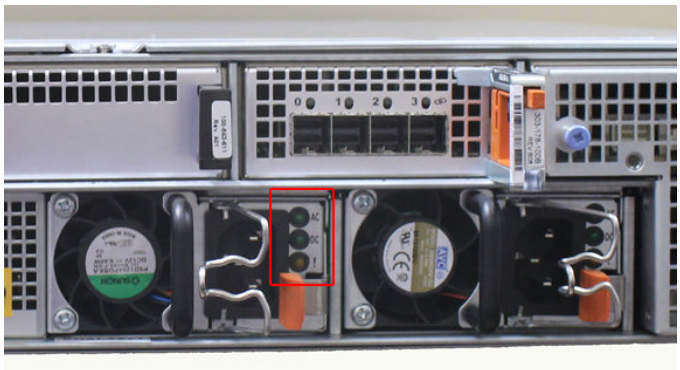
1. Slot 0.
2. Slot 1.
3. Slot 2.
4. Slot 3.
5. Slot 4, NVRAM-BBU combination module.
6. Onboard interfaces.
7. Power supply, number 0.
8. Power supply, number 1.

Power supply units

A system has two power supply units, numbered 0 and 1 from left to right. Each power unit has LEDs (shown in the photo) that indicates the following states:

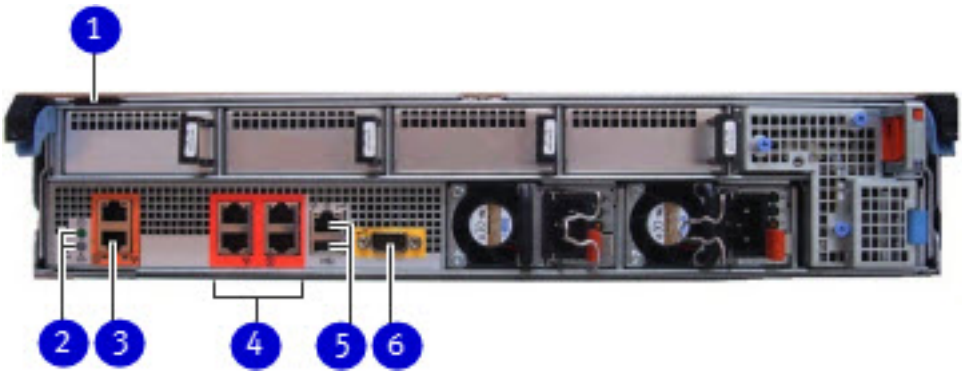
- AC LED (top): Glows green when AC input is good.
- DC LED (middle): Glows green when DC output is good.
- Symbol "!" (lower): Glows solid amber for fault or attention.

Figure 13 Power supply unit LEDs



Onboard interfaces and LEDs

Figure 14 Onboard interfaces and LEDs



1. Serial number label.
2. SP power LED (top); SP service LED (bottom).
3. Dual-port 10GBaseT.
4. Quad-port Gigabit Ethernet.
5. Service network port (top); USB port (bottom).
6. Serial port.

The onboard interfaces and LEDs are located at the far lower left side of the back of the system. The onboard interfaces enable you to check system status and connect to the system through a serial console or Ethernet connections. The dual-port 10GBaseT and quad-port Gigabit Ethernet interfaces allow connectivity to the data host.

A USB port enables the system to boot from a USB flash device.

Rear LED status summary

Table 11 Indicator status

Part	State
SP service	Blue indicates normal operation. Amber indicates fault.
SP power	Steady green indicates normal power. Dark indicates no power.
I/O module	Steady green indicates normal operation. Amber indicates fault or failure.
Power supply AC	Glows green when AC input is operational.
Power supply DC	Glows green when DC output is operational.
Power supply symbol “!”	Glows solid amber for fault or attention.

I/O modules and slot assignments

Table 12 slot assignments

Slot Number	System
0	FC, Ethernet or emptyEmpty
1	FC, Ethernet or emptyEmpty
2	FC, Ethernet or emptyEmpty
3	SAS or empty
4	NVRAM-BBU

When a system is upgraded, the newly inserted I/O module must go into slot position three. No other slot positions should be used. Existing modules should not be removed and reinserted into different slots.

When a system is upgraded, the newly inserted I/O module should go into the next available slot position. The following slot loading rules apply:

- For mixed populations, populate all Ethernet I/O modules first, then populate the FC I/O modules.
- For Ethernet I/O modules, populate the leftmost (slot 0) slot first, if empty, then slot 1 and so on.
- Slot 3 is reserved for SAS I/O modules only.

FC I/O module option

The FC I/O module is a dual-port Fibre Channel module. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Three FC I/O module slots are available for use.

Ethernet I/O module options

The following Ethernet I/O modules are available:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2-port 1000Base-T Copper (RJ-45)/2-port 1000Base-SR Optical

You can use up to three I/O module slots for Ethernet connectivity.

Internal system components

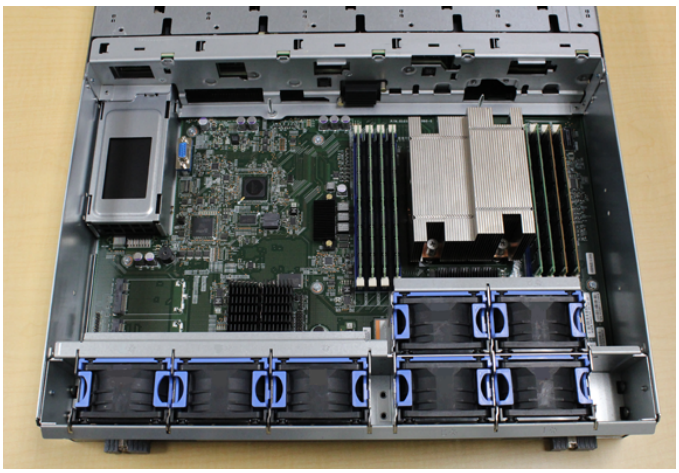
The photo shows the system with the storage processor (SP) module removed from the chassis. The top of the photo shows the rear of the system.

Figure 15 Top view of SP module (system shown)

Cooling fans

A system processor module contains seven cooling fans. The fans provide cooling for the processor, DIMMs, and I/O modules. A system can run with one fan module faulted.

Figure 16 Top view of SP module with air ducts removed



DIMM modules

systems can contain either 4 x 8 GB or 8 x 8 GB memory DIMMs.

CHAPTER 3

DD3300

- DD3300 system features 38
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- DD3300 storage capacity 40
- Front panel 41
- Rear panel 51

DD3300 system features

Table 13 DD3300 system features

Feature	4 TB configuration	8 TB configuration	16 TB configuration	32 TB configuration
Rack Height	2U, supported in four-post racks only			
Power	1 or 2 hot-swappable power units			
Fans	6 hot swappable fans, installed in two fan assemblies (3 fans per fan assembly)			
Rack mounting	Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9–76.2 cm).			
Processor	1 x 8-core Intel 4110 series, hyperthreaded			
Voltage	100–240 V~. Frequency: 50 Hz to 60 Hz.			
Internal 3.5" drives (front)	4 x 4 TB HDD	10 x 4 TB HDD	10 x 4 TB HDD	12 x 4 TB HDD
Internal 3.5" drives (middle)	N/A	N/A	N/A	4 x 4 TB HDD
Internal 3.5" drives (rear)	N/A	1 x 480 GB SSD for NVRAM[a]		
NIC	4 x 1 GbE or 4 x 10 GbE (always present)[b] + 2 x 10 GbE (optional)			
FC (DD VTL only)	4 x 16 Gbps (optional)			
Memory	16 GB or 24 GB[c]	48 GB	48 GB or 56 GB[d]	64 GB

a. The SSD is for use as an NVRAM device, and for SSD Cache Tier storage only. The maximum supported SSD Cache Tier capacity is one percent of the Active Tier capacity. Other SSD-based functions such as Random I/O handling are not supported for use with the SSD.
b. Starting with DD OS 6.2, DD3300 systems ship with a 4 x 10 GbE RJ-45 network daughter card.
c. 24 GB of memory is required to use the FC module for DD VTL.
d. A 16 TB system will have 56 GB of memory if it was a 4 TB system equipped with the FC module, and was later upgraded to 16 TB.

Note

DD OS may report less storage and memory than indicated in this table. The unreported resources are used for internal system processes.

DD3300 system specifications

Table 14 DD3300 system specifications

Watts	BTU/hr	Weight	Width	Depth	Height
750	2891	72.91 lb/33.1 kg	17.09 in/43.4 cm	28.17 inches/71.55 cm	3.42 in/8.68 cm

Table 15 System operating environment

Operating Temperature	50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
Operating Humidity	20% to 80%, non-condensing
Non-operating Temperature	-40° to +149° F (-40° to +65° C)
Operating Acoustic Noise	Sound power, LWAd: 7.52 bels. Sound pressure, LpAm: 56.4 dB. (Declared noise emission per ISO 9296.)

DD3300 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Table 16 DD3300 storage capacity

Configuration	Internal disks - physical[ab]	Internal disks - virtual	Raw storage	Usable storage (local)[c]	Cloud storage	SSD metadata cache storage
4 TB capacity /16 GB memory	4 x 4 TB 7200 RPM NLSAS	• 1 x 4 TB for Active Tier • 1 x 1 TB for DD Cloud Tier metadata	16 TB	4 TB	8 TB	N/A
8 TB capacity/48 GB memory	10 x 4 TB 7200 RPM NLSAS	• 4 x 4 TB for Active Tier • 2 x 1 TB for DD Cloud Tier metadata	40 TB	8 TB	16 TB	160 GB
16 TB capacity/48 GB memory	10 x 4 TB 7200 RPM NLSAS	• 4 x 4 TB for Active Tier • 2 x 1 TB for DD Cloud Tier metadata	40 TB	16 TB	32 TB	160 GB
32 TB capacity/64 GB memory	• 12 x 4 TB 7200 RPM NLSAS (front) • 4 x 4 TB 7200 RPM NLSAS (middle)	• 8 x 4 TB for Active Tier • 4 x 1 TB for DD Cloud Tier metadata	64 TB	32 TB	64 TB	320 GB

a. The internal physical disks are configured in a RAID6 configuration. RAID6 provides the system with the ability to withstand the simultaneous failure of two hard drives, or the failure of one hard drive while another hard drive is still rebuilding after a drive replacement operation.
b. After replacing a disk, it takes approximately 18 hours to complete the rebuild operation on the new disk, but may take significantly longer depending on the amount of activity on the system.
c. The system compensates for the required file system overhead, so the reported usable capacity matches the specified usable capacity.

Front panel

The DD3300 front panel consists of two control panels, which contain system LEDs and ports, twelve 3.5" disk drive bays, and the service tag. Figure 17 on page 41 shows the locations of the front panel components.

Figure 17 Front panel

1. Left control panel
2. 3.5" disk drive
3. Right control panel
4. Service tag.

Disk layout

The following table shows the physical location of each disk slot.

Note

Although the physical slots are numbered starting from 0, the software identifies the slots starting at 1.

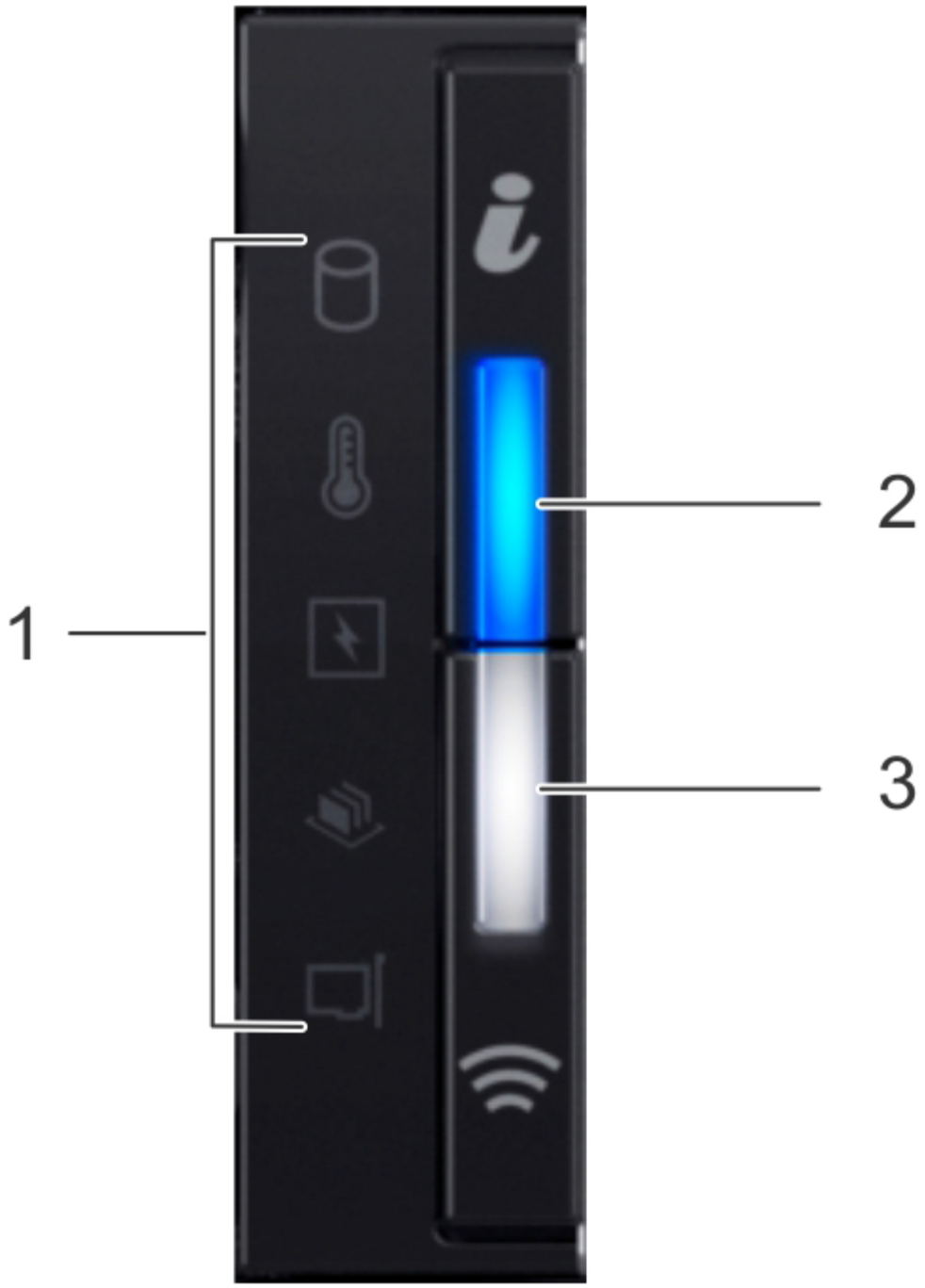
Table 17 Front disk slot numbers

Slot 0 (SW slot 1)	Slot 3 (SW slot 4)	Slot 6 (SW slot 7)	Slot 9 (SW slot 10)
Slot 1 (SW slot 2)	Slot 4 (SW slot 5)	Slot 7 (SW slot 8)	Slot 10 (SW slot 11)
Slot 2 (SW slot 3)	Slot 5 (SW slot 6)	Slot 8 (SW slot 9)	Slot 11 (SW slot 12)

Left control panel

The left control panel contains system status LEDs. Figure 18 on page 42 shows the panel.

Figure 18 Left control panel



1. System status LEDs
2. System health and system ID indicator
3. iDRAC Quick Sync 2 wireless indicator (Not supported)

The system status LEDs turn solid amber if the system experiences an error in any of the following categories. Under normal operating conditions, the system status LEDs remain off. From top to bottom, the five system status LEDs are:

- Drive indicator
- Temperature indicator

- Electrical indicator
- Memory indicator
- PCIe indicator

The system health and system ID indicator has the following states:

- Solid blue: Indicator is in system health mode. System is on and healthy.
- Blinking blue: Indicator is in system ID mode.

Note

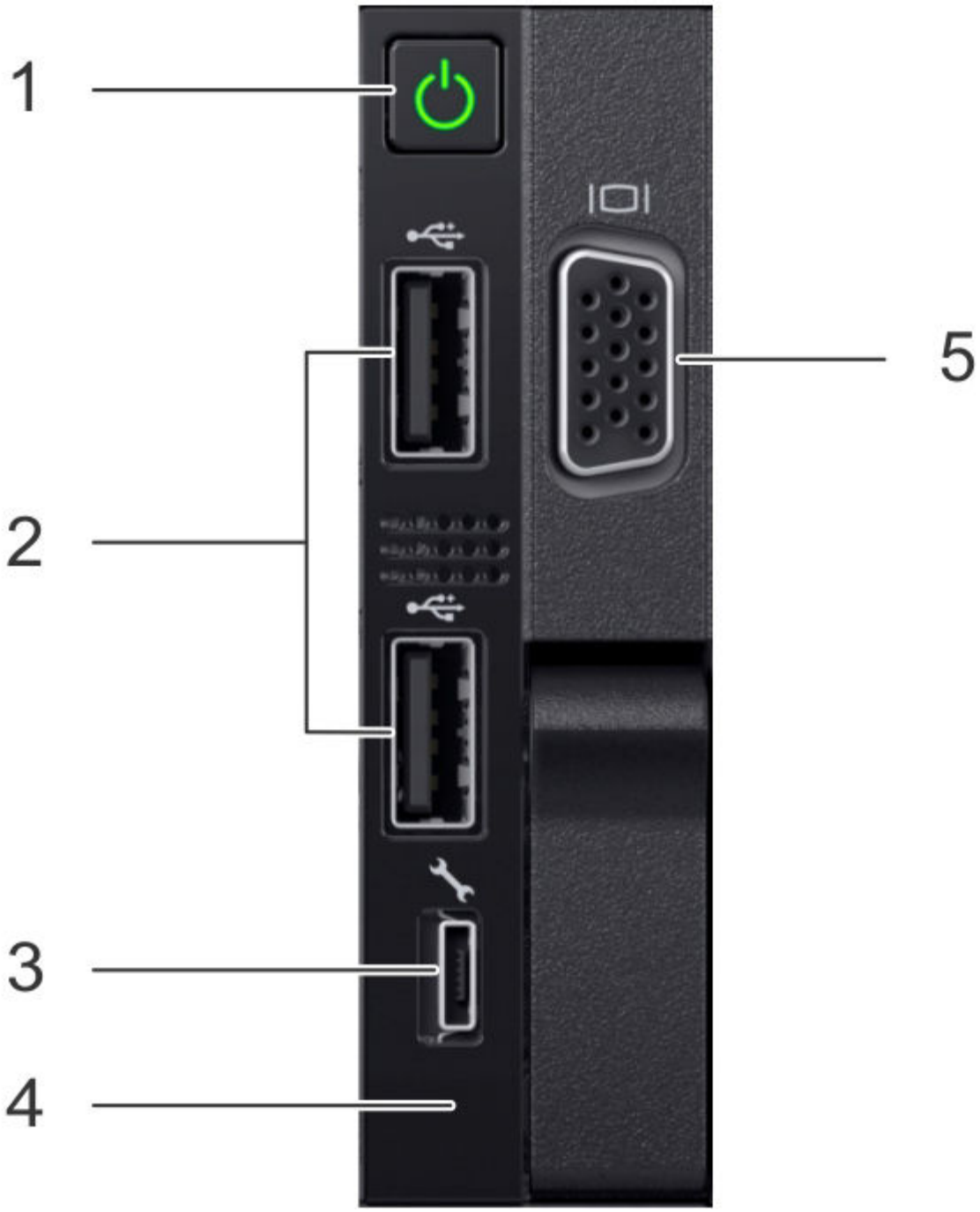
Press the System Health and System ID button to switch the indicator between system health and system ID modes.

- Solid amber: System is in fail-safe mode.
- Blinking amber: System is experiencing a fault.

Right control panel

The right control panel contains the system power button, and system maintenance ports. Figure 19 on page 44 shows the panel.

Figure 19 Right control panel



1. Power button
2. Not Supported -- 2 x USB 2.0 ports (Not supported)
3. Not Supported -- iDRAC Direct port (micro USB 2.0)
4. iDRAC Direct LED
5. Not Used -- VGA port

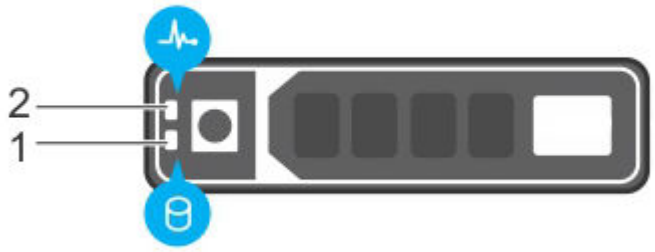
DD3300 supports the use of the iDRAC Direct port for console access. The iDRAC Direct LED lights up when the iDRAC Direct port is connected. The LED has the following the states:

- Solid green for two seconds: Service laptop is connected.
- Flashing green: Connected laptop is recognized.
- Off: Nothing is connected to the iDRAC Direct port.

Front disks

The DD3300 system contains 4, 10, or 12 front-mounted 3.5" HDDs, depending on the capacity configuration. Each HDD has an activity indicator, and a status indicator. Figure 20 on page 45 shows the HDD indicators.

Figure 20 Disk LEDs



1. HDD activity indicator
2. HDD status indicator

The HDD activity indicator blinks during drive activity.

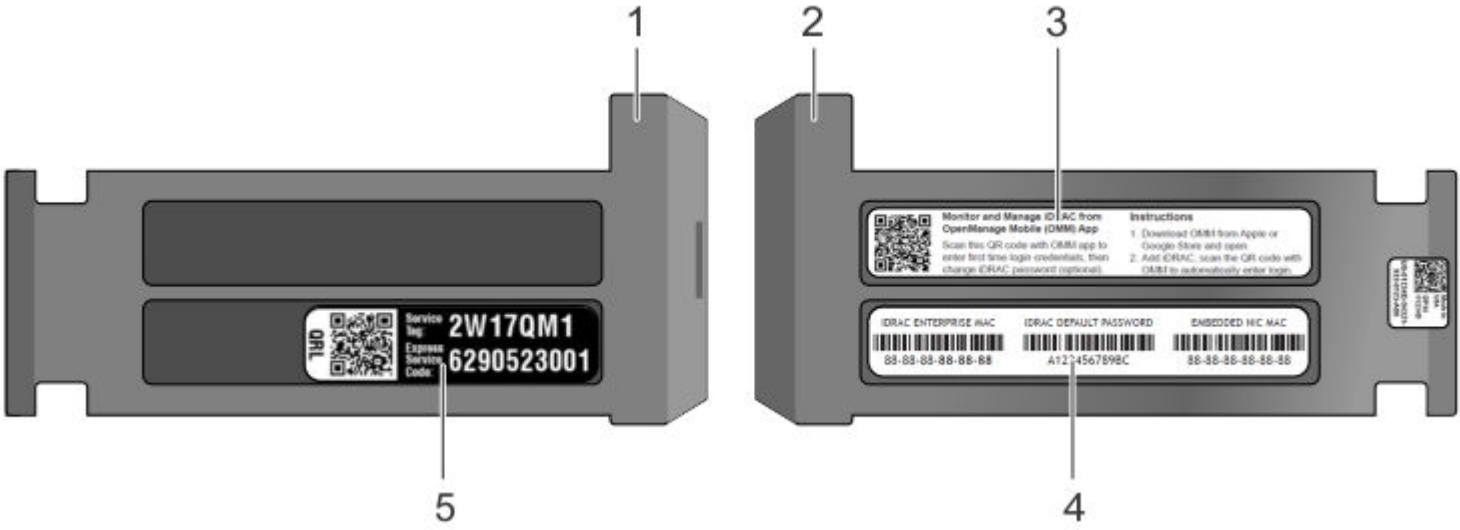
The HDD status indicator has the following states:

- Flashes green twice per second: Identifying drive or preparing for removal.
- Off: Drive is ready for removal.
- Flashes green, then amber, then turns off: Predicted drive failure.
- Flashes amber four times per second: Drive failed.
- Solid green: Drive online.
- Flashes green slowly: Drive rebuilding.
- Flashes green for three seconds, then amber for three seconds, then turns off: Rebuild stopped.

Service tag

The DD3300 system service tag is located at the front of the system, in the lower right-hand corner of the chassis. This tag is on all DD3300 systems, and includes the product serial number.

Figure 21 Service tag

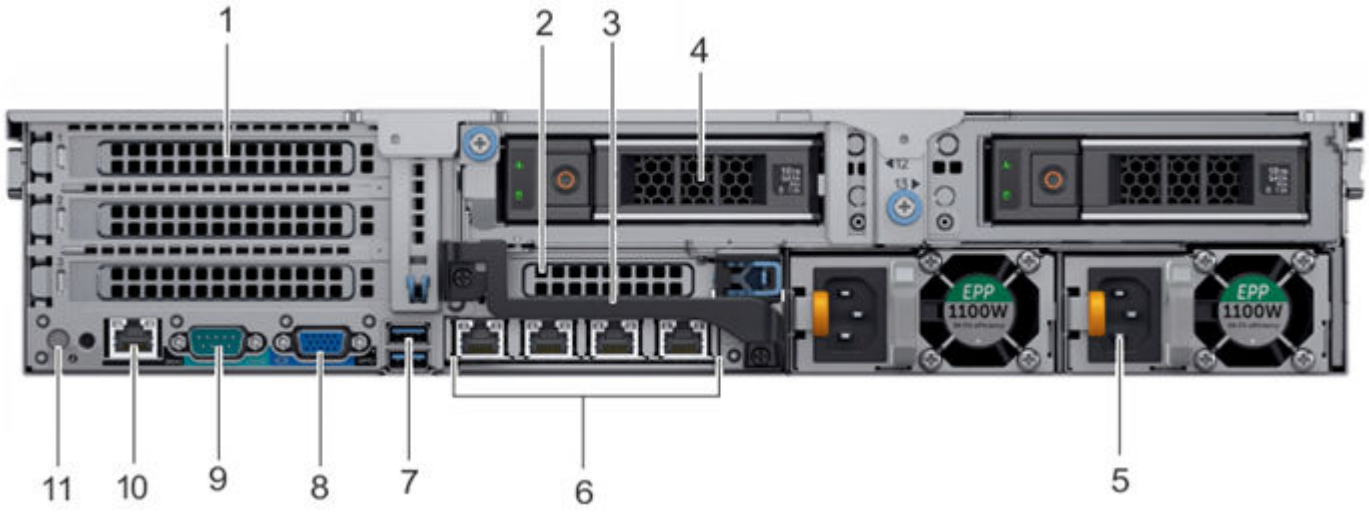


1. Information tag (top view)
2. Information tag (back view)
3. OpenManage Mobile (OMM) label
4. iDRAC MAC address and secure password label
5. Service tag

Rear panel

The DD3300 rear panel contains the system serial port, NIC cards, power supplies, and 3.5" drive bays. shows the rear of the system.

Figure 22 Rear panel



1. Full height PCIe expansion card slots
   - The top slot is for the optional 2 x 10 GbE NIC
   - The middle slot is for the optional 4 x 16 Gbps FC module

- The bottom slot is not supported

2. Not Supported -- Half height PCIe expansion card slot
3. Rear handle
4. 3.5" drive bays (used for 1 x 480 GB SSD in the 8 TB, 16 TB, and 32 TB configurations)
5. Power supply units (1 or 2)
6. Network daughter card Ethernet ports
7. Not Supported -- USB 3.0 ports
8. Not Supported -- VGA port
9. Serial port
10. iDRAC9 dedicated management port
11. System identification button

The DD3300 system supports the use of the iDRAC9 dedicated management port to emulate a serial console.

Disk layout

8 TB, 16 TB, and 32 TB configurations use one rear slot for an SSD. 4 TB configurations do not use an SSD. The following table shows the physical location of the rear SSD slots.

Note

Although the physical slots are numbered starting from 0, the software identifies the slots starting at 1.

Table 18 Rear disk slot numbers

Slot 12 (SW slot 13)	Slot 13 (SW slot 14)

Network port layout

The DD3300 network daughter card provides 4 x 1 GbE or 4 x 10 GbE network ports for network connectivity.

Note

Starting with DD OS 6.2, DD3300 systems ship with a 4 x 10 GbE RJ-45 network daughter card.

The following table lists the layout of the network daughter card ports.

Table 19 Network daughter card port identifiers

ethMa	ethMb	ethMc	ethMd

An optional 2 x 10 GbE module is supported on the DD3300 system.

The following table lists the layout of the 10 GbE ports.

Note

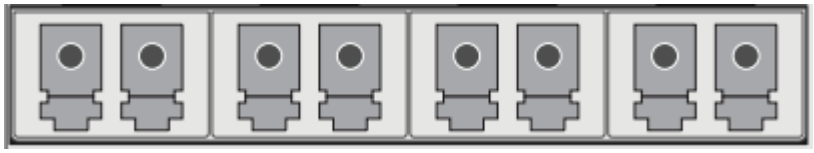
The 10 GbE module is inserted upside down, therefore the ports are in descending order from left to right.

Table 20 Optional 10 GbE module port identifiers

eth1b	eth1a

FC port layout

An optional 4 x 16 Gbps FC module is supported on the DD3300 system.



The following table lists the layout of the FC ports.

Table 21 Optional 16 Gbps FC module port identifiers

22a	22b	22c	22d

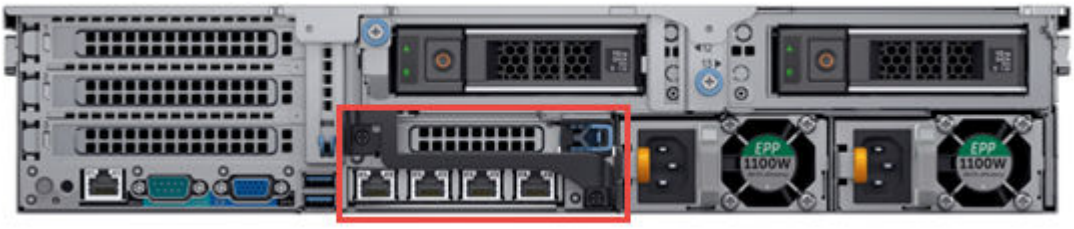
Product serial number tag (PSNT)

Some DD3300 systems have a PSNT tag located on the rear of the system, attached to the arm in the center of the chassis. If this tag is not present, the product serial number is available from the service tag located on the front of the system.

Note

Service tag on page 45 describes the front-mounted service tag.

Figure 23 PSNT location



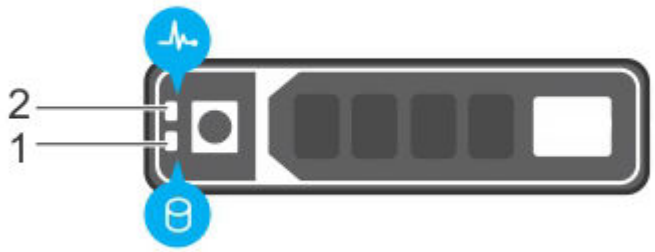
If present, the PSNT tag contains the following information:

- Product ID/Serial Number (PROD ID/SN): A 14 digit alphanumeric string starting with "FNM00". This serial number is the default system password for serial console and Data Domain system manager access.
- Part Number (PN): 900-555-024: The Data Domain part number for the DD3300 system.

Rear SSD

The DD3300 8 TB, 16 TB, and 32 TB configurations use one rear-mounted 480 GB 2.5" SSD. The SSD has an activity indicator, and a status indicator.

Figure 24 Disk LEDs



1. HDD activity indicator
2. HDD status indicator

The HDD activity indicator blinks during drive activity.

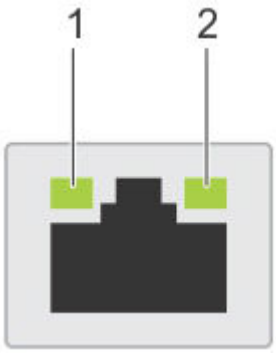
The HDD status indicator has the following states:

- Flashes green twice per second: Identifying drive or preparing for removal.
- Off: Drive is ready for removal.
- Flashes green, then amber, then turns off: Predicted drive failure.
- Flashes amber four times per second: Drive failed.
- Solid green: Drive online.

NIC indicators

All network ports on the DD3300 system have link and activity LED indicators.

Figure 25 NIC LEDs



1. Link LED indicator
2. Activity LED indicator

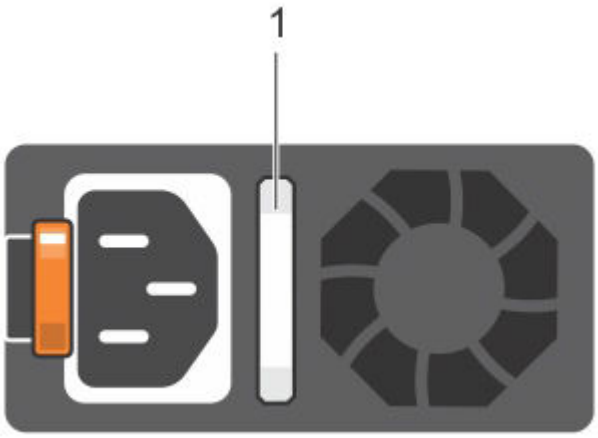
The NIC LEDs have the following states:

Link indicator state	Activity indicator state	Meaning
Green	Blinking green	The NIC is connected to a valid network at its maximum port speed and data is being sent or received.
Amber	Blinking green	The NIC is connected to a valid network at less than its maximum port speed and data is being sent or received.
Green	Off	The NIC is connected to a valid network at its maximum port speed and data is not being sent or received.
Amber	Off	The NIC is connected to a valid network at less than its maximum port speed and data is not being sent or received.
Blinking green	Off	NIC identify is enabled through the NIC configuration utility.

Power supply indicators

The power supply unit has an illuminated, translucent handle that functions as a status LED.

Figure 26 Power supply LED



The indicator has the following states:

- Green: Valid power source is connected, and the PSU is operational.
- Blinking amber: Indicates a problem with the PSU.
- Off: Power is not connected.
- Blinking green: Firmware update is in progress.

⚠ CAUTION

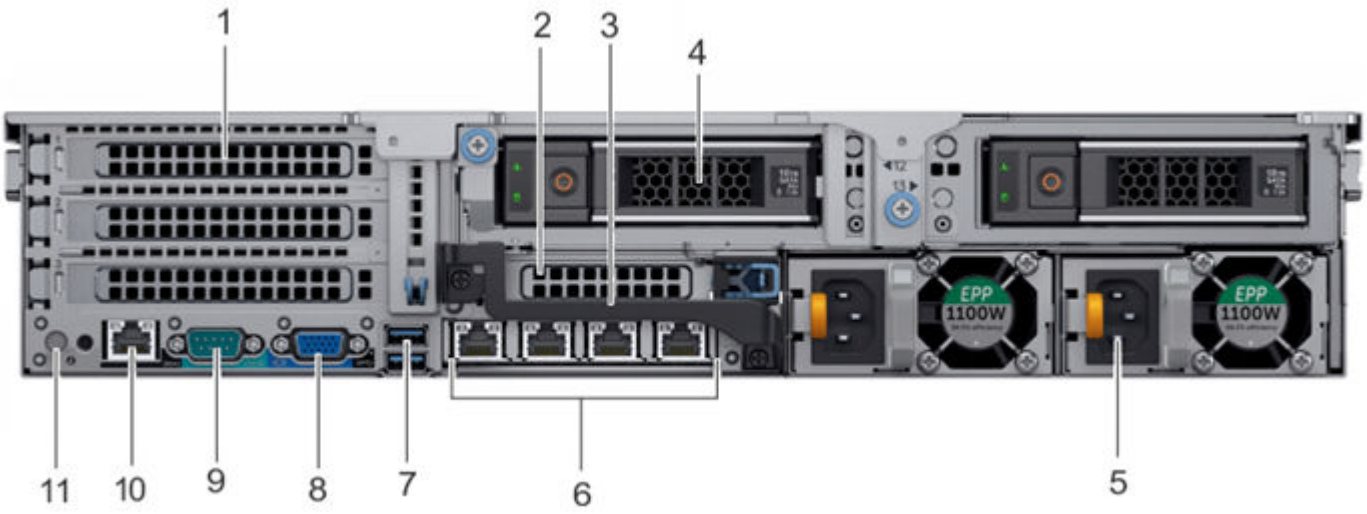
Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs do not function.

- Blinking green, then off: When hot-plugging a PSU, the PSU handle blinks green five times at a rate of 4 Hz and turns off. This indicates a PSU mismatch with respect to efficiency, feature set, health status, or supported voltage.

Rear panel

The DD3300 rear panel contains the system serial port, NIC cards, power supplies, and 3.5" drive bays. shows the rear of the system.

Figure 27 Rear panel



1. Full height PCIe expansion card slots
   - The top slot is for the optional 2 x 10 GbE NIC
   - The middle slot is for the optional 4 x 16 Gbps FC module
   - The bottom slot is not supported
2. Not Supported -- Half height PCIe expansion card slot
3. Rear handle
4. 3.5" drive bays (used for 1 x 480 GB SSD in the 8 TB, 16 TB, and 32 TB configurations)
5. Power supply units (1 or 2)
6. Network daughter card Ethernet ports
7. Not Supported -- USB 3.0 ports
8. Not Supported -- VGA port
9. Serial port
10. iDRAC9 dedicated management port
11. System identification button

The DD3300 system supports the use of the iDRAC9 dedicated management port to emulate a serial console.

Disk layout

8 TB, 16 TB, and 32 TB configurations use one rear slot for an SSD. 4 TB configurations do not use an SSD. The following table shows the physical location of the rear SSD slots.

Note

Although the physical slots are numbered starting from 0, the software identifies the slots starting at 1.

Table 22 Rear disk slot numbers

Slot 12 (SW slot 13)	Slot 13 (SW slot 14)

Network port layout

The DD3300 network daughter card provides 4 x 1 GbE or 4 x 10 GbE network ports for network connectivity.

Note

Starting with DD OS 6.2, DD3300 systems ship with a 4 x 10 GbE RJ-45 network daughter card.

The following table lists the layout of the network daughter card ports.

Table 23 Network daughter card port identifiers

ethMa	ethMb	ethMc	ethMd

An optional 2 x 10 GbE module is supported on the DD3300 system.

The following table lists the layout of the 10 GbE ports.

Note

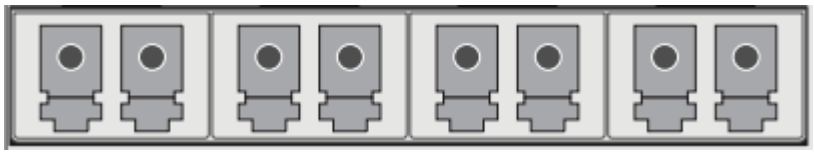
The 10 GbE module is inserted upside down, therefore the ports are in descending order from left to right.

Table 24 Optional 10 GbE module port identifiers

eth1b	eth1a

FC port layout

An optional 4 x 16 Gbps FC module is supported on the DD3300 system.



The following table lists the layout of the FC ports.

Table 25 Optional 16 Gbps FC module port identifiers

22a	22b	22c	22d

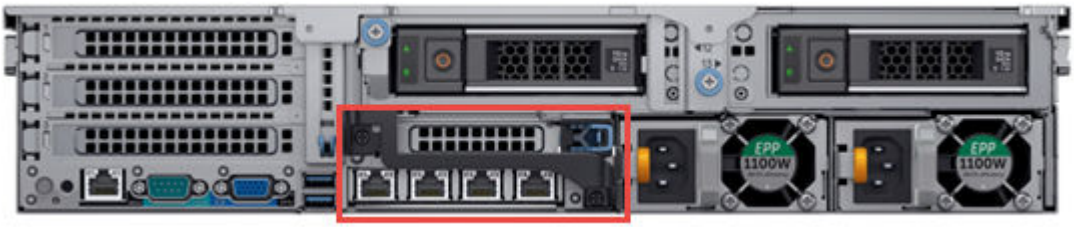
Product serial number tag (PSNT)

Some DD3300 systems have a PSNT tag located on the rear of the system, attached to the arm in the center of the chassis. If this tag is not present, the product serial number is available from the service tag located on the front of the system.

Note

Service tag on page 45 describes the front-mounted service tag.

Figure 28 PSNT location



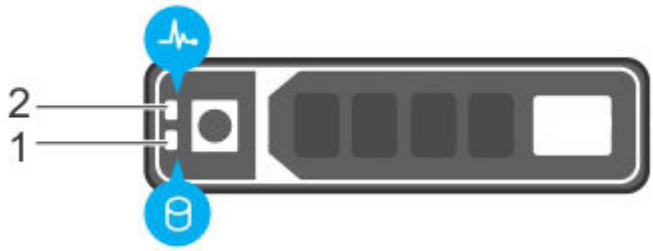
If present, the PSNT tag contains the following information:

- Product ID/Serial Number (PROD ID/SN): A 14 digit alphanumeric string starting with "FNM00". This serial number is the default system password for serial console and Data Domain system manager access.
- Part Number (PN): 900-555-024: The Data Domain part number for the DD3300 system.

Rear SSD

The DD3300 8 TB, 16 TB, and 32 TB configurations use one rear-mounted 480 GB 2.5" SSD. The SSD has an activity indicator, and a status indicator.

Figure 29 Disk LEDs



1. HDD activity indicator

2. HDD status indicator

The HDD activity indicator blinks during drive activity.

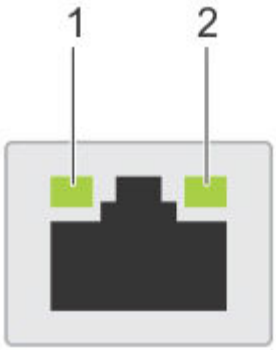
The HDD status indicator has the following states:

- Flashes green twice per second: Identifying drive or preparing for removal.
- Off: Drive is ready for removal.
- Flashes green, then amber, then turns off: Predicted drive failure.
- Flashes amber four times per second: Drive failed.
- Solid green: Drive online.

NIC indicators

All network ports on the DD3300 system have link and activity LED indicators.

Figure 30 NIC LEDs



1. Link LED indicator
2. Activity LED indicator

The NIC LEDs have the following states:

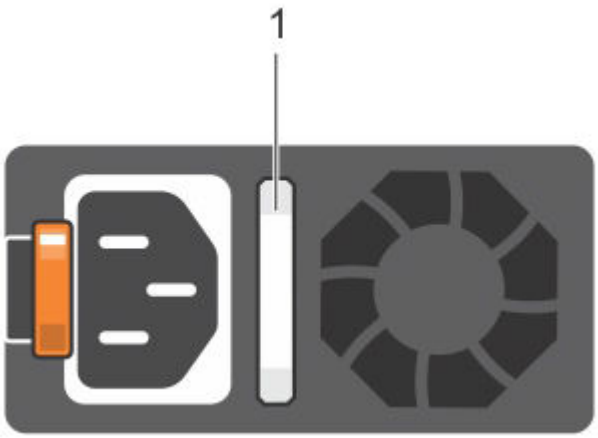
Link indicator state	Activity indicator state	Meaning
Green	Blinking green	The NIC is connected to a valid network at its maximum port speed and data is being sent or received.
Amber	Blinking green	The NIC is connected to a valid network at less than its maximum port speed and data is being sent or received.
Green	Off	The NIC is connected to a valid network at its maximum port speed and data is not being sent or received.
Amber	Off	The NIC is connected to a valid network at less than its maximum port speed and data is not being sent or received.

Link indicator state	Activity indicator state	Meaning
Blinking green	Off	NIC identify is enabled through the NIC configuration utility.

Power supply indicators

The power supply unit has an illuminated, translucent handle that functions as a status LED.

Figure 31 Power supply LED



The indicator has the following states:

- Green: Valid power source is connected, and the PSU is operational.
- Blinking amber: Indicates a problem with the PSU.
- Off: Power is not connected.
- Blinking green: Firmware update is in progress.

  ⚠ CAUTION

  Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs do not function.

- Blinking green, then off: When hot-plugging a PSU, the PSU handle blinks green five times at a rate of 4 Hz and turns off. This indicates a PSU mismatch with respect to efficiency, feature set, health status, or supported voltage.

CHAPTER 4

DD4200

- DD4200 system features 58
- DD4200 system specifications 59
- DD4200 storage capacity 60
- Front Panel 61
- Back Panel 65
- I/O modules and slot assignments 67
- Internal system components 69

DD4200 system features

The table summarizes the DD4200 system features.

Table 26 DD4200 system features

Feature		DD4200 (Base configuration)
Rack height		4U, supported in four-post racks only
Rack mounting		Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9 - 76.2 cm).
Power		1 +1 redundant, hot-swappable power units
Processor		Two 8-core processors
NVRAM		One 4-GB NVRAM module (and companion BBU) for data integrity during a power outage
Fans		Hot-swappable, redundant, 5
Memory		16 x 8 GB DIMM (128 GB)
Internal drives		SSD drives, 3 x 200 GB (base 10)
I/O module slots		Nine replaceable I/O module (Fibre Channel, Ethernet, and SAS) slots, one BBU, one NVRAM, and one Management module slot. See Management module and interfaces on page 65 and I/O modules and slot assignments on page 67.
Supported capacity	Non-extended retention	8 x 2-TB or 5 x 3-TB shelves adding up to 189 TB of usable external capacity.
	DD Cloud Tier	189 TB of Active Tier capacity, and 378 TB of Cloud Tier capacity. 2x3 TB shelves are required to store DD Cloud Tier metadata.
	DD Extended Retention	24 x 2-TB or 16 x 3-TB shelves adding up to 378 TB of usable external capacity. If lower-capacity 1 TB-drive-based shelves are used, the maximum configuration will also be limited by a maximum shelf count of 32.

DD4200 system specifications

Table 27 DD4200 system specifications

Model	Watts	BTU/hr	Power	Weight	Width	Depth	Height
DD4200	800	2730	800	80 lb / 36.3 kg	17.5 in (44.5 cm)	33 in (84 cm)	7 in (17.8 cm)

Table 28 System operating environment

Operating Temperature	50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
Operating Humidity	20% to 80%, non-condensing
Non-operating Temperature	-40° to +149° F (-40° to +65° C)
Operating Acoustic Noise	Sound power, LWAd: 7.52 bels. Sound pressure, LpAm: 56.4 dB. (Declared noise emission per ISO 9296.)

DD4200 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Table 29 DD4200 storage capacity

System/ Installed Memory	Internal Disks (SATA SSDs)	Data Storage Space	External Storage[3]
DD4200 (2 SAS I/O modules) 128 GB	2.5 in. 3 @ 200 GB No User Data	189 TB	Up to a maximum of 8 x 2-TB or 5 x 3-TB shelves.
DD4200 with DD Cloud Tier[1] (3 SAS I/O modules) 128 GB	2.5 in. 3 @ 200 GB No User Data	• 189 TB (Active Tier) • 72 TB (DD Cloud Tier metadata) • 378 TB (DD Cloud Tier)	Up to a maximum of 8 x 2-TB or 5 x 3-TB shelves. 2x3-TB shelves for DD Cloud Tier metadata.
DD4200 with Extended Retention software[1] (4 SAS I/O modules) 128 GB	2.5 in. 3 @ 200 GB No User Data	378 TB	Up to a maximum of 16 x 2-TB and 10 x 3-TB shelves.

[1]Data Domain DD4200 controller with DD Extended Retention software.

[2] Data Domain DD4200 controller with DD Cloud Tier.

[3] The capacity will differ depending on the size of the external storage shelves used. This data based on ES30 shelves.

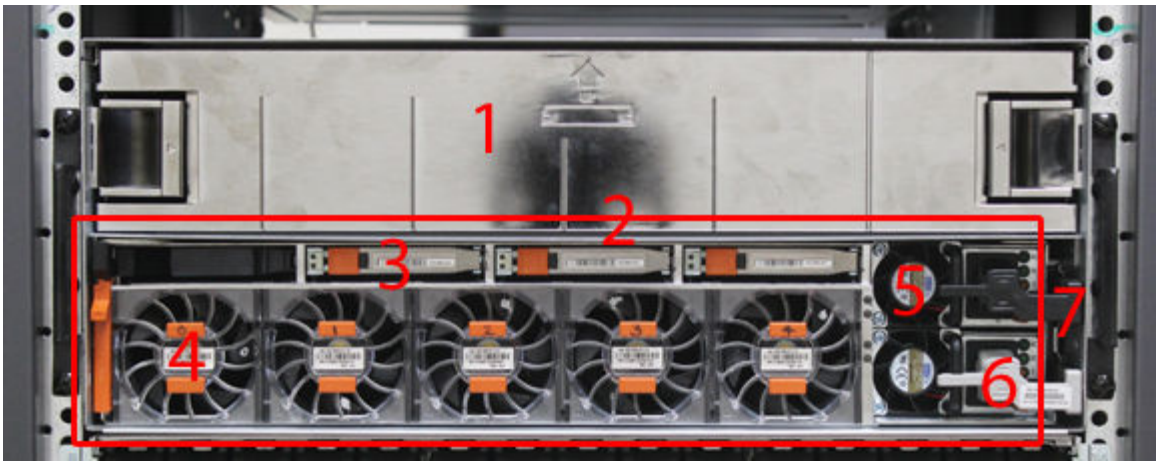
Note

For information about Data Domain expansion shelves, see the separate document, *Data Domain Expansion Shelf Hardware Guide*.

Front Panel

The photo shows the hardware features and interfaces on the front of the system.

Figure 32 Front panel components



(1)	Filler panel
(2)	The red box indicates the system processor (SP) module
(3)	SSD drive #1
(4)	Fan #0
(5)	Power supply #B
(6)	AC power disconnect plug
(7)	AC power extender module

Power supply units

A system has two power supply units, numbered A and B from the bottom up. Each power supply has its own integral cooling fan. Each power unit has three LEDs (see Figure 34 on page 63) that indicates the following states:

- AC LED: Glows green when AC input is good
- DC LED: Glows green when DC output is good
- Symbol "!": Glows solid or blinking amber for fault or attention

The AC power plugs are located to the right of each power supply. These plugs are pulled to disconnect AC power to each power supply.

AC power extender module

AC power entry is connected at the rear of the system. The AC power extender module provides power to the two power supplies on the front of the system. AC Power plugs are located in the front. The module is adjacent to the SP module and can be removed and replaced.

Cooling Fans

A system contains five hot-swappable cooling fans in a 4+1 redundant configuration. The fans provide cooling for the processors, DIMMs, IO modules, and the management module. Each fan has a fault LED which causes the fan housing to glow amber. A system can run with one fan faulted or removed.

Solid-state drives

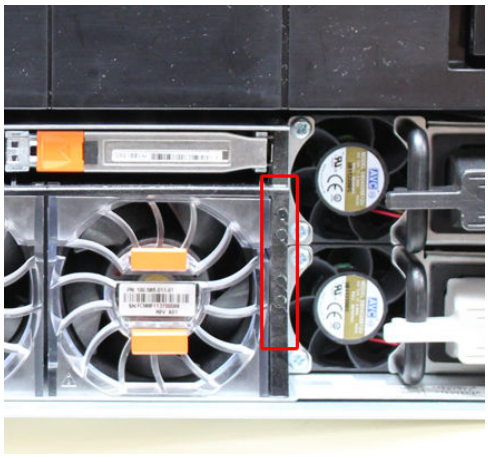
A system contains three hot-swappable 2.5" solid-state drive (SSD) bays that are located in the front and on top of the fan modules. There are four drive bays, with the left-most bay containing a blank. The next drive to the right of the blank is SSD #1, the next is #2, and the right-most bay contains SSD #3. No user backup data is kept on the SSDs.

Each drive has a blue colored power LED and an amber fault LED.

Front LED Indicators

The photo below indicates the location of the four system LEDs.

Figure 33 System LEDs



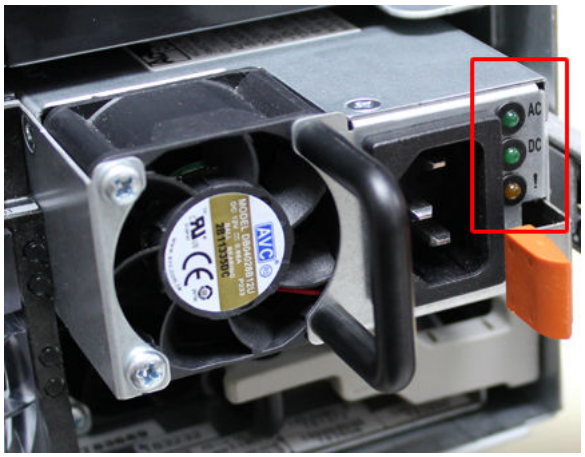
The next photo shows the location of the system LED legend label. Figure 35 on page 63 shows the power supply LEDs. Other front LEDs are shown in Figure 36 on page 64. LED states are described in Table 30 on page 64.

Figure 34 System LED legend label

The power supply LEDs include:

- AC LED on top
- DC LED in the middle
- Failure LED on the bottom

Figure 35 Power supply LEDs



Each SSD has two LEDs as shown in the following figure. The lower left corner of the housing around each fan acts as an LED, glowing amber when the fan has failed.

Figure 36 Fan and SSD LEDs

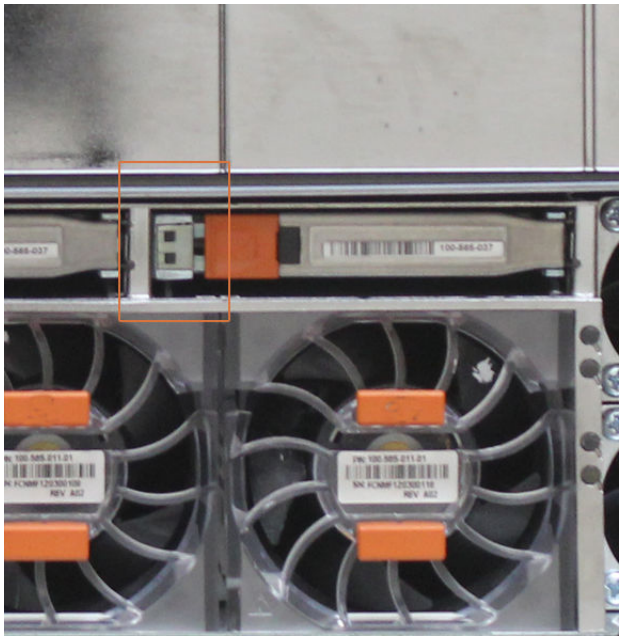


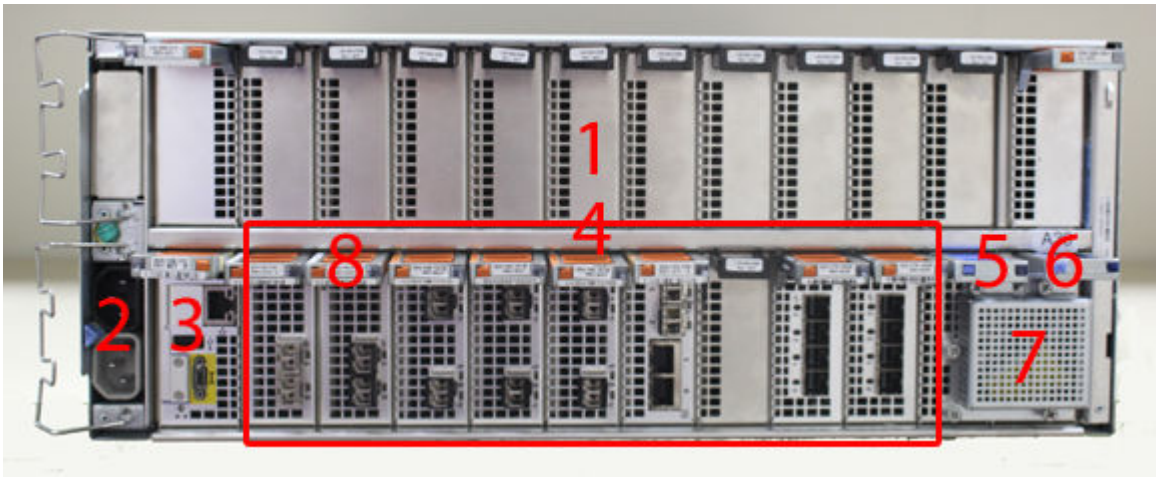
Table 30 LED status indicators

Part	Description or Location	State
System	Dot within a circle (top LED)	Blue indicates power on and normal operation.
System, SP fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates failure.
System, chassis fault	Exclamation point within a triangle with a light below	Dark indicates normal operation. Yellow indicates a fault condition.
System	Marked out hand within a black square (bottom LED)	White warms not to remove the unit.
Power supply	AC LED	Steady green indicates normal AC power.
Power supply	DC LED	Steady green indicates normal DC power.
Power supply	Failure LED	Solid amber indicates a failed power supply.
SSD	Top LED	Solid blue, disk ready, blinks while busy.
SSD	Bottom LED	Dark indicates healthy. Solid amber indicates disk fail.
Fan	Fan housing	The fan housing glows an amber color during fan failure.

Back Panel

The photo shows the hardware features and interfaces on the back of the system.

Figure 37 Features on rear of chassis



1. Upper level contains all blanks
2. AC power extender module
3. Management module (slot Mgmt A)
4. Red box indicating I/O modules (slots 0-8)
5. Battery backup (BBU in slot 9)
6. NVRAM module (slot 10)
7. Cage covering the BBU and NVRAM combination module
8. I/O LED at the end of each I/O module handle
9. Location of serial number label/tag

Note

For modules containing multiple ports, the bottom port is numbered as zero (0) with numbers increasing going upward.

I/O module LEDs

Each I/O module ejector handle contains a bi-colored LED. Green indicates normal function, while an amber color indicates a fault condition.

Management module and interfaces

The management module is on the left-most side when facing the back of the system, in slot Mgmt A. The process to remove and add a management module is the same as the I/O modules, however, the management module can only be accommodated in Mgmt A slot.

The management module contains one external LAN connection for management access to the SP module. One micro DB-9 connector is included to provide the console. A USB port is provided for use during service of the system to allow booting from a USB flash device.

Figure 38 Interfaces on the management module

(1)	Ethernet port
(2)	USB port
(3)	Micro serial port

I/O modules and slot assignments

The table shows the I/O module slot assignments for the systems. See Figure 37 on page 65 for a view of the slot positions on the back panel and Figure 39 on page 69 for a top view.

Table 31 DD4200 slot assignments

Slot Number	DD4200	DD4200 with Extended Retention Software	DD4200 with DD Cloud Tier
MGMT A	Management module	Management module	Management module
0	Fibre Channel (FC), Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
1	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
2	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
3	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
4	Ethernet or empty	Ethernet or empty	Ethernet or empty
5	Ethernet or empty	SAS	Ethernet or empty
6	Empty	SAS	SAS
7	SAS	SAS	SAS
8	SAS	SAS	SAS
9	BBU	BBU	BBU
10	NVRAM	NVRAM	NVRAM

Slot addition rules

- A maximum of six optional I/O modules (FC plus Ethernet) are allowed in systems without Extended Retention software, and a maximum of five optional I/O modules (FC plus Ethernet) are allowed in systems with Extended Retention software.
- Additional FC modules should be installed in numerically increasing slot numbers immediately to the right of the existing FC modules, or starting in slot 0 if no FC modules were originally installed. A maximum of four FC modules are allowed in a system.
- Additional Ethernet modules should be installed in numerically decreasing slot numbers immediately to the left of the existing Ethernet modules or starting in slot 4 if no Ethernet modules were originally installed. For systems without Extended Retention software, a maximum of six (limited to four of any one type) Ethernet modules can be present. For systems with Extended Retention software, a maximum of five (limited to four of any one type) Ethernet modules can be present.
- All systems include two SAS modules in slots 7 and 8. Systems with Extended Retention software must have two additional SAS modules in slots 5 and 6.
- For systems without Extended Retention software, if adding I/O modules results in the allowed maximum of six I/O modules present, slot 5 is used. Slot 5 is only used for an Ethernet module. Adding FC modules in this specific case require moving an

existing Ethernet module to slot 5. Other than this specific case, it is not recommended to move I/O modules between slots.

- Adding Extended Retention software to a system includes adding two SAS modules in slots 5 and 6. If the system originally had the maximum of 6 optional I/O modules, the I/O module in slot 5 must be permanently removed from the system.

Fibre Channel (FC) I/O Module Option

An FC I/O module is a dual-port Fibre Channel module. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Boost over Fiber Channel is optional and the total FC HBAs cannot exceed more than allowable Fibre Channel cards per controller.

Ethernet I/O Module Options

The available Ethernet I/O modules are:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2 port 1000Base-T Copper (RJ45) /2 port 1000Base-SR Optical

Internal system components

The photo shows the system with the system processor (SP) module that is removed from the chassis and the SP cover removed.

Figure 39 Top view of SP module with SP cover removed

(1)	Front of system
(2)	Four groups of 4 DIMM cards

DIMM modules

DD4200 systems contain 16 x 8 GB of memory DIMM.

CHAPTER 5

DD4500

- DD4500 system features 72
- DD4500 system specifications 73
- DD4500 storage capacity 74
- Front Panel 75
- Back Panel 79
- I/O modules and slot assignments 81
- Internal system components 83

DD4500 system features

The table summarizes the DD4500 system features.

Table 32 DD4500 system features

Feature		DD4500
Rack height		4U, supported in four-post racks only
Rack mounting		Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9 - 76.2 cm).
Power		1 +1 redundant, hot-swappable power units
Processor		Two 8-core processors
NVRAM		One 4-GB NVRAM module (and companion BBU) for data integrity during a power outage
Fans		Hot-swappable, redundant, 5
Memory		8 x 8 GB DIMM + 8 x 16 GB DIMM (192 GB)
Internal drives		SSD drives, 3 x 200 GB (base 10)
I/O module slots		Nine replaceable I/O module (Fibre Channel, Ethernet, and SAS) slots, one BBU, one NVRAM, and one Management module slot. See Management module and interfaces on page 65 and I/O modules and slot assignments on page 67.
Supported capacity	Non-extended retention	12 x 2-TB or 8 x 3-TB shelves adding up to 285 TB of usable external capacity.
	DD Cloud Tier	285 TB of Active Tier capacity, and 570 TB of Cloud Tier capacity. 2 x 4 TB shelves are required to store DD Cloud Tier metadata.
	DD Extended Retention	32 shelves adding up to 570 TB of usable external capacity. If lower-capacity 1 TB-drive-based shelves are used, the maximum configuration will also be limited by a maximum shelf count of 40.

DD4500 system specifications

Table 33 DD4500 system specifications

Model	Watts	BTU/hr	Power	Weight	Width	Depth	Height
DD4500	800	2730	800	80 lb / 36.3 kg	17.5 in (44.5 cm)	33 in (84 cm)	7 in (17.8 cm)

Table 34 System operating environment

Operating Temperature	50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
Operating Humidity	20% to 80%, non-condensing
Non-operating Temperature	-40° to +149° F (-40° to +65° C)
Operating Acoustic Noise	Sound power, LWAd: 7.52 bels. Sound pressure, LpAm: 56.4 dB. (Declared noise emission per ISO 9296.)

DD4500 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Table 35 DD4500 storage capacity

System/ Installed Memory	Internal Disks (SATA SSDs)	Data Storage Space	External Storage[1]
DD4500 (2 SAS I/O modules) 192 GB	2.5 in. 3 @ 200 GB No User Data	285 TB	Up to a maximum of 12 x 2-TB or 8 x 3-TB shelves.
DD4500 with DD Cloud Tier[1] (3 SAS I/O modules) 192 GB	2.5 in. 3 @ 200 GB No User Data	• 285 TB (Active Tier) • 96 TB (DD Cloud Tier metadata) • 570 TB (DD Cloud Tier)	Up to a maximum of 12 x 2-TB or 8 x 3-TB shelves. 2x4-TB shelves for DD Cloud Tier metadata.
DD4500 with Extended Retention software[1] (4 SAS I/O modules) 192 GB	2.5 in. 3 @ 200 GB No User Data	570 TB	Up to a maximum of 24 x 2-TB or 16 x 3-TB shelves.

[1] The capacity will differ depending on the size of the external storage shelves used. This data based on ES30 shelves.

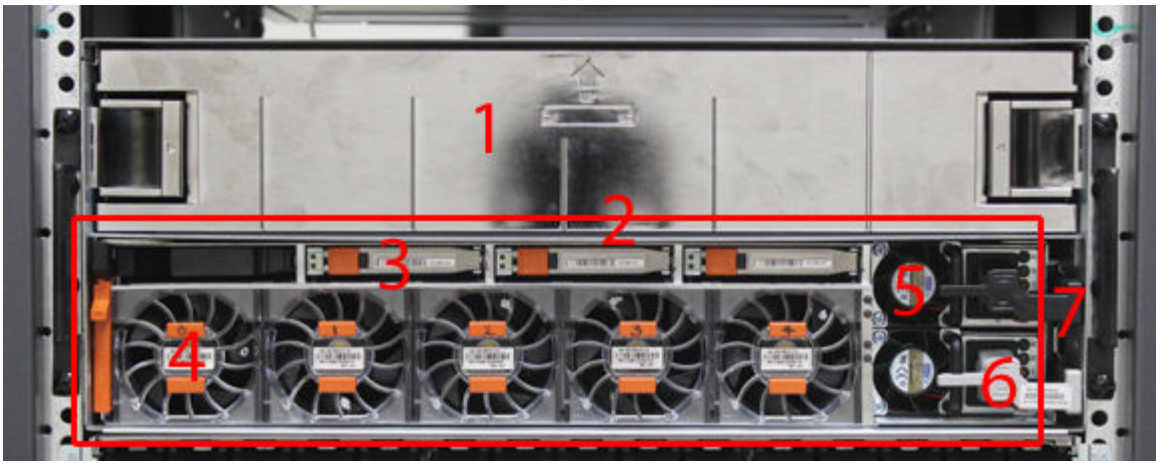
Note

For information about Data Domain expansion shelves, see the separate document, *Data Domain Expansion Shelf Hardware Guide*.

Front Panel

The photo shows the hardware features and interfaces on the front of the system.

Figure 40 Front panel components



(1)	Filler panel
(2)	The red box indicates the system processor (SP) module
(3)	SSD drive #1
(4)	Fan #0
(5)	Power supply #B
(6)	AC power disconnect plug
(7)	AC power extender module

Power supply units

A system has two power supply units, numbered A and B from the bottom up. Each power supply has its own integral cooling fan. Each power unit has three LEDs (see Figure 34 on page 63) that indicates the following states:

- AC LED: Glows green when AC input is good
- DC LED: Glows green when DC output is good
- Symbol "!": Glows solid or blinking amber for fault or attention

The AC power plugs are located to the right of each power supply. These plugs are pulled to disconnect AC power to each power supply.

AC power extender module

AC power entry is connected at the rear of the system. The AC power extender module provides power to the two power supplies on the front of the system. AC Power plugs are located in the front. The module is adjacent to the SP module and can be removed and replaced.

Cooling Fans

A system contains five hot-swappable cooling fans in a 4+1 redundant configuration. The fans provide cooling for the processors, DIMMs, IO modules, and the management module. Each fan has a fault LED which causes the fan housing to glow amber. A system can run with one fan faulted or removed.

Solid-state drives

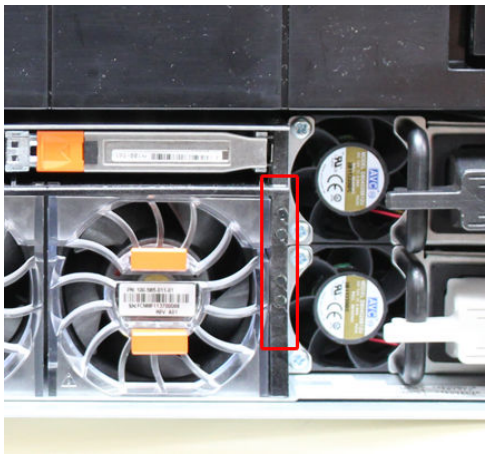
A system contains three hot-swappable 2.5" solid-state drive (SSD) bays that are located in the front and on top of the fan modules. There are four drive bays, with the left-most bay containing a blank. The next drive to the right of the blank is SSD #1, the next is #2, and the right-most bay contains SSD #3. No user backup data is kept on the SSDs.

Each drive has a blue colored power LED and an amber fault LED.

Front LED Indicators

The photo below indicates the location of the four system LEDs.

Figure 41 System LEDs



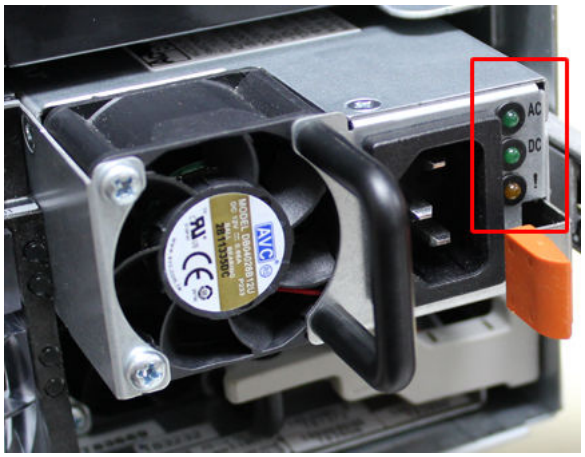
The next photo shows the location of the system LED legend label. Figure 43 on page 77 shows the power supply LEDs. Other front LEDs are shown in Figure 44 on page 78. LED states are described in Table 36 on page 78.

Figure 42 System LED legend label

The power supply LEDs include:

- AC LED on top
- DC LED in the middle
- Failure LED on the bottom

Figure 43 Power supply LEDs



Each SSD has two LEDs as shown in the following figure. The lower left corner of the housing around each fan acts as an LED, glowing amber when the fan has failed.

Figure 44 Fan and SSD LEDs

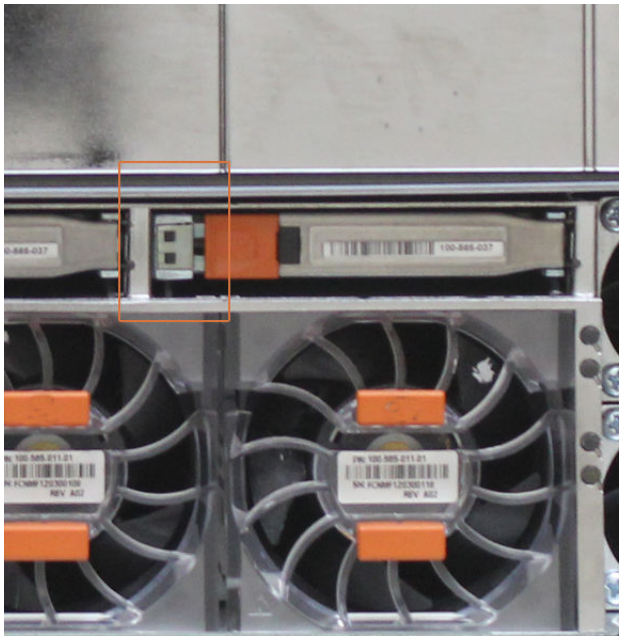


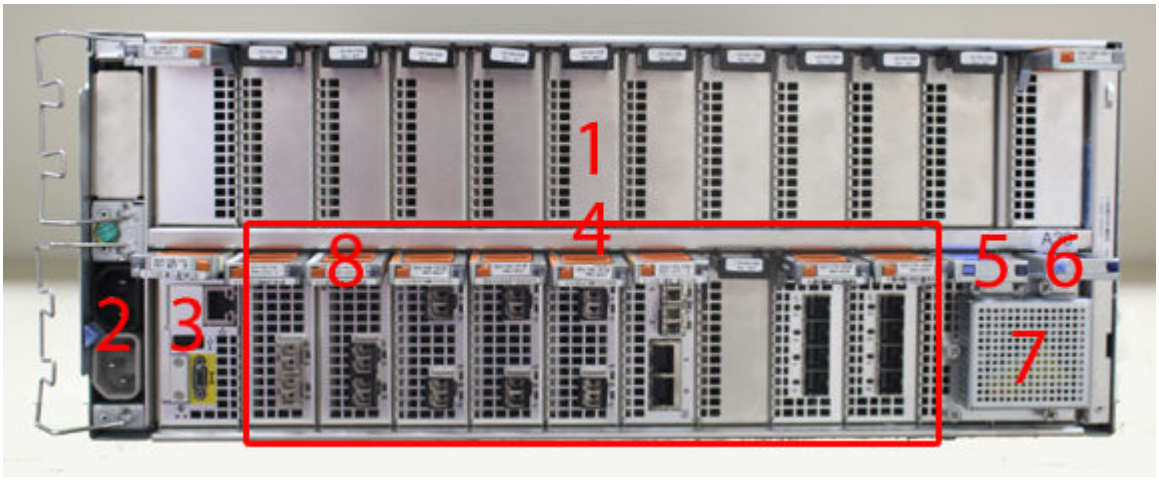
Table 36 LED status indicators

Part	Description or Location	State
System	Dot within a circle (top LED)	Blue indicates power on and normal operation.
System, SP fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates failure.
System, chassis fault	Exclamation point within a triangle with a light below	Dark indicates normal operation. Yellow indicates a fault condition.
System	Marked out hand within a black square (bottom LED)	White warms not to remove the unit.
Power supply	AC LED	Steady green indicates normal AC power.
Power supply	DC LED	Steady green indicates normal DC power.
Power supply	Failure LED	Solid amber indicates a failed power supply.
SSD	Top LED	Solid blue, disk ready, blinks while busy.
SSD	Bottom LED	Dark indicates healthy. Solid amber indicates disk fail.
Fan	Fan housing	The fan housing glows an amber color during fan failure.

Back Panel

The photo shows the hardware features and interfaces on the back of the system.

Figure 45 Features on rear of chassis



1. Upper level contains all blanks
2. AC power extender module
3. Management module (slot Mgmt A)
4. Red box indicating I/O modules (slots 0-8)
5. Battery backup (BBU in slot 9)
6. NVRAM module (slot 10)
7. Cage covering the BBU and NVRAM combination module
8. I/O LED at the end of each I/O module handle
9. Location of serial number label/tag

Note

For modules containing multiple ports, the bottom port is numbered as zero (0) with numbers increasing going upward.

I/O module LEDs

Each I/O module ejector handle contains a bi-colored LED. Green indicates normal function, while an amber color indicates a fault condition.

Management module and interfaces

The management module is on the left-most side when facing the back of the system, in slot Mgmt A. The process to remove and add a management module is the same as the I/O modules, however, the management module can only be accommodated in Mgmt A slot.

The management module contains one external LAN connection for management access to the SP module. One micro DB-9 connector is included to provide the console. A USB port is provided for use during service of the system to allow booting from a USB flash device.

Figure 46 Interfaces on the management module

(1)	Ethernet port
(2)	USB port
(3)	Micro serial port

I/O modules and slot assignments

The table shows the I/O module slot assignments for the systems. See Figure 37 on page 65 for a view of the slot positions on the back panel and Figure 39 on page 69 for a top view.

Table 37 DD4500 slot assignments

Slot Number	DD4500	DD4500 with Extended Retention Software	DD4500 with DD Cloud Tier
MGMT A	Management module	Management module	Management module
0	Fibre Channel (FC), Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
1	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
2	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
3	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
4	Ethernet or empty	Ethernet or empty	Ethernet or empty
5	Ethernet or empty	SAS	Ethernet or empty
6	Empty	SAS	SAS
7	SAS	SAS	SAS
8	SAS	SAS	SAS
9	BBU	BBU	BBU
10	NVRAM	NVRAM	NVRAM

Slot addition rules

- A maximum of six optional I/O modules (FC plus Ethernet) are allowed in systems without Extended Retention software, and a maximum of five optional I/O modules (FC plus Ethernet) are allowed in systems with Extended Retention software.
- Additional FC modules should be installed in numerically increasing slot numbers immediately to the right of the existing FC modules, or starting in slot 0 if no FC modules were originally installed. A maximum of four FC modules are allowed in a system.
- Additional Ethernet modules should be installed in numerically decreasing slot numbers immediately to the left of the existing Ethernet modules or starting in slot 4 if no Ethernet modules were originally installed. For systems without Extended Retention software, a maximum of six (limited to four of any one type) Ethernet modules can be present. For systems with Extended Retention software, a maximum of five (limited to four of any one type) Ethernet modules can be present.
- All systems include two SAS modules in slots 7 and 8. Systems with Extended Retention software must have two additional SAS modules in slots 5 and 6.
- For systems without Extended Retention software, if adding I/O modules results in the allowed maximum of six I/O modules present, slot 5 is used. Slot 5 is only used for an Ethernet module. Adding FC modules in this specific case require moving an

existing Ethernet module to slot 5. Other than this specific case, it is not recommended to move I/O modules between slots.

- Adding Extended Retention software to a system includes adding two SAS modules in slots 5 and 6. If the system originally had the maximum of 6 optional I/O modules, the I/O module in slot 5 must be permanently removed from the system.

Fibre Channel (FC) I/O Module Option

An FC I/O module is a dual-port Fibre Channel module. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Boost over Fiber Channel is optional and the total FC HBAs cannot exceed more than allowable Fibre Channel cards per controller.

Ethernet I/O Module Options

The available Ethernet I/O modules are:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2 port 1000Base-T Copper (RJ45) /2 port 1000Base-SR Optical

Internal system components

The photo shows the system with the system processor (SP) module that is removed from the chassis and the SP cover removed.

Figure 47 Top view of SP module with SP cover removed

(1)	Front of system
(2)	Four groups of 4 DIMM cards

DIMM modules

DD4500 systems contain 8 x 8 GB and 8 x 16 GB of memory DIMM. DIMMs must be in specific slots based on DIMM size.

CHAPTER 6

DD6300

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DD6300 system features

Table 38 DD6300 system features

Feature		DD6300 (Base configuration)	DD6300 (Expanded configuration)
Rack height		2U	2U
Processor		E5-2620 V3	E5-2620 V3
Kernel		3.2.x	3.2.x
NVRAM		NVRAM 8g Model 3	NVRAM 8g Model 3
Memory		6 x 8 GB DIMM (48 GB)	12 x 8 GB DIMM (96 GB)
Internal drives	HDDs in 3.5" bays	7/ 7+5	12
	SSDs in 3.5" bays	0	0
	SSDs in 2.5" bays	1	2
I/O module slots	SAS I/O modules (Quad Port 6 Gbps SAS)	• 0 for internal storage only • 1 with external storage	• 0 for internal storage only • 1 with external storage
	Network and FC I/O modules	Four replaceable I/O module slots. Not hot-swappable.	Four replaceable I/O module slots. Not hot-swappable.
Supported capacity		76 TB (28 TB internal + 48 TB external)	180 TB (36 TB internal + 144 TB external)
High availability support		No	No
HA private interconnect		N/A	N/A
External SSD shelf		N/A	N/A
SAS string depth (max)	ES30	1	4
	DS60	0	1
Stream count		270 writes, 75 reads	270 writes, 75 reads

DD6300 system specifications

Table 39 DD6300 system specifications

Model	Average power consumption 25 C	Heat dissipation (operating maximum)	Weight [a]	Width	Depth	Height
DD6300	530W	1.69 x 10^6 J/hr (1604 Btu/hr) maximum	80 lbs (36.29 kg)	17.50 in (44.45 cm)	30.5 in (77.5 cm)	3.40 in (8.64 cm)

a. The weight does not include mounting rails. Allow 2.3-4.5 kg (5-10 lb) for a rail set.

Table 40 System operating environment

Requirement	Description
Ambient temperature	10°C - 35°C; derate 1.1°C per 1,000 ft (304 m)
Relative humidity (extremes)	20–80% noncondensing
Elevation	0 - 7,500ft (0 - 2,268m)
Operating acoustic noise	L_{wad} sound power, 7.5 Bels

DD6300 storage capacity

The following table provides storage capacity information for the DD6300 system.

Table 41 DD6300 storage capacity

Memory	Internal disks	Internal storage (raw)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
48 GB (Factory base)	• Front: 7 x 4 TB • Rear: 1 x 800 GB SSD	28 TB	60 TB	• Internal: 14 TB • External: 48 TB	• Internal: 12.74 TiB • External: 43.68 TiB	• Internal: 14,000 GB • External: 48,000 GB	• Internal: 13,039 GiB • External: 44,704 GiB
48 GB (Factory upgrade)	• 12 x 4 TB HDD • Rear: 1 x 800 GB SSD	48 TB	60 TB	• Internal: 34 TB • External: 48 TB	• Internal: 30.94 TiB • External: 43.68 TiB	• Internal: 34,000 GB • External: 48,000 GB	• Internal: 31,665 GiB • External: 44,704 GiB
48 GB (Field Upgrade)	• (7 + 5) x 4 TB HDD	48 TB	60 TB	• Internal: 22 TB	• Internal: 20.02 TiB	• Internal: 22,000 GB	• Internal: 20,489 GiB

Table 41 DD6300 storage capacity (continued)

Memory	Internal disks	Internal storage (raw)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
	• Rear: 1 x 800 GB SSD			• External: 48 TB	• External: 43.68 TiB	• External: 48,000 GB	• External: 44,704 GiB
96 GB (Expanded)	• Front: 12 x 4 TB HDDs • Rear: 2 x 800 GB SSD	48 TB	180 TB	• Internal: 34 TB • External: 144 TB	• Internal: 30.94 TiB • External: 131 TiB	• Internal: 34,000 GB • External: 144,000 GB	• Internal: 31,665 GiB • External: 134,110 GiB
96 GB (Field upgrade from 48 GB)	• Front: (7 + 5) x 4 TB HDDs • Rear: 2 x 800 GB SSD	48 TB	180 TB	• Internal: 22 TB • External: 144 TB	• Internal: 20.02 TiB • External: 131 TiB	• Internal: 22,000 GB • External: 144,000 GB	• Internal: 20,489 GiB • External: 134,110 GiB

a. The capacity differs depending on the size of the external storage shelves used. This data based on ES30 shelves.

DD6300 front panel

DD6300 All-in-One (AIO) systems have one of the following front panel drive configurations to host the DD OS boot drives, and provide storage for customer data:

Note

Upgrading a base configuration to an expanded configuration provides less capacity than a factory-built expanded configuration.

Table 42 DD6300 AIO capacity

Configuration	Installed drives	Usable internal capacity
DD6300 base configuration	Seven 4 TB HDDs	14 TB
DD6300 expanded configuration (factory)	Twelve 4 TB HDDs	34 TB
DD6300 expanded configuration (upgrade)	Seven 4 TB HDDs + Five 4 TB HDDs	22 TB

Table 43 DD6300 AIO configuration

Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: HDD 5	Slot 5: HDD 6	Slot 6: HDD 7	Slot 7: Filler
Slot 8: Filler	Slot 9: Filler	Slot 10: Filler	Slot 11: Filler

Table 44 DD6300 AIO expanded configuration

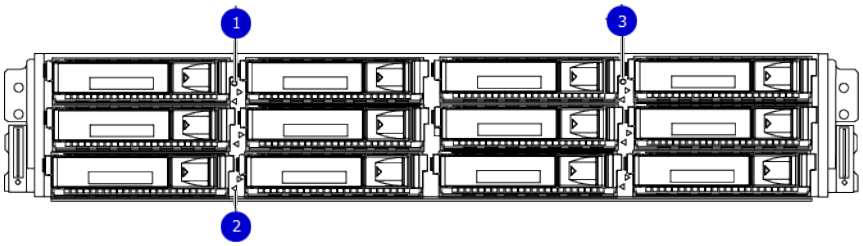
Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: HDD 5	Slot 5: HDD 6	Slot 6: HDD 7	Slot 7: HDD 8
Slot 8: HDD 9	Slot 9: HDD 10	Slot 10: HDD 11	Slot 11: HDD 12

Front LED indicators

The front of the system contain 12 disk drive status LEDs that are normally blue, and blink when there is activity on the disk. The LEDs are shaped like triangles, and the apex of the triangle points left or right, indicating that disk's status. If the disk drive has a failure, the disk's status LED turns from blue to amber, indicating that a drive must be replaced.

The front also contains two system status LEDs. A blue system power LED is present that is on whenever the system has power. An amber system fault LED is also present that is normally off and lit amber whenever the chassis or any other FRU in the system requires service.

Figure 48 Front LED indicators



1. System service LED
2. Drive activity/service LED
3. System power LED

Table 45 Front LEDs

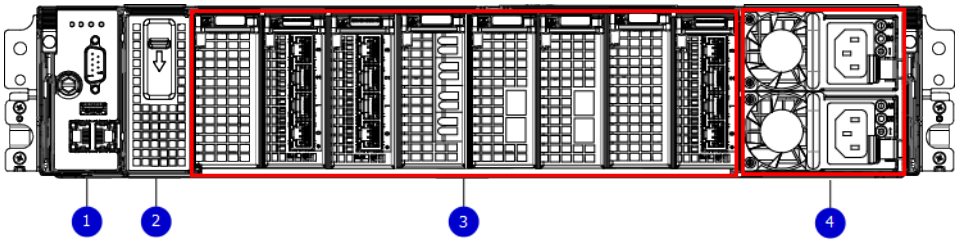
Name	Color	Purpose
System power LED	Blue	Indication that the system has power.
System service LED	Amber	Normally off; is lit amber whenever the SP or any other FRU (except disk drives) in the system requires service.

Table 45 Front LEDs (continued)

Name	Color	Purpose
Drive activity/Service LED	Blue /Amber	• Lit blue when the drive is powered. • Blinks blue during drive activity. • Lit solid amber when a disk needs service.

Back panel

The back panel of the chassis contains the following components:



1. Management panel
2. Two 2.5" SSD slots labeled 0 and 1
3. I/O module slots
4. Power supply modules (PSU 0 is the lower module, and PSU 1 is the upper module)

DD6300 rear SSDs

The D6300 system uses one or two 800 GB SSDs mounted at the rear of the chassis for metadata caching:

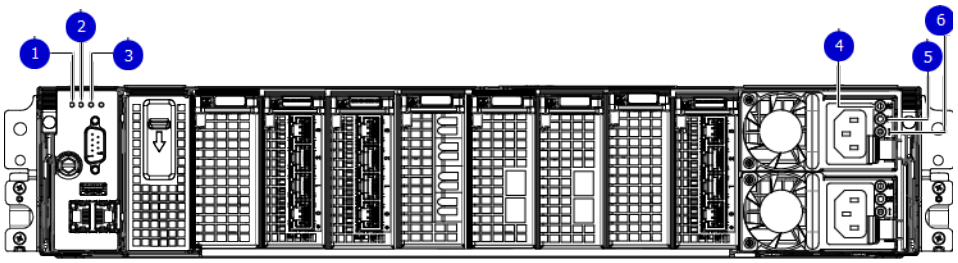
Configuration	Number of SSDs	SSD location
DD6300	1	SSD slot 0
DD6300 expanded	2	SSD slots 0 and 1

Note

SSDs are not RAID-protected.

Rear LED indicators

Figure 49 Rear LED indicators



1. Do not remove LED
2. SP service LED
3. System power LED
4. AC power good LED
5. DC power good LED

Figure 49 Rear LED indicators (continued)

6. Power supply fault LED

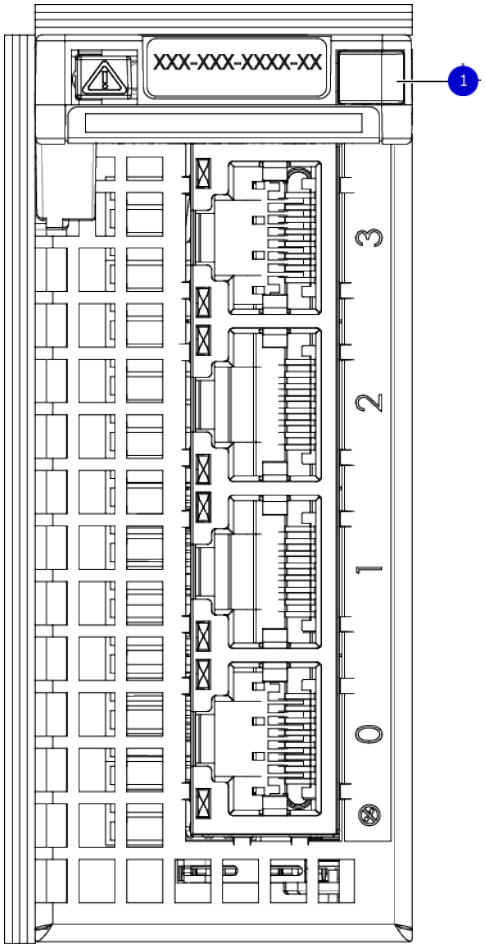
Name of LED	Location	Color	Definition
"Do not remove" LED	Upper left-most part of rear chassis	White	This LED is lit during system BIOS and BMC firmware updates and indicates that the SP should not be removed from the chassis, nor should system power be removed.

SP service LED	To the right of "Do not remove" LED	Amber	• Solid amber - SP or a FRU inside the SP requires service
			• Blinking amber - blink rate reflects one of the following is booting
			  ▪ BIOS - 1/4 Hz
			  ▪ POST - 1 Hz
			  ▪ OS - 4 Hz

Drive Power/Activity LED [a]	Left LED on the SSD	Blue	Lit blue when the drive is powered. Blinks during drive activity.
Drive Fault LED [a]	Right LED on the SSD	Amber	Lit solid amber when a drive needs service.
System power LED	Right-most LED on the management panel	Blue	SP has good, stable power
PSU FRU LED - AC Good	Top LED on power supply	Green	AC input is as expected
PSU FRU LED - DC Good	Middle LED on power supply	Green	DC output is as expected
PSU FRU LED - Attention	Bottom LED on power supply	Amber	PSU has encountered a fault condition

a. The SSD is only present on DD6300 systems.

Figure 50 I/O module Power/Service LED location

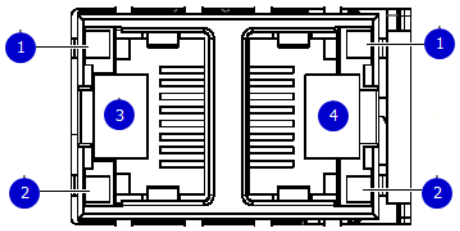


1. I/O module power/service LED

Name of LED	Location	Color	Definition
I/O module FRU LED - Figure 50 on page 93	Ejector handle of I/O modules	Green/Amber	• Green - I/O module has power and is functioning normally • Amber - I/O module has encountered a fault condition and requires service
I/O port status LED (SAS, Fibre Channel, and optical networking I/O modules only)	One LED per I/O module port	Blue	Lit when port is enabled. May flash if SW "marks" the port. [a]

a. For RJ45 networking ports, the standard green link and amber activity LEDs are used.

Figure 51 Onboard network port LEDs



1. Network port link LED
2. Network port activity LED
3. Dedicated IPMI port BMC0A
4. Management interface EthMa

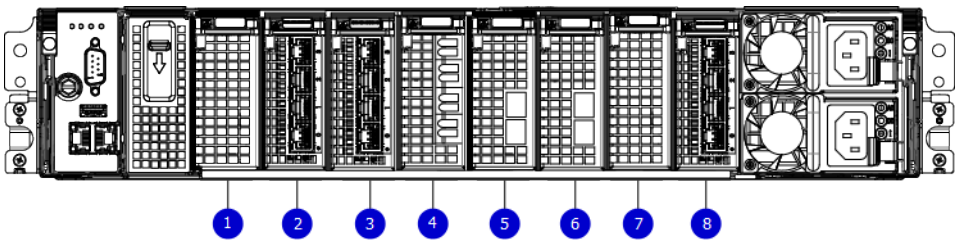
Name of LED	Location	Color	Definition
Onboard network port LED - Link LED Figure 51 on page 94	Top LED on network port	Green	• Lit when there is a link at 1000BaseT and 100BaseT speeds • Off when the link speed is 10BaseT or there is no link
Onboard network port LED - Activity LED	Bottom LED on network port	Amber	Blinks when there is traffic on the port

I/O modules

I/O module slot numbering

The eight I/O module slots are enumerated as Slot 0 (on the left when viewed from the rear) through Slot 7. Ports on an I/O module are enumerated as 0 through 3, with 0 being on the bottom.

Figure 52 I/O module slot numbering



1. Slot 0
2. Slot 1
3. Slot 2
4. Slot 3
5. Slot 4
6. Slot 5

7. Slot 6
8. Slot 7

I/O modules are only supported in fixed configurations. The fixed configurations define the exact slots into which the I/O modules may be inserted. The processors directly drive the eight I/O module slots, meaning all slots are full performance.

The non-optional SAS, NVRAM, and 10GBaseT I/O modules are allocated to fixed slots. The optional Host Interface I/O modules are used for front end networking and Fibre Channel connections. The quantity and type of these I/O modules is customizable, and there are many valid configurations.

DD6300 slot map

Slot 0, Slot 1, Slot 2 (except when it is marked "Reserved") are populated with the required I/O modules and are not optional. I/O module slots 3-7 contain optional Host Interface I/O modules and can contain specific I/O modules or no I/O modules at all.

Table 46 DD6300 I/O slot module mapping

Tier	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
AIO Expanded	NVRAM 8g Model 3	Quad Port 10 GBase-T	Reserved	(Optional) Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	(Optional) Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	(Optional) Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	(Optional) Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	(Optional) Quad Port 6 Gbps SAS [a]
AIO	NVRAM 8g Model 3	Quad Port 10 GBase-T	Reserved	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 6 Gbps SAS[a]

a. Optional in DD6300 configurations, but required with one or more external storage shelves.

I/O module population rules

The system chassis has eight slots for I/O modules. Slots 0, 1, 2, and 7 are reserved. Slots 3, 4, 5, and 6 support host interface I/O modules. The maximum supported number of any type of host interface I/O module is four.

Note

A maximum of three Quad Port 10 GBase-T I/O modules are supported in slots 3-6 because of the mandatory Quad Port 10 GBase-T I/O module in slot 1.

The following table assigns rules for populating the I/O modules.

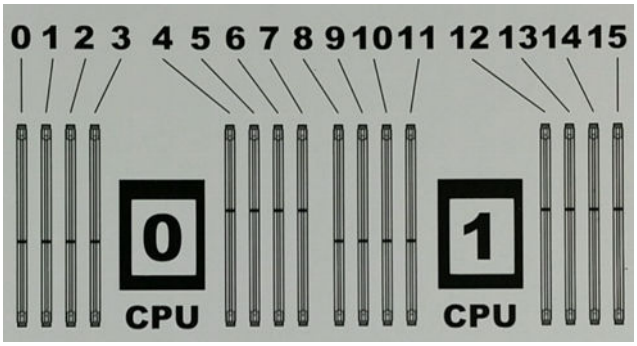
Table 47 I/O module slot population rules

Step	I/O module name	Slots	Notes
Step 1: Populate mandatory I/O modules	NVRAM 8g Model 3	0	Mandatory for all configurations
	Quad Port 10 GBase-T	1	Mandatory for all configurations
	Quad Port 6 Gbps SAS	2	Reserved for DD6300 expanded configuration.
	Quad Port 6 Gbps SAS	7	Reserved for DD6300 for base configuration.
Step 2: Populate all Quad Port 10GbE SR I/O modules	Quad Port 10GbE SR	3, 4, 5, 6	Populate starting from the lowest available slot number.
Step 3: Populate all Quad Port 10 GBase-T I/O modules	Quad Port 10 GBase-T	3, 4, 5, 6	Populate starting from the lowest available slot number. With Quad Port 10 GBase-T in slot 1, max number of Quad Port 10 GBase-T I/O modules are limited to 4.
Step 4: Populate all Dual Port 16 Gbps Fibre Channel I/O modules	Dual Port 16 Gbps Fibre Channel	6, 5, 4, 3	Populate starting from the highest available slot number.

Internal system components

The following figure shows the layout of the CPUs and DIMMs inside the chassis. The front of the system is at the top of the figure.

Figure 53 CPU and memory locations



DIMMs overview

Dual in-line memory modules (DIMM) come in various sizes, which must be configured in a certain way. This topic can help you select the correct configuration when servicing DIMMs.

The storage processor contains two Intel processors each with an integrated memory controller that supports four channels of memory. The storage processor allows two DIMM slots per channel, so the storage processor supports a total of 16 DIMM slots.

DD6300 memory DIMM configuration

Table 48 DD6300 memory DIMM configuration

Tier	Total Memory	Memory DIMM Configuration
DD6300 AIO Expanded	96 GB	12 x 8 GB
DD6300 AIO	48 GB	6 x 8 GB

To ensure maximum memory performance, there are memory DIMM population rules for best memory loading and interleaving. Table 49 on page 97 and Table 50 on page 98 specify the DIMM location rules for various memory configurations:

Table 49 Memory locations - CPU 0

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	0	1	2	3	4	5	6	7
DD6300 AIO Expanded	96 GB	8 GB	N/A	8 GB	N/A	8 GB	8 GB	8 GB	8 GB
DD6300 AIO	48 GB	N/A	N/A	8 GB	N/A	N/A	8 GB	N/A	8 GB

Table 50 Memory locations - CPU 1

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	8	9	10	11	12	13	14	15
DD6300 AIO Expanded	96 GB	8 GB	8 GB	8 GB	8 GB	N/A	8 GB	N/A	8 GB
DD6300 AIO	48 GB	8 GB	N/A	8 GB	N/A	N/A	8 GB	N/A	N/A

CHAPTER 7

DD6800

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DD6800 system features

Table 51 DD6800 system features

Feature		DD6800 (Base configuration)	DD6800 (Expanded configuration)
Rack height		2U	2U
Processor		E5-2630 V3	E5-2630 V3
Kernel		3.2.x	3.2.x
NVRAM		NVRAM 8g Model 3	NVRAM 8g Model 3
Memory		8 x 8 GB DIMM + 8 x 16 GB DIMM (192 GB)	8 x 8 GB DIMM + 8 x 16 GB DIMM (192 GB)
Internal drives	HDDs in 3.5" bays	7/ 7+5	12
	SSDs in 3.5" bays	0	0
	SSDs in 2.5" bays	1	2
I/O module slots	SAS I/O modules (Quad Port 6 Gbps SAS)	2	2
	Network and FC I/O modules	Four replaceable I/O module slots. Not hot-swappable.	Four replaceable I/O module slots. Not hot-swappable.
Supported capacity	Non-extended retention	144 TB	288 TB
	DD Cloud Tier	N/A	576 TB [a]
	Extended retention	N/A	288 TB[b]
High availability support		Yes	Yes
HA private interconnect		(2) 10GBase-T ports	(2) 10GBase-T ports
External SSD shelf		One SSD shelf for A-P high availability cluster containing two drives.	One SSD shelf for A-P high availability cluster containing four drives.
SAS string depth (max)	ES30	1	4
	DS60	0	1
	ES30 and DS60	5 shelves total	5 shelves total
Stream count		405 writes, 112 reads	405 writes, 112 reads

Table 51 DD6800 system features (continued)

a. DD Cloud Tier requires two ES30 shelves fully populated with 4 TB drives to store DD Cloud Tier metadata.
b. Extended retention not available on HA configurations

DD6800 system specifications

Table 52 DD6800 system specifications

Model	Average power consumption 25 C	Heat dissipation (operating maximum)	Weight [a]	Width	Depth	Height
DD6800	560W	1.69 x 10^6 J/hr (1604 Btu/hr) maximum	68 lbs (30.84 kg)	17.50 in (44.45 cm)	30.5 in (77.5 cm)	3.40 in (8.64 cm)

a. The weight does not include mounting rails. Allow 2.3-4.5 kg (5-10 lb) for a rail set.

Table 53 System operating environment

Requirement	Description
Ambient temperature	10°C - 35°C; derate 1.1°C per 1,000 ft (304 m)
Relative humidity (extremes)	20–80% noncondensing
Elevation	0 - 7,500ft (0 - 2,268m)
Operating acoustic noise	L_{wad} sound power, 7.5 Bels

DD6800 storage capacity

The following table provides storage capacity information for the DD6800 system.

Table 54 DD6800 storage capacity

Memory	Internal disks (system disks only)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
192 GB (Base)	• 4 x 4 TB HDD • 2 x 800 GB SSD	180 TB[b]	144 TB	131 TiB	144,000 GB	134,110 GiB
192 GB (Expanded)	• 4 x 4 TB HDD • 4 x 800 GB SSD	• Active Tier: 360 TB[b]	• Active Tier: 288 TB	• Active Tier: 261.9 TiB • Archive Tier: 261.9 TiB	• Active Tier: 288,000 GB • Archive Tier: 288,000 GB	• Active Tier: 268,221 GiB

Table 54 DD6800 storage capacity (continued)

Memory	Internal disks (system disks only)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
		• Archive Tier: 360 TB[c] • Cloud Tier: 720 TB in the cloud[d] • Cloud Tier metadata: 120 TB local storage	• Archive Tier: 288 TB • Cloud Tier: 576 TB • Cloud Tier metadata: 96 TB	• Cloud Tier: 523.8 TiB • Cloud Tier metadata: 87.3 TiB	• Cloud Tier: 576,000 GB • Cloud Tier metadata: 96,000 GB	• Archive Tier: 268,221 GiB • Cloud Tier: 536,442 GiB • Cloud Tier metadata: 89,407 GiB

a. The capacity differs depending on the size of the external storage shelves used. This data based on ES30 shelves.
b. HA is supported.
c. HA is not supported with Extended Retention.
d. HA is supported in combination with Cloud Tier.

DD6800 front panel

DD6800 Dataless Head (DLH) systems have one of the following front panel drive configurations to host the DD OS boot drives and provide metadata caching on SSD:

Table 55 DD6800 DLH SSD requirements

Configuration	Number of SSDs
DD6800	2
DD6800 expanded	4

Note

SSDs are not RAID-protected.

Table 56 DD6800 DLH configuration drive layout

Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: SSD 1	Slot 5: SSD 2	Slot 6: Filler	Slot 7: Filler
Slot 8: Filler	Slot 9: Filler	Slot 10: Filler	Slot 11: Filler

Table 57 DD6800 DLH expanded configuration drive layout

Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: SSD 1	Slot 5: SSD 2	Slot 6: SSD 3	Slot 7: SSD 4

Table 57 DD6800 DLH expanded configuration drive layout (continued)

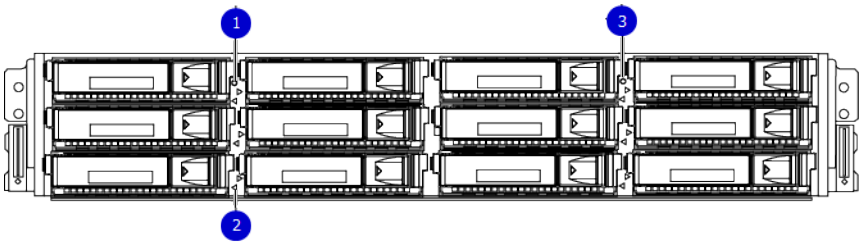
Slot 8: Filler	Slot 9: Filler	Slot 10: Filler	Slot 11: Filler

Front LED indicators

The front of the system contain 12 disk drive status LEDs that are normally blue, and blink when there is activity on the disk. The LEDs are shaped like triangles, and the apex of the triangle points left or right, indicating that disk's status. If the disk drive has a failure, the disk's status LED turns from blue to amber, indicating that a drive must be replaced.

The front also contains two system status LEDs. A blue system power LED is present that is on whenever the system has power. An amber system fault LED is also present that is normally off and lit amber whenever the chassis or any other FRU in the system requires service.

Figure 54 Front LED indicators



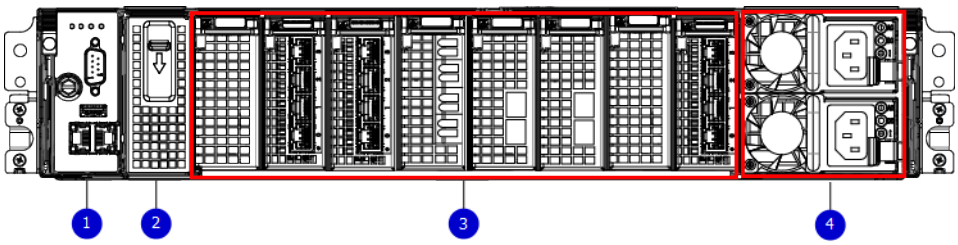
1. System service LED
2. Drive activity/service LED
3. System power LED

Table 58 Front LEDs

Name	Color	Purpose
System power LED	Blue	Indication that the system has power.
System service LED	Amber	Normally off; is lit amber whenever the SP or any other FRU (except disk drives) in the system requires service.
Drive activity/Service LED	Blue /Amber	• Lit blue when the drive is powered. • Blinks blue during drive activity. • Lit solid amber when a disk needs service.

Back panel

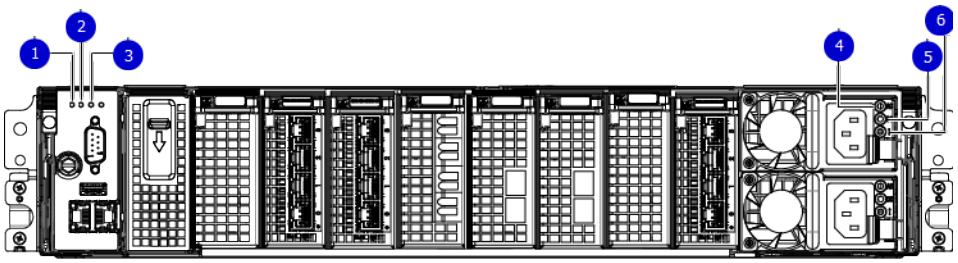
The back panel of the chassis contains the following components:



1. Management panel
2. Not Used -- Two 2.5" SSD slots labeled 0 and 1
3. I/O module slots
4. Power supply modules (PSU 0 is the lower module, and PSU 1 is the upper module)

Rear LED indicators

Figure 55 Rear LED indicators



1. Do not remove LED
2. SP service LED
3. System power LED
4. AC power good LED
5. DC power good LED
6. Power supply fault LED

Name of LED	Location	Color	Definition
"Do not remove" LED	Upper left-most part of rear chassis	White	This LED is lit during system BIOS and BMC firmware updates and indicates that the SP should not be removed from the chassis, nor should system power be removed.

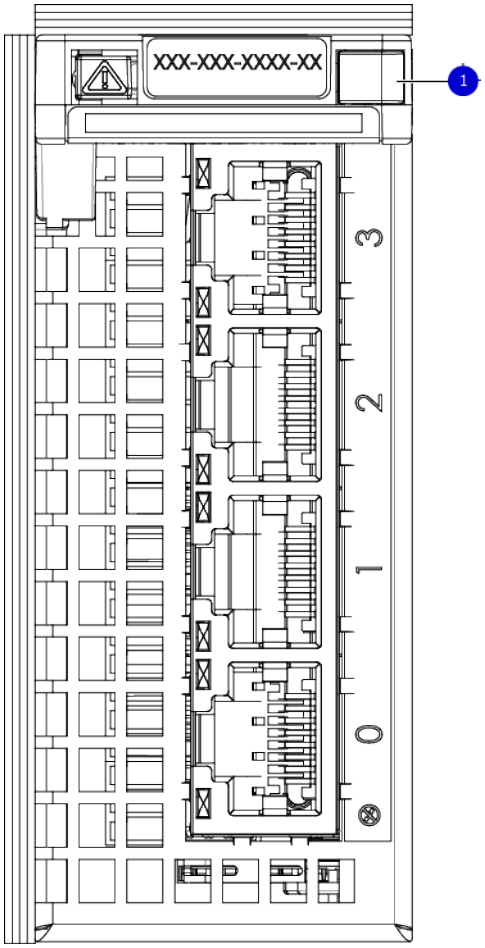
Name of LED	Location	Color	Definition

SP service LED	To the right of "Do not remove" LED	Amber	• Solid amber - SP or a FRU inside the SP requires service
			• Blinking amber - blink rate reflects one of the following is booting
			  ▪ BIOS - 1/4 Hz
			  ▪ POST - 1 Hz
			  ▪ OS - 4 Hz

Drive Power/Activity LED [a]	Left LED on the SSD	Blue	Lit blue when the drive is powered. Blinks during drive activity.
Drive Fault LED [a]	Right LED on the SSD	Amber	Lit solid amber when a drive needs service.
System power LED	Right-most LED on the management panel	Blue	SP has good, stable power
PSU FRU LED - AC Good	Top LED on power supply	Green	AC input is as expected
PSU FRU LED - DC Good	Middle LED on power supply	Green	DC output is as expected
PSU FRU LED - Attention	Bottom LED on power supply	Amber	PSU has encountered a fault condition

a. The SSD is only present on DD6300 systems.

Figure 56 I/O module Power/Service LED location

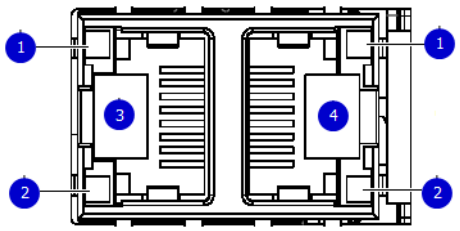


1. I/O module power/service LED

Name of LED	Location	Color	Definition
I/O module FRU LED - Figure 56 on page 106	Ejector handle of I/O modules	Green/Amber	• Green - I/O module has power and is functioning normally • Amber - I/O module has encountered a fault condition and requires service
I/O port status LED (SAS, Fibre Channel, and optical networking I/O modules only)	One LED per I/O module port	Blue	Lit when port is enabled. May flash if SW "marks" the port. [a]

a. For RJ45 networking ports, the standard green link and amber activity LEDs are used.

Figure 57 Onboard network port LEDs



1. Network port link LED
2. Network port activity LED
3. Dedicated IPMI port BMC0A
4. Management interface EthMa

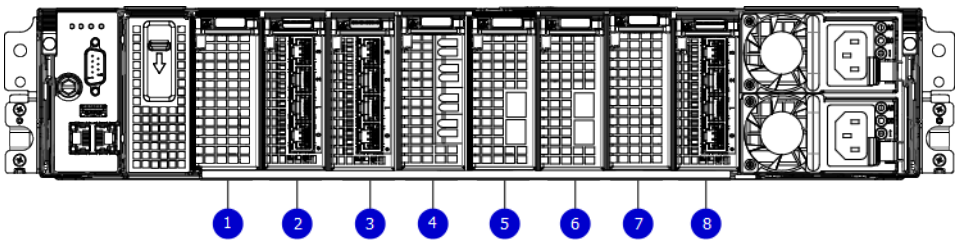
Name of LED	Location	Color	Definition
Onboard network port LED - Link LED Figure 57 on page 107	Top LED on network port	Green	• Lit when there is a link at 1000BaseT and 100BaseT speeds • Off when the link speed is 10BaseT or there is no link
Onboard network port LED - Activity LED	Bottom LED on network port	Amber	Blinks when there is traffic on the port

I/O modules

I/O module slot numbering

The eight I/O module slots are enumerated as Slot 0 (on the left when viewed from the rear) through Slot 7. Ports on an I/O module are enumerated as 0 through 3, with 0 being on the bottom.

Figure 58 I/O module slot numbering



1. Slot 0
2. Slot 1
3. Slot 2
4. Slot 3
5. Slot 4
6. Slot 5

7. Slot 6
8. Slot 7

I/O modules are only supported in fixed configurations. The fixed configurations define the exact slots into which the I/O modules may be inserted. The processors directly drive the eight I/O module slots, meaning all slots are full performance.

The non-optional SAS, NVRAM, and 10GBaseT I/O modules are allocated to fixed slots. The optional Host Interface I/O modules are used for front end networking and Fibre Channel connections. The quantity and type of these I/O modules is customizable, and there are many valid configurations.

DD6800 slot map
I/O module slots 3–6 contain optional Host Interface I/O modules and can contain specific I/O modules or no I/O modules at all. Slot 0, Slot 1, Slot 2, and Slot 7 are populated with the required I/O modules and are not optional.

Table 59 DD6800 I/O module slot mapping

Tier	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
DLH DLH Extended Retention/DD Cloud Tier	NVRAM 8g Model 3	Quad Port 10 GBase-T	Quad Port 6 Gbps SAS	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 6 Gbps SAS
DLH High Availability	NVRAM 8g Model 3	Quad Port 10 GBase-T for HA interconnect	Quad Port 6 Gbps SAS	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 6 Gbps SAS

I/O module population rules

The system chassis has eight slots for I/O modules. Slots 0, 1, 2, and 7 are reserved. Slots 3, 4, 5, and 6 support host interface I/O modules. The maximum supported number of any type of host interface I/O module is four.

Note

A maximum of three Quad Port 10 GBase-T I/O modules are supported in slots 3-6 because of the mandatory Quad Port 10 GBase-T I/O module in slot 1.

The following table assigns rules for populating the I/O modules.

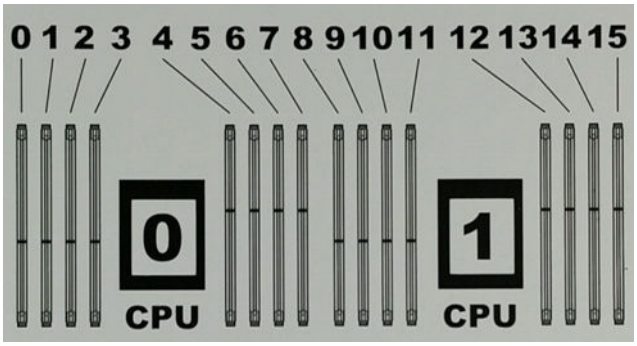
Table 60 I/O module slot population rules

Step	I/O module name	Slots	Notes
Step 1: Populate mandatory I/O modules	NVRAM 8g Model 3	0	Mandatory for all configurations
	Quad Port 10 GBase-T	1	Mandatory for all configurations
	Quad Port 6 Gbps SAS	2	Mandatory for all configurations
	Quad Port 6 Gbps SAS	7	Mandatory for all configurations
Step 2: Populate all Quad Port 10GbE SR I/O modules	Quad Port 10GbE SR	3, 4, 5, 6	Populate starting from the lowest available slot number.
Step 3: Populate all Quad Port 10 GBase-T I/O modules	Quad Port 10 GBase-T	3, 4, 5, 6	Populate starting from the lowest available slot number. With Quad Port 10 GBase-T in slot 1, max number of Quad Port 10 GBase-T I/O modules are limited to 4.
Step 4: Populate all Dual Port 16 Gbps Fibre Channel I/O modules	Dual Port 16 Gbps Fibre Channel	6, 5, 4, 3	Populate starting from the highest available slot number.

Internal system components

The following figure shows the layout of the CPUs and DIMMs inside the chassis. The front of the system is at the top of the figure.

Figure 59 CPU and memory locations



DIMMs overview

Dual in-line memory modules (DIMM) come in various sizes, which must be configured in a certain way. This topic can help you select the correct configuration when servicing DIMMs.

The storage processor contains two Intel processors each with an integrated memory controller that supports four channels of memory. The storage processor allows two DIMM slots per channel, so the storage processor supports a total of 16 DIMM slots.

DD6800 memory DIMM configuration

Table 61 DD6800 memory DIMM configuration

Tier	Total Memory	Memory DIMM Configuration
DD6800 DLH	192 GB	8 x 16 GB +8 x 8 GB
DD6800 DLH Extended Retention/DD Cloud Tier	192 GB	8 x 16 GB +8 x 8 GB

HA is supported with all available memory configurations.

To ensure maximum memory performance, there are memory DIMM population rules for best memory loading and interleaving. Table 62 on page 110 and Table 63 on page 111 specify the DIMM location rules for various memory configurations:

Table 62 Memory locations - CPU 0

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	0	1	2	3	4	5	6	7
DD6800 DLH (Base)	192 GB	16 GB	8 GB	16 GB	8 GB	8 GB	16 GB	8 GB	16 GB

Table 62 Memory locations - CPU 0 (continued)

DD6800 DLH (Expanded)	192 GB	16 GB	8 GB	16 GB	8 GB	8 GB	16 GB	8 GB	16 GB

Table 63 Memory locations - CPU 1

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	8	9	10	11	12	13	14	15
DD6800 DLH (Base)	192 GB	16 GB	8 GB	16 GB	8 GB	8 GB	16 GB	8 GB	16 GB
DD6800 DLH (Expanded)	192 GB	16 GB	8 GB	16 GB	8 GB	8 GB	16 GB	8 GB	16 GB

CHAPTER 8

DD7200

- DD7200 system features 114
- DD7200 system specifications 115
- DD7200 storage capacity 116
- Front Panel 117
- Back Panel 121
- I/O modules and slot assignments 123
- Internal system components 125

DD7200 system features

The table summarizes the DD7200 system features.

Table 64 DD7200 system features

Feature		DD7200 (Base configuration)	DD7200 (Expanded configuration)
Rack height		4U, supported in four-post racks only	4U, supported in four-post racks only
Rack mounting		Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9 - 76.2 cm).	Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9 - 76.2 cm).
Power		1 +1 redundant, hot-swappable power units	1 +1 redundant, hot-swappable power units
Processor		Two 8-core processors	Two 8-core processors
NVRAM		One 4-GB NVRAM module (and companion BBU) for data integrity during a power outage	One 4-GB NVRAM module (and companion BBU) for data integrity during a power outage
Fans		Hot-swappable, redundant, 5	Hot-swappable, redundant, 5
Memory		8 x 16 GB DIMM (128 GB)	16 x 16 GB DIMM (256 GB)
Internal drives		SSD drives, 3 x 200 GB (base 10)	SSD drives, 3 x 200 GB (base 10)
I/O module slots		Nine replaceable I/O module (Fibre Channel, Ethernet, and SAS) slots, one BBU, one NVRAM, and one Management module slot. See Management module and interfaces on page 65 and I/O modules and slot assignments on page 67.	Nine replaceable I/O module (Fibre Channel, Ethernet, and SAS) slots, one BBU, one NVRAM, and one Management module slot. See Management module and interfaces on page 65 and I/O modules and slot assignments on page 67.
Supported capacity	Non-extended retention	12 x 2-TB or 8 x 3-TB shelves adding up to 285 TB of usable external capacity.	8 x 2-TB or 12 x 3-TB shelves adding up to 428 TB of usable external capacity.
	DD Cloud Tier	N/A	428 TB of Active Tier capacity, and 856 TB of Cloud Tier capacity. 4 x 4

Table 64 DD7200 system features (continued)

Feature		DD7200 (Base configuration)	DD7200 (Expanded configuration)
			TB shelves are required to store DD Cloud Tier metadata.
	DD Extended Retention	N/A	56 shelves adding up to a maximum of 856 GB of usable external capacity.

DD7200 system specifications

Table 65 DD7200 system specifications

Model	Watts	BTU/hr	Power	Weight	Width	Depth	Height
DD7200	800	2730	800	80 lb / 36.3 kg	17.5 in (44.5 cm)	33 in (84 cm)	7 in (17.8 cm)

Table 66 System operating environment

Operating Temperature	50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
Operating Humidity	20% to 80%, non-condensing
Non-operating Temperature	-40° to +149° F (-40° to +65° C)
Operating Acoustic Noise	Sound power, LWAd: 7.52 bels. Sound pressure, LpAm: 56.4 dB. (Declared noise emission per ISO 9296.)

DD7200 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Table 67 DD7200 storage capacity

System/ Installed Memory	Internal Disks (SATA SSDs)	Data Storage Space	External Storage[3]
DD7200 (2 SAS I/O modules) 128 GB	2.5 in. 3 @ 200 GB No User Data	285 TB	Up to a maximum of 12 x 2-TB or 8 x 3-TB shelves.
DD7200 (2 SAS I/O modules) 256 GB	2.5 in. 3 @ 200 GB No User Data	428 TB	Up to a maximum of 18 x 2-TB or 12 x 3-TB shelves.
DD7200 with DD Cloud Tier[1] (4 SAS I/O modules) 256 GB	2.5 in. 3 @ 200 GB No User Data	• 428 TB (Active Tier) • 192 TB (DD Cloud Tier metadata) • 856 TB (DD Cloud Tier)	Up to a maximum of 18 x 2-TB or 12 x 3-TB shelves. 4x4-TB shelves for DD Cloud Tier metadata.
DD7200 with Extended Retention software[1] (4 SAS I/O modules) 256 GB	2.5 in. 3 @ 200 GB No User Data	856 TB	Up to a maximum of 36 x 2-TB or 24 x 3-TB shelves.

[1]Data Domain DD7200 controller with DD Extended Retention software.

[2] Data Domain DD7200 controller with DD Cloud Tier.

[3] The capacity will differ depending on the size of the external storage shelves used. This data based on ES30 shelves.

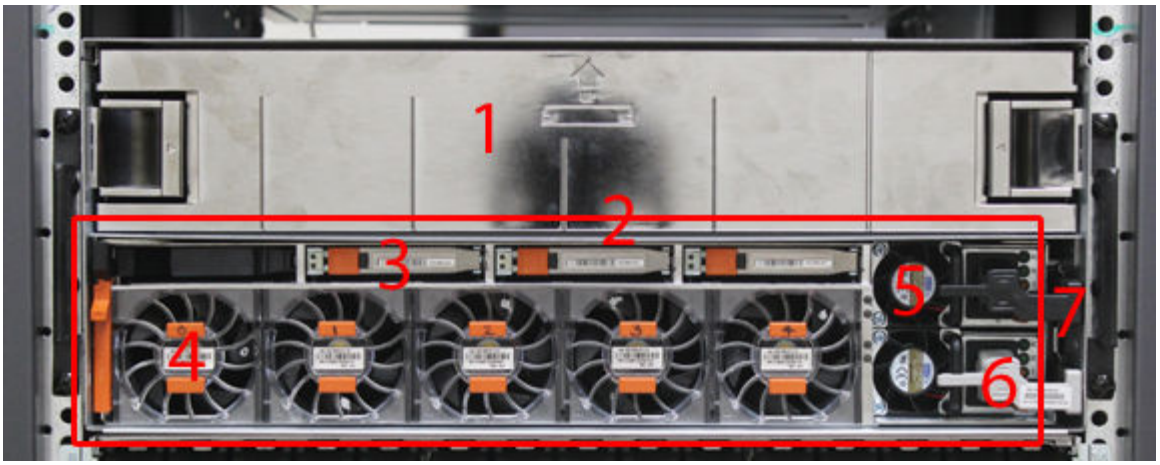
Note

For information about Data Domain expansion shelves, see the separate document, *Data Domain Expansion Shelf Hardware Guide*.

Front Panel

The photo shows the hardware features and interfaces on the front of the system.

Figure 60 Front panel components



(1)	Filler panel
(2)	The red box indicates the system processor (SP) module
(3)	SSD drive #1
(4)	Fan #0
(5)	Power supply #B
(6)	AC power disconnect plug
(7)	AC power extender module

Power supply units

A system has two power supply units, numbered A and B from the bottom up. Each power supply has its own integral cooling fan. Each power unit has three LEDs (see Figure 34 on page 63) that indicates the following states:

- AC LED: Glows green when AC input is good
- DC LED: Glows green when DC output is good
- Symbol “!”: Glows solid or blinking amber for fault or attention

The AC power plugs are located to the right of each power supply. These plugs are pulled to disconnect AC power to each power supply.

AC power extender module

AC power entry is connected at the rear of the system. The AC power extender module provides power to the two power supplies on the front of the system. AC Power plugs are located in the front. The module is adjacent to the SP module and can be removed and replaced.

Cooling Fans

A system contains five hot-swappable cooling fans in a 4+1 redundant configuration. The fans provide cooling for the processors, DIMMs, IO modules, and the management module. Each fan has a fault LED which causes the fan housing to glow amber. A system can run with one fan faulted or removed.

Solid-state drives

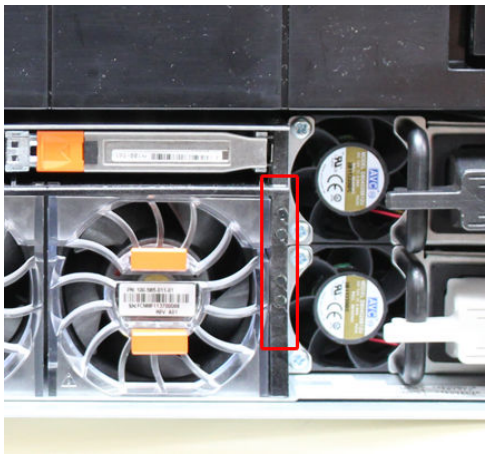
A system contains three hot-swappable 2.5" solid-state drive (SSD) bays that are located in the front and on top of the fan modules. There are four drive bays, with the left-most bay containing a blank. The next drive to the right of the blank is SSD #1, the next is #2, and the right-most bay contains SSD #3. No user backup data is kept on the SSDs.

Each drive has a blue colored power LED and an amber fault LED.

Front LED Indicators

The photo below indicates the location of the four system LEDs.

Figure 61 System LEDs



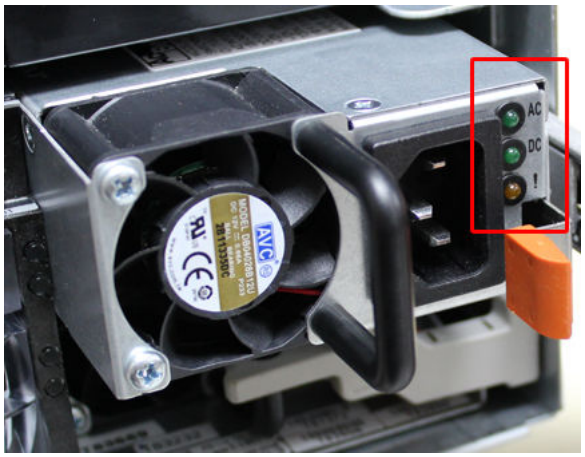
The next photo shows the location of the system LED legend label. Figure 63 on page 119 shows the power supply LEDs. Other front LEDs are shown in Figure 64 on page 120. LED states are described in Table 68 on page 120.

Figure 62 System LED legend label

The power supply LEDs include:

- AC LED on top
- DC LED in the middle
- Failure LED on the bottom

Figure 63 Power supply LEDs



Each SSD has two LEDs as shown in the following figure. The lower left corner of the housing around each fan acts as an LED, glowing amber when the fan has failed.

Figure 64 Fan and SSD LEDs

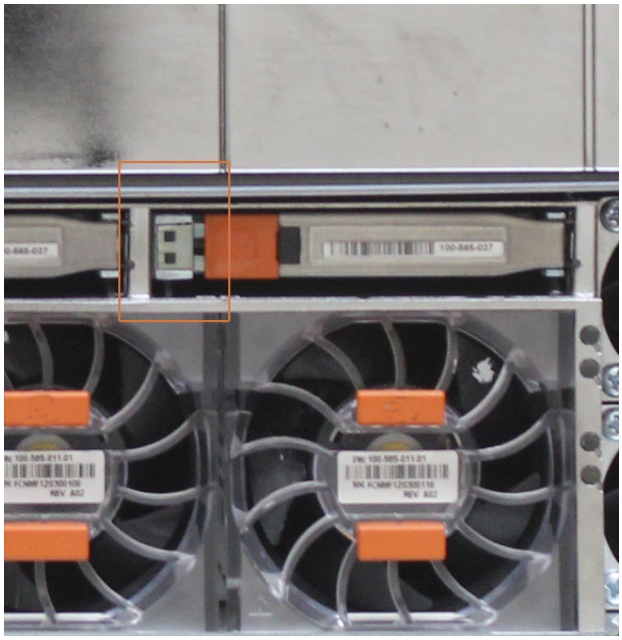


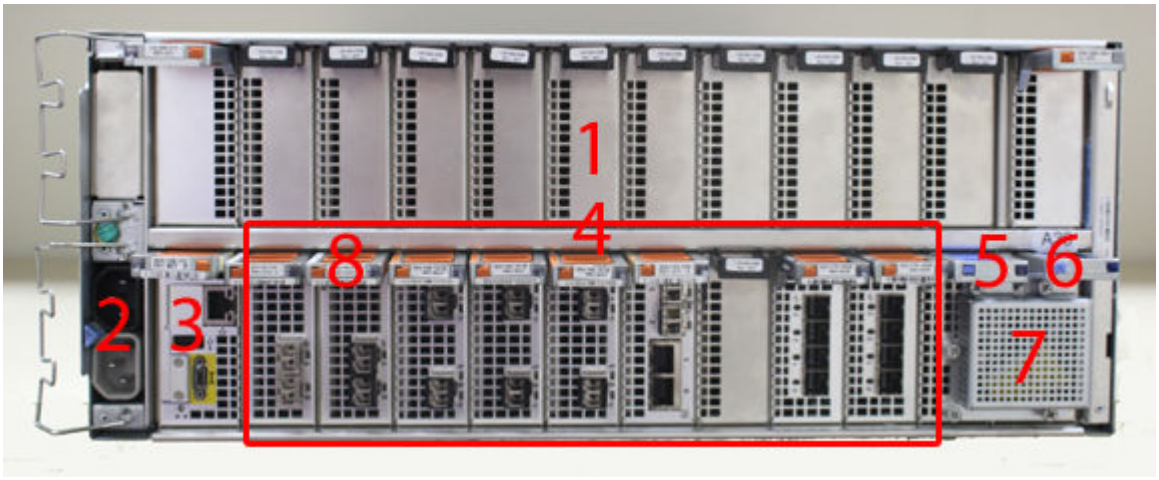
Table 68 LED status indicators

Part	Description or Location	State
System	Dot within a circle (top LED)	Blue indicates power on and normal operation.
System, SP fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates failure.
System, chassis fault	Exclamation point within a triangle with a light below	Dark indicates normal operation. Yellow indicates a fault condition.
System	Marked out hand within a black square (bottom LED)	White warms not to remove the unit.
Power supply	AC LED	Steady green indicates normal AC power.
Power supply	DC LED	Steady green indicates normal DC power.
Power supply	Failure LED	Solid amber indicates a failed power supply.
SSD	Top LED	Solid blue, disk ready, blinks while busy.
SSD	Bottom LED	Dark indicates healthy. Solid amber indicates disk fail.
Fan	Fan housing	The fan housing glows an amber color during fan failure.

Back Panel

The photo shows the hardware features and interfaces on the back of the system.

Figure 65 Features on rear of chassis



1. Upper level contains all blanks
2. AC power extender module
3. Management module (slot Mgmt A)
4. Red box indicating I/O modules (slots 0-8)
5. Battery backup (BBU in slot 9)
6. NVRAM module (slot 10)
7. Cage covering the BBU and NVRAM combination module
8. I/O LED at the end of each I/O module handle
9. Location of serial number label/tag

Note

For modules containing multiple ports, the bottom port is numbered as zero (0) with numbers increasing going upward.

I/O module LEDs

Each I/O module ejector handle contains a bi-colored LED. Green indicates normal function, while an amber color indicates a fault condition.

Management module and interfaces

The management module is on the left-most side when facing the back of the system, in slot Mgmt A. The process to remove and add a management module is the same as the I/O modules, however, the management module can only be accommodated in Mgmt A slot.

The management module contains one external LAN connection for management access to the SP module. One micro DB-9 connector is included to provide the console. A USB port is provided for use during service of the system to allow booting from a USB flash device.

Figure 66 Interfaces on the management module

(1)	Ethernet port
(2)	USB port
(3)	Micro serial port

I/O modules and slot assignments

The table shows the I/O module slot assignments for the systems. See Figure 37 on page 65 for a view of the slot positions on the back panel and Figure 39 on page 69 for a top view.

Table 69 DD7200 slot assignments

Slot Number	DD7200	DD7200 with Extended Retention Software	DD7200 with DD Cloud Tier
MGMT A	Management module	Management module	Management module
0	Fibre Channel (FC), Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
1	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
2	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
3	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
4	Ethernet or empty	Ethernet or empty	Ethernet or empty
5	Ethernet or empty	SAS	SAS
6	Empty	SAS	SAS
7	SAS	SAS	SAS
8	SAS	SAS	SAS
9	BBU	BBU	BBU
10	NVRAM	NVRAM	NVRAM

Slot addition rules

- A maximum of six optional I/O modules (FC plus Ethernet) are allowed in systems without Extended Retention software, and a maximum of five optional I/O modules (FC plus Ethernet) are allowed in systems with Extended Retention software.
- Additional FC modules should be installed in numerically increasing slot numbers immediately to the right of the existing FC modules, or starting in slot 0 if no FC modules were originally installed. A maximum of four FC modules are allowed in a system.
- Additional Ethernet modules should be installed in numerically decreasing slot numbers immediately to the left of the existing Ethernet modules or starting in slot 4 if no Ethernet modules were originally installed. For systems without Extended Retention software, a maximum of six (limited to four of any one type) Ethernet modules can be present. For systems with Extended Retention software, a maximum of five (limited to four of any one type) Ethernet modules can be present.
- All systems include two SAS modules in slots 7 and 8. Systems with Extended Retention software must have two additional SAS modules in slots 5 and 6.
- For systems without Extended Retention software, if adding I/O modules results in the allowed maximum of six I/O modules present, slot 5 is used. Slot 5 is only used for an Ethernet module. Adding FC modules in this specific case require moving an

existing Ethernet module to slot 5. Other than this specific case, it is not recommended to move I/O modules between slots.

- Adding Extended Retention software to a system includes adding two SAS modules in slots 5 and 6. If the system originally had the maximum of 6 optional I/O modules, the I/O module in slot 5 must be permanently removed from the system.

Fibre Channel (FC) I/O Module Option

An FC I/O module is a dual-port Fibre Channel module. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Boost over Fiber Channel is optional and the total FC HBAs cannot exceed more than allowable Fibre Channel cards per controller.

Ethernet I/O Module Options

The available Ethernet I/O modules are:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2 port 1000Base-T Copper (RJ45) /2 port 1000Base-SR Optical

Internal system components

The photo shows the system with the system processor (SP) module that is removed from the chassis and the SP cover removed.

Figure 67 Top view of SP module with SP cover removed

(1)	Front of system
(2)	Four groups of 4 DIMM cards

DIMM modules

- DD7200 systems with 128 GB of memory contain 8 x 16 GB DIMMs, with 8 empty DIMM slots.
- DD7200 systems with 256 GB of memory contain 16 x 16 GB DIMMs.

CHAPTER 9

DD9300

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DD9300 system features

Table 70 DD9300 system features

Feature		DD9300 (Base configuration)	DD9300 (Expanded configuration)
Rack height		2U	2U
Processor		E5-2680 V3	E5-2680 V3
Kernel		3.2.x	3.2.x
NVRAM		NVRAM 8g Model 3	NVRAM 8g Model 3
Memory		4 x 32 GB DIMM + 4 x 16 GB DIMM (192 GB)	8 x 32 GB DIMM + 8 x 16 GB DIMM (384 GB)
Internal drives	HDDs in 3.5" bays	4	4
	SSDs in 3.5" bays	5	8
	SSDs in 2.5" bays	0	0
I/O module slots	SAS I/O modules (Quad Port 6 Gbps SAS)	2	2
	Network and FC I/O modules	Four replaceable I/O module slots. Not hot-swappable.	Four replaceable I/O module slots. Not hot-swappable.
Supported capacity	Non-extended retention	384 TB	720 TB
	DD Cloud Tier	N/A	1440 TB [a]
	Extended retention	N/A	720 TB[b]
High availability support		Yes	Yes
HA private interconnect		(2) 10GBase-T ports	(2) 10GBase-T ports
External SSD shelf		One SSD shelf for A-P high availability cluster containing two drives.	One SSD shelf for A-P high availability cluster containing four drives.
SAS string depth (max)	ES30	6	6 (7 for extended retention)
	DS60	3	3
	ES30 and DS60	5 shelves total	5 shelves total
Stream count		810 writes, 225 reads	810 writes, 225 reads

Table 70 DD9300 system features (continued)

a. DD Cloud Tier requires four ES30 shelves fully populated with 4 TB drives to store DD Cloud Tier metadata.
b. Extended retention not available on HA configurations

DD9300 system specifications

Table 71 DD9300 system specifications

Model	Average power consumption 25 C	Heat dissipation (operating maximum)	Weight [a]	Width	Depth	Height
DD9300	645W	1.69 x 10^6 J/hr (1604 Btu/hr) maximum	70 lbs (31.75 kg)	17.50 in (44.45 cm)	30.5 in (77.5 cm)	3.40 in (8.64 cm)

a. The weight does not include mounting rails. Allow 2.3-4.5 kg (5-10 lb) for a rail set.

Table 72 System operating environment

Requirement	Description
Ambient temperature	10°C - 35°C; derate 1.1°C per 1,000 ft (304 m)
Relative humidity (extremes)	20–80% noncondensing
Elevation	0 - 7,500ft (0 - 2,268m)
Operating acoustic noise	L_{wad} sound power, 7.5 Bels

DD9300 storage capacity

The following table provides storage capacity information for the DD9300 system.

Table 73 DD9300 storage capacity

Memory	Internal disks (system disks only)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
192 GB (Base)	• 4 x 4 TB HDD • 5 x 800 GB SSD	480 TB[b]	384 TB	349.2 TiB	384,000 GB	357,628 GiB
384 GB (Expanded)	• 4 x 4 TB HDD • 8 x 800 GB SSD	• Active Tier: 900 TB[b]	• Active Tier: 720 TB	• Active Tier: 654.8 TiB • Archive Tier: 654.8 TiB	• Active Tier: 720,000 GB • Archive Tier: 720,000 GB	• Active Tier: 670,552 GiB

Table 73 DD9300 storage capacity (continued)

Memory	Internal disks (system disks only)	External storage (raw)	Usable data storage space (TB/TiB/GB/GiB)[a]			
		• Archive Tier: 900 TB[c] • Cloud Tier: 1800 TB in the cloud[d] • Cloud Tier metadata: 240 TB local storage	• Archive Tier: 720 TB • Cloud Tier: 1,440 TB • Cloud Tier metadata: 192 TB	• Cloud Tier: 1,309.6 TiB • Cloud Tier metadata: 174.6 TiB	• Cloud Tier: 144,000 GB • Cloud Tier metadata: 192,000 GB	• Archive Tier: 670,552 GiB • Cloud Tier: 1,341,104 GiB • Cloud Tier metadata: 178,814 GiB

a. The capacity differs depending on the size of the external storage shelves used. This data based on ES30 shelves.
b. HA is supported.
c. HA is not supported with Extended Retention.
d. HA is supported in combination with Cloud Tier.

DD9300 front panel

DD9300 Dataless Head (DLH) systems have one of the following front panel drive configurations to host the DD OS boot drives and provide metadata caching on SSD:

Table 74 DD9300 DLH SSD requirements

Configuration	Number of SSDs
DD9300	5
DD9300 expanded	8

Note

SSDs are not RAID-protected.

Table 75 DD9300 DLH configuration drive layout

Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: SSD 1	Slot 5: SSD 2	Slot 6: SSD 3	Slot 7: SSD 4
Slot 8: SSD 5	Slot 9: Filler	Slot 10: Filler	Slot 11: Filler

Table 76 DD9300 DLH expanded configuration drive layout

Slot 0: HDD 1	Slot 1: HDD 2	Slot 2: HDD 3	Slot 3: HDD 4
Slot 4: SSD 1	Slot 5: SSD 2	Slot 6: SSD 3	Slot 7: SSD 4

Table 76 DD9300 DLH expanded configuration drive layout (continued)

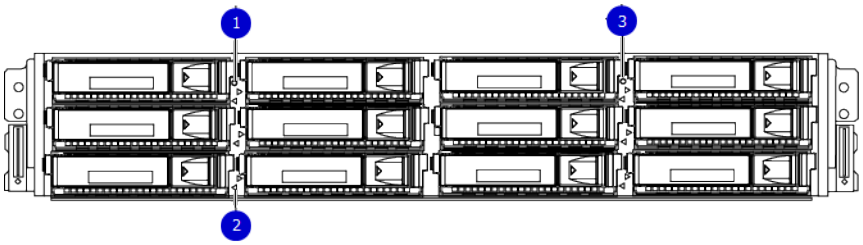
Slot 8: SSD 5	Slot 9: SSD 6	Slot 10: SSD 7	Slot 11: SSD 8

Front LED indicators

The front of the system contain 12 disk drive status LEDs that are normally blue, and blink when there is activity on the disk. The LEDs are shaped like triangles, and the apex of the triangle points left or right, indicating that disk's status. If the disk drive has a failure, the disk's status LED turns from blue to amber, indicating that a drive must be replaced.

The front also contains two system status LEDs. A blue system power LED is present that is on whenever the system has power. An amber system fault LED is also present that is normally off and lit amber whenever the chassis or any other FRU in the system requires service.

Figure 68 Front LED indicators



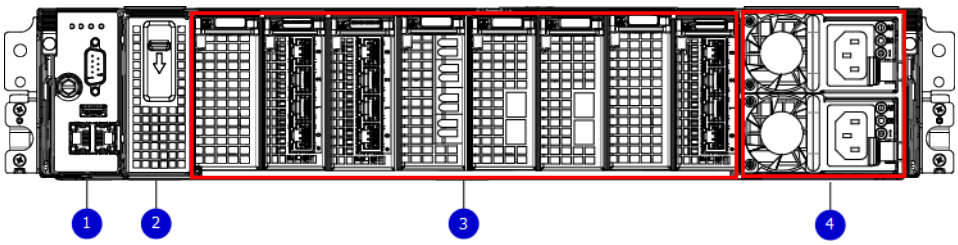
1. System service LED
2. Drive activity/service LED
3. System power LED

Table 77 Front LEDs

Name	Color	Purpose
System power LED	Blue	Indication that the system has power.
System service LED	Amber	Normally off; is lit amber whenever the SP or any other FRU (except disk drives) in the system requires service.
Drive activity/Service LED	Blue /Amber	• Lit blue when the drive is powered. • Blinks blue during drive activity. • Lit solid amber when a disk needs service.

Back panel

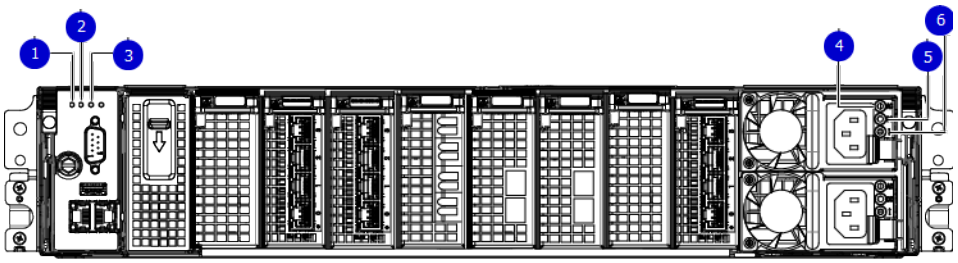
The back panel of the chassis contains the following components:



1. Management panel
2. Not Used -- Two 2.5" SSD slots labeled 0 and 1
3. I/O module slots
4. Power supply modules (PSU 0 is the lower module, and PSU 1 is the upper module)

Rear LED indicators

Figure 69 Rear LED indicators



1. Do not remove LED
2. SP service LED
3. System power LED
4. AC power good LED
5. DC power good LED
6. Power supply fault LED

Name of LED	Location	Color	Definition
"Do not remove" LED	Upper left-most part of rear chassis	White	This LED is lit during system BIOS and BMC firmware updates and indicates that the SP should not be removed from the chassis, nor should system power be removed.

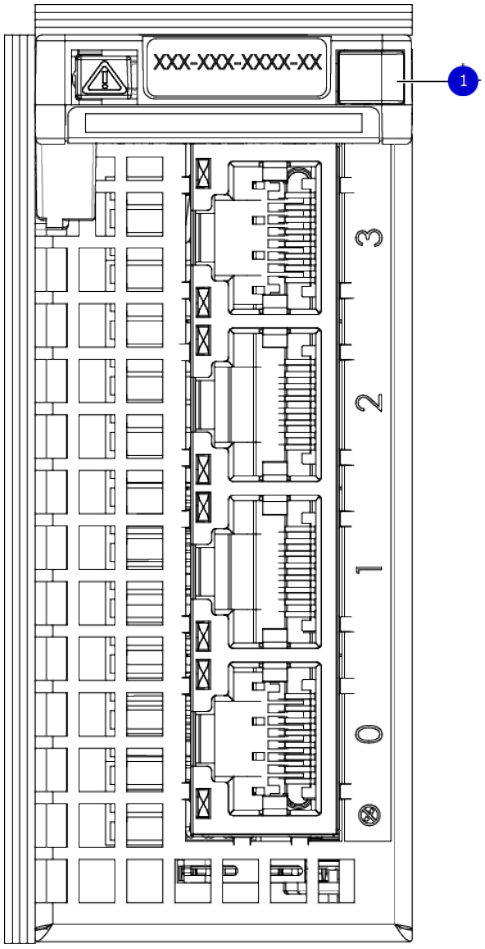
Name of LED	Location	Color	Definition

SP service LED	To the right of "Do not remove" LED	Amber	• Solid amber - SP or a FRU inside the SP requires service
			• Blinking amber - blink rate reflects one of the following is booting
			  ▪ BIOS - 1/4 Hz
			  ▪ POST - 1 Hz
			  ▪ OS - 4 Hz

Drive Power/Activity LED [a]	Left LED on the SSD	Blue	Lit blue when the drive is powered. Blinks during drive activity.
Drive Fault LED [a]	Right LED on the SSD	Amber	Lit solid amber when a drive needs service.
System power LED	Right-most LED on the management panel	Blue	SP has good, stable power
PSU FRU LED - AC Good	Top LED on power supply	Green	AC input is as expected
PSU FRU LED - DC Good	Middle LED on power supply	Green	DC output is as expected
PSU FRU LED - Attention	Bottom LED on power supply	Amber	PSU has encountered a fault condition

a. The SSD is only present on DD6300 systems.

Figure 70 I/O module Power/Service LED location

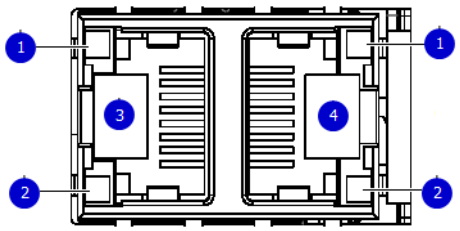


1. I/O module power/service LED

Name of LED	Location	Color	Definition
I/O module FRU LED - Figure 70 on page 134	Ejector handle of I/O modules	Green/Amber	• Green - I/O module has power and is functioning normally • Amber - I/O module has encountered a fault condition and requires service
I/O port status LED (SAS, Fibre Channel, and optical networking I/O modules only)	One LED per I/O module port	Blue	Lit when port is enabled. May flash if SW "marks" the port. [a]

a. For RJ45 networking ports, the standard green link and amber activity LEDs are used.

Figure 71 Onboard network port LEDs



1. Network port link LED
2. Network port activity LED
3. Dedicated IPMI port BMC0A
4. Management interface EthMa

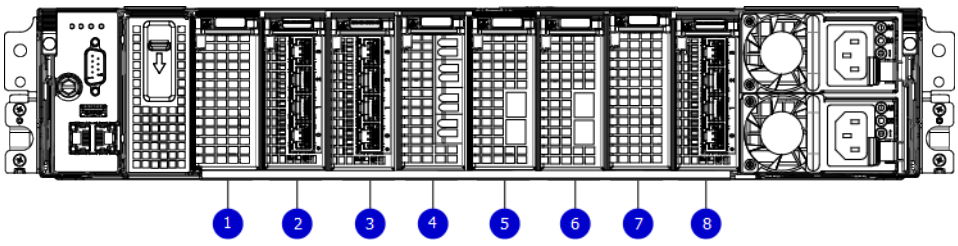
Name of LED	Location	Color	Definition
Onboard network port LED - Link LED Figure 71 on page 135	Top LED on network port	Green	• Lit when there is a link at 1000BaseT and 100BaseT speeds • Off when the link speed is 10BaseT or there is no link
Onboard network port LED - Activity LED	Bottom LED on network port	Amber	Blinks when there is traffic on the port

I/O modules

I/O module slot numbering

The eight I/O module slots are enumerated as Slot 0 (on the left when viewed from the rear) through Slot 7. Ports on an I/O module are enumerated as 0 through 3, with 0 being on the bottom.

Figure 72 I/O module slot numbering



1. Slot 0
2. Slot 1
3. Slot 2
4. Slot 3
5. Slot 4
6. Slot 5

7. Slot 6
8. Slot 7

I/O modules are only supported in fixed configurations. The fixed configurations define the exact slots into which the I/O modules may be inserted. The processors directly drive the eight I/O module slots, meaning all slots are full performance.

The non-optional SAS, NVRAM, and 10GBaseT I/O modules are allocated to fixed slots. The optional Host Interface I/O modules are used for front end networking and Fibre Channel connections. The quantity and type of these I/O modules is customizable, and there are many valid configurations.

DD9300 slot map
I/O module slots 3–6 contain optional Host Interface I/O modules and can contain specific I/O modules or no I/O modules at all. Slot 0, Slot 1, Slot 2, and Slot 7 are populated with the required I/O modules and are not optional.

Table 78 DD9300 I/O module slot mapping

Tier	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
DLH DLH Extended Retention/DD Cloud Tier	NVRAM 8g Model 3	Quad Port 10 GBase-T	Quad Port 6 Gbps SAS	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 6 Gbps SAS
DLH High Availability	NVRAM 8g Model 3	Quad Port 10 GBase-T for HA interconnect	Quad Port 6 Gbps SAS	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 10GbE SR, Quad Port 10 GBase-T, or Dual Port 16 Gbps Fibre Channel	Quad Port 6 Gbps SAS

I/O module population rules

The system chassis has eight slots for I/O modules. Slots 0, 1, 2, and 7 are reserved. Slots 3, 4, 5, and 6 support host interface I/O modules. The maximum supported number of any type of host interface I/O module is four.

Note

A maximum of three Quad Port 10 GBase-T I/O modules are supported in slots 3-6 because of the mandatory Quad Port 10 GBase-T I/O module in slot 1.

The following table assigns rules for populating the I/O modules.

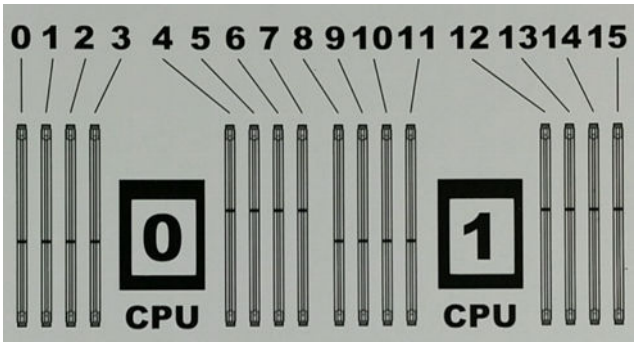
Table 79 I/O module slot population rules

Step	I/O module name	Slots	Notes
Step 1: Populate mandatory I/O modules	NVRAM 8g Model 3	0	Mandatory for all configurations
	Quad Port 10 GBase-T	1	Mandatory for all configurations
	Quad Port 6 Gbps SAS	2	Mandatory for all configurations
	Quad Port 6 Gbps SAS	7	Mandatory for all configurations
Step 2: Populate all Quad Port 10GbE SR I/O modules	Quad Port 10GbE SR	3, 4, 5, 6	Populate starting from the lowest available slot number.
Step 3: Populate all Quad Port 10 GBase-T I/O modules	Quad Port 10 GBase-T	3, 4, 5, 6	Populate starting from the lowest available slot number. With Quad Port 10 GBase-T in slot 1, max number of Quad Port 10 GBase-T I/O modules are limited to 4.
Step 4: Populate all Dual Port 16 Gbps Fibre Channel I/O modules	Dual Port 16 Gbps Fibre Channel	6, 5, 4, 3	Populate starting from the highest available slot number.

Internal system components

The following figure shows the layout of the CPUs and DIMMs inside the chassis. The front of the system is at the top of the figure.

Figure 73 CPU and memory locations



DIMMs overview

Dual in-line memory modules (DIMM) come in various sizes, which must be configured in a certain way. This topic can help you select the correct configuration when servicing DIMMs.

The storage processor contains two Intel processors each with an integrated memory controller that supports four channels of memory. The storage processor allows two DIMM slots per channel, so the storage processor supports a total of 16 DIMM slots.

DD9300 memory DIMM configuration

Table 80 DD9300 memory DIMM configuration

Tier	Total Memory	Memory DIMM Configuration
DD9300 DLH Expanded	384 GB	8 x 32 GB + 8 x 16 GB
DD9300 DLH	192 GB	4 x 32 GB + 4 x 16 GB
DD9300 DLH Extended Retention/DD Cloud Tier	384 GB	8 x 32 GB +8 x 16 GB

HA is supported with all available memory configurations.

To ensure maximum memory performance, there are memory DIMM population rules for best memory loading and interleaving. Table 81 on page 138 and Table 82 on page 139 specify the DIMM location rules for various memory configurations:

Table 81 Memory locations - CPU 0

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	0	1	2	3	4	5	6	7
DD9300 DLH Expanded	384 GB	32 GB	16 GB	32 GB	16 GB	16 GB	32 GB	16 GB	32 GB

Table 81 Memory locations - CPU 0 (continued)

DD9300 DLH	192 GB	16 GB	N/A	16 GB	N/A	N/A	32 GB	N/A	32 GB
DD9300 DLH Extended Retention/DD Cloud Tier	384 GB	32 GB	16 GB	32 GB	16 GB	16 GB	32 GB	16 GB	32 GB

Table 82 Memory locations - CPU 1

		Channel A		Channel B		Channel D		Channel C	
Tier	Total Memory	8	9	10	11	12	13	14	15
DD9300 DLH Expanded	384 GB	32 GB	16 GB	32 GB	16 GB	16 GB	32 GB	16 GB	32 GB
DD9300 DLH	192 GB	32 GB	N/A	32 GB	N/A	N/A	16 GB	N/A	16 GB
DD9300 DLH Extended Retention/DD Cloud Tier	384 GB	32 GB	16 GB	32 GB	16 GB	16 GB	32 GB	16 GB	32 GB

CHAPTER 10

DD9500

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System features

Table 83 DD9500 system features

Feature		DD9500 (Base configuration)	DD9500 (Expanded configuration)
Rack height		4U, supported in four-post racks only	4U, supported in four-post racks only
Rack mounting		Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9–76.2 cm).	Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9–76.2 cm).
Power		4 hot-swappable power units, 2 pairs of 1 +1 redundant	4 hot-swappable power units, 2 pairs of 1 +1 redundant
Voltage		200–240 V~. Frequency: 50 Hz to 60 Hz.	200–240 V~. Frequency: 50 Hz to 60 Hz.
Processor		4 Intel EX processors.	4 Intel EX processors.
NVRAM		One 8-GB NVRAM module for data integrity during a power outage	One 8-GB NVRAM module for data integrity during a power outage
Fans		8 hot-swappable fans, redundant	8 hot-swappable fans, redundant
Memory		32 x 8 GB DIMM (256 GB)	32 x 8 GB DIMM + 16 x 16 GB DIMM (512 GB)
Internal drives		4 x 400 GB (base 10) hot-swappable solid state drives (SSD)	4 x 400 GB (base 10) hot-swappable solid state drives (SSD)
I/O module slots		11 I/O module (Fibre Channel, Ethernet, and SAS) slots. Replaceable I/O modules are not hot-swappable. See I/O module slot assignments on page 155	11 I/O module (Fibre Channel, Ethernet, and SAS) slots. Replaceable I/O modules are not hot-swappable. See I/O module slot assignments on page 155
Supported capacity	Non-extended retention	540 TB	1080 TB
	DD Cloud Tier	N/A	2160 TB[a]
	Extended retention	N/A	1080 TB[b]
High availability support		Yes	Yes
HA private interconnect		4 10 GbE optical ports	4 10 GbE optical ports
External SSD shelf		Optional 1 x 8 drive SSD shelf	Optional 1 x 15 drive SSD shelf

a. DD Cloud Tier requires five ES30 shelves fully populated with 4 TB drives to store DD Cloud Tier metadata.

Table 83 DD9500 system features (continued)

b. Extended retention not available on HA configurations

System specifications

Table 84 DD9500/DD9800 system specifications

Model	Watts	BTU/hr	Power (VA)	Weight	Width	Depth	Height
DD9500/ DD9800	1887	6444	1981	117 lb / 53.2 kg	19 in / 48.3 cm	29.5 in / 74.9 cm	7 in / 17.8 cm

- Operating temperature: 50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
- Operating humidity: 20% to 80%, non-condensing
- Non-operating temperature: -40° to +149° F (-40° to +65° C)
- Operating acoustic noise: Sound power, LWAd, is 7.7 bels.

DD9500 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Note

Data Domain system commands compute and display amounts of disk space or data as decimal multiples of certain powers of two (2^{10}, 2^{20}, 2^{30}, and so forth). For example, 7 GiB of disk space = 7 x 2^{30} bytes = 7 x 1,073,741,824 bytes. Data Domain refers to this process as Base 2 calculation.

Table 85 DD9500 storage capacity

System/ Installed Memory	Internal Disks	Raw Storage (Base 10)	Data Storage Space (Base 2 Calculation)	Data Storage Space (Base 10 Calculation)
DD9500 (3 SAS I/O modules) 256 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	540 TB (external)	392.9 TiB	432 TB
DD9500 (3 SAS I/O modules) 512 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	1,080 TB (external)	786.8 TiB	864 TB
DD9500 with DD Cloud Tier software (4 SAS I/O modules) 512 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	3,240 TB (external)	2360.4 TiB	2592 TB
DD9500 with Extended Retention (ER) software (4 SAS I/O modules) 512 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	2,160 TB (external)	1573.6 TiB	1728 TB

Note

For information about Data Domain expansion shelves and guidelines on using a mixture of shelves, see the *Data Domain ES30 Expansion Shelf Hardware Guide* and *Data Domain DS60 Expansion Shelf Hardware Guide*.

Table 86 DD9500 with ES30 SAS shelves

	DD9500	DD9500
Memory (GB)	256	512
SAS I/O modules x ports per module	3x4	3x4
ES30 support (TB)	SAS 30, 45, 60	SAS 30, 45, 60
Maximum shelves per set	5	5
Maximum number of sets	6	6

Note

ES30 SATA shelves are supported when upgrading from an older Data Domain single node system, but are not supported with HA pairs or new installations.

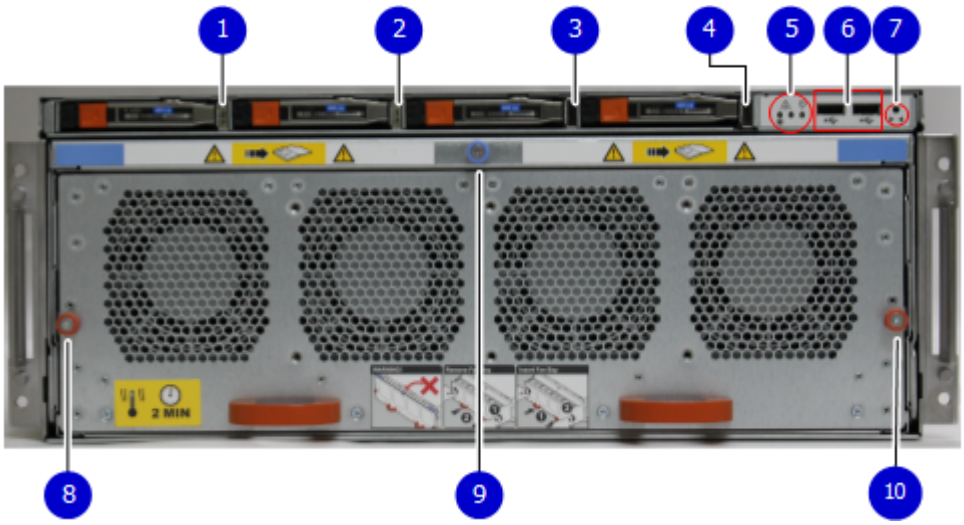
Table 87 DD9500 with DS60 shelves

	DD9500	DD9500
Memory (GB)	256	512
SAS I/O modules x ports per module	3x4	3x4
DS60 support (TB)	SAS 45, 60	SAS 45, 60
Maximum shelves per set	4	4
Maximum number of sets	6	6

Front panel

The four solid state drives (SSDs), the storage processor (SP), and the fans are accessed from the front of the system. The SP must be pulled out to provide access to the DIMMs. The fans are accessed without pulling or removing the SP and they are hot-swappable. The photo shows the interfaces on the front of the system.

Figure 74 Front panel components



1. SSD slot 0
2. SSD slot 1
3. SSD slot 2
4. SSD slot 3
5. Front LEDs
6. USB ports
7. Power button
8. Fan tray thumbscrew (left)
9. SP module thumbscrew to secure the ejector handle
10. Fan tray thumbscrew (right)

Front LED indicators

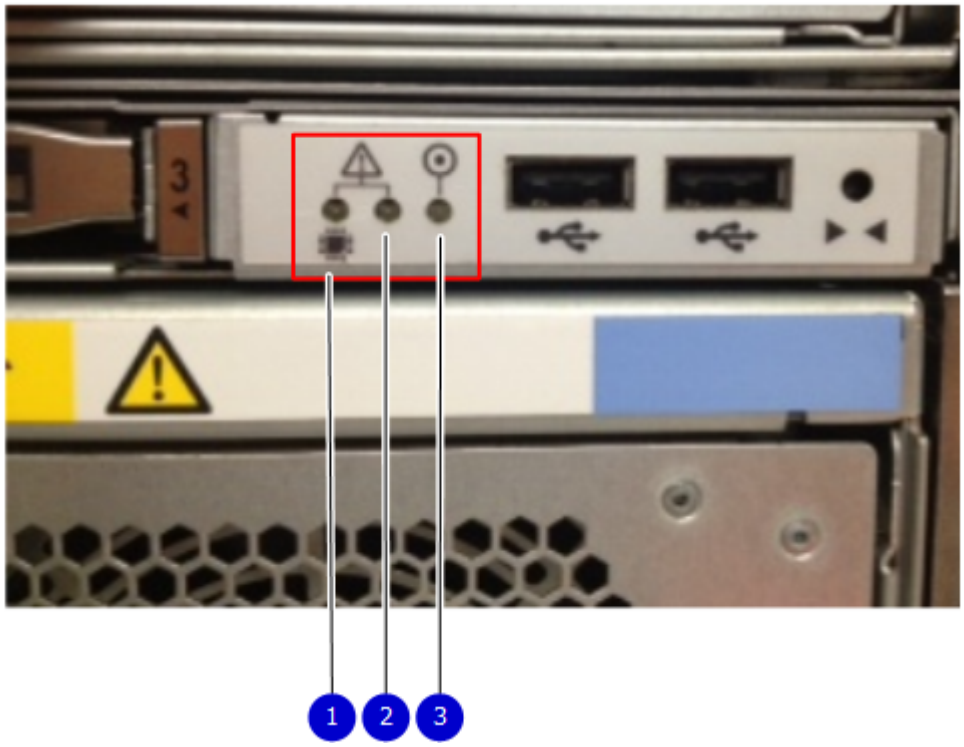
On the front panel to the right of SSD #4 (in Slot 3) are 3 LEDs that show high level system status. The System Power LED glows blue to show the system is powered on.

Note

The system can have power (be plugged in) but the blue LEDs are off if the system is powered off.

The SP Service LED is normally off, but glows amber whenever the storage processor (SP) requires service. The Enclosure Service LED is normally off, but glows amber whenever the SP or other replaceable parts require service. The System Power and Enclosure Service LEDs are visible through the front bezel.

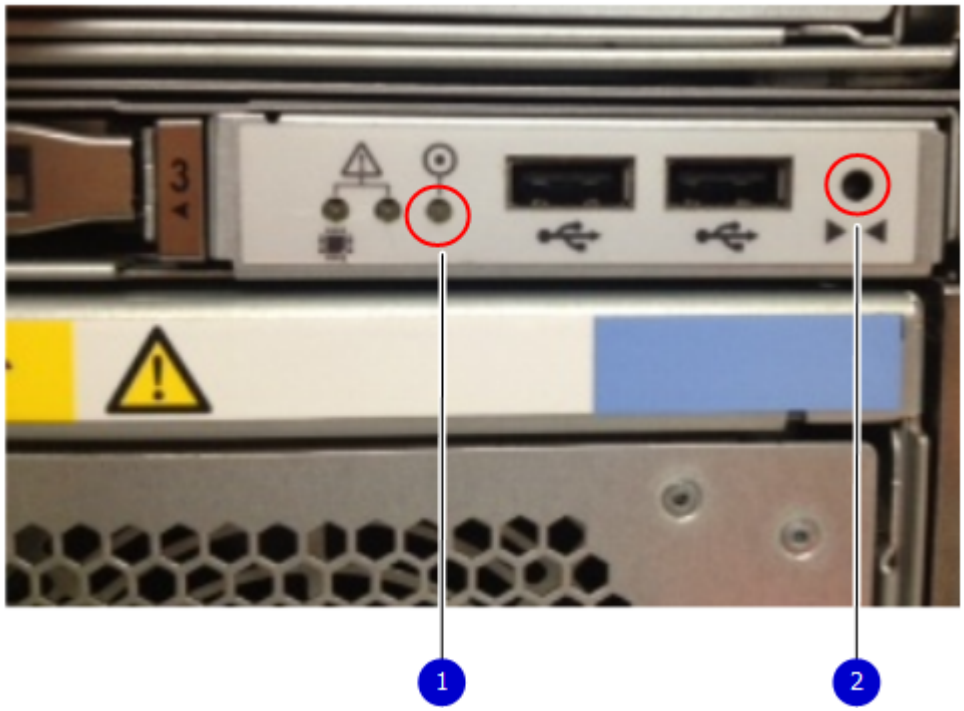
Figure 75 Service LEDs



1. SP service LED — Amber light indicates that the SP or one of its components needs service.
2. Enclosure Service LED — This is normally off, but amber light indicates that the enclosure or something within the enclosure— the fans, SP, I/O modules, management module etc—requires service.
3. System power LED — Blue light indicates system running

The power button shown in the picture is used when a system needs to be powered up after a shut down using the `system poweroff` command. Once power is restored the system power LED light turns blue.

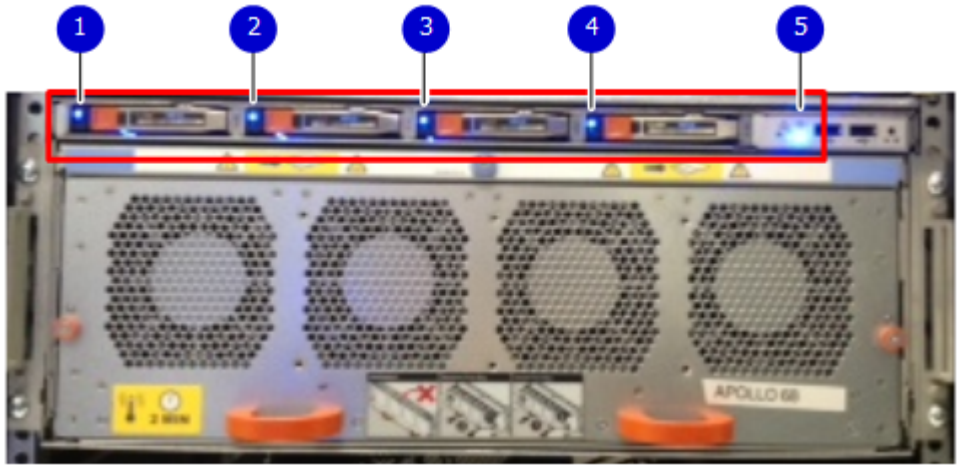
Figure 76 Power button



1. System power LED — Blue light indicates system running
2. Power button

The LEDs in the front are shown in the following figure.

Figure 77 Front LEDs



1. SSD LED in slot 0
2. SSD LED in slot 1
3. SSD LED in slot 2
4. SSD LED in slot 3
5. System power LED — Blue light indicates system running

Table 88 Front panel LED status indicators

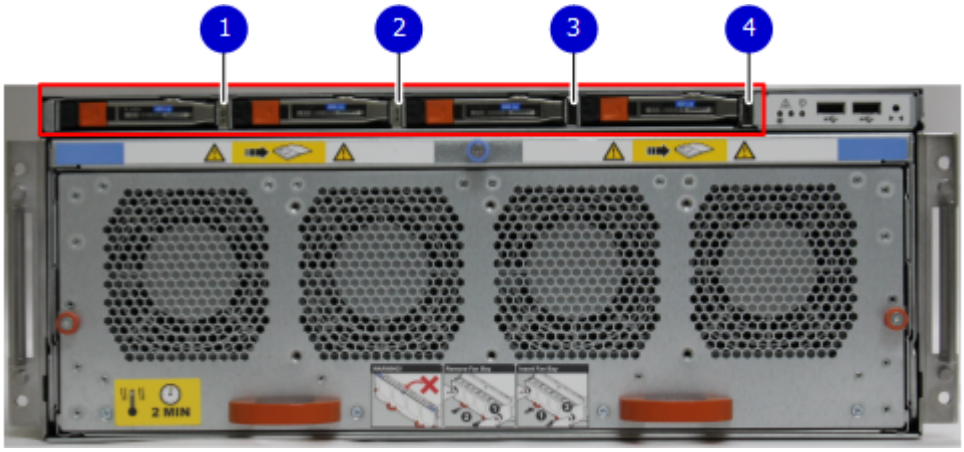
Part	Description or Location	State
System, SP fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates failure.
System, chassis fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates a fault condition.
SSD	Top LED	Solid blue, disk ready, blinks while busy.
SSD	Bottom LED	Dark indicates healthy. Solid amber indicates disk fail.

Solid-state drives

A system contains 4 hot-swappable 2.5 in. 400 GB solid-state drives (SSD) located in the front. There are four drive bays numbered 0–3 from left to right. A dual drive failure allows the system to operate without disruption.

Each drive has a blue colored power LED and an amber fault LED.

Figure 78 SSD drives

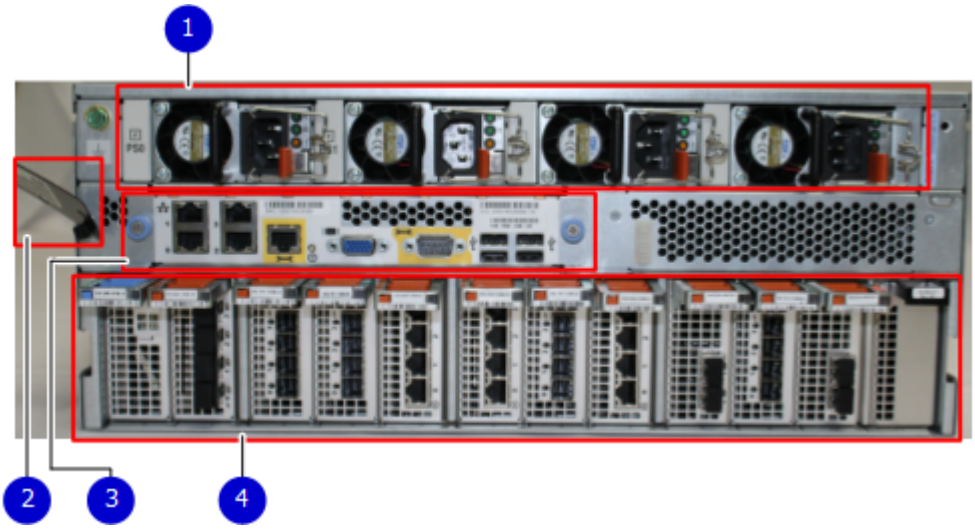


1. Slot 0
2. Slot 1
3. Slot 2
4. Slot 3

Rear panel

In the rear of the system, the top section contains the 4 power supply units. In the middle of the section, on the left, is serial number tag location. To the right of the serial number tag location is the management module. The lower section contains the NVRAM and the I/O modules numbered 0 through 11 from left to right. The photo shows the hardware features and interfaces on the rear of the system.

Figure 79 Features on rear of chassis



1. Power supply units
2. Serial number tag
3. Management module
4. NVRAM and I/O modules (slots 0-11)

The figure shows the location of the serial number tag on the left of the management module.

Figure 80 Serial number tag location

Power supply units

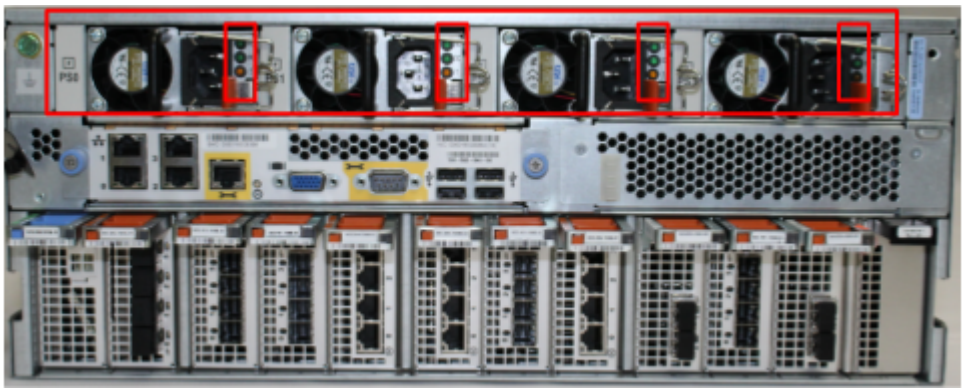
A DD9500/DD9800 system has four power supply units, numbered PSU0, PSU1, PSU2, and PSU3 from left to right. Each power supply has its own integral cooling fan.

Note

The DD9500/DD9800 system should be powered from redundant AC sources. This allows one AC source to fail or be serviced without impacting system operation. PSU0 and PSU1 should be attached to one AC source. PSU2 and PSU3 should be attached to the other AC source.

The AC power plugs are located to the right of each power supply. The wire clips for the AC cords hold the cords in place. The wire clips must be disengaged before disconnecting the AC power to each power supply.

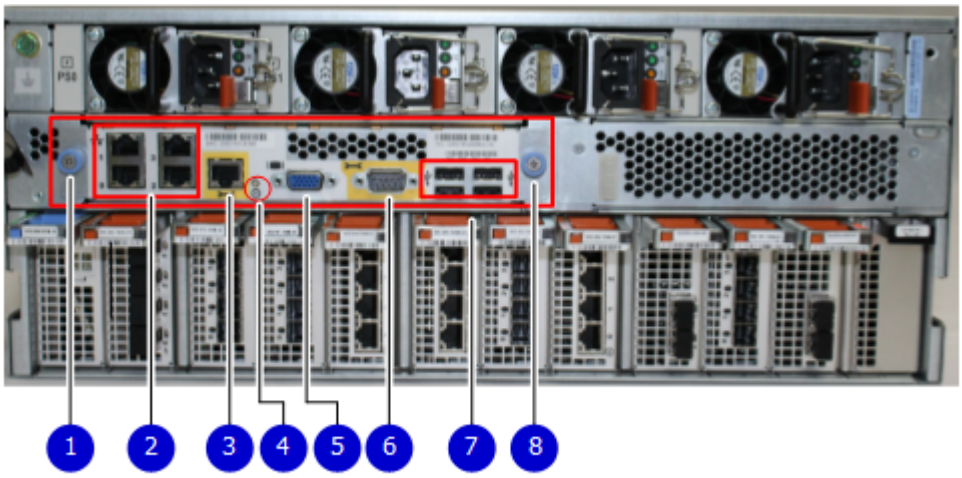
Figure 81 Four power supplies



Management module

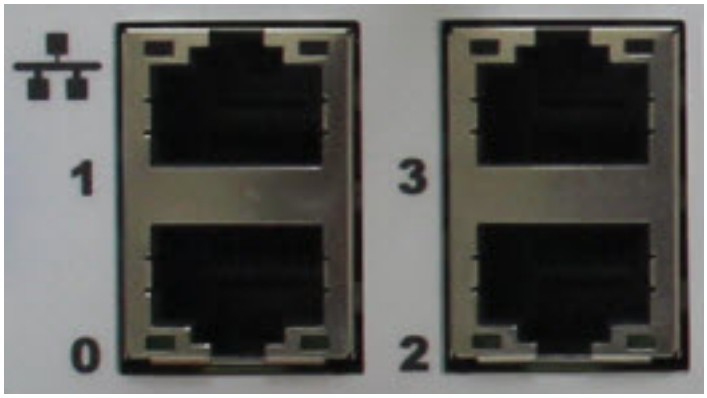
The following figure shows the location of the DD9500/DD9800 management module on the rear of the system and identifies the interfaces.

Figure 82 Management module



1. Left blue thumbscrew to loosen the management module
2. 4 x 1000BaseT Ethernet ports (For details, see the picture - 1000BaseT Ethernet ports)
3. Service network port (IPMI, 1000BaseT Ethernet port)
4. Service LED
5. VGA port
6. Serial port
7. Four USB ports
8. Right blue thumbscrew to loosen the management module

Figure 83 1000BaseT Ethernet ports



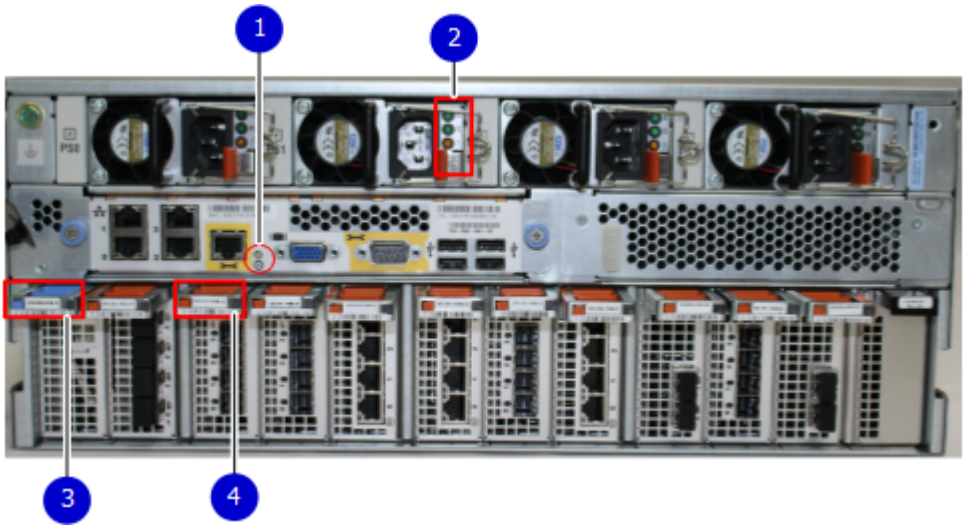
- Lower left port: physical #0, logical ethMa
- Top left port: physical #1, logical ethMb
- Lower right port: physical #2, logical ethMc
- Top right port: physical #3, logical ethMd

Rear LED indicators

The rear elements containing LEDs include each power supply, each I/O module, and the management module.

The figure shows the rear LEDS.

Figure 84 Rear LEDs



1. Management module service LEDs
2. Power supply LEDs
3. NVRAM LEDs
4. I/O Module LEDs

The power supply LEDs include:

- AC LED on top
- DC LED in the middle
- Service Required LED on the bottom

Figure 85 Power supply LEDs

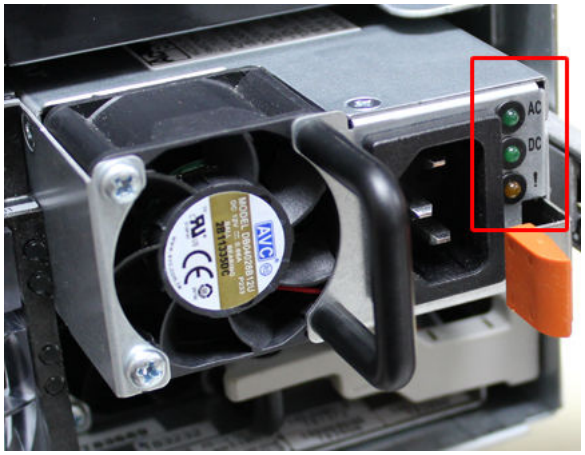


Table 89 Rear LED status indicators

Part	Description or Location	State
Power supply	AC LED	Steady green indicates normal AC input power.

Table 89 Rear LED status indicators (continued)

Part	Description or Location	State
Power supply	DC LED	Steady green indicates normal DC output power.
Power supply	Service LED	Solid amber indicates a failed power supply.
I/O module	I/O module handle	Solid green means I/O module functioning normally. Amber indicates a fault condition. Each I/O module also has per port LEDs. These LEDs are blue on the FC, and SAS I/O modules. They light when the port is active.
Management module	Bicolor LED	Solid green means management module functioning normally. Amber indicates that the management module requires service.

Available I/O modules

I/O modules may include:

- Quad port Ethernet 10GBase-SR Optical with LC connectors
- Quad port Ethernet 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad port Ethernet 10GBase-T Copper
- Dual port 16 Gbps Fibre Channel
- Quad port 6 Gbps SAS

I/O module port physical mapping

I/O module ports are numbered starting with 0. When the I/O modules are inserted vertically into the system chassis, port 0 is on the bottom.

I/O module port logical mapping

The numerical port labels on the I/O modules are identified logically in the DD OS software by the following descriptions:

- I/O module type
- I/O module slot
- Alphabetic character corresponding to the physical port number

The following example is based on a four-port Ethernet I/O module installed in slot 1 of the system chassis.

Table 90 Physical to logical port mapping example

Physical port	Logical identifier
0	eth1a

Table 90 Physical to logical port mapping example (continued)

Physical port	Logical identifier
1	eth1b
2	eth1c
3	eth1d

Ethernet I/O module options

The available Ethernet I/O modules are:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2 port 1000Base-T Copper (RJ45) /2 port 1000Base-SR Optical

Fibre Channel I/O modules

A Fibre Channel (FC) I/O module is a dual-port Fibre Channel module. Up to four FC I/O modules may be installed. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Boost over Fibre Channel is an optional feature and requires at least one FC I/O module. A maximum of four FC I/O modules may be installed in a system using either VTL or the Boost protocol or a combination of both protocols.

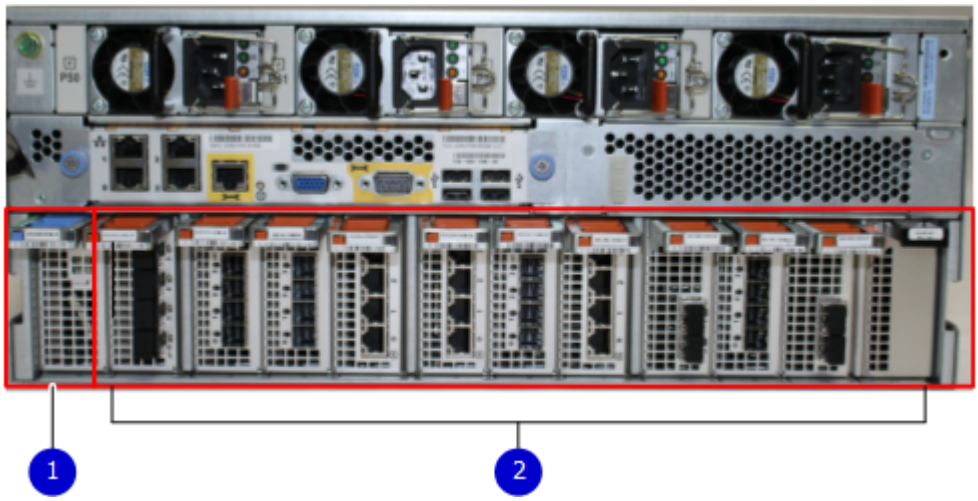
SAS I/O modules

DD9500 systems have three quad-port SAS I/O modules installed in slots 2, 3 and 6. Systems configured with DD Extended Retention (ER) or DD Cloud Tier software options require an additional SAS I/O module in slot 9.

I/O module slot assignments

The following figure shows the location of the NVRAM and I/O modules.

Figure 86 Location of NVRAM and I/O modules



1. NVRAM module—slot 0
2. I/O modules—slots 1 to 11 (See the I/O module slot assignments table.)

The table shows the I/O module slot assignments for the DD9500 system. Each type of I/O module is restricted to certain slots.

Table 91 DD9500 I/O module slot assignments

Slot	Base configuration	HA	ER or DD Cloud Tier	DD Cloud Tier and HA
0	NVRAM	NVRAM	NVRAM	NVRAM
1	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty
2	SAS	SAS	SAS	SAS
3	SAS	SAS	SAS	SAS
4	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
5	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
6	SAS	SAS	SAS	SAS
7	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
8	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
9	Not available (contains a filler)	Not available (contains a filler)	SAS	SAS
10	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
11	FC, Ethernet or empty	10 Gb optical Ethernet for interconnect	FC, Ethernet or empty	10 Gb optical Ethernet for interconnect between the

Table 91 DD9500 I/O module slot assignments (continued)

Slot	Base configuration	HA	ER or DD Cloud Tier	DD Cloud Tier and HA
		between the primary and standby nodes in the HA pair.		primary and standby nodes in the HA pair.

Slot addition rules

This system has 12 slots for I/O modules. Slots 0, 2, 3, 6, 9, and 11 are reserved for mandatory I/O modules. Slots 1, 4, 5, 7, 8, and 10 support optional host interface I/O modules. The maximum supported number of any type of host interface (Ethernet or FC) I/O module is four.

Note

The maximum number of host interface I/O modules that are listed above does not include the 10 GbE Optical I/O module for the HA interconnect. The HA interconnect is a fifth Ethernet module, but it is reserved for communication between the two nodes of an HA pair, and is not available for host connections.

The maximum number of I/O modules, including both mandatory and optional I/O modules, supported in a system varies by configuration:

- Single node: 10
- HA: 10
- DD Extended Retention: 10
- DD Cloud Tier: 10
- HA + DD Cloud Tier: 11

Three I/O module slots are tied to each CPU in the system. When installing I/O modules, balance the load across the CPUs. The following table shows the CPU to slot mappings.

CPU	I/O module slots
0	0, 1, 2
1	3, 4, 5
2	6, 7, 8
3	9, 10, 11

The following table assigns rules for populating the I/O modules.

Table 92 I/O module slot population rules

Step	I/O module type	Slots	Notes
1: Populate mandatory I/O modules	NVRAM	0	
	Quad Port SAS	2	
	Quad Port SAS	3	

Table 92 I/O module slot population rules (continued)

Step	I/O module type	Slots	Notes
	Quad Port SAS	6	
	Quad Port SAS	9	This slot remains empty if the system does not use DD Cloud Tier or DD Extended Retention.
	Quad Port 10GbE Optical	11	This slot remains empty if the system does not use HA.
2: Populate host interface I/O modules	• Quad Port 10GbE SR • Quad Port 10 GBase-T • Dual Port 16 Gbps Fibre Channel	1, 4, 5, 7, 8, 10	Install host interface I/O modules in the remaining slots. Install the I/O modules to balance the load across the CPUs. Do not place two Ethernet or two FC I/O modules on one CPU.[a]

a. HA systems are the exception to this guidance, as a Quad Port 10GbE SR I or Quad Port 10 GBase-T /O module can be added in slot 10 alongside the HA interconnect I/O module in slot 11.

Internal System Components

The storage processor (SP) is a subassembly within the chassis that contains the memory risers with the DIMMs and a fan tray with fan modules. The SP module also contains the 4 CPUs, which cannot be removed or replaced.

- The memory risers tray, which contains 8 memory risers with DIMMs, can be accessed from the front of the SP module. The memory risers are not hot swappable
- The fan tray, which contains 8 fan modules, can be accessed from the front of the SP module. The fans are hot swappable.

The DIMMS can be accessed by pulling the entire SP module away from the chassis. Depending on the model, there are DIMMs totaling:

- 256 GB or 512 GB for a DD9500 system.
- 256 GB or 768 GB for a DD9800 system.

The figures show the location of the SP module, the DIMM risers accessed from a partly removed SP module, and the fan tray partly removed.

Do not lift the DD9500/DD9800 system, or the storage processor (SP) module, or any modules by the handle. The handle is not designed to support the weight of the populated shelf. Also do not carry the DD9500/DD9800 system or the SP by the handle. The handles are only intended to be used to insert or remove the SP module.

Figure 87 SP module

Figure 88 Releasing a memory riser

1. Left riser card ejector handle
2. Release button
3. Right riser card ejector handle

Figure 89 Open fan tray

Note

Do not loosen the blue thumbscrew on the SP latch handle to access the fan tray. Use the orange thumbscrews on the front as shown in the picture.

1. Left fan tray thumbscrew
2. Front panel left handle
3. Front panel right handle
4. Right fan tray thumbscrew
5. Location map of the fans

DIMM modules

The DD9500 system contains the following memory configurations:

Table 93 DD9500 memory configurations

System	Base	Expanded	ER/DD Cloud Tier
DD9500	32 x 8 GB DIMMs (256 GB)	32 x 8 GB DIMMs + 16 x 16 GB DIMMs (512 GB)	32 x 8 GB DIMMs + 16 x 16 GB DIMMs (512 GB)

Cooling fans

A system contains eight hot-swappable cooling fans in a 7+1 redundant configuration, which is located in the front of the system within a movable fan tray. The fans provide cooling for the processors, DIMMs, and I/O modules. Each fan has an LED which glows amber when the fan is failed or faulted. A system can run with one fan faulted.

CHAPTER 11

DD9800

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- DD9800 system specifications 163
- DD9800 storage capacity 164
- DD9800 front panel 166
- Rear panel 170
- I/O module slot assignments 175
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DD9800 system features

Table 94 DD9800 system features

Feature		DD9800 (Base configuration)	DD9800 (Expanded configuration)
Rack height		4U, supported in four-post racks only	4U, supported in four-post racks only
Rack mounting		Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9–76.2 cm).	Rack mount kit included with each system. Adjustable between 24 - 36 in. (60.9–76.2 cm).
Power		4 hot-swappable power units, 2 pairs of 1 +1 redundant	4 hot-swappable power units, 2 pairs of 1 +1 redundant
Voltage		200–240 V~. Frequency: 50 Hz to 60 Hz.	200–240 V~. Frequency: 50 Hz to 60 Hz.
Processor		4 Intel EX processors.	4 Intel EX processors.
NVRAM		One 8-GB NVRAM module for data integrity during a power outage	One 8-GB NVRAM module for data integrity during a power outage
Fans		8 hot-swappable fans, redundant	8 hot-swappable fans, redundant
Memory		32 x 8 GB DIMM (256 GB)	32 x 8 GB DIMM + 32 x 16 GB DIMM (768 GB)
Internal drives		4 x 400 GB (base 10) hot-swappable solid state drives (SSD)	4 x 400 GB (base 10) hot-swappable solid state drives (SSD)
I/O module slots		11 I/O module (Fibre Channel, Ethernet, and SAS) slots. Replaceable I/O modules are not hot-swappable. See I/O module slot assignments on page 155	11 I/O module (Fibre Channel, Ethernet, and SAS) slots. Replaceable I/O modules are not hot-swappable. See I/O module slot assignments on page 155
Supported capacity	Non-extended retention	630 TB	1260 TB
	DD Cloud Tier	N/A	2520 TB [a]
	Extended retention	N/A	1260 TB [b]
High availability support		Yes	Yes
HA private interconnect		4 10 GbE optical ports	4 10 GbE optical ports
External SSD shelf		1 x 8 drive SSD shelf	1 x 15 drive SSD shelf

a. DD Cloud Tier requires five ES30 shelves fully populated with 4 TB drives to store DD Cloud Tier metadata.
b. Extended retention not available on HA configurations

DD9800 system specifications

Table 95 DD9800 system specifications

Model	Watts	BTU/hr	Power (VA)	Weight	Width	Depth	Height
DD9800	1887	6444	1981	117 lb / 53.2 kg	19 in / 48.3 cm	29.5 in / 74.9 cm	7 in / 17.8 cm

- Operating temperature: 50° to 95° F (10° to 35° C), derate 1.1° C per 1000 feet, above 7500 feet up to 10,000 feet
- Operating humidity: 20% to 80%, non-condensing
- Non-operating temperature: -40° to +149° F (-40° to +65° C)
- Operating acoustic noise: Sound power, LWAd, is 7.7 bels.

DD9800 storage capacity

The table lists the capacities of the systems. Data Domain system internal indexes and other product components use variable amounts of storage, depending on the type of data and the sizes of files. If you send different data sets to otherwise identical systems, one system may, over time, have room for more or less actual backup data than another.

Note

Data Domain system commands compute and display amounts of disk space or data as decimal multiples of certain powers of two (2^{10}, 2^{20}, 2^{30}, and so forth). For example, 7 GiB of disk space = 7 x 2^{30} bytes = 7 x 1,073,741,824 bytes. Data Domain refers to this process as Base 2 calculation.

Table 96 DD9800 storage capacity

System/ Installed Memory	Internal Disks	Raw Storage (Base 10)	Data Storage Space (Base 2 Calculation)	Data Storage Space (Base 10 Calculation)
DD9800 (3 SAS I/O modules) 256 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	630 TB (external)	457.8 TiB	504 TB
DD9800 (3 SAS I/O modules) 768 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	1,260 TB (external)	915.6 TiB	1,008 TB
DD9800 with DD Cloud Tier (4 SAS I/O modules) 768 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	3,780 TB (external)	2746.8 TiB	3.024 TB
DD9800 with ER (4 SAS I/O modules) 768 GB	2.5 in.; 4 x 400 GB SATA SSD No User Data	2,520 TB (external)	1,831.2 TiB	2,016 TB

Note

For information about Data Domain expansion shelves and guidelines on using a mixture of shelves, see the *Data Domain ES30 Expansion Shelf Hardware Guide* and *Data Domain DS60 Expansion Shelf Hardware Guide*.

Table 97 DD9800 with ES30 SAS shelves

	DD9800	DD9800
Memory (GB)	256	768
SAS I/O modules x ports per module	3x4	3x4
ES30 support (TB)	SAS 30, 45, 60	SAS 30, 45, 60
Maximum shelves per set	5	5
Maximum number of sets	6	6

Note

ES30 SATA shelves are supported when upgrading from an older Data Domain single node system, but are not supported with HA pairs or new installations.

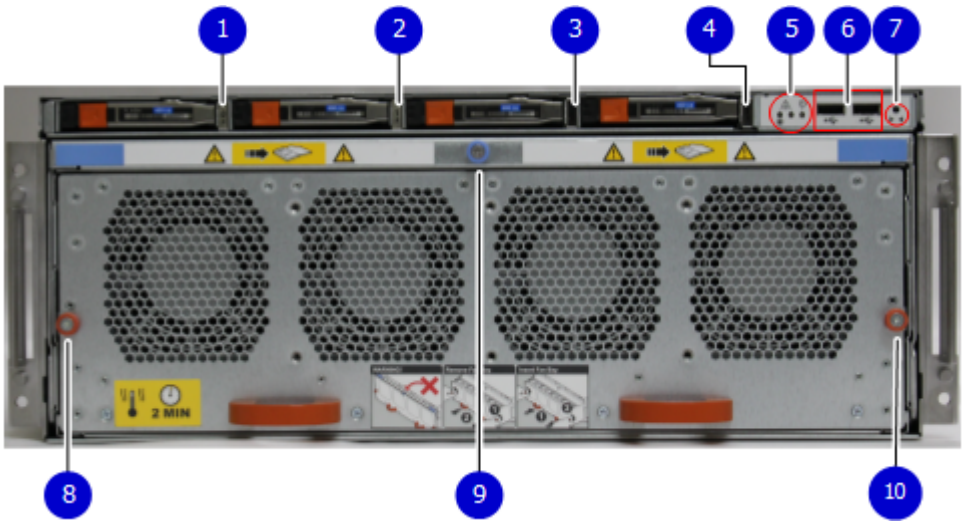
Table 98 DD9800 with DS60 shelves

	DD9800	DD9800
Memory (GB)	256	768
SAS I/O modules x ports per module	3x4	3x4
DS60 support (TB)	SAS 45, 60	SAS 45, 60
Maximum shelves per set	4	4
Maximum number of sets	6	6

DD9800 front panel

The four solid state drives (SSDs), the storage processor (SP), and the fans are accessed from the front of the system. The SP must be pulled out to provide access to the DIMMs. The fans are accessed without pulling or removing the SP and they are hot-swappable. The photo shows the interfaces on the front of the system.

Figure 90 Front panel components



1. SSD slot 0
2. SSD slot 1
3. SSD slot 2
4. SSD slot 3
5. Front LEDs
6. USB ports
7. Power button
8. Fan tray thumbscrew (left)
9. SP module thumbscrew to secure the ejector handle
10. Fan tray thumbscrew (right)

Front LED indicators

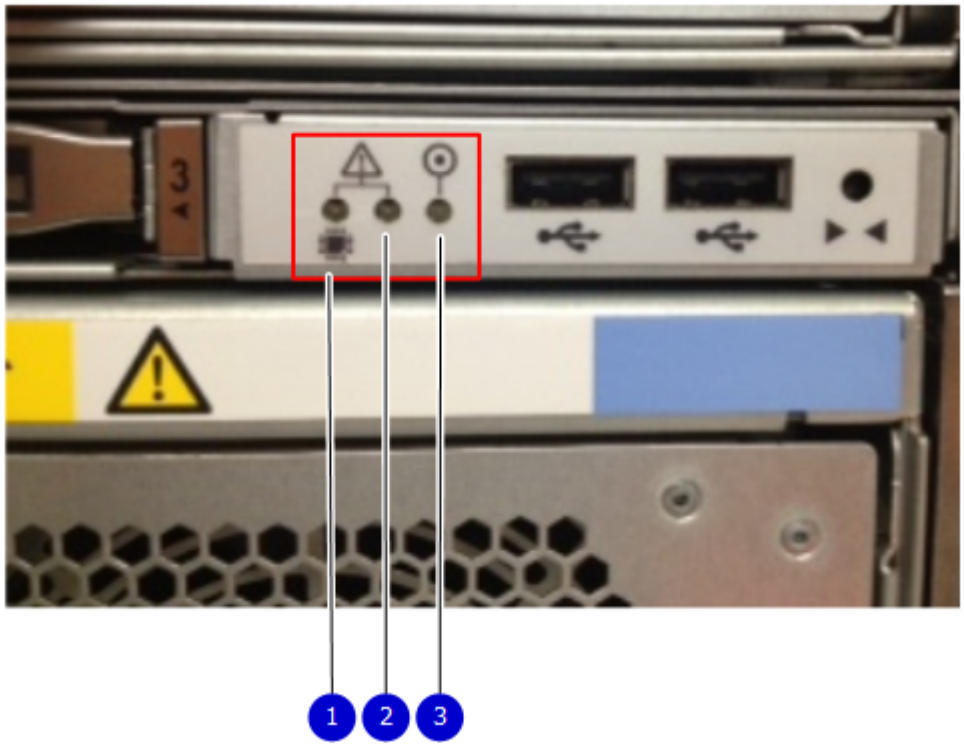
On the front panel to the right of SSD #4 (in Slot 3) are 3 LEDs that show high level system status. The System Power LED glows blue to show the system is powered on.

Note

The system can have power (be plugged in) but the blue LEDs are off if the system is powered off.

The SP Service LED is normally off, but glows amber whenever the storage processor (SP) requires service. The Enclosure Service LED is normally off, but glows amber whenever the SP or other replaceable parts require service. The System Power and Enclosure Service LEDs are visible through the front bezel.

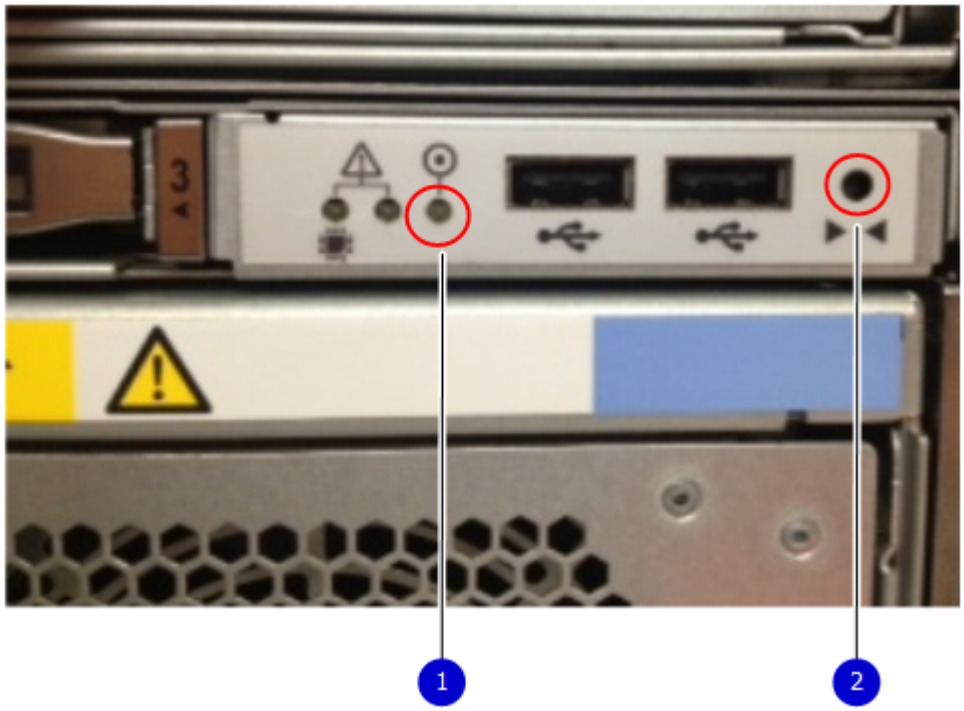
Figure 91 Service LEDs



1. SP service LED — Amber light indicates that the SP or one of its components needs service.
2. Enclosure Service LED — This is normally off, but amber light indicates that the enclosure or something within the enclosure— the fans, SP, I/O modules, management module etc—requires service.
3. System power LED — Blue light indicates system running

The power button shown in the picture is used when a system needs to be powered up after a shut down using the `system poweroff` command. Once power is restored the system power LED light turns blue.

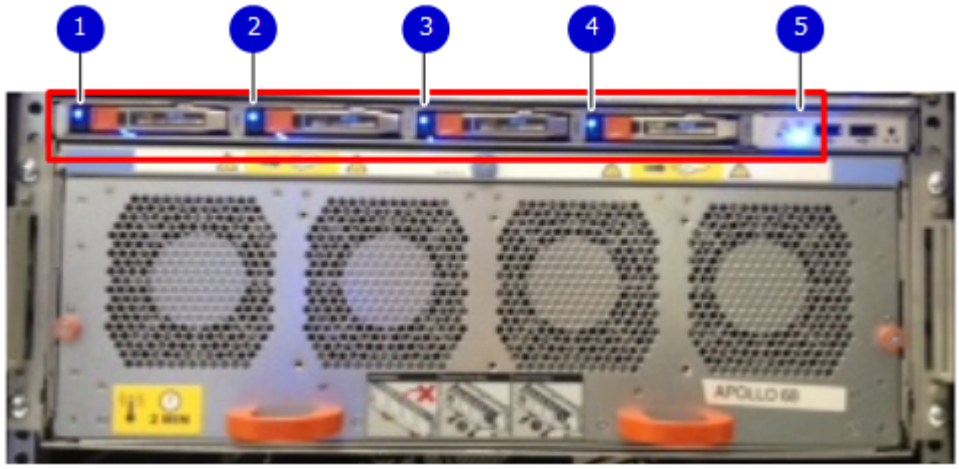
Figure 92 Power button



1. System power LED — Blue light indicates system running
2. Power button

The LEDs in the front are shown in the following figure.

Figure 93 Front LEDs



1. SSD LED in slot 0
2. SSD LED in slot 1
3. SSD LED in slot 2
4. SSD LED in slot 3
5. System power LED — Blue light indicates system running

Table 99 Front panel LED status indicators

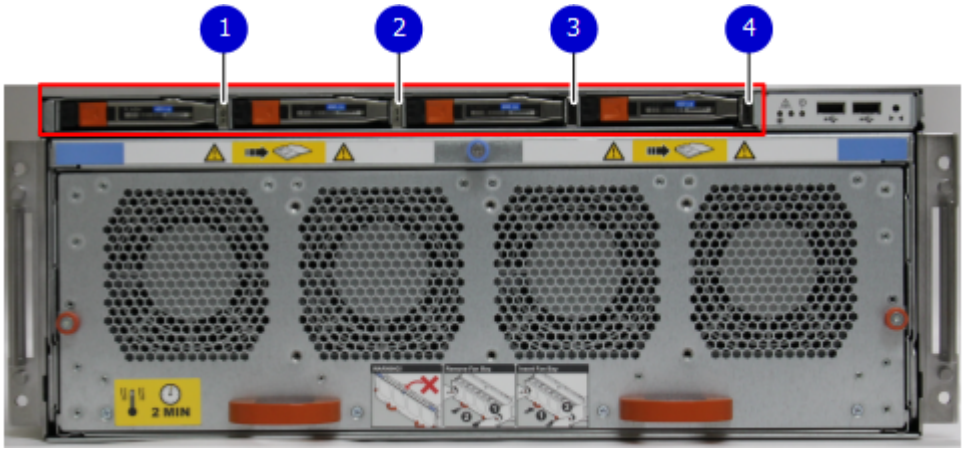
Part	Description or Location	State
System, SP fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates failure.
System, chassis fault	Exclamation point within a triangle	Dark indicates normal operation. Amber indicates a fault condition.
SSD	Top LED	Solid blue, disk ready, blinks while busy.
SSD	Bottom LED	Dark indicates healthy. Solid amber indicates disk fail.

Solid-state drives

A system contains 4 hot-swappable 2.5 in. 400 GB solid-state drives (SSD) located in the front. There are four drive bays numbered 0–3 from left to right. A dual drive failure allows the system to operate without disruption.

Each drive has a blue colored power LED and an amber fault LED.

Figure 94 SSD drives

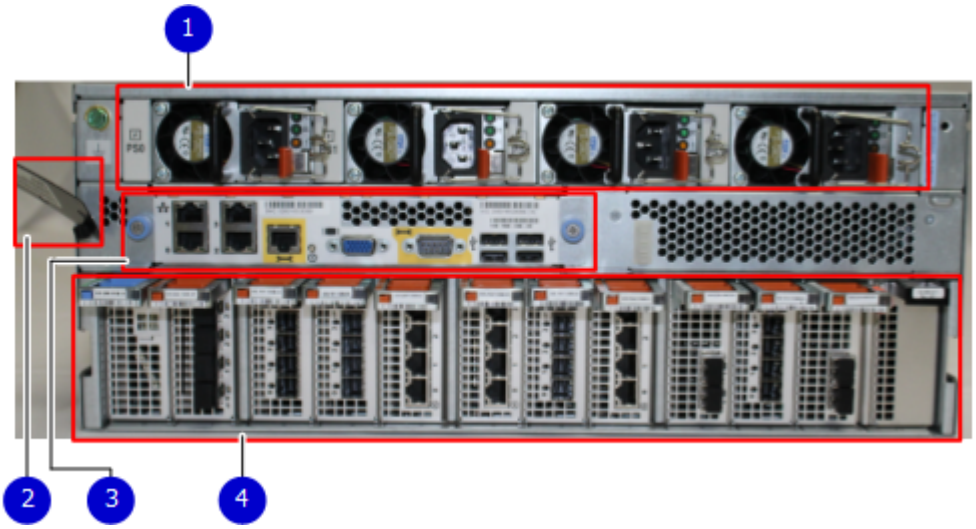


1. Slot 0
2. Slot 1
3. Slot 2
4. Slot 3

Rear panel

In the rear of the system, the top section contains the 4 power supply units. In the middle of the section, on the left, is serial number tag location. To the right of the serial number tag location is the management module. The lower section contains the NVRAM and the I/O modules numbered 0 through 11 from left to right. The photo shows the hardware features and interfaces on the rear of the system.

Figure 95 Features on rear of chassis



1. Power supply units
2. Serial number tag
3. Management module
4. NVRAM and I/O modules (slots 0-11)

The figure shows the location of the serial number tag on the left of the management module.

Figure 96 Serial number tag location

Power supply units

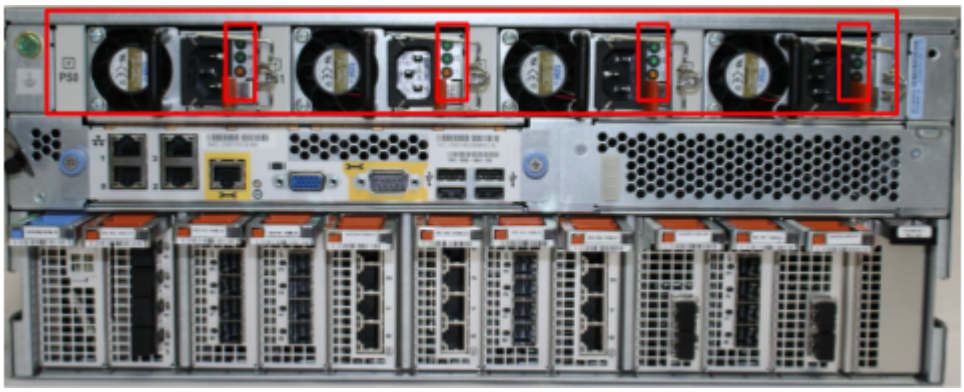
A DD9800 system has four power supply units, numbered PSU0, PSU1, PSU2, and PSU3 from left to right. Each power supply has its own integral cooling fan.

Note

The DD9800 system should be powered from redundant AC sources. This allows one AC source to fail or be serviced without impacting system operation. PSU0 and PSU1 should be attached to one AC source. PSU2 and PSU3 should be attached to the other AC source.

The AC power plugs are located to the right of each power supply. The wire clips for the AC cords hold the cords in place. The wire clips must be disengaged before disconnecting the AC power to each power supply.

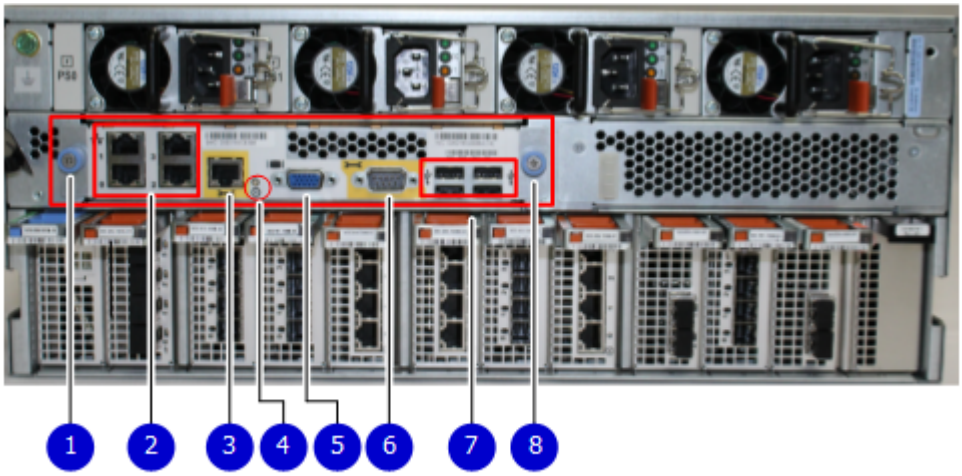
Figure 97 Four power supplies



Management module

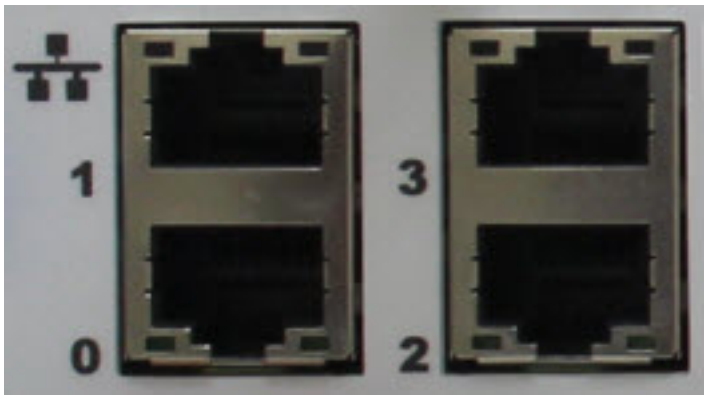
The following figure shows the location of the DD9500/DD9800 management module on the rear of the system and identifies the interfaces.

Figure 98 Management module



1. Left blue thumbscrew to loosen the management module
2. 4 x 1000BaseT Ethernet ports (For details, see the picture - 1000BaseT Ethernet ports)
3. Service network port (IPMI, 1000BaseT Ethernet port)
4. Service LED
5. VGA port
6. Serial port
7. Four USB ports
8. Right blue thumbscrew to loosen the management module

Figure 99 1000BaseT Ethernet ports



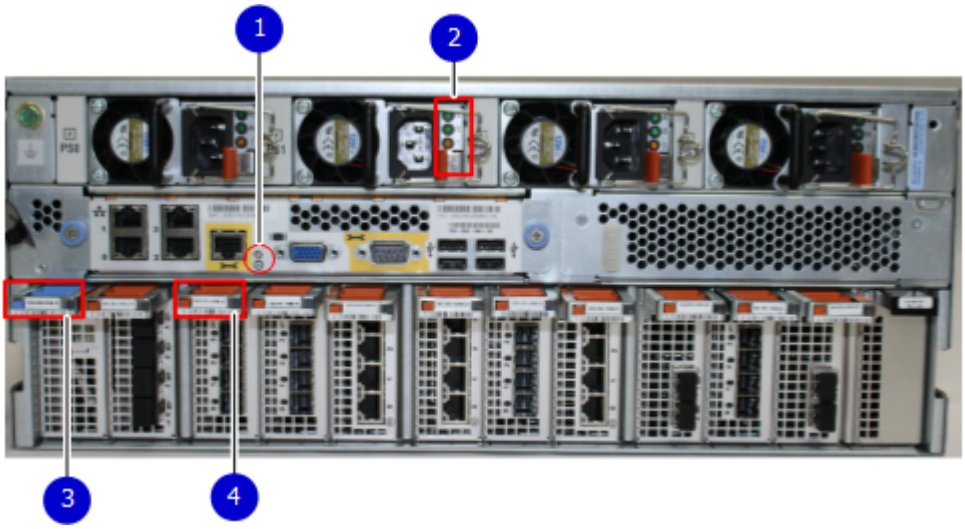
- Lower left port: physical #0, logical ethMa
- Top left port: physical #1, logical ethMb
- Lower right port: physical #2, logical ethMc
- Top right port: physical #3, logical ethMd

Rear LED indicators

The rear elements containing LEDs include each power supply, each I/O module, and the management module.

The figure shows the rear LEDS.

Figure 100 Rear LEDs



1. Management module service LEDs
2. Power supply LEDs
3. NVRAM LEDs
4. I/O Module LEDs

The power supply LEDs include:

- AC LED on top
- DC LED in the middle
- Service Required LED on the bottom

Figure 101 Power supply LEDs

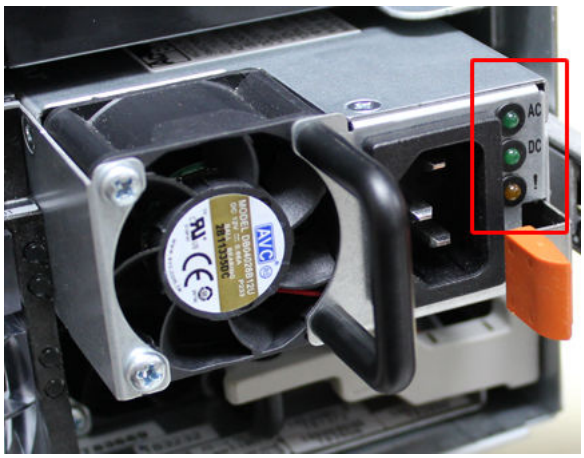


Table 100 Rear LED status indicators

Part	Description or Location	State
Power supply	AC LED	Steady green indicates normal AC input power.
Power supply	DC LED	Steady green indicates normal DC output power.

Table 100 Rear LED status indicators (continued)

Part	Description or Location	State
Power supply	Service LED	Solid amber indicates a failed power supply.
I/O module	I/O module handle	Solid green means I/O module functioning normally. Amber indicates a fault condition. Each I/O module also has per port LEDs. These LEDs are blue on the FC, and SAS I/O modules. They light when the port is active.
Management module	Bicolor LED	Solid green means management module functioning normally. Amber indicates that the management module requires service.

Available I/O modules

I/O modules may include:

- Quad port Ethernet 10GBase-SR Optical with LC connectors
- Quad port Ethernet 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad port Ethernet 10GBase-T Copper
- Dual port 16 Gbps Fibre Channel
- Quad port 6 Gbps SAS

I/O module port physical mapping
I/O module ports are numbered starting with 0. When the I/O modules are inserted vertically into the system chassis, port 0 is on the bottom.

I/O module port logical mapping
The numerical port labels on the I/O modules are identified logically in the DD OS software by the following descriptions:

- I/O module type
- I/O module slot
- Alphabetic character corresponding to the physical port number

The following example is based on a four-port Ethernet I/O module installed in slot 1 of the system chassis.

Table 101 Physical to logical port mapping example

Physical port	Logical identifier
0	eth1a
1	eth1b

Table 101 Physical to logical port mapping example (continued)

Physical port	Logical identifier
2	eth1c
3	eth1d

Ethernet I/O module options

The available Ethernet I/O modules are:

- Dual Port 10GBase-SR Optical with LC connectors
- Dual Port 10GBase-CX1 Direct Attach Copper with SPF+ module
- Quad Port 1000Base-T Copper with RJ-45 connectors
- Quad port 2 port 1000Base-T Copper (RJ45) /2 port 1000Base-SR Optical

Fibre Channel I/O modules

A Fibre Channel (FC) I/O module is a dual-port Fibre Channel module. Up to four FC I/O modules may be installed. The optional virtual tape library (VTL) feature requires at least one FC I/O module. Boost over Fibre Channel is an optional feature and requires at least one FC I/O module. A maximum of four FC I/O modules may be installed in a system using either VTL or the Boost protocol or a combination of both protocols.

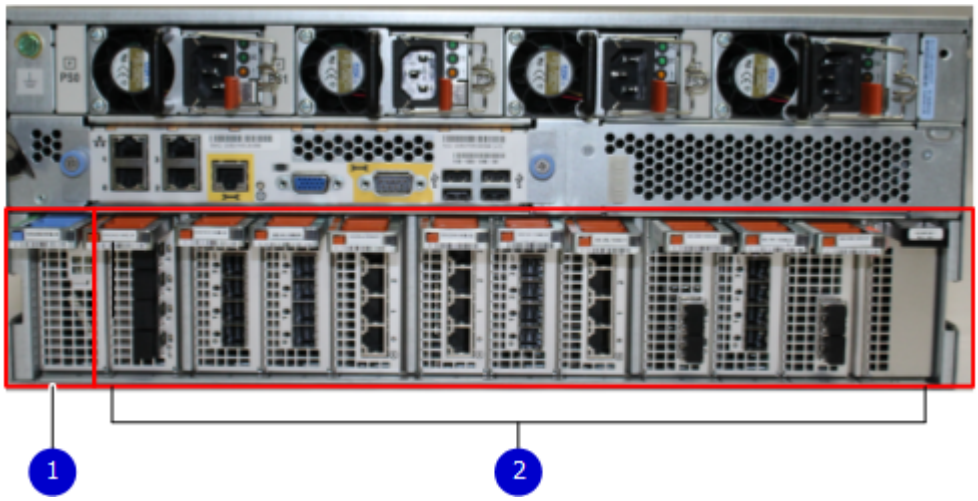
SAS I/O modules

DD9800 systems have three quad-port SAS I/O modules installed in slots 2, 3 and 6. Systems configured with DD Extended Retention (ER) or DD Cloud Tier software options require an additional SAS I/O module in slot 9.

I/O module slot assignments

The following figure shows the location of the NVRAM and I/O modules.

Figure 102 Location of NVRAM and I/O modules



1. NVRAM module—slot 0
2. I/O modules—slots 1 to 11 (See the I/O module slot assignments table.)

The table shows the I/O module slot assignments for the DD9800 system. Each type of I/O module is restricted to certain slots.

Table 102 DD9800 I/O module slot assignments

Slot	Base configuration	HA	ER or DD Cloud Tier	DD Cloud Tier and HA
0	NVRAM	NVRAM	NVRAM	NVRAM
1	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty	Fibre Channel (FC), Ethernet or empty
2	SAS	SAS	SAS	SAS
3	SAS	SAS	SAS	SAS
4	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
5	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
6	SAS	SAS	SAS	SAS
7	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
8	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
9	Not available (contains a filler)	Not available (contains a filler)	SAS	SAS
10	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty	FC, Ethernet or empty
11	FC, Ethernet or empty	10 Gb optical Ethernet for interconnect between the primary and standby nodes in the HA pair.	FC, Ethernet or empty	10 Gb optical Ethernet for interconnect between the primary and standby nodes in the HA pair.

Slot addition rules

This system has 12 slots for I/O modules. Slots 0, 2, 3, 6, 9, and 11 are reserved for mandatory I/O modules. Slots 1, 4, 5, 7, 8, and 10 support optional host interface I/O modules. The maximum supported number of any type of host interface (Ethernet or FC) I/O module is four.

Note

The maximum number of host interface I/O modules that are listed above does not include the 10 GbE Optical I/O module for the HA interconnect. The HA interconnect is a fifth Ethernet module, but it is reserved for communication between the two nodes of an HA pair, and is not available for host connections.

The maximum number of I/O modules, including both mandatory and optional I/O modules, supported in a system varies by configuration:

- Single node: 10
- HA: 10
- DD Extended Retention: 10
- DD Cloud Tier: 10
- HA + DD Cloud Tier: 11

Three I/O module slots are tied to each CPU in the system. When installing I/O modules, balance the load across the CPUs. The following table shows the CPU to slot mappings.

CPU	I/O module slots
0	0, 1, 2
1	3, 4, 5
2	6, 7, 8
3	9, 10, 11

The following table assigns rules for populating the I/O modules.

Table 103 I/O module slot population rules

Step	I/O module type	Slots	Notes
1: Populate mandatory I/O modules	NVRAM	0	
	Quad Port SAS	2	
	Quad Port SAS	3	
	Quad Port SAS	6	
	Quad Port SAS	9	This slot remains empty if the system does not use DD Cloud Tier or DD Extended Retention.
	Quad Port 10GbE Optical	11	This slot remains empty if the system does not use HA.
2: Populate host interface I/O modules	• Quad Port 10GbE SR • Quad Port 10 GBase-T • Dual Port 16 Gbps Fibre Channel	1, 4, 5, 7, 8, 10	Install host interface I/O modules in the remaining slots. Install the I/O modules to balance the load across the CPUs. Do not place two Ethernet or two FC I/O modules on one CPU.[a]

a. HA systems are the exception to this guidance, as a Quad Port 10GbE SR I or Quad Port 10 GBase-T /O module can be added in slot 10 alongside the HA interconnect I/O module in slot 11.

Internal system components

The storage processor (SP) is a subassembly within the chassis that contains the memory risers with the DIMMs and a fan tray with fan modules. The SP module also contains the 4 CPUs, which cannot be removed or replaced.

- The memory risers tray, which contains 8 memory risers with DIMMs, can be accessed from the front of the SP module. The memory risers are not hot swappable
- The fan tray, which contains 8 fan modules, can be accessed from the front of the SP module. The fans are hot swappable.

The DIMMS can be accessed by pulling the entire SP module away from the chassis. Depending on the model, there are DIMMs totaling 256 GB or 768 GB.

The figures show the location of the SP module, the DIMM risers accessed from a partly removed SP module, and the fan tray partly removed.

Do not lift the DD9800 system, or the storage processor (SP) module, or any modules by the handle. The handle is not designed to support the weight of the populated shelf. Also do not carry the DD9800 system or the SP by the handle. The handles are only intended to be used to insert or remove the SP module.

Figure 103 SP module

Figure 104 Releasing a memory riser

1. Left riser card ejector handle
2. Release button
3. Right riser card ejector handle

Figure 105 Open fan tray

Note

Do not loosen the blue thumbscrew on the SP latch handle to access the fan tray. Use the orange thumbscrews on the front as shown in the picture.

1. Left fan tray thumbscrew
2. Front panel left handle
3. Front panel right handle
4. Right fan tray thumbscrew
5. Location map of the fans

DIMM modules

The DD9800 system contains the following memory configurations:

Table 104 DD9800 memory configurations

System	Base	Expanded	ER/DD Cloud Tier
DD9800	32 x 8 GB DIMMs (256 GB)	32 x 8 GB DIMMs + 32 x 16 GB DIMMS (768 GB)	32 x 8 GB DIMMs + 32 x 16 GB DIMMS (768 GB)

Cooling fans

A system contains eight hot-swappable cooling fans in a 7+1 redundant configuration, which is located in the front of the system within a movable fan tray. The fans provide cooling for the processors, DIMMs, and I/O modules. Each fan has an LED which glows amber when the fan is failed or faulted. A system can run with one fan faulted.

CHAPTER 12

ES30

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- ES30 site requirements 182
- ES30 hardware specifications 183
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- Back panel 185
- Ports 188

ES30 overview

Adding ES30 expansion shelves to a Data Domain system increases the system's storage capacity.

The expansion shelves are organized by sets (or chains). The following table shows the number of ES30 shelves than can be in a set.

Table 105 ES30 shelves in a set

Configuration	ES30 shelves
Base Data Domain systems	1–4
Extended Retention software option	1–7

For redundancy, a shelf set is usually connected to two separate SAS I/O modules or HBA cards on the Data Domain controller, and all of the shelves within a set are connected to each other via dual paths.

ES30 site requirements

This table lists the ES30 site requirements.

Table 106 ES30 site requirements

Requirement	ES30 expansion shelf
Vertical Space in Standard 19", 4-post Rack	3U. Do not use a two-post rack. See the slide rail and installation documentation in the packaging for installing in a rack.
Air Conditioning	Air conditioning that can cope with the maximum BTU/hr thermal rating.
Temperature Controls	Adequate temperature control with a gradient (change) not to exceed 30° C in an hour.
Front Bezel Clearance	1.56 inches (4.0 cm) of unobstructed clearance.
Back Panel Clearance	5 inches (12.7 cm) of unobstructed clearance.
Airflow	In a closed or multi-unit rack, ensure that the unit has adequate airflow. If the equipment is mounted in an enclosed (as opposed to a four-post open rack), the front and rear doors should have 65% minimum open area for airflow. Whether in an open or enclosed rack, use filler panels to prevent hot air recirculation. The rack design and installation should take into consideration the maximum ambient operating temperature of the equipment, which is 35° C.
Power/ Grounding	Two single-phase AC power outlets with an earth ground conductor (safety ground). A safe electrical earth connection must be

Table 106 ES30 site requirements (continued)

Requirement	ES30 expansion shelf
	provided to each power cord. Voltage should be 100-120 VAC or 200-240 VAC; 50 or 60 Hz. Use only with branch circuits protected by a minimum 15A overcurrent protector. Plug the two power cords into separate branch circuit supplies for redundancy.

ES30 hardware specifications

Note

All ratings assume a fully configured ES30.

Table 107 ES30 hardware specifications

Specification	Description
AC line voltage	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC line current (operating maximum)	2.8 A max at 100 Vac, 1.4 A max at 200 Vac
Power consumption (operating maximum)	280 VA (235 W) max
Power factor	0.98 min at full load, low voltage
Heat dissipation (operating maximum)	8.46 x 10^5 J/hr, (800 Btu/hr) max
Dimensions (rack mounted, with bezel)	• Width: 17.62" (45 cm) Depth: 14” (35.56cm) • Height: 5.25” (13.34cm) 3 RU
Maximum Weight	68 lbs (30.8 kg)
Operating Temperature	• Ambient temperature: 10° C to 35° C (50° F to 95° F) • Temperature gradient: 10° C/hr (180° F/hr) • Relative humidity extremes: 20% to 80% noncondensing
Recommended Operating Relative Humidity	40% to 55% noncondensing
Non-Operating Temperature	• Ambient temperature: -40° C to 65° C (-40° F to 149° F) • Temperature gradient: 25° C/hr (45°F/hr) • Relative humidity: 10% to 90% noncondensing

Front panel

After you unlock and remove the snap-on bezel on the front panel, the 15 disks are visible. Disk numbers, as reported by system commands, range from 1 to 15. When facing the front panel, Disk 1 is located in the leftmost slot in the enclosure and Disk 15 in the rightmost slot.

Figure 106 ES30 front panel (bezel removed)

Note

The flanges or sheet metal on the ES30 show 0 to 14 but the software will refer to the logical numbering of 1 to 15.

Each disk in the enclosure has two LEDs. The disk's active LED glows green when the disk is functional. The disk fault LED glows amber when the disk has failed.

If there is a problem with the enclosure, the enclosure fault light is amber. The disk enclosure power light should be on (blue) when the shelf is powered on.

When replacing disks, a good practice is to run this command:

```
disk beacon <enclosure-id>.<disk-id>
```

Note

The `disk beacon` command causes the LED that signals normal operation to flash on the target disk. Enter `Ctrl-C` to stop the flash. You can also use the `enclosure beacon` command to check the LED to blink on every disk.

Figure 107 Front panel LEDs

1. Disk enclosure fault light
2. Disk enclosure power light
3. Disk active light
4. Disk fault light

Table 108 Status lights visible from front of disk enclosure

Light	Quantity	Color	Meaning
Disk enclosure fault light	1	Amber	On when any fault condition exists; if the fault is not obvious from a disk module light, look at the back of the disk enclosure.
Disk enclosure power light	1	Blue	Power to enclosure is on.
Disk active light	1 per disk module	Green	No LED when the slot is empty or has a filler module. Also, off when the disk is powered down by command; for example, the result of a temperature fault. Fast blinking when the SATA/SAS drive is powered up but not spinning; this is a normal part of the spin-up sequence, occurring during the spin-up delays of a slot. On when the drive has power but is not handing any I/O activity (the ready state. Slow blinking when the drive is spinning and handling I/O activity.
Disk fault light	1 per disk module	Amber	On when the disk module is faulty, or as an indication to replace the drive.

Back panel

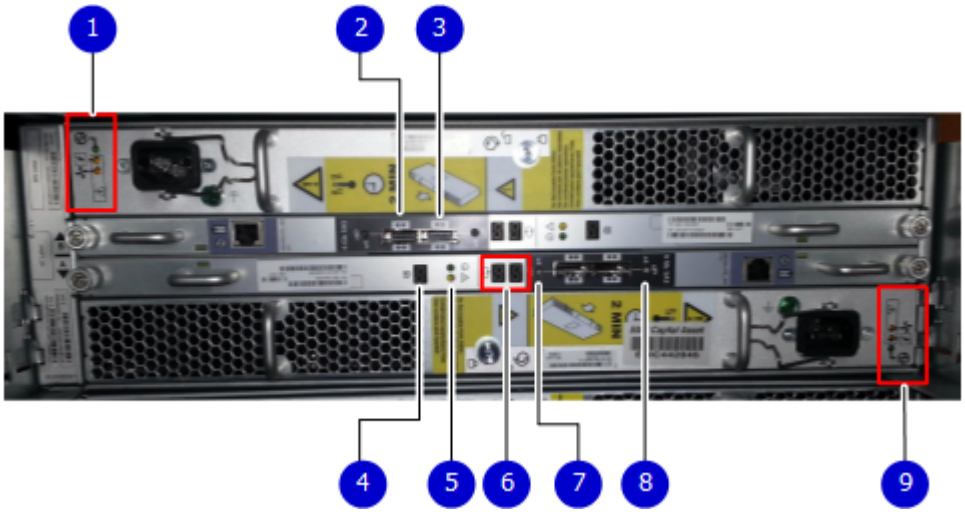
For redundancy, the shelf has two identical power supply/cooling modules and two identical shelf controllers which are placed in reverse order.

Note

When replacing a component, note its orientation before removing it. Insert the replacement in the same position.

Power supply A and controller A are located at the bottom of the chassis, and power supply B and controller B are located at the top of the chassis.

Figure 108 Back panel: Power modules and controllers



1. LEDs
   - Power supply B: Power LED
   - Power fault: Amber
   - Blower fault: Amber
2. Expansion (Out)
3. Host (In)
4. Enclosure address (not used)
5. Power (Green) or Fault (Amber)
6. Bus ID (not used)
7. Host link active
8. Expansion link active
9. LEDs
   - Power supply A Power LED
   - Power fault: Amber
   - Blower fault: Amber

Figure 109 Power Supply A LEDs

Each shelf controller has two SAS ports. The port labeled with a circle symbol is the Host port, and the port labeled with a diamond symbol is the Expansion port. The Expansion ports are located on the outside, and the Host ports on the inside (reversed controller positions).

Table 109 Status lights visible from rear of disk enclosure

Light	Quantity	Color	Meaning
Controller Power	1 per Controller	Blue or Green	On when the Controller is powered on. Blue when host connection is active at the normal speed for DD990, DD2500, DD4200, DD4500, DD6300, DD6800, DD7200, DD9300, DD9500, and DD9800 systems. Green when host connection is slow for those systems or at normal speed for all other systems. Blue when host connection is active at the normal speed. Green when host connection is slow.
Controller Fault	1 per Controller	Amber	On when either the Controller or a SAS connection is faulty. On during power-on self-test
Host Link Active	1 per Controller	Blue	On when the host connection is active.
Expansion Link Active	1 per Controller	Blue	On when the expansion connection is active.
Power Supply Active	1 per power supply	Green	On when the power supply is operating.
Power Supply Fault*	1 per power supply	Amber	On when the power supply is faulty or is not receiving AC line voltage.

Table 109 Status lights visible from rear of disk enclosure (continued)

Light	Quantity	Color	Meaning
			Flashing when either a multiple blower or ambient over temperature condition has shut off DC power to the system.
Blower Fault*	1 per power supply	Amber	On when one of the blowers in the power supply is faulty.

*The ES30 and FS15 continue to run with a single power supply and three of its four blowers. Removing a power/cooling module constitutes a multiple blower fault condition, and powers down the shelf unless you replace a module within two minutes.

Ports

Depending on the model, a Data Domain system has one to four dual- or quad-port SAS HBA cards or SAS I/O modules installed. The ES30 shelf has two controllers (B located above A). Each controller has two ports, a host and an expansion port.

See #unique_137 for SAS HBA card, SAS I/O module, and port locations.

CHAPTER 13

DS60

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- DS60 hardware specifications 191
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- Expansion shelf cables 197
- Ports 198

DS60 overview

Adding DS60 expansion shelves to a Data Domain system increases the system's storage capacity.

The expansion shelves are organized by sets (or chains). The following table shows the number of DS60 shelves in set (chain) each system can support.

Table 110 DS60 shelf set support

System (base)	DS60 shelves
DD4200, DD4500, and DD7200	2 per set (chain)
DD6300	1 shelf only*
DD6800, DD9300, DD9500, and DD9800	4 per set (chain)

* DD6300 systems only supports the addition of one DS60 expansion shelf.

DS60 site requirements

This table lists the DS60 site requirements. See DS60 hardware specifications on page 191 for hardware specifications information.

Table 111 Site requirements

Requirement	DS60 Expansion Shelf
Vertical space in standard 19", 4-post rack	5U including a 1U Cable Managements Tray. Do not use a two-post rack. See the slide rail and installation documentation in the packaging for installing in a rack.
Air conditioning	Air conditioning that can cope with the maximum BTU/hr thermal rating.
Temperature controls	Adequate temperature control with a gradient (change) not to exceed 30° C in an hour.
Front bezel clearance	1.56 inches (4.0 cm) of unobstructed clearance.
Back panel clearance	5 inches (12.7 cm) of unobstructed clearance.
Airflow	In a closed or multi-unit rack, ensure that the unit has adequate airflow. If the equipment is mounted in an enclosed (as opposed to a four-post open rack), the front and rear doors should have 65% minimum open area for airflow. Whether in an open or enclosed rack, use filler panels to prevent hot air re-circulation. The rack design and installation should take into consideration the maximum ambient operating temperature of the equipment, which is 35° C.

Table 111 Site requirements (continued)

Requirement	DS60 Expansion Shelf
Power/grounding	The Power distribution within the rack should provide a safe electrical earth connection. Voltage should be 200-240 VAC; 50 or 60 Hz. Plug four power cords - two from each power supply into separate branch circuit supplies for redundancy—one set of cords from one power supply goes to one branch and the second set of cords from the other power supply goes to a different branch. Each receptacle must be capable of safely supplying 0.94 amps from each power socket or 1.87 amps from each socket in case of a redundant circuit.

DS60 hardware specifications

Note

All ratings assume a fully configured DS60 shelves.

Table 112 Hardware specifications

Specification	Description
AC line voltage	200 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC line current (operating maximum)	4.9 A max at 200 Vac
Power consumption (operating maximum)	980 VA (931W) max
Power factor	0.95 min at full load, low voltage
Heat dissipation (operating maximum)	3.36 x 10^6 J/hr, (3177 Btu/hr) max
Dimensions (rack mounted)	• Height: 8.75 in (22.23 cm) 5U (4U plus 1U cable management tray). • Width including rails: 17.50 in (44.45 cm) • Depth (chassis only): 34.5 in (87.63 cm) • Maximum depth (fully configured): 36.4 in (92.46 cm)
Shelf weight	• Without FRUs installed: 55.0 lb (24.7 kg) • With FRUs installed: 225.0 lb (102 kg)
Operating temperature	• Ambient temperature: 41º F to 104º F (5º C to 40º C) • Temperature gradient: 18º F/hr (10º C/hr)

Table 112 Hardware specifications (continued)

Specification	Description
	• Relative humidity extremes: 20% to 80% noncondensing
Recommended operating relative humidity	40% to 55% noncondensing
Operating elevation	-50 to 7500 ft (-16 to 2300 m)
Non-operating (shipping and storage) temperature	• Ambient temperature: -40° F to 149° F (-40° C to 65° F) • Temperature gradient: 45° F/hr (25°C/hr) • Relative humidity: 10% to 90% noncondensing • Elevation: -50 to 35,000 ft (-16 to 10,600 m)

DS60 front panel

Figure 110 DS60 front panel

Note

The front LEDs are identified inside the red rectangle.

If there is a problem with the enclosure, the enclosure fault light LED (marked with a triangle with an exclamation mark) is amber. When the shelf is powered on and active, the disk enclosure power LED (marked with a circle with a vertical line) is blue.

Table 113 LED status lights

Light	Quantity	Color	Meaning
Disk Enclosure Power	1	Blue	Power to enclosure is on.
Disk Enclosure Fault	1	Amber	On when any fault condition exists; if the

Table 113 LED status lights (continued)

Light	Quantity	Color	Meaning
			fault is not obvious from a disk or fan module light, look at the back of the disk enclosure.

Note

The individual disk LEDs are only visible when the disk enclosure is opened to verify the disks inside.

For part replacement information, refer to the *DS60 Expansion Shelf Installation and FRU Replacement Guide.*

Back panel

The back panel has two dual power supplies and two LCCs (Link Controller Cards).

Figure 111 DS60 back panel

Each controller has 4 SAS ports (laid out as 2 pairs). Standard Data Domain systems, and systems with the licensed HA feature only use ports 0 and 2 on each controller. Ports 1 and 3 typically have a plastic plug blocking the unused ports to make inserting a cable into the correct ports easier.

Table 114 Status lights visible from rear of disk enclosure

Light	Quantity	Color	Meaning
Controller power	1 per controller	Green	On when the Controller is powered on.
Controller fault	1 per controller	Amber	On when either the Controller or a SAS connection is faulty. On during power-on self test.
Link active	4 per controller	Blue	On when the host connection is active.
Power supply input voltage	1 per power supply	Green	Input power green when it is working.

Table 114 Status lights visible from rear of disk enclosure (continued)

Light	Quantity	Color	Meaning
Power supply fault*	1 per power supply	Amber	• On when the power supply is faulty or is not receiving AC line voltage. • Flashing when either a multiple blower or ambient over temperature condition has shut off DC power to the system.

The DS60 continues to run with a single power supply and two fans (out of the three fans).

For part replacement information, refer to the *DS60 Installation and FRU Replacement Guide.*

Disk enclosure interior

The disks are visible when the DS60 is pulled out of the rack and the top cover is removed from the chassis. There are also three fans in the front of the disk enclosure and each fan has a fault LED.

Each disk in the enclosure has two LEDs. The active LED glows blue when the disk is functional. The disk fault LED glows amber when the disk has failed.

Note

The individual disk and fan LEDs are only visible when the disk enclosure is opened to verify the disks inside.

Figure 112 Fans and disk drives inside the disk enclosure

Table 115 LED status lights

Light	Quantity	Color	Meaning
Disk Active **Note** Only visible after the disk enclosure is opened.	1 per disk module	Blue	• No LED when the slot is empty or has a filler module. Also, off when the disk is powered down by command; for example, the result of a temperature fault. • Fast blinking when the SAS drive is powered up but not spinning; this is a normal part of the spin-up sequence, occurring during the spin-up delays of a slot. • On when the drive has power but is not handing any I/O activity (the ready state). • Disk and fan lights are only available when enclosure is removed from the chassis. • Slow blinking when the drive is spinning and handling I/O activity.
Disk Fault **Note** Only visible after the disk enclosure is opened.	1 per disk module	Amber	On when the disk module is faulty, or as an indication to replace the drive.
Fan fault	1 per fan module	Amber	On when the fan module is faulty, or as

Table 115 LED status lights (continued)

Light	Quantity	Color	Meaning
			an indication to replace the fan.

The DD OS software manages the drives in packs (groups) of 15. A top down view of the chassis shows that the disks are arranged in four packs (groups) of 15 drives. The packs are color coded—pack 1 purple, pack 2 is yellow, pack 3 is green, and pack 4 is pink. A pack must have the same size drives. Pack 1 is shown within the red rectangle.

Figure 113 Drives as packs

The next table shows how the drives are distributed by packs (groups) and numbered physically. The bottom of the table represents the front of the shelf

Table 116 Physical drives

Rows	Pack 1	Pack 2	Pack 3	Pack 4
E	0-2	3-5	6-8	9-11
D	0-2	3-5	6-8	9-11

Table 116 Physical drives (continued)

Rows	Pack 1	Pack 2	Pack 3	Pack 4
C	0-2	3-5	6-8	9-11
B	0-2	3-5	6-8	9-11
A	0-2	3-5	6-8	9-11

Although the disk numbers are physically 0 to 59, the disks are reported logically by system software commands in two ways:

- A range from 1 to 60, usually reported with the enclosure number (e.g. 3.37)
- The position matrix A-E (1-12)

For part replacement information, refer to the *DS60 Expansion Shelf Installation and FRU Replacement Guide.*

Expansion shelf cables

Expansion shelves are connected to each other and to the Data Domain controller with qualified cables. The expansion shelf can be connected to supported Data Domain systems only by using SAS (serial-attached SCSI) cables. A Data Domain shelf with qualified disks can be added as an expansion shelf if there are complete drive packs (15 in a pack) in the correct position.

Note

Shelves for other Dell EMC product lines look identical. Check the product numbers when unpacking.

DS60 cables

The DS60 shelves use cables with HD-mini-SAS connectors at both ends to connect the shelves to the controllers that have SAS I/O modules, such as DD4200, DD4500, DD6300, DD6800, DD7200, DD9300, DD9500, and DD9800 systems.

The DS60 connector is referred as the HD-mini-SAS connector and is same as the I/O module connectors. These cables are available in 3M, 4M, and 5M lengths.

Use the appropriate length for the connection you are making. Refer to the specific Installation and Configuration Guide of the shelves for the recommended cable lengths:

- Use the 3-meter cable in the same rack either to connect to a controller or shelf to adjacent shelf.
- Use a 3-meter, 4-meter, or 5-meter cable when a DS60 is in another rack.

Figure 114 HD-mini-SAS connector

Table 117 HD-mini-SAS to mini-SAS cable part numbers

Cable Part Number	Cable Length
038-004-380-01	3M(118 in.)
038-000-212-00	4M (158 in.)
038-000-214-00	5M (196 in.)

Special cables must be used when attaching an ES30 to a chain with a DS60. Specifically, one HOST (circle) connection and one EXPANSION (diamond) cables are connected between the ES30 LCC and the DS60 LCC connection. Since this is not a common situation, only two expansion cable lengths are available.

Table 118 HD-mini-SAS to ES30 host and ES30 expansion port cable part numbers

Cable Part Number	Cable Type	Cable Length
038-003-810	Host	2M (78 in.)
038-003-813	Host	5M (196 in.)
038-004-108	Expansion	2M (78 in.)
038-004-111	Expansion	5M (196 in.)

The cable connectors must be secured with their latch assembly.

Ports

Depending on the model, a Data Domain system has two to four quad-port SAS IO modules installed. The DS60 shelf has two controllers. Each DS60 controller has four ports, labeled 0, 1, 2, and 3 (right to left).

CHAPTER 14

FS15

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Overview of FS15 SSD drives

The FS15 is an external shelf consisting of a specific number of SSD drives, depending upon the Data Domain system, and are used to cache meta-data.

The SSDs for the FS15 shelf are 800GB 3WPD devices, which have positive performance and longevity characteristics.

Table 119 Number of SSD drives and Data Domain model compatibilty

Number of Drives	Model
2	DD6800 with HA
5	• DD6800 with HA • DD9300 with HA
8	• DD9500 - with or without HA • DD9300with HA
15	DD9500 - with or without HA

Note

Unused drive slots have drive fillers to improve airflow.

There are also upgrade kits available to add more SSDs if a Data Domain system is expanded to have additional memory.

Upgrade Pack	Use
3 Drive Upgrade Pack	To create a 5 drive shelf from originally a 2 drive shelf or an 8 drive shelf from originally a 5 drive shelf
7 Drive Upgrade Pack	To create a 15 drive shelf from an 8 drive shelf

Site requirements

This table lists the FS15 site requirements.

Table 120 FS15 site requirements

Requirement	FS15 shelf
Vertical Space in Standard 19", 4-post Rack	3U. Do not use a two-post rack. See the slide rail and installation documentation in the packaging for installing in a rack.
Air Conditioning	Air conditioning that can cope with the maximum BTU/hr thermal rating.
Temperature Controls	Adequate temperature control with a gradient (change) not to exceed 30° C in an hour.

Table 120 FS15 site requirements (continued)

Requirement	FS15 shelf
Front Bezel Clearance	1.56 inches (4.0 cm) of unobstructed clearance.
Back Panel Clearance	5 inches (12.7 cm) of unobstructed clearance.
Airflow	In a closed or multi-unit rack, ensure that the unit has adequate airflow. If the equipment is mounted in an enclosed (as opposed to a four-post open rack), the front and rear doors should have 65% minimum open area for airflow. Whether in an open or enclosed rack, use filler panels to prevent hot air recirculation. The rack design and installation should take into consideration the maximum ambient operating temperature of the equipment, which is 35° C.
Power/ Grounding	Two single-phase AC power outlets with an earth ground conductor (safety ground). A safe electrical earth connection must be provided to each power cord. Voltage should be 100-120 VAC or 200-240 VAC; 50 or 60 Hz. Use only with branch circuits protected by a minimum 15A overcurrent protector. Plug the two power cords into separate branch circuit supplies for redundancy.

FS15 hardware specifications

Note

All ratings assume a fully configured FS15.

Table 121 FS15 hardware specifications

Specification	Description
AC line voltage	100 to 240 Vac ± 10%, single-phase, 47 to 63 Hz
AC line current (operating maximum)	2.8 A max at 100 Vac, 1.4 A max at 200 Vac
Power consumption (operating maximum)	280 VA (235 W) max
Power factor	0.98 min at full load, low voltage
Heat dissipation (operating maximum)	8.46 x 10^5 J/hr, (800 Btu/hr) max
Dimensions (rack mounted, with bezel)	• Width: 17.62" (45 cm) Depth: 14” (35.56cm) • Height: 5.25” (13.34cm) 3 RU
Maximum Weight	68 lbs (30.8 kg)
Operating Temperature	• Ambient temperature: 10° C to 35° C (50° F to 95° F) • Temperature gradient: 10° C/hr (180° F/hr)

Table 121 FS15 hardware specifications (continued)

Specification	Description
	• Relative humidity extremes: 20% to 80% noncondensing
Recommended Operating Relative Humidity	40% to 55% noncondensing
Non-Operating Temperature	• Ambient temperature: -40° C to 65° C (-40° F to 149° F) • Temperature gradient: 25° C/hr (45°F/hr) • Relative humidity: 10% to 90% noncondensing

FS15 front panel

After you unlock and remove the snap-on bezel on the front panel, the 15 disks are visible. Disk numbers, as reported by system commands, range from 1 to 15. When facing the front panel, Disk 1 is located in the leftmost slot in the enclosure and Disk 15 in the rightmost slot.

Figure 115 FS15 front panel (bezel removed)

Note

The flanges or sheet metal on the FS15 show 0 to 14 but the software will refer to the logical numbering of 1 to 15.

Each disk in the enclosure has two LEDs. The disk's active LED glows green when the disk is functional. The disk fault LED glows amber when the disk has failed.

If there is a problem with the enclosure, the enclosure fault light is amber. The disk enclosure power light should be on (blue) when the shelf is powered on.

When replacing FS15 disks, a good practice is to run this command:

```
disk beacon <enclosure-id>.<disk-id>
```

Note

The `disk beacon` command causes the LED that signals normal operation to flash on the target disk. Enter `Ctrl-C` to stop the flash. You can also use the `enclosure beacon` command to check the LED to blink on every disk.

Figure 116 Front panel LEDs

1. Disk enclosure fault light
2. Disk enclosure power light
3. Disk active light
4. Disk fault light

Table 122 Status lights visible from front of disk enclosure

Light	Quantity	Color	Meaning
Disk enclosure fault light	1	Amber	On when any fault condition exists; if the fault is not obvious from a disk module light, look at the back of the disk enclosure.
Disk enclosure power light	1	Blue	Power to enclosure is on.
Disk active light	1 per disk module	Green	No LED when the slot is empty or has a filler module. Also, off when the disk is powered down by command; for example, the result of a temperature fault. Fast blinking when the SATA/SAS drive is powered up but not spinning; this is a normal part of the spin-up sequence, occurring during the spin-up delays of a slot. On when the drive has power but is not handing any I/O activity (the ready state. Slow blinking when the drive is spinning and handling I/O activity.
Disk fault light	1 per disk module	Amber	On when the disk module is faulty, or as an indication to replace the drive.

Back panel

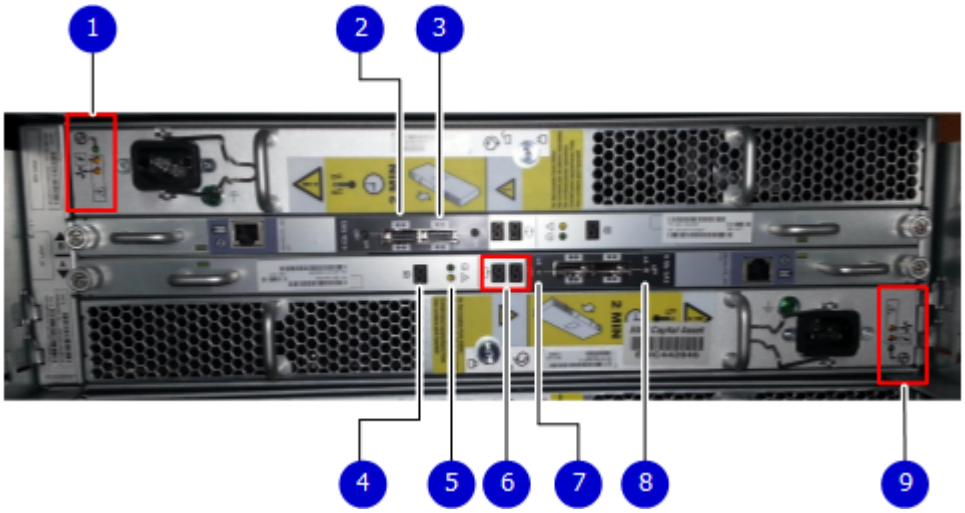
For redundancy, the shelf has two identical power supply/cooling modules and two identical shelf controllers which are placed in reverse order.

Note

When replacing a component, note its orientation before removing it. Insert the replacement in the same position.

Power supply A and controller A are located at the bottom of the chassis, and power supply B and controller B are located at the top of the chassis.

Figure 117 Back panel: Power modules and controllers



1. LEDs
   - Power supply B: Power LED
   - Power fault: Amber
   - Blower fault: Amber
2. Expansion (Out)
3. Host (In)
4. Enclosure address (not used)
5. Power (Green) or Fault (Amber)
6. Bus ID (not used)
7. Host link active
8. Expansion link active
9. LEDs
   - Power supply A Power LED
   - Power fault: Amber
   - Blower fault: Amber

Figure 118 Power Supply A LEDs

Each shelf controller has two SAS ports. The port labeled with a circle symbol is the Host port, and the port labeled with a diamond symbol is the Expansion port. The Expansion ports are located on the outside, and the Host ports on the inside (reversed controller positions).

Table 123 Status lights visible from rear of disk enclosure

Light	Quantity	Color	Meaning
Controller Power	1 per Controller	Blue or Green	On when the Controller is powered on. Blue when host connection is active at the normal speed for DD990, DD2500, DD4200, DD4500, DD6300, DD6800, DD7200, DD9300, DD9500, and DD9800 systems. Green when host connection is slow for those systems or at normal speed for all other systems. Blue when host connection is active at the normal speed. Green when host connection is slow.
Controller Fault	1 per Controller	Amber	On when either the Controller or a SAS connection is faulty. On during power-on self-test
Host Link Active	1 per Controller	Blue	On when the host connection is active.
Expansion Link Active	1 per Controller	Blue	On when the expansion connection is active.
Power Supply Active	1 per power supply	Green	On when the power supply is operating.
Power Supply Fault*	1 per power supply	Amber	On when the power supply is faulty or is not receiving AC line voltage.

Table 123 Status lights visible from rear of disk enclosure (continued)

Light	Quantity	Color	Meaning
			Flashing when either a multiple blower or ambient over temperature condition has shut off DC power to the system.
Blower Fault*	1 per power supply	Amber	On when one of the blowers in the power supply is faulty.

*The ES30 and FS15 continue to run with a single power supply and three of its four blowers. Removing a power/cooling module constitutes a multiple blower fault condition, and powers down the shelf unless you replace a module within two minutes.

Status LEDs

Verify the status of the by checking the LEDs. Controller B is located above Controller A in the center of the rear panel. The power supply/cooling units are above and below the controllers.

Facing the back panel of the FS15, the Expander ports are the outer of the two ports; the Host ports are the inner of the two ports. The ports are identified by symbols on the rear panel: a circle symbol indicates a Host port; a diamond symbol indicates an Expander port.

Figure 119 Rear panel overview

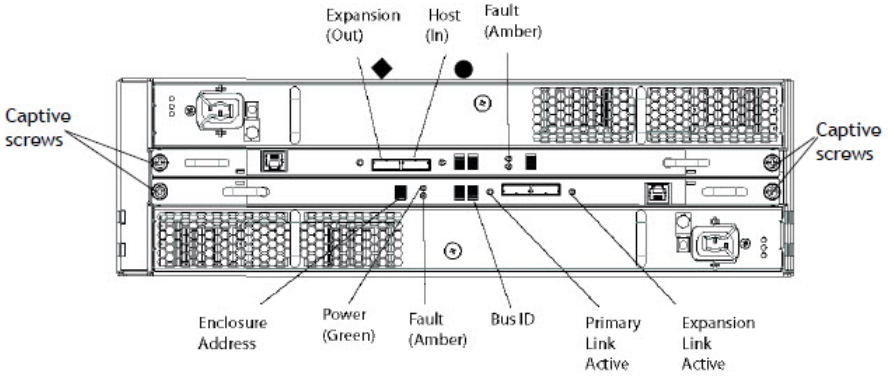


Table 124 Status LEDs

Light	Quantity	Color	Meaning
Controller power	1 per controller	Green	On when the controller is powered on
Controller failure	1 per controller	Amber	On when either the controller or a SAS connection has failed. On during a power-on self test.
Host link active	1 per controller	Blue	On when the host connection is active

Table 124 Status LEDs (continued)

Light	Quantity	Color	Meaning
Expansion link active	1 per controller	Blue	On when the expansion host is active