Dell EMC PowerEdge XR11 and XR12

Technical Guide

D&LL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

System overview

The Dell™ PowerEdge™ XR11 and XR12 are Dell's latest rugged servers, designed to run complex workloads using highly scalable memory, I/O, and network options in locations constrained by space or environmental challenges.

The PowerEdge XR11 is a 1-socket, short-depth 1U rugged server.

The PowerEdge XR12 is a 1-socket, short-depth 2U rugged server.

The systems feature the 3rd Generation Intel Xeon Scalable Processor with up to 8 DIMMs, PCI Express® (PCIe) 4.0 enabled expansion slots, and a choice of network interface technologies to cover NIC. The PowerEdge XR11 and XR12 systems are unique platforms designed to optimize computing at the edge with performance in mind. The systems are well suited to operate at high temperatures in harsh or space-constrained environments, and are capable of handling demanding processing workloads and applications such as for the Telecom, Military and Defense industries, as well as, for the commercial sector.

Topics:

Key workloads

There are a diverse set of applications that operate at the Edge and each of these applications has a different set of requirements.

- Retail Applications - Built with a minimum footprint and enterprise compute to optimize expensive retail space and deliver a targeted virtual experience, including video surveillance analytics, point of sale analytics and IoT device aggregation and analytics
- Telco / 5G - Compact and rugged design capable of supporting accelerators for remote private networks requiring AI/ML/DL type workloads. Use cases include MEC, CDN and VRAN
- Military - Reliable DC power in a hardened chassis to support mobile data centers deployed globally to collect and analyze reconnaissance data

New technologies

Table 1. New technologies featured on XR11 and XR12

Technology	Detailed description
3rd Generation Intel® Xeon Scalable Processor	10nm process technology - Maximum of 36 cores - Maximum of 3.5 GHz - Maximum of 64 lanes of PCI Express 4.0 links capable of 16 GT/s - Maximum TDP: 225 W Consult the Processor section for specific SKU details. ⓘ **NOTE:** TDP support will vary based on the maximum operating temperature.
3200 MT/s DDR4 Memory	- Up to 8 DDR4 channels with 1 DPC; 8 DIMMs in total - Speed up to 3200 MT/s (configuration-dependent) - Supports DDR4 ECC RDIMM (max: 64 GB) and DDR4 ECC LRDIMM (max: 256 GB)
Persistent Memory	256 GB Intel Optane DC Persistent Memory 200 Series support on two configurations: 4+4

Table 1. New technologies featured on XR11 and XR12 (continued)

Technology	Detailed description
	6+1 Number of DDR4 DIMMs plus number of Intel Optane Persistent Memory 200 Series DIMMs
Chassis Orientation	The XR11 and XR12 have two chassis options: 1. Rear Accessed Configuration, where power supplies and network cards are in the rear 2. Front Accessed Configuration, where power supplies and network cards are in the front The location of the control panel changes with the chassis orientation on the XR11. The location of the control panels does not change on the XR12.
iDRAC9 w/ Lifecycle Controller	The embedded systems management solution for Dell servers features hardware and firmware inventory and alerting, in-depth memory alerting, faster performance, a dedicated gigabit port and many more features.
Power Supplies	60 mm dimension (new PSU form factor for new generation of servers) - Platinum 800 W (WRAC and MM 240 V) *1100 W -48 V DC *Platinum 1400 W (WRAC and MM 240 V) (i) **NOTE:** *These PSUs are available in two types: - Reverse airflow design for use in Front Accessed chassis configurations - Normal airflow design for use in Rear Accessed chassis configurations

System features

Table 2. System features of XR11 and XR12

Feature	XR11	XR12
Processor	1x 3rd Generation Intel® Xeon Scalable Processor	1x 3rd Generation Intel® Xeon Scalable Processor
Chipset	Intel Lewisburg PCH (Intel® C620 Series Chipset)	Intel Lewisburg PCH (Intel® C620 Series Chipset)
Memory	8x RDIMM, LRDIMM DDR4 with ECC Two Intel Optane Persistent Memory 200 series configurations: ● 4+4 ● 6+1 Number of DDR4 DIMMs plus number of Intel Optane Persistent Memory 200 series DIMMs	8x RDIMM, LRDIMM DDR4 with ECC Two Intel Optane Persistent Memory 200 series configurations: ● 4+4 ● 6+1 Number of DDR4 DIMMs plus number of Intel Optane Persistent Memory 200 series DIMMs
Disk Drives	4 x 2.5-inch - 12 GB SAS, 6 GB SATA Up to 4x NVMe	6 x 2.5-inch - 12 GB SAS, 6 GB SATA Up to 6 x NVMe
Storage Controllers	● PERC 10.5: H345* (Adapter) ● PERC 11: H355*, HBA355i (Adapter), H755 (Adapter) ● External Adapters: H840; HBA355e ● Software RAID: S150 ● BOSS-S1 (RAID) ⓘ **NOTE:** * indicates the H355 will replace H345 from Dec'21.	● PERC 10.5: H345* (Adapter) ● PERC 11: H355*, HBA355i (Adapter), H755 (Adapter) ● External Adapters: H840; HBA355e ● Software RAID: S150 ● BOSS-S1 (RAID) ⓘ **NOTE:** * indicates the H355 will replace H345 from Dec'21.
External Storage Supported	ME484, MD1420 and MD1400	ME484, MD1420 and MD1400
M.2 SSD	Up to 2x M.2 Boot Optimized Storage Subsystem (BOSS-S1)	Up to 2x M.2 Boot Optimized Storage Subsystem (BOSS-S1)
PCIe Slots	Two riser configuration options: ● 3x PCIe Gen4 (one x8 PCIe Gen4 + two x16 PCIe Gen4) ● 3x PCIe Gen4 (one x16 PCIe Gen4 + two x16 PCIe Gen4) (Only supported for Front Accessed Chassis)	Five riser configuration options: ● 3x PCIe Gen4 (one x8 PCIe Gen4 + two x16 PCIe Gen4) ● 3x PCIe Gen4 (one x16 PCIe Gen4 + two x16 PCIe Gen4) (Only supported for Front Accessed Chassis) ● 4x PCIe Gen 4 (three x8 PCIe Gen4 + one x16 PCIe Gen 4) ● 4x PCIe Gen 4 (two x8 PCIe Gen 4 + two x16 PCIe Gen 4) (Only supported for Front Accessed Chassis) ● 5x PCIe Gen4 (five x8 PCIe Gen4)
Integrated LOM	4x 25 GbE SFP+ (Broadcom Thor)	4x 25 GbE SFP+ (Broadcom Thor)
Chassis Orientation	XR11 has two chassis options: 1. Rear Accessed Configuration, where power supplies and network cards are in the rear.	XR12 has two chassis options: 1. Rear Accessed Configuration, where power supplies and network cards are in the rear.

Table 2. System features of XR11 and XR12 (continued)

Feature	XR11	XR12
	ⓘ **NOTE:** Network, Serial, VGA, Power supplies and PCIe Slots are accessible in the rear of the platform and the Hard Drives, Power button, Status LED, USB and Management port are in the front of the system. 2. Front Accessed Configuration, where power supplies and network cards are in the front. ⓘ **NOTE:** Power button, Network ports, Serial, VGA and PCIe Slots are accessible in the front of the platform and the Hard Drives and Status LED are in the rear of the system. The location of the control panel changes with the chassis orientation.	ⓘ **NOTE:** Network, Serial, VGA ports, Power supplies, Hard drives and PCIe Slots are accessible in the rear of the platform. 2. Front Accessed Configuration, where power supplies and network cards are in the front. ⓘ **NOTE:** Network, Serial, VGA ports, Power supplies, Hard drives and PCIe Slots are accessible in the front of the platform.

I/O Ports	Rear Accessed Configuration
	● Front:
	  ○ one standard USB 2.0 port
	  ○ one micro USB 2.0 port dedicated to iDRAC management
	● Rear:
	  ○ one standard USB 3.0 port
	  ○ one standard USB 2.0 port
	  ○ one Dedicated 1GbE
	  ○ one Serial port
	  ○ one VGA port
	● Internal: one standard USB 3.0 port on Riser 1B
		Rear Accessed Configuration
		● Front:
		  ○ one standard USB 2.0 port
		  ○ one micro USB 2.0 port dedicated to iDRAC management
		● Rear:
		  ○ one standard USB 3.0 port
		  ○ one standard USB 2.0 port
		  ○ one Dedicated 1GbE
		  ○ one Serial port
		  ○ one VGA port
		● Internal: one standard USB 3.0 port on Riser 1B

	Front Accessed Configuration ● Front: one standard USB 3.0 port, one standard USB 2.0 port, one micro USB 2.0 port dedicated to iDRAC management, one Dedicated 1GbE, one Serial port, one VGA port ● Internal: one standard USB 3.0 port on Riser 1B	Front Accessed Configuration ● Front: one standard USB 3.0 port, two standard USB 2.0 ports, one micro USB 2.0 port dedicated to iDRAC management, one Dedicated 1GbE, one Serial port, one VGA port ● Internal: one standard USB 3.0 port on Riser 1B
Rack Height	1U	2U
Power Supplies	800 W (WRAC and MM 240 V), *1400 W (WRAC and 240 V), *1100 W (-48 V DC) ⓘ **NOTE:** *These PSUs are also available in reverse airflow design to support Front Accessed Configuration.	800 W (WRAC and MM 240 V), *1400 W (WRAC and 240 V), *1100 W (-48 V DC) ⓘ **NOTE:** *These PSUs are also available in reverse airflow design to support Front Accessed Configuration.
System Management	● iDRAC9 ● Lifecycle Controller ● OpenManage ● OME Power Manager ● Digital License Key	● iDRAC9 ● Lifecycle Controller ● OpenManage ● OME Power Manager ● Digital License Key
Internal GPU	Up to 2x 70 W (SW/FH/HL)	Up to 2x 75 W/150 W (SW) and 2x 300 W (DW/FH/FL) based on riser configuration
Availability	● Hot-plug Drives ● Redundant Cooling ● Hot-plug Redundant Power Supplies (1+1)	● Hot-plug Drives ● Redundant Cooling ● Hot-plug Redundant Power Supplies (1+1)

Chassis views and features

Topics:

- Chassis views
- Quick Resource Locator (QRL)

Chassis views

Front view of XR11 front accessed chassis
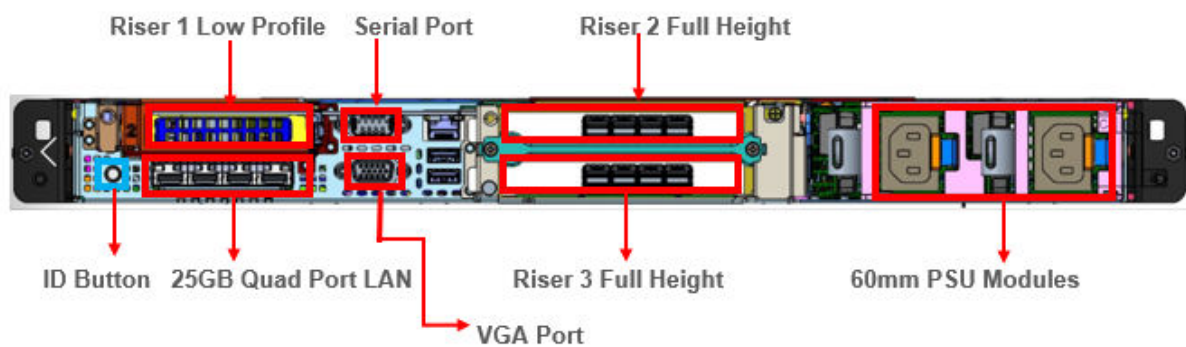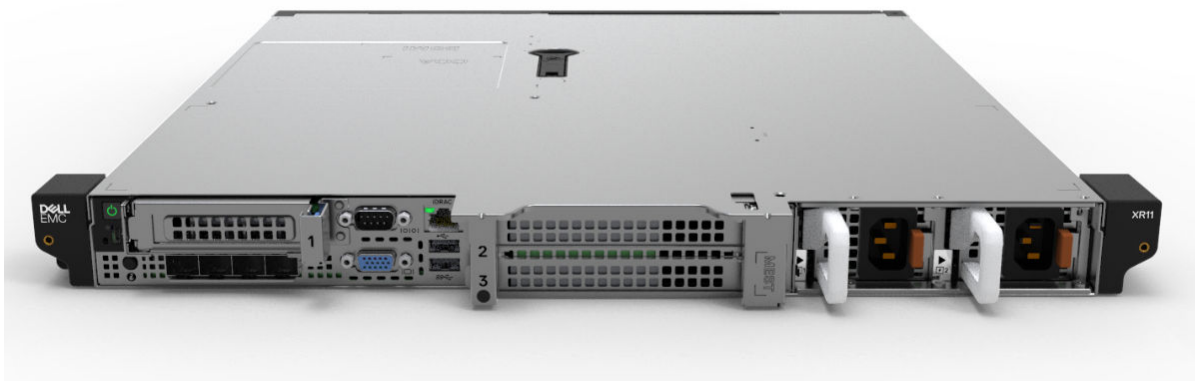
Figure 1. XR11 Front accessed chassis front views

Front view of XR11 rear accessed chassis

Figure 2. XR11 Rear accessed chassis front view, no bezel

Figure 3. XR11 Rear accessed chassis view with front bezel

Front view of XR12 front accessed chassis

Left Ear | RISER2 GPGPU Module (FH/FL) | 6x 2.5" hot plug HDD | Right Ear

EST TAG

ID Button | 25G LAN x4 | LAN+USB | 60 PSU Module x2

D-SUB & Serial | RISER3 GPGPU Module (FH/FL)

RISER 1 Low-profile PCIE Module
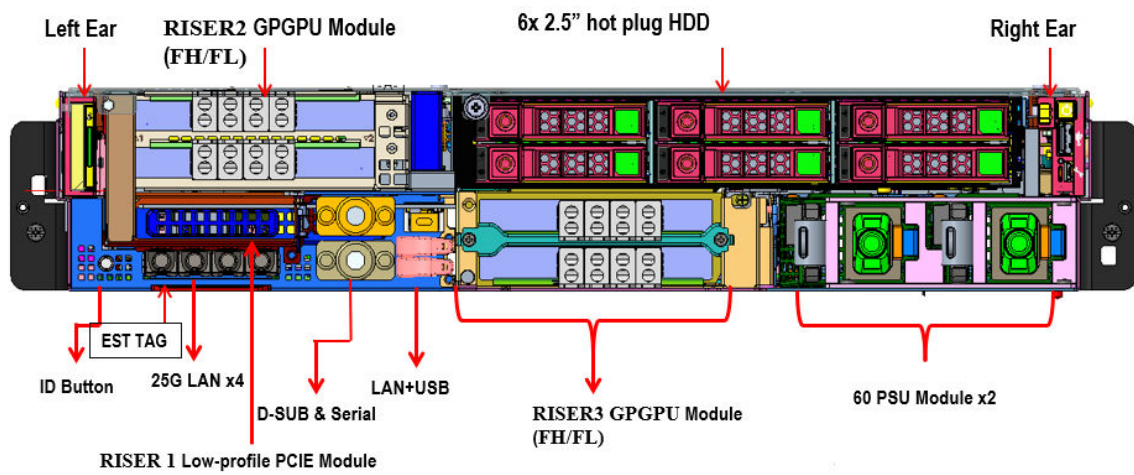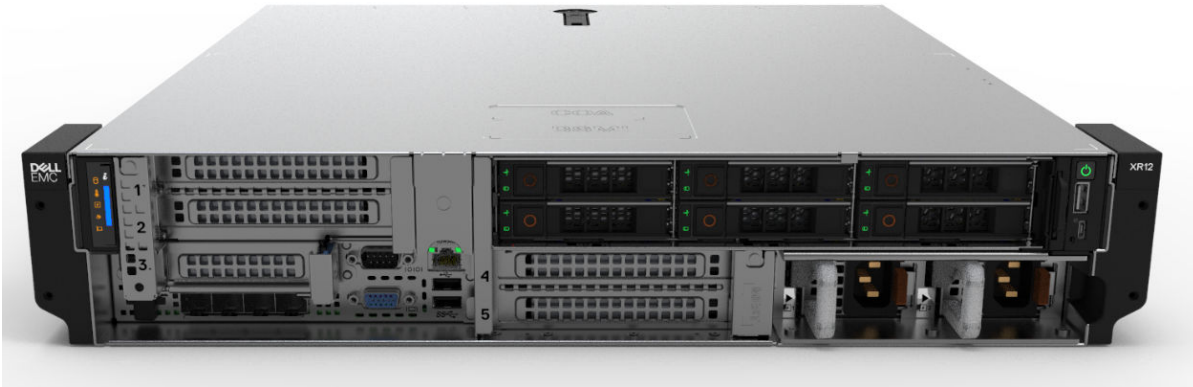
Figure 4. XR12 Front accessed chassis front views

Figure 5. XR12 Front accessed chassis, front-side view with filter bezel

Front view of XR12 rear accessed chassis

Figure 6. XR12 Rear accessed chassis front view, no bezel

Figure 7. XR12 Rear accessed chassis view with front bezel

Rear view of XR11 front accessed chassis

Figure 8. XR11 Front accessed chassis rear view

Rear view of XR11 rear accessed chassis
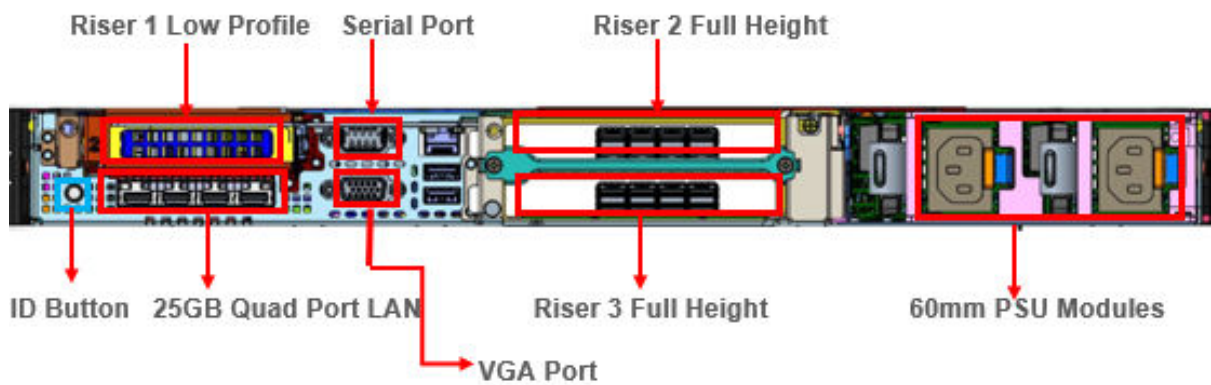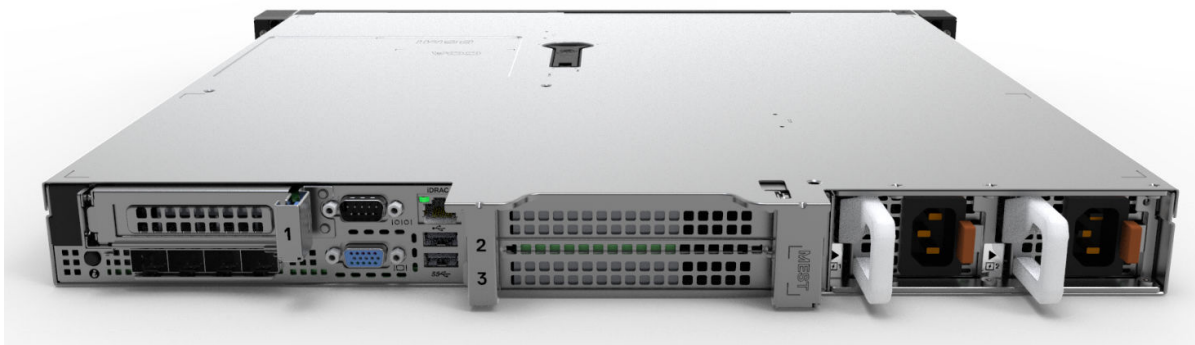
Figure 9. XR11 Rear accessed chassis rear views

Rear view of XR12 front accessed chassis

Figure 10. XR12 Front accessed chassis rear view

Rear view of XR12 rear accessed chassis
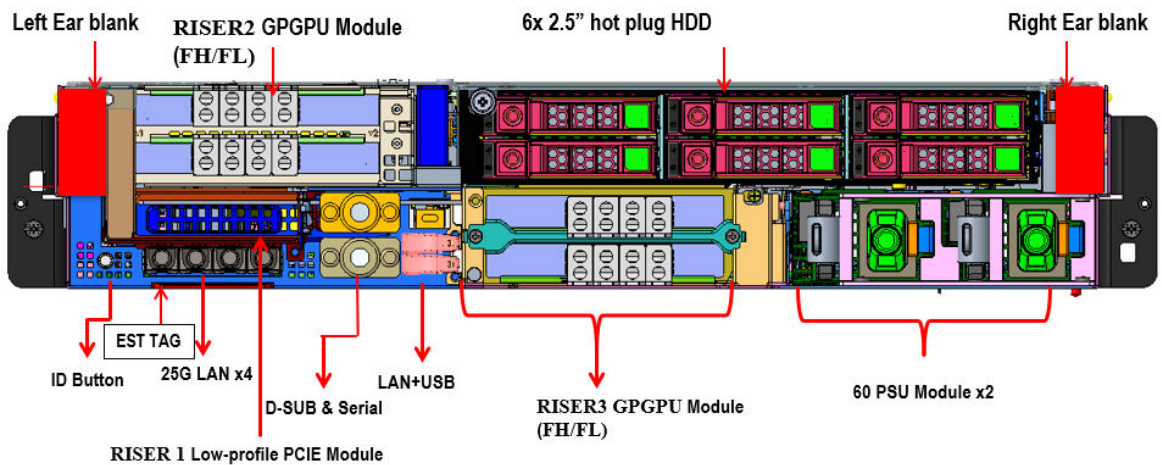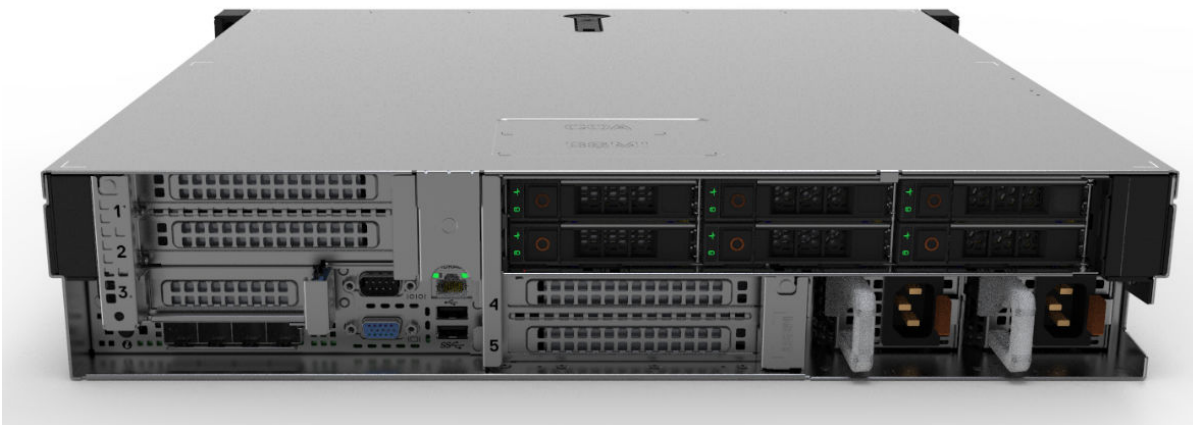
Figure 11. XR12 Rear accessed chassis rear views

Inside the XR11 front accessed chassis
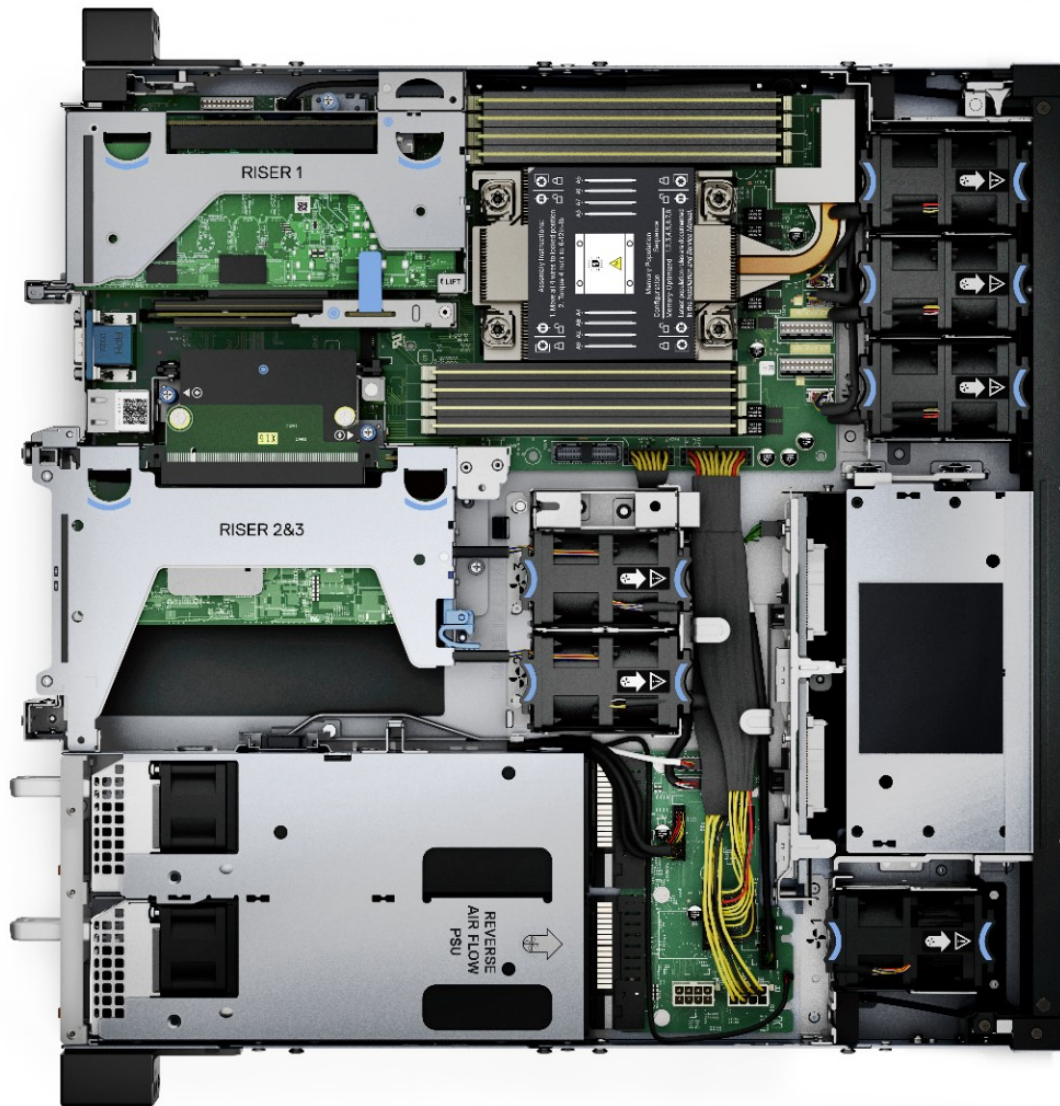
Figure 12. XR11 Front accessed chassis internal view (no bezel)
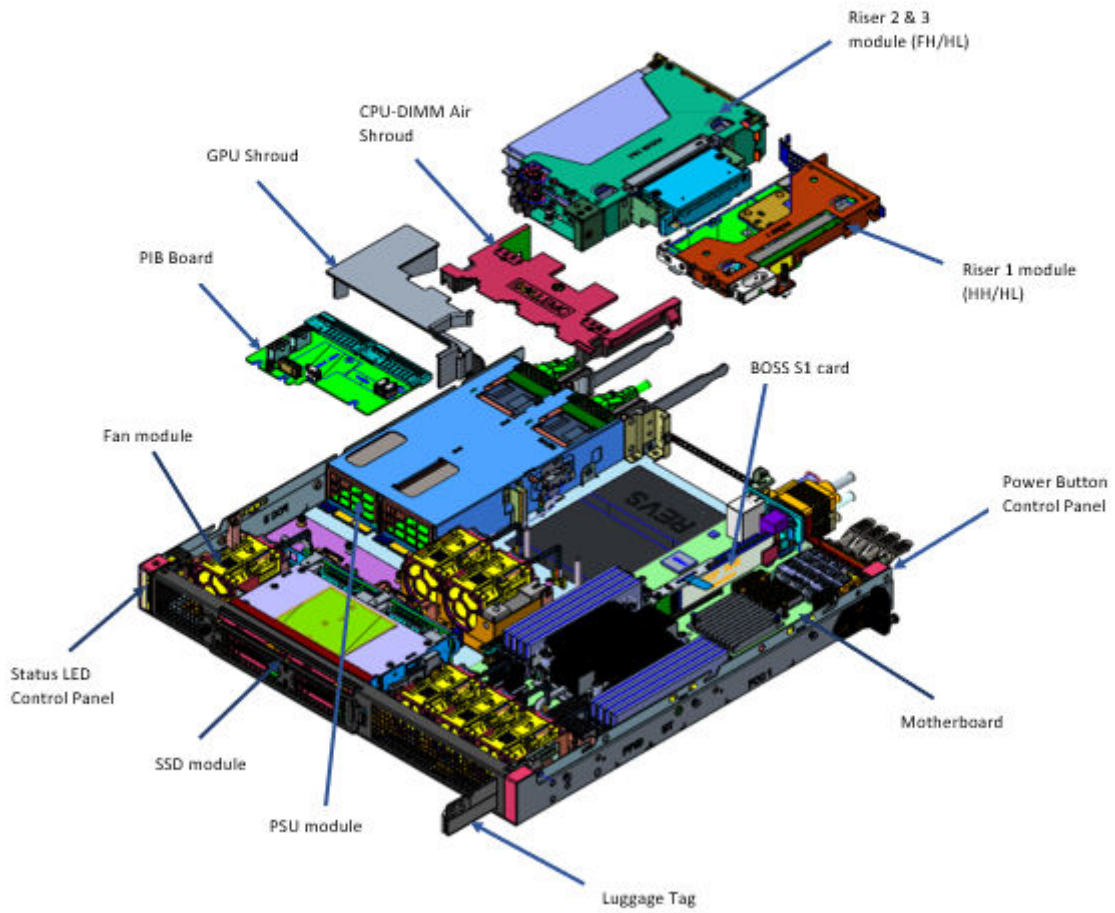
Figure 13. XR11 Front accessed chassis internal exploded view (rear to front)

Inside the XR11 rear accessed chassis
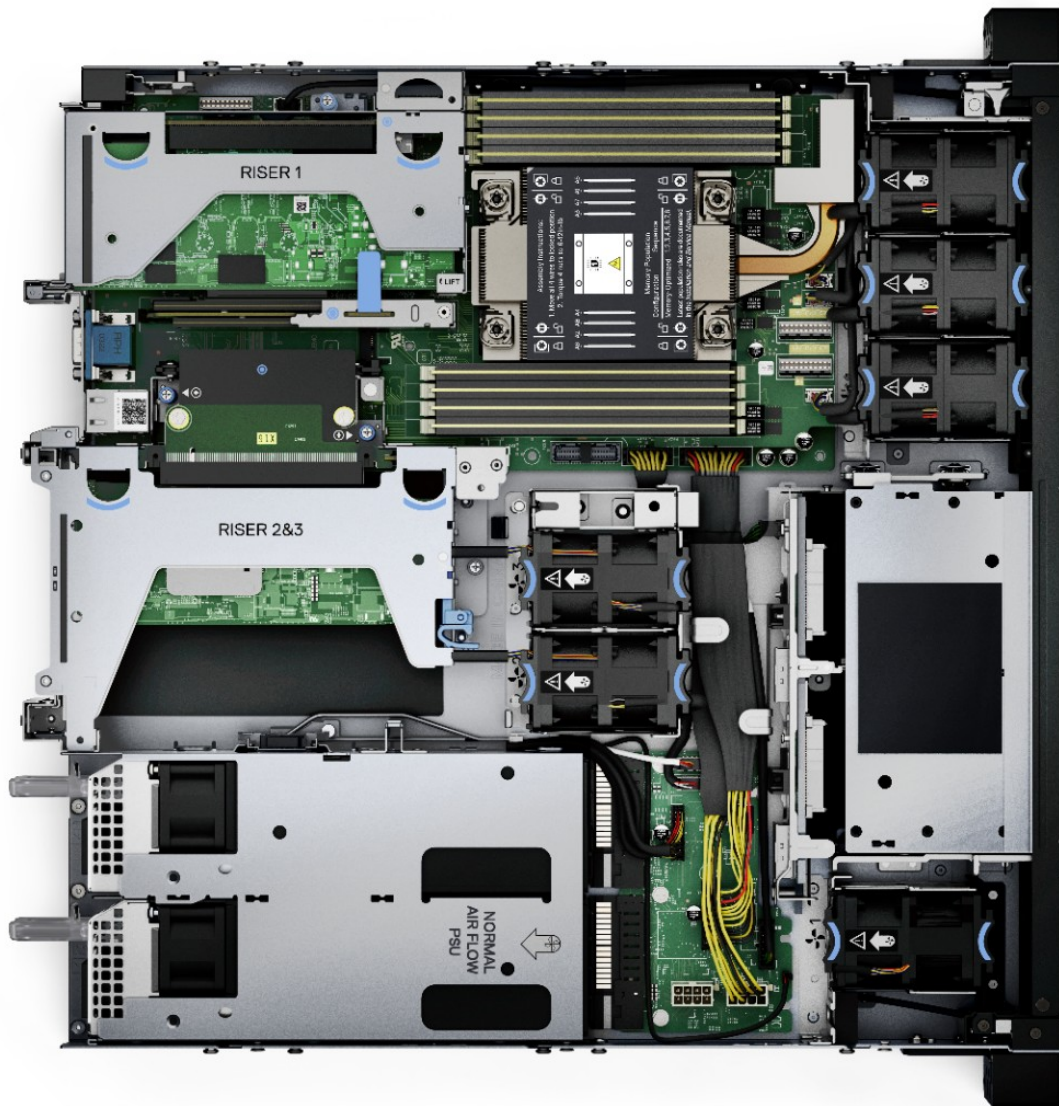
Figure 14. XR11 Rear accessed chassis internal view (no bezel)
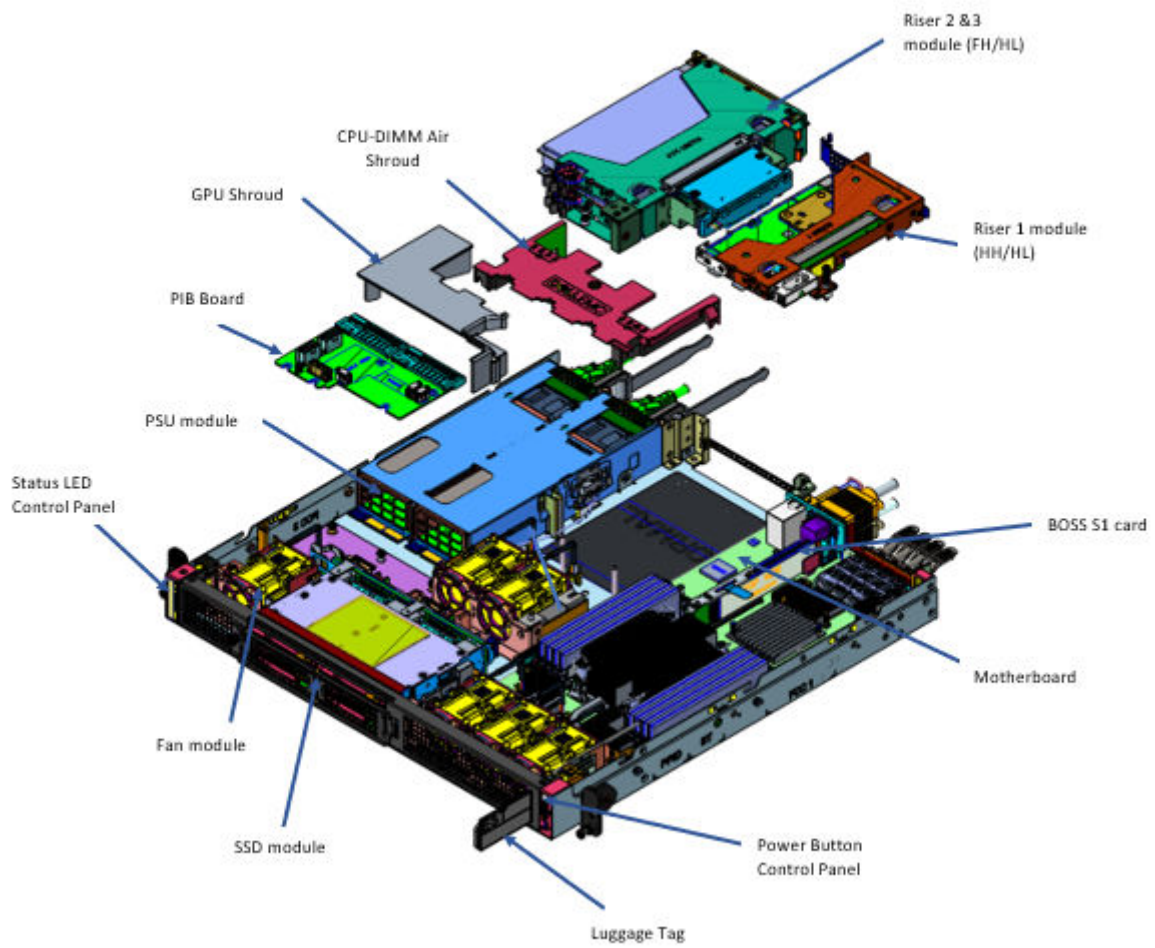
Figure 15. XR11 Rear accessed chassis internal exploded view (no bezel)

Inside the XR12 front accessed chassis
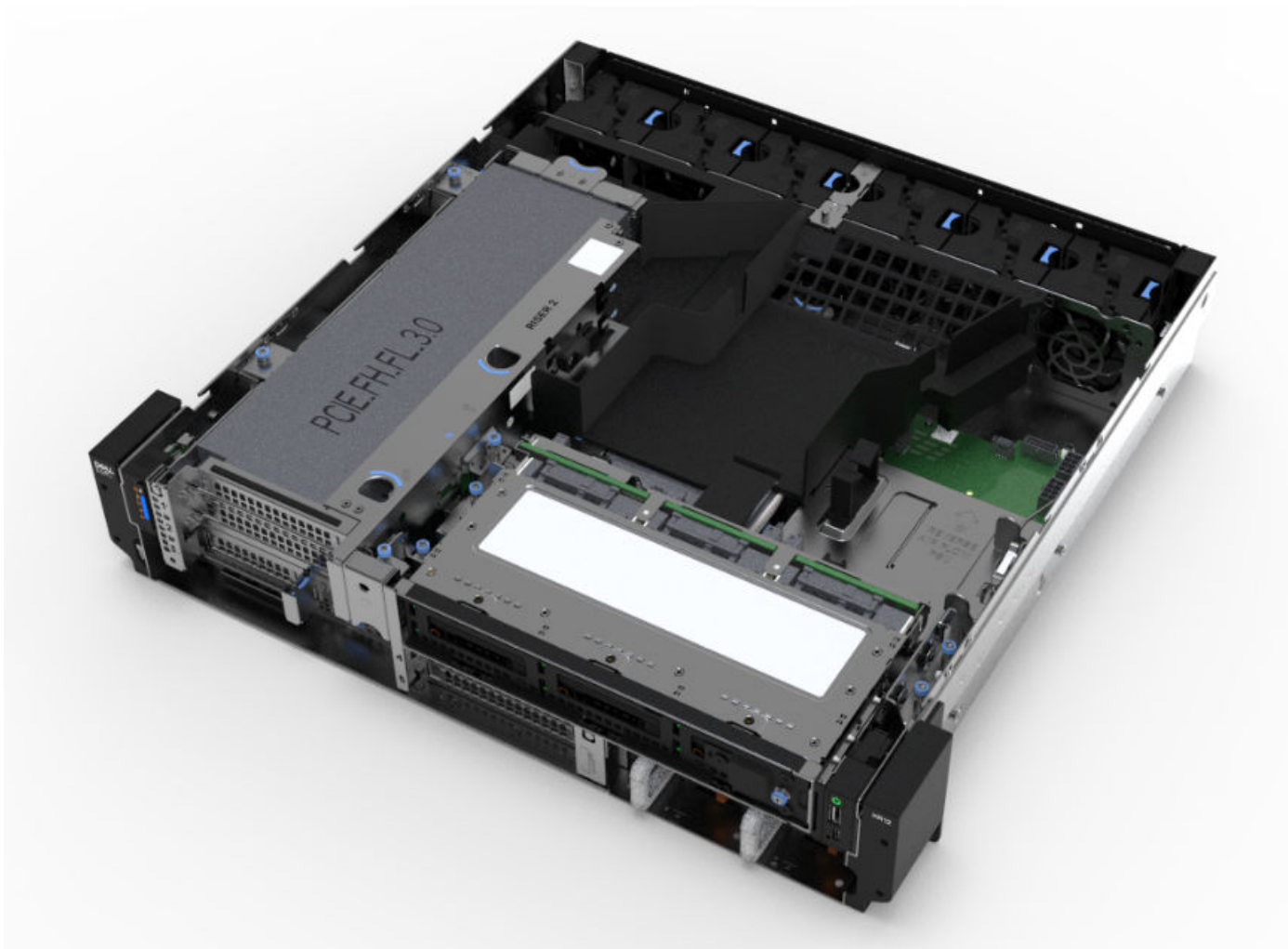
Figure 16. XR12 Front accessed chassis internal front view (no bezel)
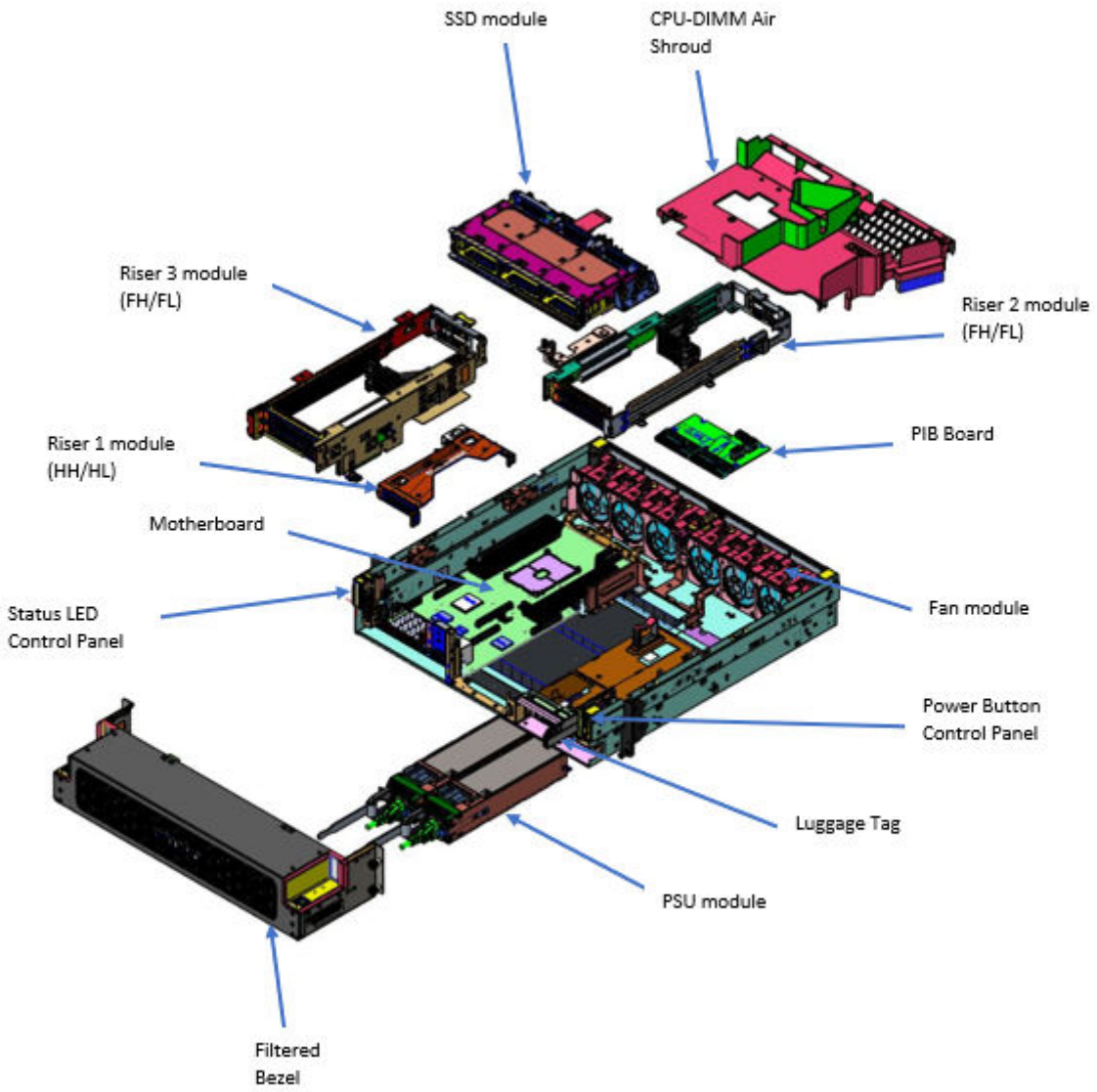
Figure 17. XR12 Front accessed chassis internal exploded view

Inside the XR12 rear accessed chassis

Figure 18. XR12 Rear accessed chassis internal view (no bezel, no shroud)
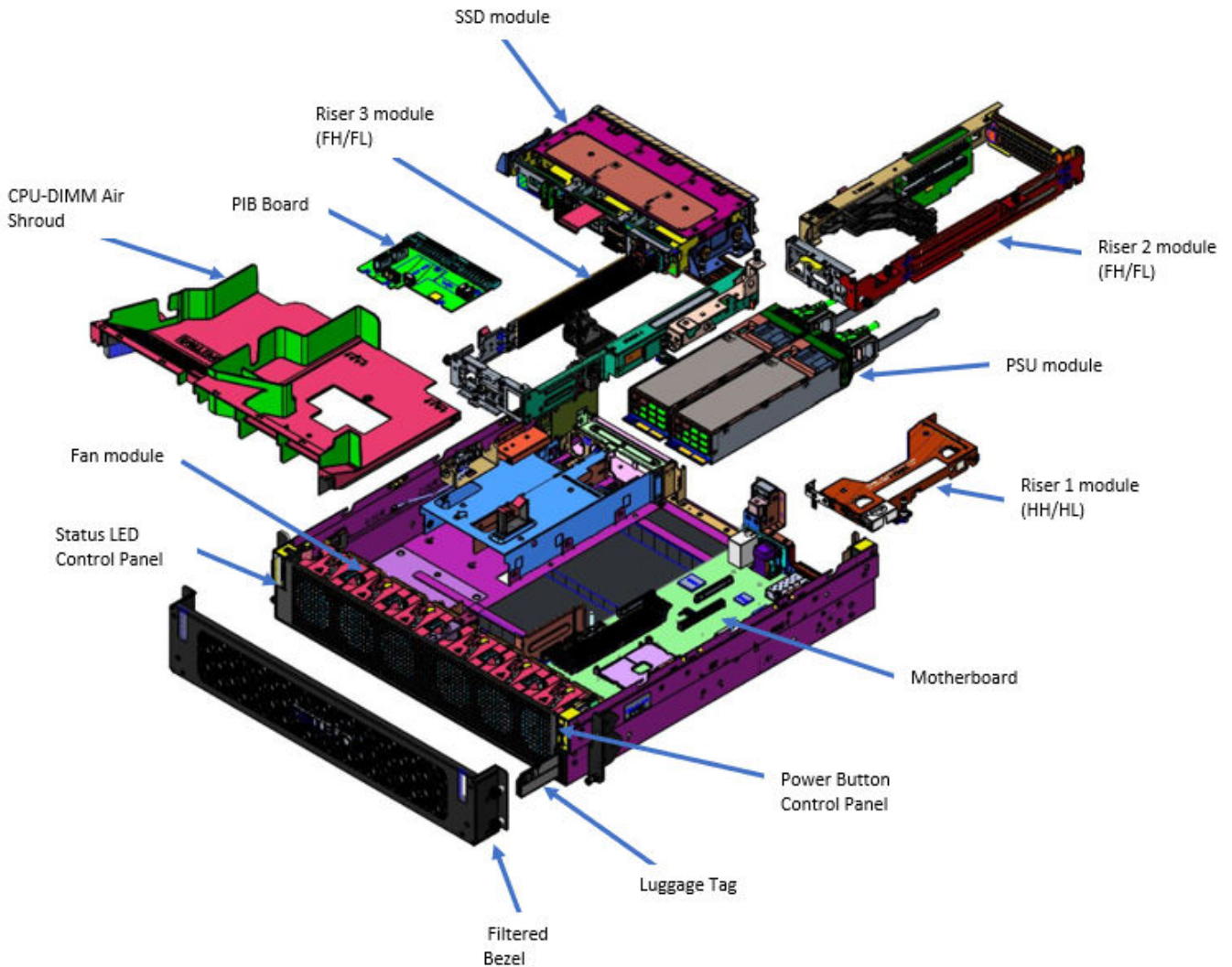
Figure 19. XR12 Rear accessed chassis internal exploded view

Quick Resource Locator (QRL)

There are two types of QRLs on the PowerEdge XR11 and XR12: a generic QRL and a QRL on the Express Service Tag (EST).

The generic QRL for XR11 and XR12 can be found on the System Information Labels (SILs), Getting Started Guide (GSG) and Installation and Service Manuals. It leads to a webpage with links to product information such as Setup and Service videos, iDRAC Manual, and other resources that apply to the platform.

The QRL on the EST for XR11 and XR12 is located on the information tag and is unique and specific to that service tag. It contains the service tag number of the system. The label and the QRL code within it are printed on demand at the L10 factories. The QRL on the EST also links to a webpage that shows the exact configuration as built for that customer, and the specific warranty purchased. It is one click away from the same content of generic information that applies to XR11 and XR12 that is available in the other QRL.

Figure 20. Generic QRL for XR11 on SIL

Figure 21. Generic QRL for XR12 on SIL

Figure 22. QRL on EST

Processor
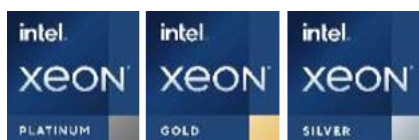
Topics:

• Processor features

Processor features

The 3rd Generation Xeon® Scalable Processors stack is the next generation data center processor offering with the latest features, increased performance, and incremental memory options. This latest generation Xeon Scalable processor supports usages from entry designs that are based on Intel Xeon Silver processors to advanced capabilities offered in new Intel Xeon Platinum processor.

The following lists the features and functions that are in the upcoming 3rd Generation Intel® Xeon Scalable Processor offering:

● More, faster I/O with PCI Express 4 and up to 64 lanes (per socket) at 16 GT/s
● Enhanced Memory Performance with support for up to 3200 MT/s DIMMs

Supported processors for XR11 and XR12

The table below details the list of processors that will be offered at launch. This list is subject to change based on Intel Roadmap and will be updated accordingly.

Table 3. Processor SKU stack

Proc	Clock Speed (GHz)	Cache (M)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	Intel Mem Enabled	TDP	XR11	XR12
8351N	2.4	54	36	72	Turbo	2933	6 TB	Y	225 W	Supported	Supported
6354	3	39	18	36	Turbo	3200	6 TB	Y	205 W	Supported	Supported
6338 T	2.1	48	24	64	Turbo	3200	6 TB	Y	165 W	Supported	Supported
6338 N	2.2	48	32	64	Turbo	2666	6 TB	Y	185 W	Supported	Supported
6330 N	2.2	42	28	56	Turbo	2666	6 TB	Y	165 W	Supported	Supported
6326	2.9	24	16	32	Turbo	3200	6 TB	Y	185 W	Supported	Supported
6314U	2.3	48	32	64	Turbo	3200	6 TB	Y	205 W	Supported	Supported
6312U	2.4	36	24	48	Turbo	3200	6 TB	Y	185 W	Supported	Supported

Table 3. Processor SKU stack (continued)

Proc	Clock Speed (GHz)	Cache (M)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	Intel Mem Enabled	TDP	XR11	XR12
5320 T	2.3	30	20	40	Turbo	2933	6 TB	Y	150 W	Supported	Supported
5318Y	2.1	36	24	48	Turbo	2933	6 TB	Y	165 W	Supported	Supported
5318N	2.1	36	24	48	Turbo	2666	6 TB	Y	150 W	Supported	Supported
5317	3	18	12	24	Turbo	2933	6 TB	Y	150 W	Supported	Supported
5315Y	3.2	12	8	16	Turbo	2933	6 TB	Y	140 W	Supported	Supported
4316	2.3	30	20	40	Turbo	2666	6 TB	N	150 W	Supported	Supported
4314	2.4	24	16	32	Turbo	2666	6 TB	Y	135 W	Supported	Supported
4310	2.1	18	12	24	Turbo	2666	6 TB	N	120 W	Supported	Supported
4310T	2.3	15	10	20	Turbo	2666	6 TB	N	105 W	Supported	Supported
4309 Y	2.8	12	8	16	Turbo	2666	6 TB	N	105 W	Supported	Supported

.

Memory subsystem

The PowerEdge XR11 and XR12 systems support up to 8 DIMMs, with up to 2048 GB of standard memory and speeds of up to 3200 MT/s.

In addition, the PowerEdge XR11 and XR12 systems support Registered DIMMs (RDIMMs) and Load Reduced DIMMs (LRDIMMs) which use a buffer to reduce memory loading and provide greater density, allowing for the maximum platform memory capacity. Unbuffered DIMMs (UDIMMs) and 3DS DIMMs are not supported on both XR11 and XR12. The XR11 and XR12 systems support up to 256 GB of Intel Optane DC persistent memory 200 Series.

Topics:

*   Supported memory

Supported memory

The table below lists the memory technologies supported by the platforms XR11 and XR12.

Table 4. Supported DDR4 memory technologies

Feature	XR11 and XR12 (DDR4)
DIMM Type	RDIMM
	LRDIMM
Transfer Speed	3200 MT/s
Voltage	1.2V (DDR4)

The table below lists the supported DDR4 DIMMs for the platforms XR11 and XR12.

Table 5. Memory speed

DIMM Type	DIMM Ranking	DIMM Capacity	DIMM Speed (MT/s)	Data width	DIMM Volts
RDIMM	1R	8 GB	3200	8	1.2 V
RDIMM	2R	16 GB	3200	8	1.2 V
RDIMM	2R	32 GB	3200	8	1.2 V
RDIMM	2R	64 GB	3200	4	1.2 V
LRDIMM	4R	128 GB	3200	4	1.2 V
LRDIMM	4R	256 GB	3200	4	1.2 V
Intel Optane PMem 200 Series	1R	128 GB	3200	4	1.2 V
Intel Optane PMem 200 Series	1R	256 GB	3200	4	1.2 V

Table 6. Supported Intel Optane PMem 200 Series for processor configurations

Configuration	Description	Memory population rules		
		RDIMMs	**LRDIMM**	**Intel Optane PMem 200 Series**
Configuration 1	4 x RDIMMs, 4 x Intel Optane PMem 200 Series	Processor1 {A1, A2, A3, A4}	-	Processor1 {A5, A6, A7, A8}
	4 x LRDIMMs, 4 x Intel Optane PMem 200 Series	-	Processor1 {A1, A2, A3, A4}	Processor1 {A5, A6, A7, A8}
Configuration 2	6 x RDIMMs, 1 x Intel Optane PMem 200 Series	Processor1 {A1, A2, A3, A4, A5, A6}	-	Processor1 {A7}
	6 x LRDIMMs, 1 x Intel Optane PMem 200 Series	-	Processor1 {A1, A2, A3, A4, A5, A6}	Processor1 {A7}

(i) **NOTE:** Memory DIMM slots are not hot pluggable.

Storage

Topics:

- Supported drives
- Internal storage configuration matrix for XR11
- Internal storage configuration matrix for XR12
- External storage

Supported drives

The XR11 and XR12 will support several types of drives in these technologies and form factors: 2.5-inch SATA solid-state drives (SSDs), 2.5-inch SAS SSDs and 2.5-inch NVME SSDs. For a list of the specific drives supported on this platform, please refer to the Drive And Platform Matrix.

Table 7. Supported drive specifications for XR11

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5-inch	SATA SSD	6 GB	N/A	480GB, 960G, 1.9TB, 3.84TB
2.5-inch	SAS SSD	12 GB	N/A	400GB, 800GB, 960GB, 1.6TB, 1.92TB, 3.2TB, 3,84TB, 7.6TB, 15TB
2.5-inch	NVMe		N/A	375GB, 750GB, 800GB, 960GB (QNS only) 1.6TB, 1.92TB, 3.2TB, 3.84TB, 6.4TB, 7.68TB, 15.36 TB (QNS only)

Table 8. Supported drive specifications for XR12

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5-inch	SATA SSD	6 GB	N/A	480GB, 960G, 1.9TB, 3.84TB
2.5-inch	SAS SSD	12 GB	N/A	400GB, 800GB, 960GB, 1.6TB, 1.92TB, 3.2TB, 3,84TB, 7.6TB, 15TB
2.5-inch	NVMe		N/A	375GB, 750GB, 800GB, 960GB (QNS only) 1.6TB, 1.92TB, 3.2TB, 3.84TB, 6.4TB, 7.68TB, 12.8TB, 15.36TB (QNS only)

ⓘ **NOTE:** QNS is Qualified Not Shipped. QNS drives can be offered through RCI/DSS via the intake process.

ⓘ **NOTE:** XR11 and XR12 will not support Pin 3 power disable for 12 GB SAS drives as is common in other server designs.

ⓘ **NOTE:** XR11 and XR12 will not support NVMe drives with Riser 1A installed.

Internal storage configuration matrix for XR11

Table 9. Internal storage configuration matrix

Config uration	Chassis orientatio n	Base configuration description	Backplane description	Storage controller(s)	Controller form factor	BOSS enabled	Riser configuration
1	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SATA (only)	Onboard SATA	Onboard SATA	Y	C0/1: R1B+R2+R3
2	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	HBA355i	Adapter	Y	C0/1: R1B+R2+R3
3	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	H755	Adapter	Y	C0/1: R1B+R2+R3
4	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	H345* / H355*	Adapter	Y	C0/1: R1B+R2+R3
5	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 NVME (only)	S150	Direct Attach (SL)	Y	C0/1: R1B+R2+R3
6	Rear Access (NAF)	ASSY, CHAS, NAF, 4HD, 3PCI, 1U, XR11	x4 2.5 NVME (only)	H755	Adapter	Y	C0/1: R1B+R2+R3
7	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SATA (only)	Onboard SATA	Onboard SATA	Y	C0/1: R1B+R2+R3 C2: R1A+R2+R3
8	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	HBA355i	Adapter	Y	C0/1: R1B+R2+R3
9	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	H755	Adapter	Y	C0/1: R1B+R2+R3
10	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 SAS/ SATA	H345* / H355*	Adapter	Y	C0/1: R1B+R2+R3
11	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 NVME (only)	S150	Direct Attach (SL)	Y	C0/1: R1B+R2+R3
12	Front Access (RAF)	ASSY, CHAS, RAF, 4HD, 3PCI, 1U, XR11	x4 2.5 NVME (only)	H755	Adapter	Y	C0/1: R1B+R2+R3

(i) **NOTE:** * indicates the H355 will replace H345 from Dec'21.

For cable routing information on the different configurations, please refer to the cable matrix on this link: https:// www.delltechnologies.com/sales/en-us/auth/index.htm.

Internal storage configuration matrix for XR12

Table 10. Internal storage configuration matrix

Configu ration	Chassis orientation	Base configuration description	Backplane description	Storage controller(s)	Controller form factor	BOSS enabled	Riser configuration
1	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SATA (only)	Onboard SATA	Onboard SATA	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A C3: R1A+R2A+R3A C4: R1A+R2B+R3A
2	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	HBA355i	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
3	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	H755	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
4	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	H345* / H355*	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
5	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x4 2.5 NVME + 2.5 SATA	S150 + Onboard SATA	Direct Attach (SL) + Onboard SATA	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
6	Front Access (RAF)	ASSY, CHAS, RAF, 6HD, 3PCI, 2U, XR12	x6 2.5 NVME (only)	H755	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
7	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SATA (only)	Onboard SATA	Onboard SATA	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
8	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	HBA355i	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
9	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	H755	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
10	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x6 2.5 SAS/ SATA	H345* / H355*	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
11	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x4 2.5 NVME + 2.5 SATA	S150 + Onboard SATA	Direct Attach (SL) + Onboard SATA	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A
12	Rear Access (NAF)	ASSY, CHAS, NAF, 6HD, 3PCI, 2U, XR12	x6 2.5 NVME (only)	H755	Adapter	Y	C0: R1B+R2A+R3A C1: R1B+R2B+R3B C2: R1B+R2B+R3A

(i) **NOTE:** * indicates the H355 will replace H345 from Dec'21.

For cable routing information on the different configurations, please refer to the cable matrix on this link: https://www.delltechnologies.com/sales/en-us/auth/index.htm.

External storage

The XR11 and XR12 supports the external storage device types listed in the table below:

Table 11. Supported external storage devices for XR11 and XR12

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12 Gbps SAS ME484, MD1420 and MD1400

Expansion cards and expansion card risers

> ⓘ **NOTE:** When an expansion card is not supported or missing, riser the iDRAC and Lifecycle Controller logs an event. This does not prevent your system from booting. However, if a F1/F2 pause occurs with an error message, see *Troubleshooting expansion cards* section in the *Dell EMC PowerEdge Servers Troubleshooting Guide* at www.dell.com/poweredgemanuals.

Topics:

- Expansion cards and risers for the PowerEdge XR11 system
- Expansion cards and risers for the PowerEdge XR12 system

Expansion cards and risers for the PowerEdge XR11 system

This section provides information on different expansion cards and risers supported for the PowerEdge XR11 system.

Expansion card installation guidelines
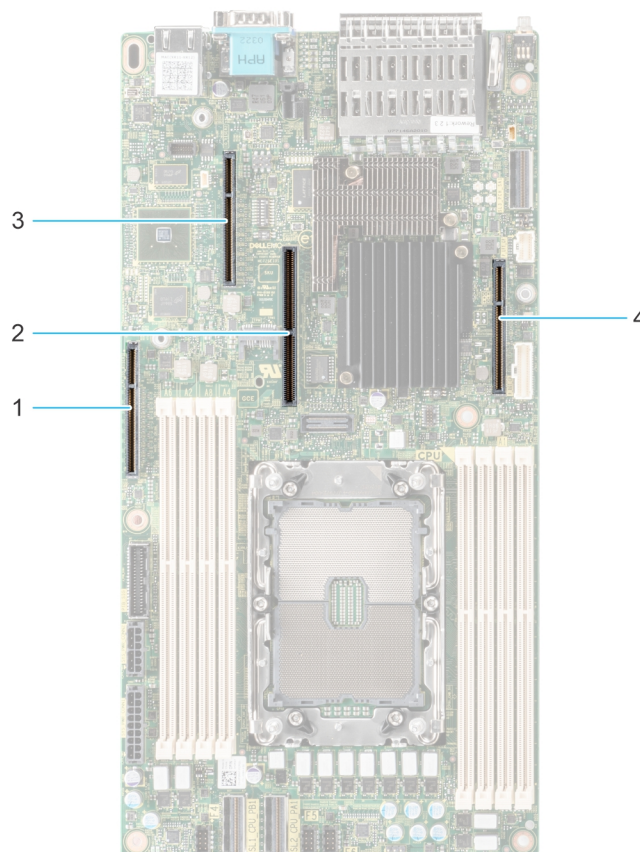
Figure 23. Expansion card slot connectors

1. IO_Riser3 (Riser 3 connector)
2. BOSS S1 card connector

3. IO_Riser2 (Riser 2 connector)
4. IO_Riser1 (Riser 1 connector)

The following table describes the expansion card riser configurations:

Table 12. Expansion card riser configurations

Configurations	Expansion card risers	PCIe Slots	Controlling processor	Height	Length	Slot width
Config0.	R1B+R2+R3 Rear Accessed configuration	1	Processor 1	Low profile	Half length	x8
		2		Full Height	Half length	x16
		3		Full Height	Half length	x16
Config1.	R1B+R2+R3 Front Accessed configuration	1	Processor 1	Low profile	Half length	x8
		2		Full Height	Half length	x16
		3		Full Height	Half length	x16
Config2.	R1A+R2+R3 Front Accessed configuration	1	Processor 1	Low profile	Half length	x16
		2		Full Height	Half length	x16
		3		Full Height	Half length	x16

ⓘ **NOTE:** Riser 2 and 3 are combined in one expansion card riser module.
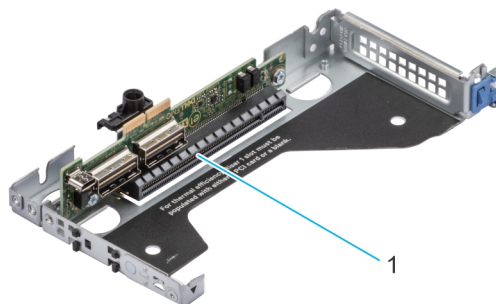
Figure 24. Riser 1A

1. Slot 1, x16, LP-HL (Low Profile - Half Length)
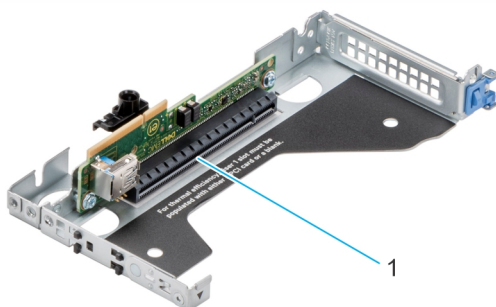
Figure 25. Riser 1B

1. Slot 1, x8, LP-HL (Low Profile - Half Length)
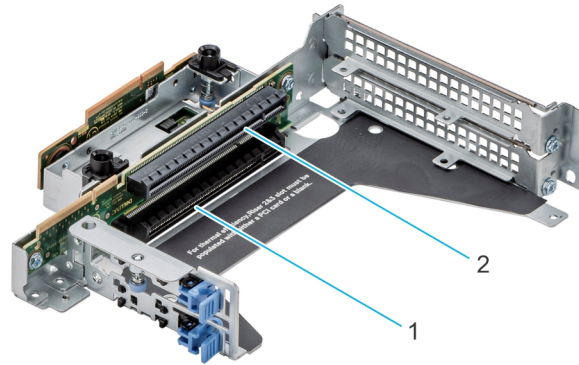
Figure 26. Riser 2 and 3

1. Slot 2, x16, FH-HL (Full Height - Half Length)
2. Slot 3, x16, FH-HL (Full Height - Half Length)

(i) **NOTE:** The expansion-card slots are not hot-swappable.

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

Table 13. Configuration 0: R1B+R2+R3 for Rear Accessed configuration

Card type	Slot priority	Maximum number of cards
Internal PERC adapter (LP)	1	1
Dell External Adapter (FH)	3,2	2
GPU (FH)	2,3	2
Mellanox (NIC: 100Gb) (FH)	2,3	2
Mellanox (NIC: 25Gb) (FH)	2,3	2
Mellanox (NIC: 25Gb) (LP)	1	1
Broadcom NIC: 100Gb (FH)	2,3	2
Broadcom (NIC: 25Gb) (FH)	2,3	2
Broadcom (NIC: 25Gb) (LP)	1	1
Broadcom (NIC: 10Gb) (FH)	2,3	2
Broadcom (NIC: 10Gb) (LP)	1	1
Broadcom (NIC: 1Gb) (FH)	2,3	2
Broadcom (NIC: 1Gb) (LP)	1	1
Intel (NIC:100Gb) (FH)	2,3	2
Intel (NIC: 25Gb) (FH)	2,3	2
Intel (NIC: 25Gb) (LP)	1	1
Intel (NIC: 2x10Gb SFP+) (FH)	2	1
Intel (NIC: 4x10Gb SFP+) (FH)	2	1
Intel (NIC: 10Gb) (FH) (all others including V2 of 4 x10 SFP+ and 2 x10 SFP+ cards)	2,3	2
Intel (NIC: 10Gb) (LP)	1	1
Intel (NIC: 1Gb) (FH)	2,3	2

Table 13. Configuration 0: R1B+R2+R3 for Rear Accessed configuration (continued)

Card type	Slot priority	Maximum number of cards
Intel (NIC: 1Gb) (LP)	1	1
Intel FPGA Accelerator (FH)	2,3	1
Dell BOSS S1 card Module	Integrated slot	1

Table 14. Configuration 1: R1B+R2+R3 for Front Accessed configuration

Card type	Slot priority	Maximum number of cards
Internal PERC adapter (LP)	1	1
Dell External Adapter (FH)	3,2	2
GPU (FH)	2,3	2
Mellanox (NIC: 100Gb) (FH)	2,3	2
Mellanox (NIC: 25Gb) (FH)	2,3	2
Mellanox (NIC: 25Gb) (LP)	1	1
Broadcom NIC: 100Gb (FH)	2,3	2
Broadcom (NIC: 25Gb) (FH)	2,3	2
Broadcom (NIC: 25Gb) (LP)	1	1
Broadcom (NIC: 10Gb) (FH)	2,3	2
Broadcom (NIC: 10Gb) (LP)	1	1
Broadcom (NIC: 1Gb) (FH)	2,3	2
Broadcom (NIC: 1Gb) (LP)	1	1
Intel (NIC:100Gb) (FH)	2,3	2
Intel (NIC: 25Gb) (FH)	2,3	2
Intel (NIC: 25Gb) (LP)	1	1
Intel (NIC: 2x10Gb SFP+) (FH)	2	1
Intel (NIC: 4x10Gb SFP+) (FH)	2	1
Intel (NIC: 10Gb) (FH) (all others including V2 of 4 x10 SFP+ and 2 x10 SFP+ cards)	2,3	2
Intel (NIC: 10Gb) (LP)	1	1
Intel (NIC: 1Gb) (FH)	2,3	2
Intel (NIC: 1Gb) (LP)	1	1
Intel FPGA Accelerator (FH)	2,3	1
Dell BOSS S1 card Module	Integrated slot	1

Table 15. Configuration 2: R1A+R2+R3 for Front Accessed configuration

Card type	Slot priority	Maximum number of cards
Dell External Adapter (FH)	3,2	2
GPU (FH)	2,3	2
Mellanox (NIC: 100Gb) (FH)	2,3	2
Mellanox (NIC: 100Gb) (LP)	1	1

Card type	Slot priority	Maximum number of cards
Mellanox (NIC: 25Gb) (FH)	2,3	2
Broadcom NIC: 100Gb (FH)	2,3	2
Broadcom (NIC: 25Gb) (FH)	2,3	2
Broadcom (NIC: 10Gb) (FH)	2,3	2
Broadcom (NIC: 1Gb) (FH)	2,3	2
Intel (NIC:100Gb) (FH)	2,3	2
Intel (NIC: 25Gb) (FH)	2,3	2
Intel (NIC: 2x10Gb SFP+) (FH)	2	1
Intel (NIC: 4x10Gb SFP+) (FH)	2	1
Intel (NIC: 10Gb) (FH) (all others including V2 of 4 x10 SFP+ and 2 x10 SFP+ cards)	2,3	2
Intel (NIC: 1Gb) (FH)	2,3	2
Intel FPGA Accelerator (LP)	1	1
Dell BOSS S1 card Module	Integrated slot	1

Expansion cards and risers for the PowerEdge XR12 system

This section provides information on different expansion cards and risers supported for the PowerEdge XR12 system.

Expansion card installation guidelines
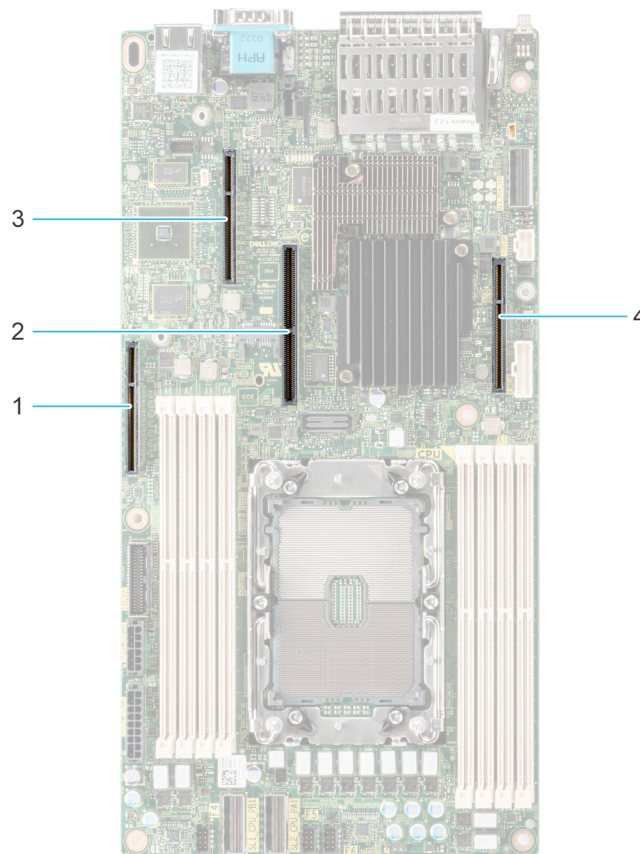
Figure 27. Expansion card slot connectors

1. IO_Riser3 (Riser 3 connector)
2. BOSS (M.2) card connector
3. IO_Riser2 (Riser 2 connector)
4. IO_Riser1 (Riser 1 connector)

The following table describes the expansion card riser configurations:

Table 16. Expansion card riser configurations

Configurations	Expansion card risers	PCIe Slots	Controlling processor	Height	Length	Slot width
Config0.	R1B+R2A+R3A	3	Processor 1	Low profile	Half length	x8
	Rear / Front Accessed configurations	2		Full Height	Full length	x16
		4		Full Height	Full length	x16
Config1.	R1B+R2B+R3B	3	Processor 1	Low profile	Half length	x8
	Rear / Front Accessed configurations	1, 2		Full Height	Full length	x8+x8
		4, 5		Full Height	Full length	x8+x8
Config2.	R1B+R2B+R3A	3	Processor 1	Low profile	Half length	x8
	Rear / Front Accessed configurations	1, 2		Full Height	Full length	x8+x8
		4		Full Height	Full length	x16
Config3.	R1A+R2A+R3A	3	Processor 1	Low profile	Half length	x16
		2		Full Height	Full length	x16

Table 16. Expansion card riser configurations (continued)

Configurations	Expansion card risers	PCIe Slots	Controlling processor	Height	Length	Slot width
	Front Accessed configurations	4		Full Height	Full length	x16
Config4.	R1A+R2B+R3A	3	Processor 1	Low profile	Half length	x16
	Front Accessed configurations	1,2		Full Height	Full length	x8+x8
		4		Full Height	Full length	x16
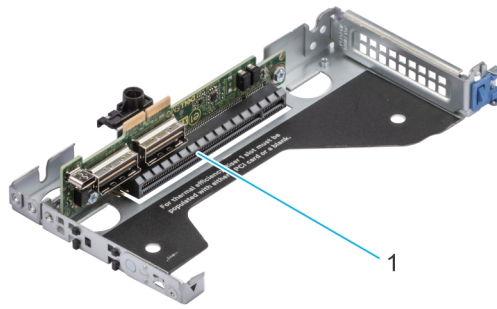
Figure 28. Riser 1A

1. Riser 1A, slot 3, x16, LP-HL (Low Profile - Half Length)
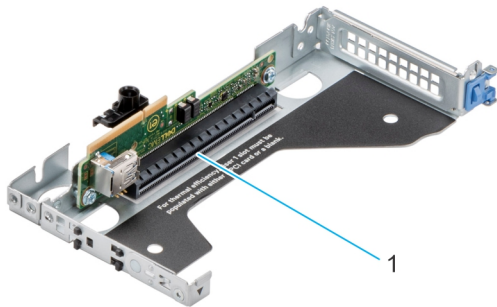
Figure 29. Riser 1B

1. Riser 1B, slot 3, x8, LP-HL (Low Profile - Half Length)
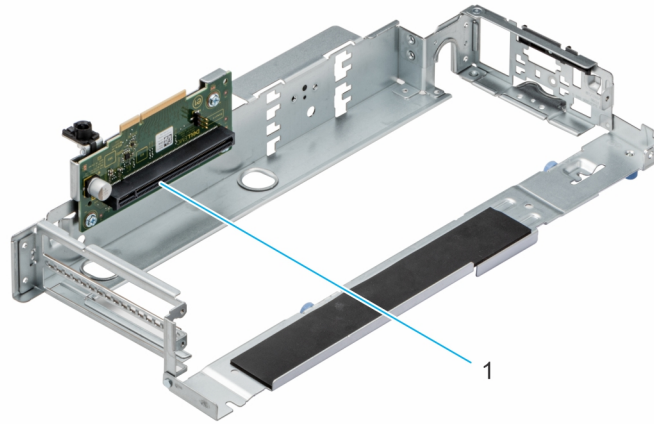
Figure 30. Riser 2A

1. Riser 2A, slot 2, x16, FH-FL (Full height - Full Length)
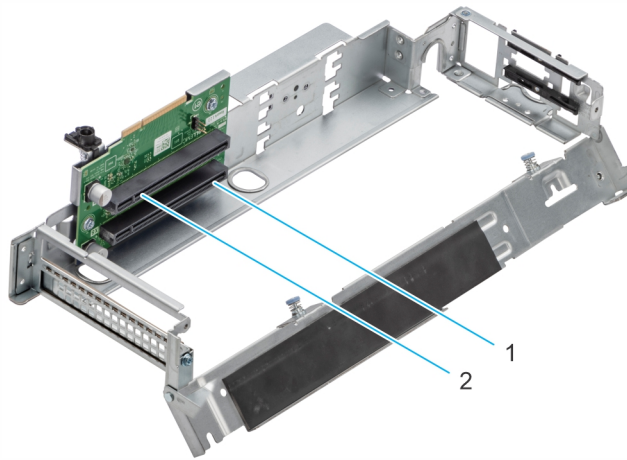
Figure 31. Riser 2B

1. Riser 2B, slot 1, x8, FH-FL (Full height - Full Length)
2. Riser 2B, slot 2, x8, FH-FL (Full height - Full Length)
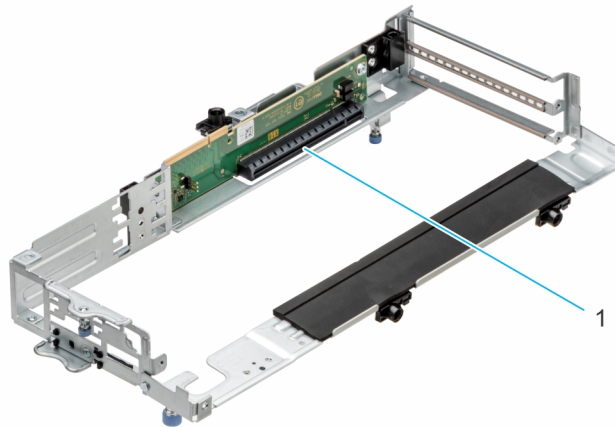
Figure 32. Riser 3A

1. Riser 3A, slot 4, x16, FH-FL (Full height - Full Length)
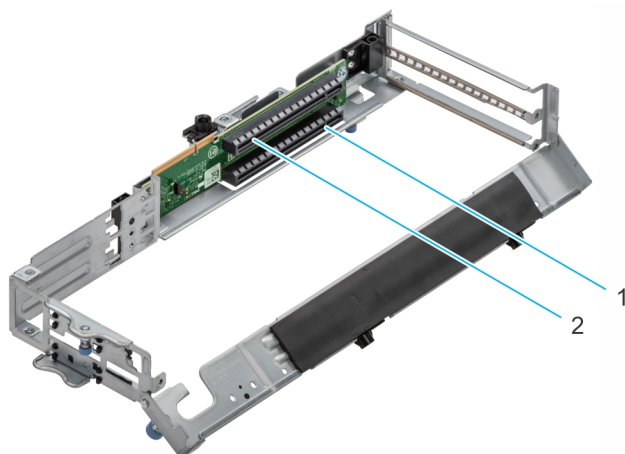
Figure 33. Riser 3B

1. Riser 3B, slot 4, x8, FH-FL (Full height - Full Length)
2. Riser 3B, slot 5, x8, FH-FL (Full height - Full Length)

ⓘ **NOTE:** The expansion-card slots are not hot-swappable.

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

Table 17. Configuration 0: R1B+R2A+R3A for Rear / Front Accessed configurations

| Card type	Slot priority	Maximum number of cards
Internal PERC adapter (LP)	3	1
Dell External Adapter (FH)	2, 4	2
GPU (FH)	4, 2	2
Mellanox (NIC: 100Gb) (FH)	4, 2	2
Mellanox (NIC: 25Gb) (FH)	4, 2	2
Mellanox (NIC:25Gb) (LP)	3	1
Broadcom (NIC: 100Gb) (FH)	4,2	2
Broadcom (NIC: 25Gb) (FH)	4, 2	2
Broadcom (NIC: 25Gb) (LP)	3	1
Broadcom (NIC: 10Gb) (FH)	4, 2	2
Broadcom (NIC: 10Gb) (LP)	3	1
Broadcom (NIC: 1Gb) (FH)	4, 2	2
Broadcom (NIC: 1Gb) (LP)	3	1
Intel (NIC: 100Gb) (FH)	4, 2	2
Intel (NIC: 25Gb) (FH)	4, 2	2
Intel (NIC: 25Gb) (LP)	3	1
Intel (NIC: 2x10Gb SFP+) (FH)	2	1
Intel (NIC: 4x10Gb SFP+) (FH)	2	1
Intel (NIC: 10Gb) (FH) (all others including V2 of 4x10 and 2x10 SFP+ cards)	4, 2	2
Intel (NIC: 10Gb) (LP)	3	1

Table 17. Configuration 0: R1B+R2A+R3A for Rear / Front Accessed configurations (continued)

Card type	Slot priority	Maximum number of cards
Intel (NIC: 1Gb) (FH)	4, 2	2
Intel (NIC: 1Gb) (LP)	3	1
Intel (FPGA Accelerator card FH)	4, 2	1
Dell BOSS S1 card Module	Integrated slot	1

Table 18. Configuration 1: R1B+R2B+R3B Rear / Front Accessed configurations

Card type	Slot priority	Maximum number of cards
Internal PERC adapter (LP)	3	1
Dell External Adapter (FH)	1, 2, 4, 5	2
Mellanox (NIC: 25Gb) (FH)	4, 5, 1, 2	4
Mellanox (NIC: 25Gb) (LP)	3	1
Broadcom (NIC: 25Gb) (FH)	4, 5, 2, 1	4
Broadcom (NIC: 25Gb) (LP)	3	1
Broadcom (NIC: 10Gb) (FH)	4, 5, 2, 1	4
Broadcom (NIC: 10Gb) (LP)	3	1
Broadcom (NIC: 1Gb) (FH)	4, 5, 2, 1	4
Broadcom (NIC: 1Gb) (LP)	3	1
Intel (NIC: 25Gb) (FH)	4, 5, 1, 2	4
Intel (NIC: 25Gb) (LP)	3	1
Intel (NIC: 4x10Gb SFP+) (FH)	1, 2	2
Intel (NIC: 2x10Gb SFP+) (FH)	1, 2	2
Intel (NIC: 10Gb) (FH) (all others including V2 of 4x10 and 2x10 SFP+ cards)	4, 5, 1, 2	4
Intel (NIC: 10Gb) (LP)	3	1
Intel (NIC: 1Gb) (FH)	4, 5, 1, 2	4
Intel (NIC: 1Gb) (LP)	3	1
Dell BOSS S1 card Module	Integrated slot	1

Table 19. Configuration 2: R1B+R2B+R3A for Rear / Front Accessed configuration

Card type	Slot priority	Maximum number of cards
Internal PERC adapter (LP)	3	1
Dell External Adapter (FH)	2, 1, 4	2
GPU (FH)	4	1
Mellanox (NIC: 100Gb) (FH)	4	1
Mellanox (NIC: 25Gb) (FH)	4	1
Mellanox CX5 (NIC: 25Gb) (FH)	4	1
Mellanox (NIC: 25Gb) (FH)	4,1,2	3
Mellanox (NIC: 25Gb) (LP)	3	1

Table 19. Configuration 2: R1B+R2B+R3A for Rear / Front Accessed configuration (continued)

Card type	Slot priority	Maximum number of cards
Broadcom (NIC: 100Gb) (FH)	4	1
Broadcom (NIC: 25Gb QP) (FH) (x16)	4	1
Broadcom (NIC: 25Gb DP) (FH)	4, 1, 2	3
Broadcom (NIC: 25Gb) (LP)	3	1
Broadcom (NIC: 10Gb) (FH)	4, 1, 2	3
Broadcom (NIC: 10Gb) (LP)	3	1
Broadcom (NIC: 1Gb) (FH)	4, 1, 2	3
Broadcom (NIC: 1Gb) (LP)	3	1
Intel (NIC: 100Gb) (FH)	4	1
Intel (NIC: 25Gb QP) (FH) (x16)	4	1
Intel (NIC: 25Gb DP) (FH)	4, 1, 2	3
Intel (NIC: 25Gb 4P) (FH)	4	1
Intel (NIC: 25Gb) (LP)	3	1
Intel (NIC: 2x10Gb SFP+) (FH)	1, 2	2
Intel (NIC: 4x10Gb SFP+) (FH)	1, 2	2
Intel (NIC: 10Gb) (FH) (all others including V2 of 4x10 and 2x10 SFP+ cards)	4, 1, 2	3
Intel (NIC: 10Gb) (LP)	3	1
Intel (NIC: 1Gb) (FH)	4, 1, 2	3
Intel (NIC: 1Gb) (LP)	3	1
Intel (FPGA Accelerator card) (FH)	4	1
Dell BOSS S1 card Module	Integrated slot	1

Table 20. Configuration 3: R1A+R2A+R3A for Front Accessed configuration

Card type	Slot priority	Maximum number of cards
Dell External PERC Adapter (FH)	2,4	2
GPU (FH)	4,2	2
Mellanox (NIC: 100Gb) (FH)	4,2	2
Mellanox (NIC: 100Gb) (LP)	3	1
Mellanox (NIC:25Gb) (FH)	4,2	2
Broadcom (NIC: 100Gb) (FH)	4,2	2
Broadcom (NIC: 25Gb) (FH)	4,2	2
Broadcom (NIC: 10Gb) (FH)	4,2	2
Broadcom (NIC: 1Gb) (FH)	4,2	2
Intel (NIC:100Gb) (FH)	4,2	2
Intel (NIC:25Gb) (FH)	4,2	2
Intel (NIC: 2x10Gb SFP+) (FH)	2	1
Intel (NIC: 4x10Gb SFP+) (FH)	2	1

Table 20. Configuration 3: R1A+R2A+R3A for Front Accessed configuration (continued)

Card type	Slot priority	Maximum number of cards
Intel (NIC: 10Gb) (FH) (all others including V2 of 4x10Gb and 2x10Gb SFP+ cards)	4,2	2
Intel (NIC: 1Gb) (FH)	4,2	2
Intel (FPGA Accelerator) (LP)	3	1
Dell BOSS S1 card Module	Integrated slot	1

Table 21. Configuration 4: R1A+R2B+R3A for Front Accessed configuration

Card type	Slot priority	Maximum number of cards
Dell External PERC Adapter (FH)	2,1,4	2
GPU (FH)	4	1
Mellanox (NIC: 100Gb) (FH)	4	1
Mellanox (NIC: 100Gb) (LP)	3	1
Mellanox CX5 (NIC:25Gb) (FH) x16	4	1
Mellanox (NIC:25Gb) (FH)	4,1,2	3
Intel (FPGA Accelerator) (LP)	3	1
Broadcom (NIC: 100Gb) (FH)	4	1
Broadcom (NIC: 25Gb QP) (FH) x16	4	1
Broadcom (NIC: 25Gb DP) (FH)	4,1,2	3
Broadcom (NIC: 10Gb) (FH)	4,1,2	3
Broadcom (NIC: 1Gb) (FH)	4,1,2	3
Intel (NIC:100Gb) (FH)	4	1
Intel (NIC:25Gb QP) (FH) x16	4	1
Intel (NIC:25Gb DP) (FH)	4,1,2	3
Intel (NIC: 25Gb 4P) (FH)	4	1
Intel (NIC: 2x10Gb SFP+) (FH)	1,2	2
Intel (NIC: 4x10Gb SFP+) (FH)	1,2	2
Intel (NIC: 10Gb) (FH) (all others including V2 of 4x10Gb and 2x10Gb SFP+ cards)	4,1,2	3
Intel (NIC: 1Gb) (FH)	4,1,2	3
Dell BOSS S1 card Module	Integrated slot	1

⚠️ **CAUTION: Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.**

⚠️ **WARNING: Consumer-Grade GPU should not be installed or used in the Enterprise Server products.**

Power, thermal, and acoustics

Topics:

Power for XR11 and XR12

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

Table 22. Power tools and technologies

Feature	Description
Power Supply Units (PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power Supply Units section.
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at www.dell.com/calc.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guidelines, including 80 PLUS, Climate Savers and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: ● Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% ● More accurate reporting of power ● Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.
Systems Management	iDRAC9 Datacenter provides server- level management that monitors, reports, and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermals at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	Please refer to the section ASHRAE A3/A4/Rugged support restriction.
Rack infrastructure	Dell offers some of the industry's highest- efficiency power infrastructure solutions, including: ● Power distribution units (PDUs)

Table 22. Power tools and technologies (continued)

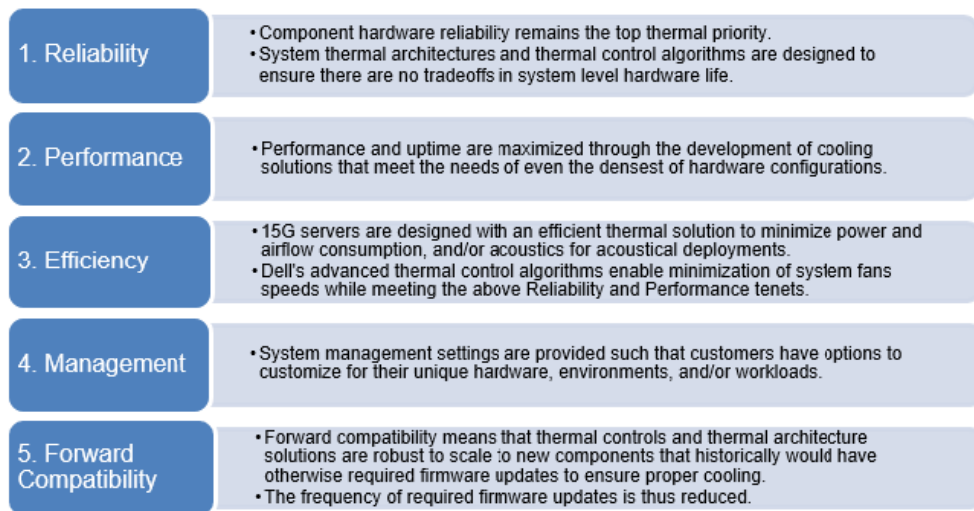| Feature	Description
	● Uninterruptible power supplies (UPSs) ● Energy Smart containment rack enclosures Find additional information at: https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm.

Thermal for XR11 and XR12

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Thermal management of the platform helps delivers high performance for the right amount of cooling to components at the lowest fan speeds across a wide range of ambient temperatures from 10°C to 35°C (50°F to 86°F) and to extended ambient temperature ranges (see Environmental Specifications). The benefits to you are lower fan power consumption (lower server system power and data center power consumption) and greater acoustical versatility.

Thermal design

Thermal management of PowerEdge XR11 and XR12 deliver high performance with the right amount of cooling to components while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C (50°F) to 35°C (95°F) for the base standard configurations, and to extended ambient temperatures of 5°C (41°F) to 45°C (113°F) for custom configurations (see Environmental Specifications). In addition, the XR11 and XR12 will operate in the rugged space at the extended ambient temperature ranges of -5°C (23°F) to 55°C (131°F) for selected configurations. Refer to Thermal Restrictions section and Rugged Certifications and Specifications section for more information.

1. Reliability
- Component hardware reliability remains the top thermal priority.
- System thermal architectures and thermal control algorithms are designed to ensure there are no tradeoffs in system level hardware life.

2. Performance
- Performance and uptime are maximized through the development of cooling solutions that meet the needs of even the densest of hardware configurations.

3. Efficiency
- 15G servers are designed with an efficient thermal solution to minimize power and airflow consumption, and/or acoustics for acoustical deployments.
- Dell's advanced thermal control algorithms enable minimization of system fans speeds while meeting the above Reliability and Performance tenets.

4. Management
- System management settings are provided such that customers have options to customize for their unique hardware, environments, and/or workloads.

5. Forward Compatibility
- Forward compatibility means that thermal controls and thermal architecture solutions are robust to scale to new components that historically would have otherwise required firmware updates to ensure proper cooling.
- The frequency of required firmware updates is thus reduced.

Figure 34. Thermal design characteristics

The thermal design of the PowerEdge XR11 and XR12 reflects the following:

● System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power

● Comprehensive thermal management: The thermal control system regulates the fan speed based on several different responses from all system- component temperature sensors, as well as inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipset, the inlet air ambient, hard disk drives, PCIe cards, and GPU

● Open and closed loop thermal fan speed control: Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. Closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds

● User-configurable settings: With the understanding and realization that every customer has unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user- configurable settings residing in the iDRAC BIOS setup screen. For more information, see the PowerEdge XR11 Installation and Service Manual

and XR12 Installation and Service Manual on Support.Dell.com/Manuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com
- Cooling redundancy: The XR11 and XR12 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system
- Environmental Specifications: The optimized thermal management makes the XR11 and XR12 reliable under a wide range of operating environments

Thermal restriction matrix

Table 23. Thermal restriction matrix for processor and fans

Configuration / Processor TDP	Front and Rear Accessed configuration with filtered bezel	Maximum Ambient Temperature
105 W	VHP fan Ext. HSK (XR12) Std. HSK (XR11)	55°C
120 W	VHP fan Ext. HSK (XR12) Std. HSK (XR11)	55°C
135 W	VHP fan Ext. HSK (XR12) Std. HSK (XR11)	55°C
140 W	VHP fan Ext. HSK (XR12) Std. HSK (XR11)	55°C
150 W	VHP fan Ext. HSK (XR12) Std. HSK (XR11)	55°C
165 W	VHP fan Ext. HSK	35°C
185 W	VHP fan Ext. HSK	35°C
205 W	VHP fan Ext. HSK	35°C
225 W	VHP fan Ext. HSK	35°C

Table 24. Label reference

Label	Description
VHP fan	Very High Performance fan
Std.	Standard
Ext.	Extended
HSK	Heat sink

Acoustics

Acoustical design for XR11 and XR12

Dell EMC PowerEdge XR11/XR12 is a 1U/2U rack mount server whose acoustical output provides for deployment from general use spaces to data centers. There are two chassis options:

Rear Accessed chassis, where power supplies and network cards are in the rear.

Front Accessed chassis, where power supplies and network cards are in the front.

Acoustical performance is provided in terms of three configurations: minimum, typical, maximum. Configuration details are provided in Table below , and acoustical performance data that is associated with each configuration of PowerEdge XR11/XR12 is provided in Table below. Each configuration has been tested according to Dell EMC acoustical standards for rack-mounted servers.

Table 25. Acoustical reference points and output comparisons

Value measured at your ears		Equivalent familiar noise experience
LpA (dBA, re 20 µPa)	Loudness, sones	
90	80	Loud concert
75	40	Data center, vacuum cleaner, voice must be elevated to be heard.
60	10	Conversation levels
45	4	Whispering, open office layout, normal living room
35	2	Quiet office
30	1	Quiet library
20	0	Recording studio

Acoustical performance

Acoustical performance is provided in terms of three configurations: minimum, typical, maximum. Configuration details are provided in Tables 23 and 25, and acoustical performance data associated with each configuration of PowerEdge XR11/XR12 is provided in Tables 24 and 26. Each configuration has been tested according to Dell EMC acoustical standards for rack-mounted servers.

PowerEdge XR11/XR12 acoustical dependencies

Some product features impact acoustical server output more than others. The following features are considered strong drivers of acoustical response, thus configurations, or operating conditions that include these features may increase air mover speed and acoustical output of the server:

1. Ambient temperature: Dell EMC evaluates the acoustical performance of servers in a 23±2°C environment. Ambient temperatures more than 25°C has higher acoustical output and may experience larger fluctuations between state changes.
2. CPU Thermal Design Power (TDP): Higher wattage CPUs may require more airflow for cooling under load and thus increase the potential acoustical output of the system.
3. Storage type: NVME SSD consumes more power than SAS/SATA drive technologies and therefore demands more airflow to achieve system cooling targets.
4. System Thermal Profile Selection in BIOS or iDRAC user interface.
   - *Default Thermal Profile* , generally provides a lower air mover speed thus lower acoustical output than those of other thermal profiles.
   - *Maximum Performance* (Performance Optimized) will result in higher acoustical output.
   - *Sound Cap*, for products that support the feature, will limit the maximum acoustical output of the system by sacrificing some processor performance.

5. GPU/FPGA/Acceleration Cards: When installed, the system acoustical output may be higher than configurations without acceleration cards.

Methods to reduce acoustical output of the XR11/XR12

Although the XR11/XR12 is designed for use in data centers, some users may have needs to deploy it in a quieter setting. The following is a list of means to do so. Please note however in most cases, the idle air mover speed of the system cannot be lowered without changing the configuration of the system, and in some cases, even a configuration change may not reduce idle air mover speeds.

1. Enable sound cap in IDRAC GUI: Sound cap, a setting in the BIOS, can be toggled on/off during boot up. When enabled, sound cap reduces the acoustics of the system at the expense of some performance.
2. Reduce ambient temperature: Lowering the ambient temperature allows the system to cool components more efficiently than at higher ambient temperatures.
3. Set target in Third party PCIe card options: Dell EMC provides airflow customization for third-party PCIe adapters installed in PowerEdge platforms. If automatic cooling response is above desired levels (LFM) based on the card specifications, a different LFM target can be set using PCIe Airflow Settings options in iDRAC GUI.
4. Replace third party PCI cards with similar Dell supported temperature-controlled cards, if available. Dell EMC works diligently with card vendors to validate and develop PCI cards to meet Dell EMC's exacting standards for thermal performance.

Table 26. Acoustical configuration of XR11

Configuration	XR11 - Rear Accessed Chassis			XR11 - Front accessed Chassis		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
CPU Type	Intel	Intel	Intel	Intel	Intel	Intel
CPU TDP	105W	150W	225W	105W	150W	225W
CPU Quantity	1	1	1	1	1	1
RDIMM Memory	8GB DDR4 RDIMM	32GB DDR4 RDIMM	128GB LRDIMM; 128GB BPS DIMM	8GB DDR4 RDIMM	32GB DDR4 RDIMM	128GB LRDIMM; 128GB BPS DIMM
Memory Quantity	1	2	4+4	1	2	4+4
Backplane Type	4x2.5"	4x2.5"	4x2.5"	4x2.5"	4x2.5"	4x2.5"
HDD Type	2.5" 240GB SATA SSD	2.5" 480GB SATA SSD	2.5" 7.68TB NVMe SSD	2.5" 240GB SATA SSD	2.5" 480GB SATA SSD	2.5" 7.68TB NVMe SSD
HDD Quantity	1	4	4	1	4	4
PSU Type	800 W	800 W	1400 W	1400 W	1400 W	1400 W
PSU Quantity	1	2	2	1	2	2
PCI 1	X	X	H755	X	X	H755
PCI 2	X	Dual Port 25GbE	Dual Port 25GbE	X	Dual Port 25GbE	Dual Port 25GbE
PCI 3	X	X	GPU T4	X	X	GPU T4
BOSS/M.2	X	X	BOSS S1 2x 480GB	X	BOSS S1 2x 480GB	BOSS S1 2x 480GB

Table 27. Acoustical performance of XR11 acoustical configurations

Configuration		XR11 - Rear Accessed Chassis			XR11 - Front Accessed Chassis		
		Minimum	Typical	Maximum	Minimum	Typical	Maximum
Acoustical Performance: Idle/ Operating @ 25 °C Ambient							
$L_{wA,m}$ (B)	Idle	5.5	5.4	7.3	5.3	5.3	6.4
	Operating	5.5	5.4	7.5	5.3	5.3	7.1
K_v (B)	Idle	0.4	0.4	0.4	0.4	0.4	0.4
	Operating	0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle	38	38	57	36	37	49
	Operating	38	38	58	36	37	57
Prominent tones	No prominent tones in Idle and Operating						
Acoustical Performance: Idle @ 28 °C Ambient							
$L_{wA,m}$ (B)		5.8	5.9	7.5	5.7	5.6	6.7
K_v (B)		0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		42	44	60	40	40	51
Acoustical Performance: CPU Max. Loading @ 35 °C Ambient							
$L_{wA,m}$ (B)		6.8	7.0	8.8	6.4	6.9	8.2
K_v (B)		0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		53	55	72	49	53	66

LwA,m: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

LpA,m: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed in a 24U rack enclosure, 25cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

Prominent tones: Criteria of D.6 and D.11 of ECMA-74 (17th ed., Dec. 2019) are followed to determine if discrete tones are prominent and to report them, if so.

Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

Operating mode: The maximum of the steady state acoustical output at 50% of CPU TDP, active HDDs, or 100% of GPU TDP per C.9.3.2 in ECMA-74 (17th ed., Dec. 2019).

Table 28. Acoustical configuration of XR12

Configuration	XR12 - Rear Accessed Chassis			XR12 - Front Accessed Chassis		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
CPU Type	Intel	Intel	Intel	Intel	Intel	Intel

Table 28. Acoustical configuration of XR12 (continued)

Configuration	XR12 - Rear Accessed Chassis			XR12 - Front Accessed Chassis		
	Minimum	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
CPU TDP	105W	150W	225W	105W	150W	225W
CPU Quantity	1	1	1	1	1	1
RDIMM Memory	8GB DDR4 RDIMM	32GB DDR4 RDIMM	128GB LRDIMM; 128GB BPS DIMM	8GB DDR4 RDIMM	32GB DDR4 RDIMM	128GB LRDIMM; 128GB BPS DIMM
Memory Quantity	1	2	4+4	1	2	4+4
Backplane Type	6x2.5"	6x2.5"	6x2.5"	6x2.5"	6x2.5"	6x2.5"
HDD Type	2.5" 240GB SATA SSD	2.5" 480GB SATA SSD	2.5" 7.68TB NVMe SSD	2.5" 240GB SATA SSD	2.5" 480GB SATA SSD	2.5" 7.68TB NVMe SSD
HDD Quantity	1	6	6	1	6	6
PSU Type	800 W	800 W	1400 W	1400 W	1400 W	1400 W
PSU Quantity	1	2	2	1	2	2
PCI 1	X	X	H755	X	X	H755
PCI 2	X	GPU T4	GPU A40	X	GPU T4	GPU A40
PCI 3	X	X	GPU A40	X	X	GPU A40
BOSS/M.2	X	X	BOSS S1 2x 480GB	X	BOSS S1 2x 480GB	BOSS S1 2x 480GB

Table 29. Acoustical performance of XR12 acoustical configurations

Configuration		XR12 - Rear Accessed Chassis			XR12 - Front Accessed Chassis		
		Minimum	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
Acoustical Performance: Idle/ Operating @ 25 °C Ambient							
$L_{wA,m}$ (B)	Idle	5.4	5.4	7.5	5.5	5.5	6.4
	Operating	5.4	7.4	7.8	5.5	6.9	7.2
K_v (B)	Idle	0.4	0.4	0.4	0.4	0.4	0.4
	Operating	0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle	39	40	60	41	42	48
	Operating	39	58	65	42	54	57
Prominent tones	No prominent tones in Idle and Operating						
Acoustical Performance: Idle @ 28 °C Ambient							
$L_{wA,m}$ (B)		5.7	5.8	7.7	5.8	5.7	6.6
K_v (B)		0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		43	43	63	44	44	51
Acoustical Performance: CPU Max. Loading @ 35 °C Ambient							

Table 29. Acoustical performance of XR12 acoustical configurations (continued)

Configuration	XR12 - Rear Accessed Chassis			XR12 - Front Accessed Chassis		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
$L_{wA,m}$ (B)	6.7	6.9	9.1	6.8	7.2	8.4
K_v (B)	0.4	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	52	55	77	53	58	70

LwA,m: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

LpA,m: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed in a 24U rack enclosure, 25cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

Prominent tones: Criteria of D.6 and D.11 of ECMA-74 (17th ed., Dec. 2019) are followed to determine if discrete tones are prominent and to report them, if so.

Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

Operating mode: The maximum of the steady state acoustical output at 50% of CPU TDP, active HDDs, or 100% of GPU TDP per C.9.3.2 in ECMA-74 (17th ed., Dec. 2019).

Rack, rails, and cable management

Key factors in selecting the proper rails include:

● Identifying the type of rack in which they will be installed
● The spacing between the front and rear mounting flanges of the rack
● The type and location of any equipment mounted in the back of the rack such as power distribution units (PDUs), and the overall depth of the rack

Reference the Dell EMC Enterprise Systems Rail Sizing and Rack Compatibility Matrix link below for the following information:

● Specific details about rail types and their functionalities
● Rail adjustability ranges for various rack mounting flange types
● Rail depth with and without cable management accessories
● Rack types supported for various rack mounting flange types

https://i.dell.com/sites/csdocuments/Business_solutions_engineering-Docs_Documents/en/rail-rack-matrix.pdf.

Topics:

• Rails information
• Cable Management Arm
• Strain Relief Bar

Rails information

The PowerEdge XR11 and XR12 only supports sliding rails. Due to the short depth of the XR11 and XR12, new sliding rails with shorter minimum extension have been created.

ⓘ **NOTE:** No other rails are compatible with the XR11 and XR12 system.

The sliding rails shown in below image Installing the system in Stab-in sliding rails allow the system to be fully extended out of the rack for service and are available with the optional cable management arm (CMA) and optional strain relief bar (SRB). There are 2 types of sliding rails available for the PowerEdge XR11 and XR12 as listed below:

● 2-post / 4-post rack mounting – traditional datacenter rack types with post-to-post depth range 18.5-inch – 29.5-inch [470 mm – 750 mm].
● Transit case mounting for mobility – The rugged MIL 901E performance is only certified in the Pelican custom rack 25-036329-01-DE2412-05/24/05.

The PowerEdge XR11 and XR12 sliding rails are stab-in style. A "stab-in" design means that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack. 2U systems require a two-person lift.
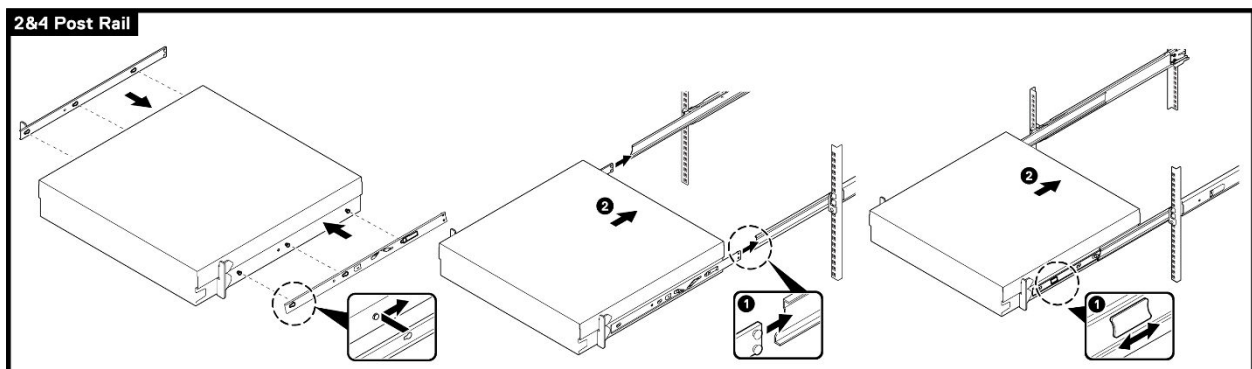

**Figure 35. Installing the system in stab-in sliding rails**

Dell PowerEdge XR11 and XR12 sliding rails overview:

● Support for tool-less installation in 19-inch EIA-310-E compliant square or unthreaded round hole racks including all generations of Dell racks. Also supports tooled installation in threaded round hole racks.
● Supports Stab-in installation of the chassis to the rails.
● Support full extension of the system out of the rack to allow serviceability of key internal components.
● Supports for optional cable management arm (CMA) and strain relief bar (SRB).

Sliding rails in 2-post rack

The sliding rails for XR11 and XR12 provide support for 2-post racks with 19-inch EIA-310-E compliant square, round, or threaded round mounting holes. Adapter brackets and screws (included in the rail kit) are necessary to mount the XR11 and XR12 into 2-post racks either in flush-mount or center-mount positions.

(i) **NOTE:** Two-post racks are not supported in the rugged environment.
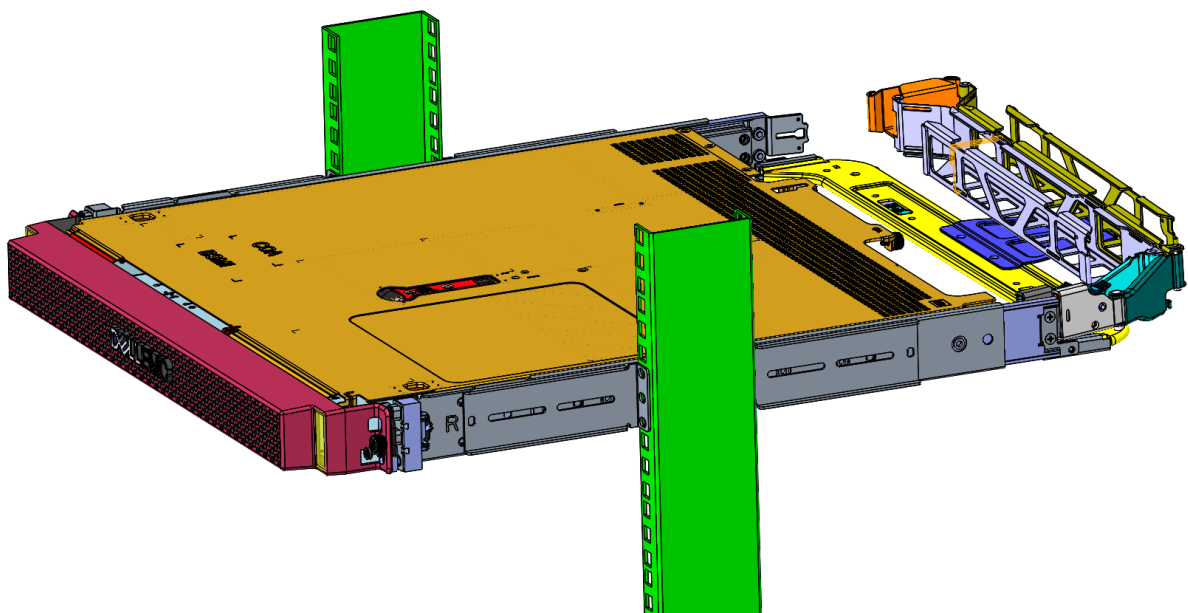
Figure 36. XR11 Mounted in sliding rails in 2-post center-mount configuration
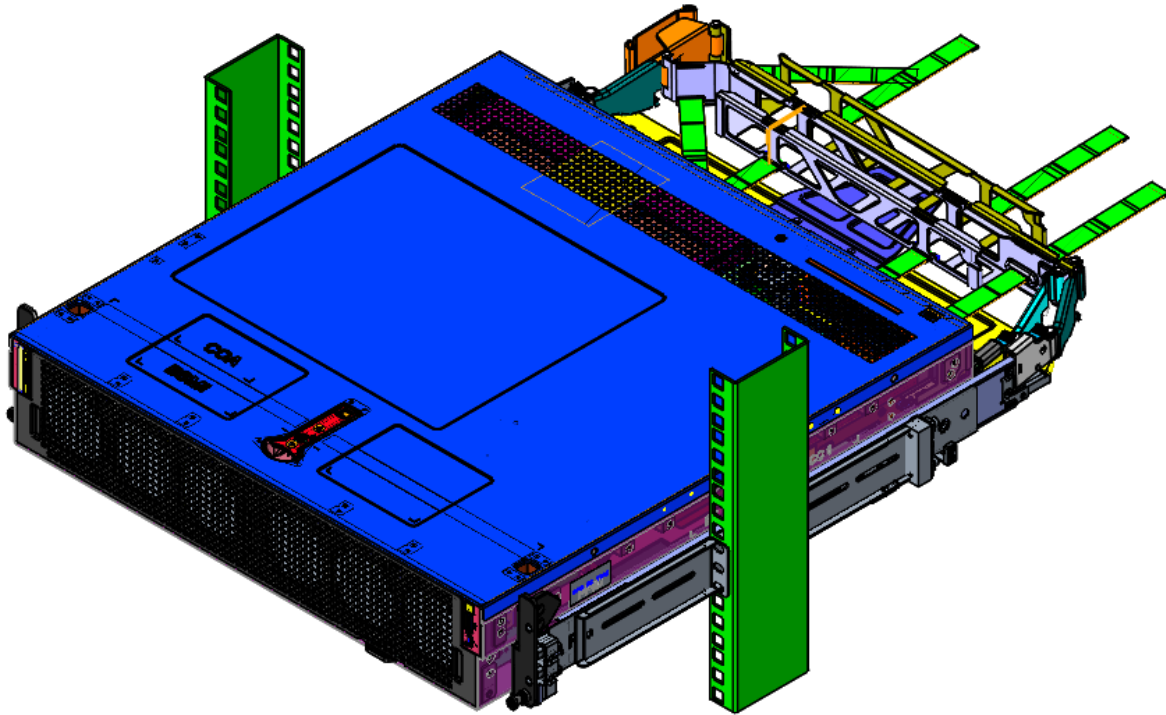
Figure 37. XR12 Mounted in sliding rails in 2-post center-mount configuration

Sliding rails in 4-post rack

The sliding rails for XR11 and XR12 provide tool-less support for 4-post racks with 19-inch EIA-310-E compliant square or unthreaded round mounting holes including all generations of Dell racks when the post-to-post rack depth is between 18.5-inch – 29.5-inch [470 mm – 750 mm]. There are additional screws included in the rail kit to tightly secure the rails to the 4-post rack if desired.
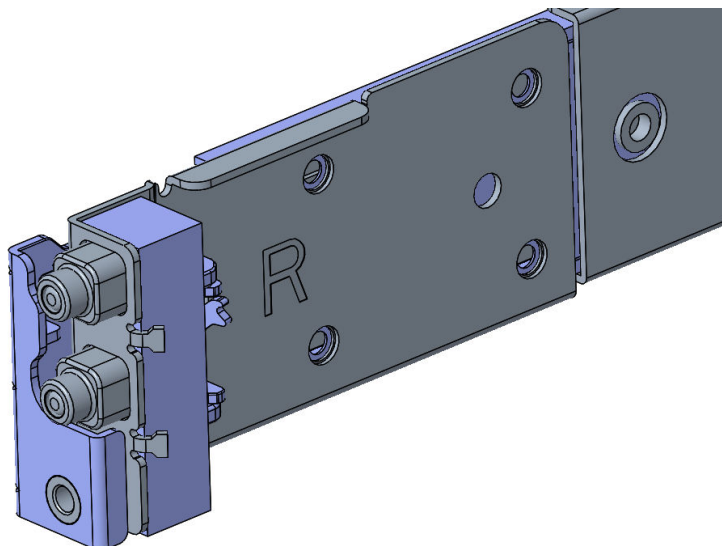

Figure 38. XR11 and XR12 stab-in sliding rail mounting interface for 4-post round or square hole racks
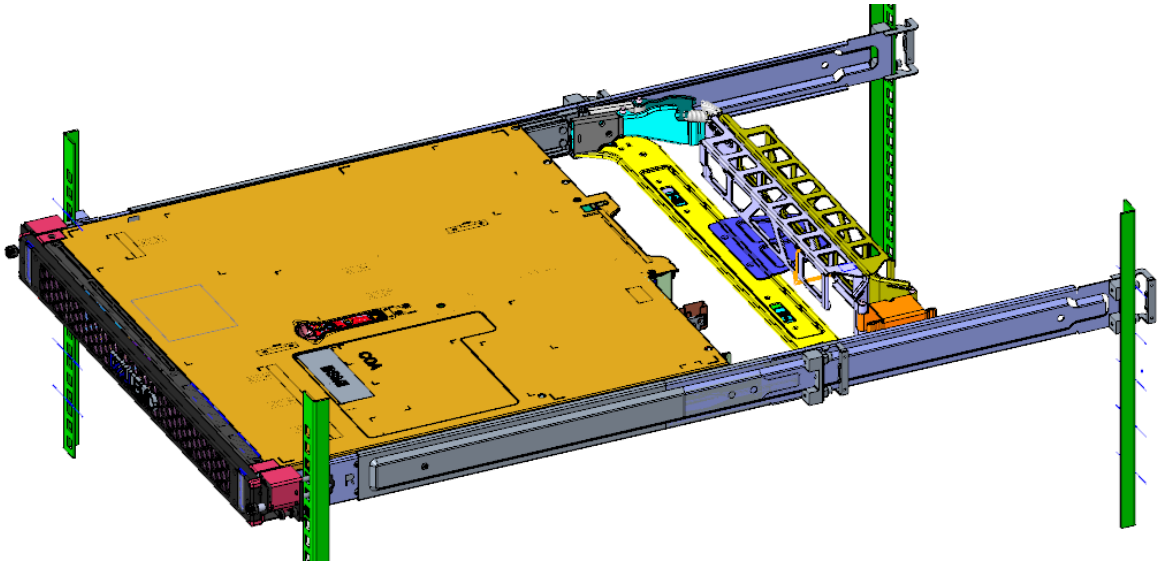
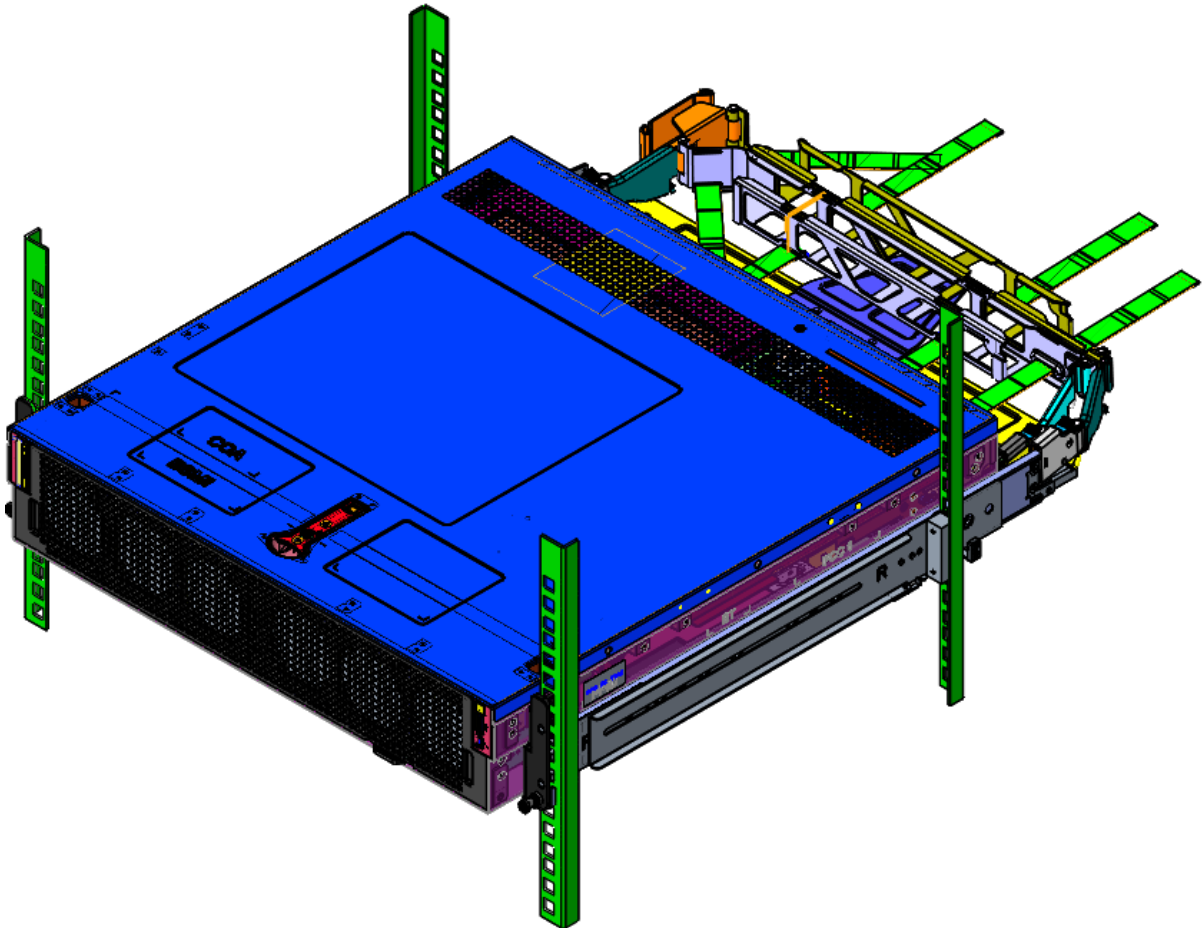**Figure 39. XR11 mounted in sliding rails with the CMA in 4-post rack**

Figure 40. XR12 mounted in sliding rails with the CMA in 4-post rack

Sliding rails in Pelican transit case

For transit cases, a specific type of rail has been designed. It is orderable from Dell and is compatible with the Pelican custom rack. It has a 20-inch post spacing with post-to-post rack depth is between 16.8-inch - 22-inch [428 mm - 558 mm].

Dell only certifies XR11 and XR12 compliance for MIL 901E performance in this Pelican case.

(i) **NOTE:** The part number for the Pelican case is 25-036329-01-DE2412-05/24/05.
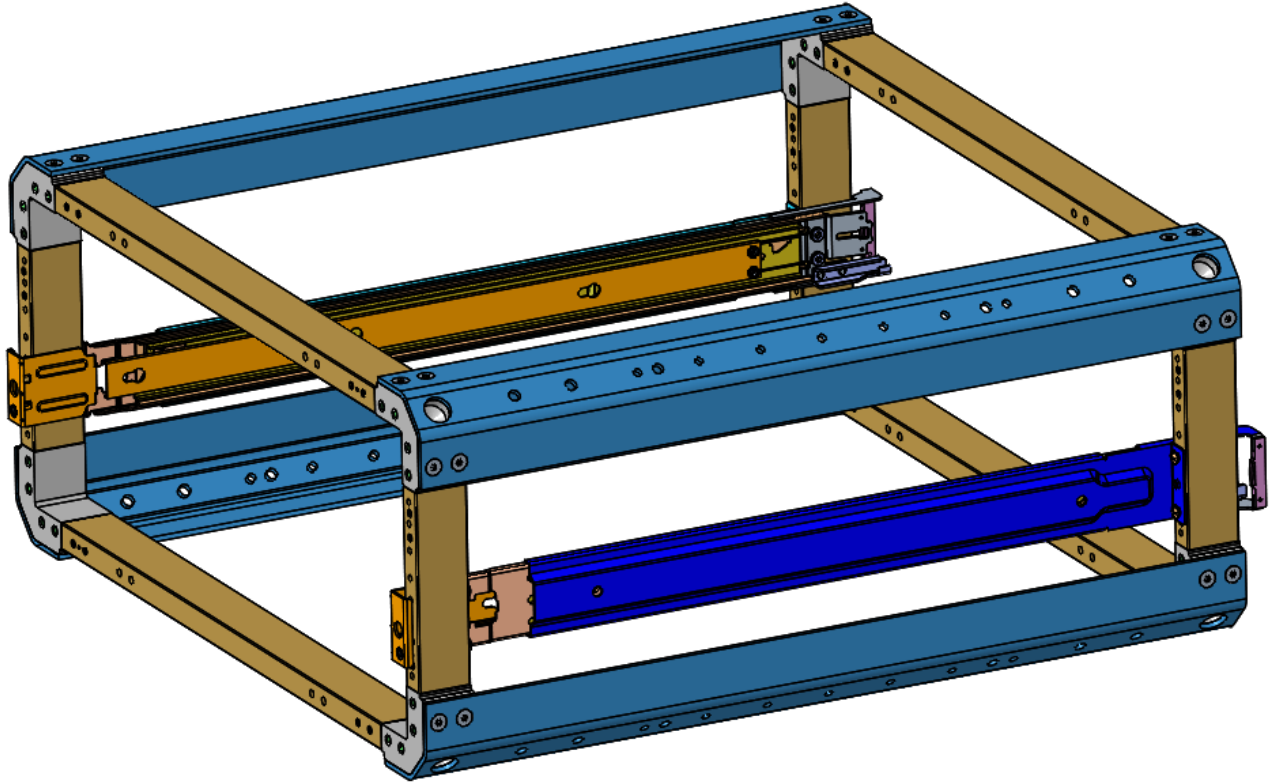

Figure 41. XR11 and XR12 Transit case rails in Pelican case frame

Cable Management Arm

The optional cable management arm (CMA) for the XR11 and XR12 organizes and secures the cords and cables exiting the back of the server and unfolds to allow the server to extend out of the rack without having to detach the cables. Some key features of the CMA include:

- Large U-shaped baskets to support dense cable loads
- Open vent pattern for optimal airflow
- Can be mounted on either side by simply swinging the spring-loaded brackets from one side to the other
- Utilizes hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling
- Includes a low-profile fixed tray to both support and retain the CMA in its fully closed position
- Both the CMA and the tray mount without the use of tools via simple and intuitive snap-in designs

The CMA can be mounted to either side of the sliding rails without the use of tools or the need for conversion, but it is recommended that it be mounted on the side opposite to the power supplies to allow easier access to the power supplies for service or replacement.
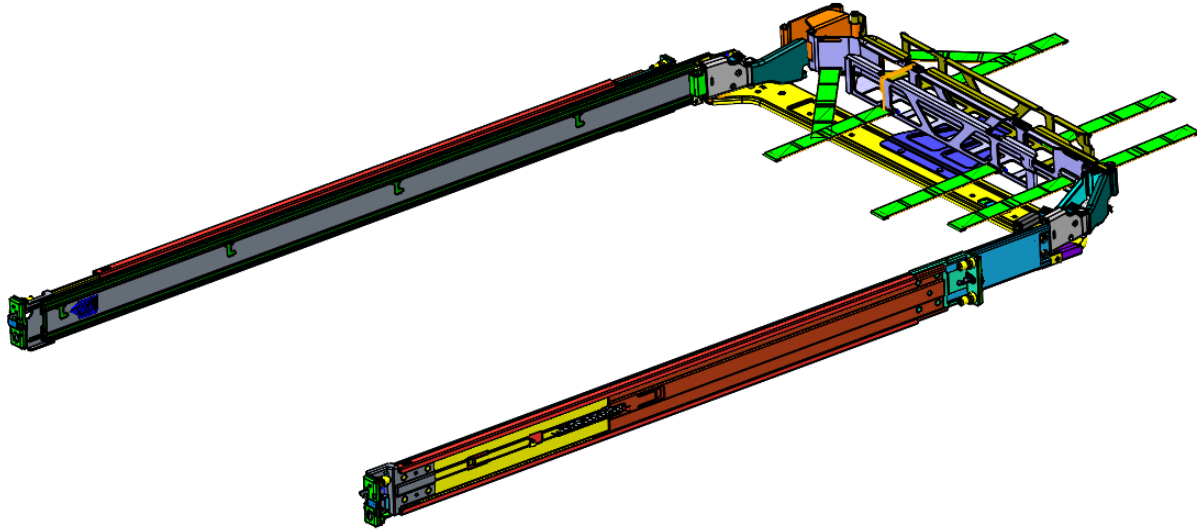
Figure 42. Sliding rails with optional CMA

(i) **NOTE:** The XR11 and XR12 are short depth servers, so if placed in a standard data center rack and attached with a CMA, the CMA may not be accessible from the back of the system in a deep cavity.

Strain Relief Bar

The optional strain relief bar (SRB) for the XR11 and XR12 organizes and secures cables exiting the back of the server.
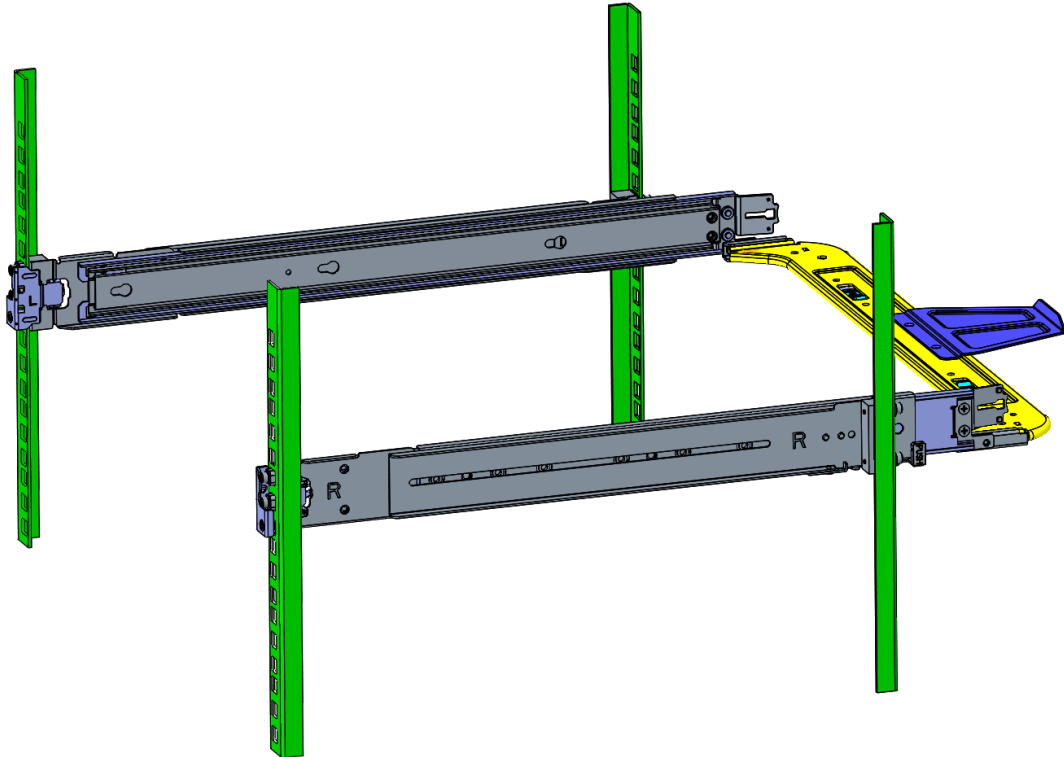
Figure 43. Sliding rails with optional SRB

● Tool-less attachment to rails

- Two depth positions to accommodate various cable loads and rack depths
- Supports cable loads and controls stresses on server connectors
- Cables can be segregated into discrete, purpose specific bundles

Supported Operating Systems

The PowerEdge XR11 and XR12 systems support the following operating systems:

- Canonical® Ubuntu® Server LTS
- Citrix® Hypervisor®
- Microsoft® Windows Server® with Hyper-V
- Red Hat® Enterprise Linux
- SUSE® Linux Enterprise server
- VMware® ESXi®
- RHEL Realtime

Links to specific OS versions and editions, certification matrices, Hardware Compatibility Lists (HCL) portal, and Hypervisor support are available at Dell EMC Enterprise Operating Systems.

Dell EMC OpenManage systems management

Figure 44. Dell EMC OpenManage Portfolio

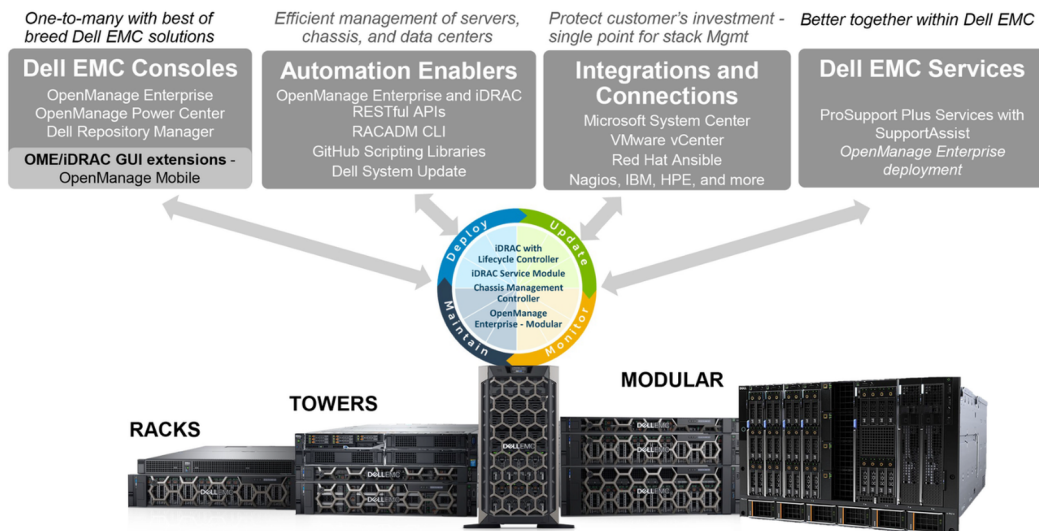Dell EMC delivers management solutions that help IT Administrators effectively deploy, update, monitor, and manage IT assets. OpenManage solutions and tools enable you to quickly respond to problems by helping them to manage Dell EMC servers effectively and efficiently; in physical, virtual, local, and remote environments, operating in-band, and out-of-band (agent-free). The OpenManage portfolio includes innovative embedded management tools such as the integrated Dell Remote Access Controller (iDRAC), Chassis Management Controller and Consoles like OpenManage Enterprise, OpenManage Power Manager plug in, and tools like Repository Manager.

Dell EMC has developed comprehensive systems management solutions based on open standards and has integrated with management consoles that can perform advanced management of Dell hardware. Dell EMC has connected or integrated the advanced management capabilities of Dell hardware into offerings from the industry's top systems management vendors and frameworks such as Ansible, thus making Dell EMC platforms easy to deploy, update, monitor, and manage.

The key tools for managing Dell EMC PowerEdge servers are iDRAC and the one-to-many OpenManage Enterprise console. OpenManage Enterprise helps the system administrators in complete lifecycle management of multiple generations of PowerEdge servers. Other tools such as Repository Manager, which enables simple yet comprehensive change management.

OpenManage tools integrate with systems management framework from other vendors such as VMware, Microsoft, Ansible, and ServiceNow. This enables you to use the skills of the IT staff to efficiently manage Dell EMC PowerEdge servers.

Topics:

- Server and Chassis Managers
- Dell EMC consoles
- Automation Enablers
- Integration with third-party consoles
- Connections for third-party consoles
- Dell EMC Update Utilities
- Dell resources

Server and Chassis Managers

- Integrated Dell Remote Access Controller (iDRAC)
- iDRAC Service Module (iSM)

Dell EMC consoles

- Dell EMC OpenManage Enterprise
- Dell EMC Repository Manager (DRM)
- Dell EMC OpenManage Enterprise Power Manager plugin to OpenManage Enterprise
- Dell EMC OpenManage Mobile (OMM)

Automation Enablers

- OpenManage Ansible Modules
- iDRAC RESTful APIs (Redfish)
- Standards-based APIs (Python, PowerShell)
- RACADM Command Line Interface (CLI)
- GitHub Scripting Libraries

Integration with third-party consoles

- Dell EMC OpenManage Integrations with Microsoft System Center
- Dell EMC OpenManage Integration for VMware vCenter (OMIVV)
- Dell EMC OpenManage Ansible Modules
- Dell EMC OpenManage Integration with ServiceNow

Connections for third-party consoles

- Micro Focus and other HPE tools
- OpenManage Connection for IBM Tivoli
- OpenManage Plug-in for Nagios Core and XI

Dell EMC Update Utilities

- Dell System Update (DSU)
- Dell EMC Repository Manager (DRM)
- Dell EMC Update Packages (DUP)
- Dell EMC Server Update Utility (SUU)
- Dell EMC Platform Specific Bootable ISO (PSBI)

Dell resources

For additional information about white papers, videos, blogs, forums, technical material, tools, usage examples, and other information, go to the OpenManage page at https://www.dell.com/openmanagemanuals or the following product pages:

Table 30. Dell resources

Resource	Location
Integrated Dell Remote Access Controller (iDRAC)	https://www.dell.com/idracmanuals
iDRAC Service Module (iSM)	https://www.dell.com/support/kbdoc/000178050/
OpenManage Ansible Modules	https://www.dell.com/support/kbdoc/000177308/
OpenManage Essentials (OME)	https://www.dell.com/support/kbdoc/000175879/
OpenManage Mobile (OMM)	https://www.dell.com/support/kbdoc/000176046
OpenManage Integration for VMware vCenter (OMIVV)	https://www.dell.com/support/kbdoc/000176981/
OpenManage Integration for Microsoft System Center (OMIMSSC)	https://www.dell.com/support/kbdoc/000147399
Dell EMC Repository Manager (DRM)	https://www.dell.com/support/kbdoc/000177083
Dell EMC System Update (DSU)	https://www.dell.com/support/kbdoc/000130590
Dell EMC Platform Specific Bootable ISO (PSBI)	Dell.com/support/article/sln296511
Dell EMC Chassis Management Controller (CMC)	www.dell.com/support/article/sln311283
OpenManage Connections for Partner Consoles	https://www.dell.com/support/kbdoc/000146912
OpenManage Enterprise Power Manager	https://www.dell.com/support/kbdoc/000176254
OpenManage Integration with ServiceNow (OMISNOW)	Dell.com/support/article/sln317784

ⓘ **NOTE:** Features may vary by server. Please refer to the product page on https://www.dell.com/manuals for details.

Dell Technologies Services

Dell Technologies Services include a wide, customizable range of service choices to simplify the assessment, design, implementation, management and maintenance of IT environments and to help you transition from platform to platform. Depending on your current business requirements and the level of service right for you, we provide factory, on-site, remote, modular, and specialized services that fit your needs and budget. We'll help with a little or a lot—your choice—and provide access to our global resources.

For more information, see DellEMC.com/Services.

Topics:

- Dell EMC ProDeploy Enterprise Suite
- Dell EMC Remote Consulting Services
- Dell EMC Data Migration Service
- Dell EMC ProSupport Enterprise Suite
- Dell EMC ProSupport Plus for Enterprise
- Dell EMC ProSupport for Enterprise
- Dell EMC ProSupport One for Data Center
- ProSupport for HPC
- Support Technologies
- Dell Technologies Education Services
- Dell Technologies Consulting Services
- Dell EMC Managed Services

Dell EMC ProDeploy Enterprise Suite

ProDeploy Enterprise Suite gets your server out of the box and into optimized production—fast. Our elite deployment engineers with broad and deep experience utilizing best-in-class processes along with our established global scale can help you around the clock and around the globe. From simple to the most complex server installations and software integration, we take the guess work and risk out of deploying your new server technology.

		Basic Deployment	ProDeploy	ProDeploy Plus
Pre-deployment	Single point of contact for project management	-	●	In-region
	Site readiness review	-	●	●
	Implementation planning	-	●	●
	SAM engagement for ProSupport Plus entitled devices	-	-	●
Deployment	Deployment service hours	Business hours	24x7	24x7
	Remote guidance for hardware installation or Onsite hardware installation and packaging material removal	Onsite	Remote or Onsite	Onsite
	Install and configure system software	-	Remote	Onsite
	Install support software and connect with Dell Technologies	-	●	●
	Project documentation with knowledge transfer	-	●	●
Post-deployment	Deployment verification	-	●	●
	Configuration data transfer to Dell EMC technical support	-	●	●
	30-days of post-deployment configuration assistance	-	-	●
	Training credits for Dell EMC Education Services	-	-	●

Figure 45. ProDeploy Enterprise Suite capabilities

ⓘ **NOTE:** Hardware installation not applicable on selected software products.

Dell EMC ProDeploy Plus

From beginning to end, ProDeploy Plus provides the skill and scale needed to successfully execute demanding deployments in today's complex IT environments. Certified Dell EMC experts start with extensive environmental assessments and detailed migration planning and recommendations. Software installation includes set up of most versions of Dell EMC SupportAssist and OpenManage system management utilities. Post-deployment configuration assistance, testing, and product orientation services are also available.

Dell EMC ProDeploy

ProDeploy provides full service installation and configuration of both server hardware and system software by certified deployment engineers including set up of leading operating systems and hypervisors as well as most versions of Dell EMC SupportAssist and OpenManage system management utilities. To prepare for the deployment, we conduct a site readiness review and implementation planning exercise. System testing, validation, and full project documentation with knowledge transfer complete the process.

Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians who know Dell EMC servers inside and out.

Dell EMC Server Configuration Services

With Dell EMC Rack Integration and other Dell EMC PowerEdge Server Configuration Services, you save time by receiving your systems racked, cabled, tested, and ready to integrate into the data center. Dell EMC staff pre-configure RAID, BIOS and iDRAC settings, install system images, and even install third-party hardware and software.

For more information, see Server Configuration Services.

Dell EMC Residency Services

Residency Services helps customers transition to new capabilities quickly with the assistance of on-site or remote Dell EMC experts whose priorities and time you control. Residency experts can provide post implementation management and knowledge transfer related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

Dell EMC Remote Consulting Services

When you are in the final stages of your PowerEdge server implementation, you can rely on Dell EMC Remote Consulting Services and our certified technical experts to help you optimize your configuration with best practices for your software, virtualization, server, storage, networking, and systems management.

Dell EMC Data Migration Service

Protect your business and data with our single point of contact to manage your data migration project. Your project manager will work with our experienced team of experts to create a plan using industry-leading tools and proven processes based on global best practices to migrate your existing files and data so your business system get up and running quickly and smoothly.

Dell EMC ProSupport Enterprise Suite

With the ProSupport Enterprise Suite, we help keep your IT systems running smoothly, so you can focus on running your business. We will help maintain peak performance and availability of your most essential workloads. ProSupport Enterprise Suite is a suite of support services that enable you to build the solution that is right for your organization.

Choose support models based on how you use technology and where you want to allocate resources. From the desktop to the data center, address everyday IT challenges, such as unplanned downtime, mission-critical needs, data and asset protection, support planning, resource allocation, software application management and more. Optimize IT resources by choosing the right support model.
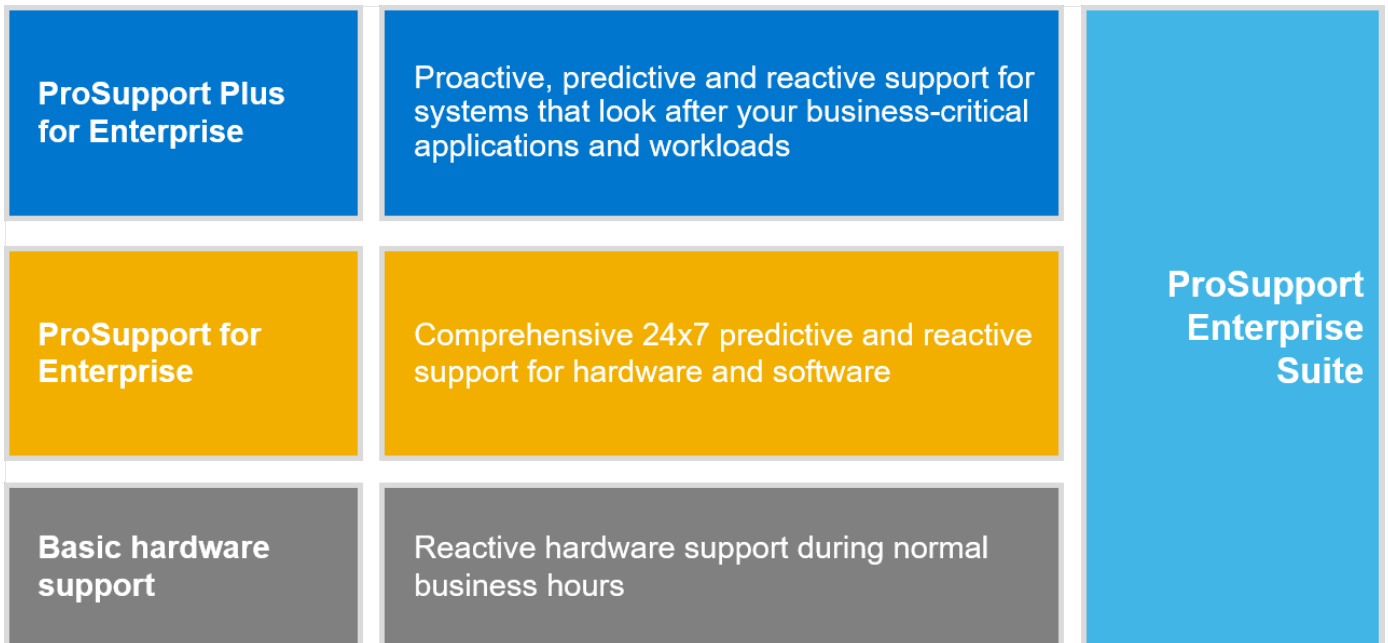

Figure 46. Dell EMC ProSupport Enterprise Suite

Dell EMC ProSupport Plus for Enterprise

When you purchase your PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for your business-critical systems. ProSupport Plus provides you with all the benefits of ProSupport, plus the following:

- An assigned Services Account Manager who knows your business and your environment
- Immediate advanced troubleshooting from an engineer who understands your PowerEdge server
- Personalized, preventive recommendations based on analysis of support trends and best practices from across the Dell Technologies infrastructure solutions customer base to reduce support issues and improve performance
- Predictive analysis for issue prevention and optimization enabled by SupportAssist
- Proactive monitoring, issue detection, notification, and automated case creation for accelerated issue resolution enabled by SupportAssist
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect

Dell EMC ProSupport for Enterprise

Our ProSupport service offers highly trained experts around the clock and around the globe to address your IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- Predictive, automated tools and innovative technology
- A central point of accountability for all hardware and software issues
- Collaborative 3rd party support
- Hypervisor, operating system and application support
- Consistent experience regardless of where you are located or what language you speak
- Optional onsite parts and labor response options including next business day or four-hour mission critical

ⓘ **NOTE:** Subject to service offer country availability.

Enterprise Support Services
Feature Comparison

	Basic	ProSupport	ProSupport Plus
Remote technical support	9x5	24x7	24x7
Covered products	Hardware	Hardware Software	Hardware Software
Onsite hardware support	Next business day	Next business day or 4hr mission critical	Next business day or 4 hr mission critical
3rd party collaborative assistance		●	●
Automated issue detection & proactive case creation		●	●
Self-service case initiation and management		●	●
Access to software updates		●	●
Priority access to specialized support experts			●
3rd party software support			●
Assigned Services Account Manager			●
Personalized assessments and recommendations			●
Semiannual systems maintenance			●

Availability and terms of Dell Technologies services vary by region and by product. For more information, please view our Service Descriptions available on Dell.com

Figure 47. Dell EMC Enterprise Support model

Dell EMC ProSupport One for Data Center

ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets. This offering is built on standard ProSupport components that leverage our global scale but are tailored to your company's needs. While not for everyone, this service option offers a truly unique solution for Dell Technologies largest customers with the most complex environments.

- Team of assigned Services Account Managers with remote, on-site options
- Assigned ProSupport One technical and field engineers who are trained on your environment and configurations
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect
- Flexible on-site support and parts options that fit your operational model
- A tailored support plan and training for your operations staff

ProSupport for HPC

The ProSupport for HPC provides solution-aware support including:
- Access to senior HPC experts
- Advanced HPC cluster assistance: performance, interoperability & configuration
- Enhanced HPC solution level end-to-end support
- Remote pre-support engagement with HPC Specialists during ProDeploy implementation

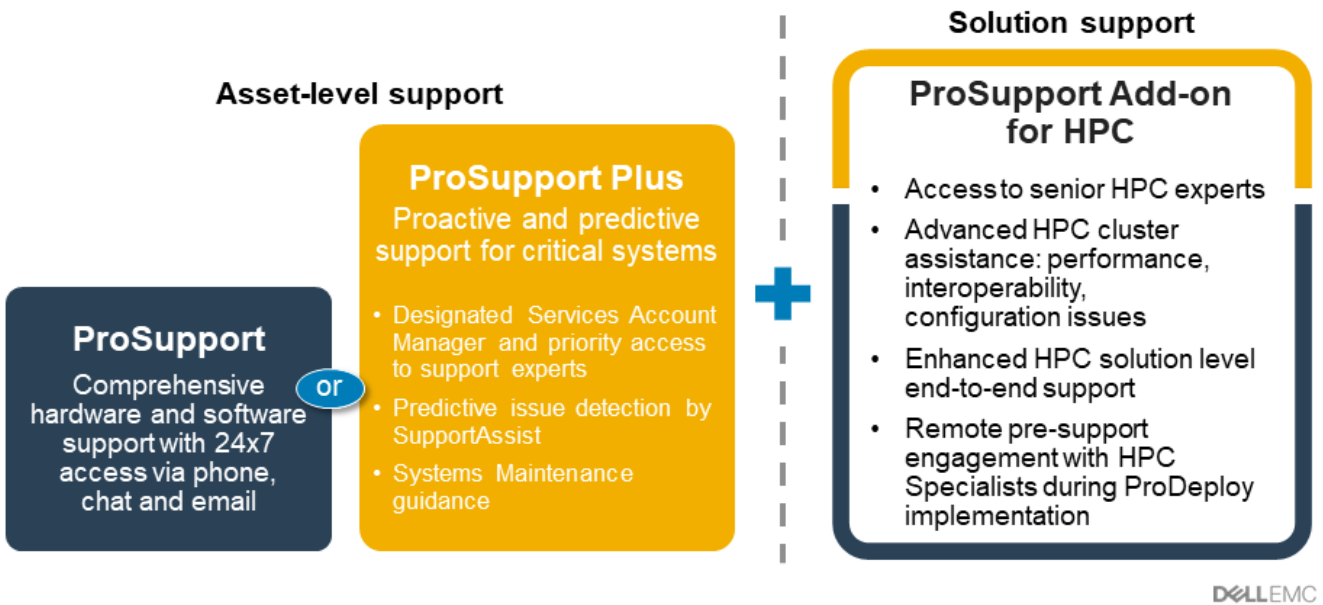Learn more at DellEMC.com/HPC-Services.

Figure 48. ProSupport for HPC

Support Technologies

Powering your support experience with predictive, data-driven technologies.

Dell EMC SupportAssist

The best time to solve a problem is before it happens. The automated proactive and predictive technology SupportAssist helps reduce steps and time to resolution, often detecting issues before they become a crisis. Benefits include:

- Value—SupportAssist is available to all customers at no additional charge
- Improve productivity—replace manual, high-effort routines with automated support
- Accelerate time to resolution—receive issue alerts, automatic case creation, and proactive contact from Dell EMC experts
- Gain insight and control—optimize enterprise devices with on-demand ProSupport Plus reporting in TechDirect, and get predictive issue detection before the problem starts

(i) **NOTE:** SupportAssist is included with all support plans, but features vary based on service level agreement.

	Basic Hardware Warranty	ProSupport	ProSupport Plus
Automated issue detection and system state information collection	●	●	●
Proactive, automated case creation and notification		●	●
Predictive issue detection for failure prevention			●
Recommendation reporting available on-demand in TechDirect			●

Figure 49. SupportAssist model

Get started at Dell.com/SupportAssist

Dell EMC TechDirect

Boost IT team productivity when supporting Dell EMC systems. With over 1.4 million self-dispatches processed each year, TechDirect has proven its effectiveness as a support tool. You can:

- Self-dispatch replacement parts
- Request technical support
- Integrate APIs into your help desk

Or, access all your Dell EMC certification and authorization requirements. Train your staff on Dell EMC products, as TechDirect allows you to:

- Download study guides
- Schedule certification and authorization exams
- View transcripts of completed courses and exams

Register at techdirect.dell.

Dell Technologies Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and execute transformational strategy that drives competitive advantage. Leverage the training and certification required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications designed to help you achieve more from your hardware investment. The curriculum delivers the information and the practical, hands-on skills that you and your team need to confidently install, configure, manage, and troubleshoot your Dell EMC servers. To learn more or register for a class today, see LearnDell.com/Server.

Dell Technologies Consulting Services

Our expert consultants help you transform faster, and quickly achieve business outcomes for the high value workloads Dell EMC PowerEdge systems can handle.

From strategy to full-scale implementation, Dell Technologies Consulting can help you determine how to execute your IT, workforce, or application transformation.

We use prescriptive approaches and proven methodologies combined with Dell Technologies' portfolio and partner ecosystem to help you achieve real business outcomes. From multi-cloud, applications, DevOps, and infrastructure transformations, to business resiliency, data center modernization, analytics, workforce collaboration, and user experiences—we're here to help.

Dell EMC Managed Services

Reduce the cost, complexity, and risk of managing IT. Focus your resources on digital innovation and transformation while our experts help optimize your IT operations and investment with managed services backed by guaranteed service levels.

Appendix A. Additional specifications

Topics:

- Chassis dimensions
- Chassis weight
- Video specifications
- USB ports
- Power Supply Units for XR11 and XR12
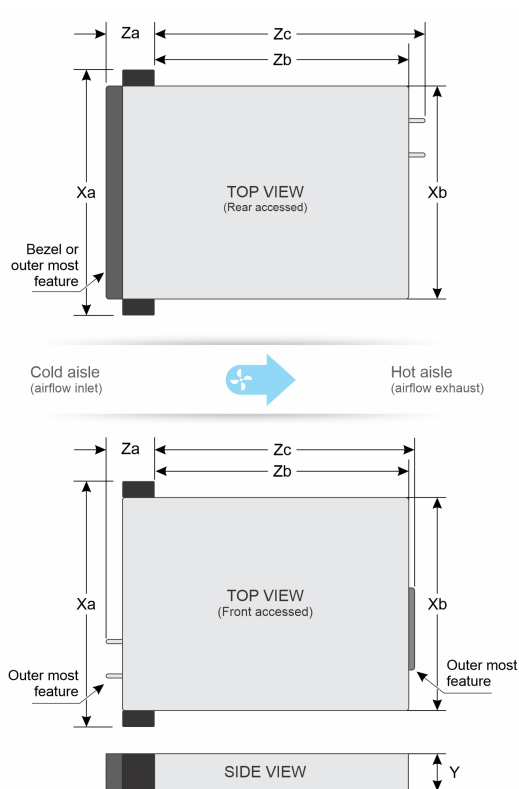- Environmental specifications

Chassis dimensions

Figure 50. XR11 Chassis dimensions for rear accessed (top) and front accessed (bottom)
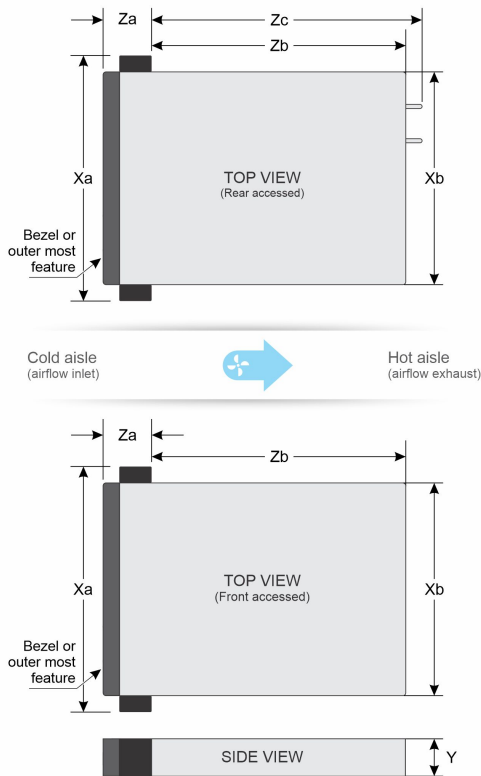
Figure 51. XR12 Chassis dimensions for rear accessed (top) and front accessed (bottom)

Table 31. XR11 and XR12 Chassis dimensions

Dimensions	Rear Accessed chassis		Front Accessed chassis	
	XR11	XR12	XR11	XR12
Xa	482.6 mm (19 inches)	482.6 mm (19 inches)	482.6 mm (19 inches)	482.6 mm (19 inches)
Xb	434 mm (17.08 inches)	434 mm (17.08 inches)	434 mm (17.08 inches)	434 mm (17.08 inches)
Y	42.8 mm (1.68 inches)	86.8 mm (3.41 inches)	42.8 mm (1.68 inches)	86.8 mm (3.41 inches)
Za	31 mm (1.22 inches) without bezel	31 mm (1.22 inches) without bezel	63 mm (2.48 inches) without bezel	63 mm (2.48 inches) without bezel
Za (bezel)	45 mm (1.77 inches) with bezel	45 mm (1.77 inches) with bezel	N/A	153 mm (6.02 inches) with bezel
Zb	400 mm (15.74 inches) Ear to rear wall	400 mm (15.74 inches) Ear to rear wall	400 mm (15.74 inches) Ear to rear wall	400 mm (15.74 inches) Ear to rear wall
Zc	432 mm (17 inches) Ear to PSU handle	432 mm (17 inches) Ear to PSU handle	408 mm (16.06 inches)	N/A

For XR11 and XR12 Rear Accessed orientations support racks with 48 mm spacing from rack post to inside surface of rack door.
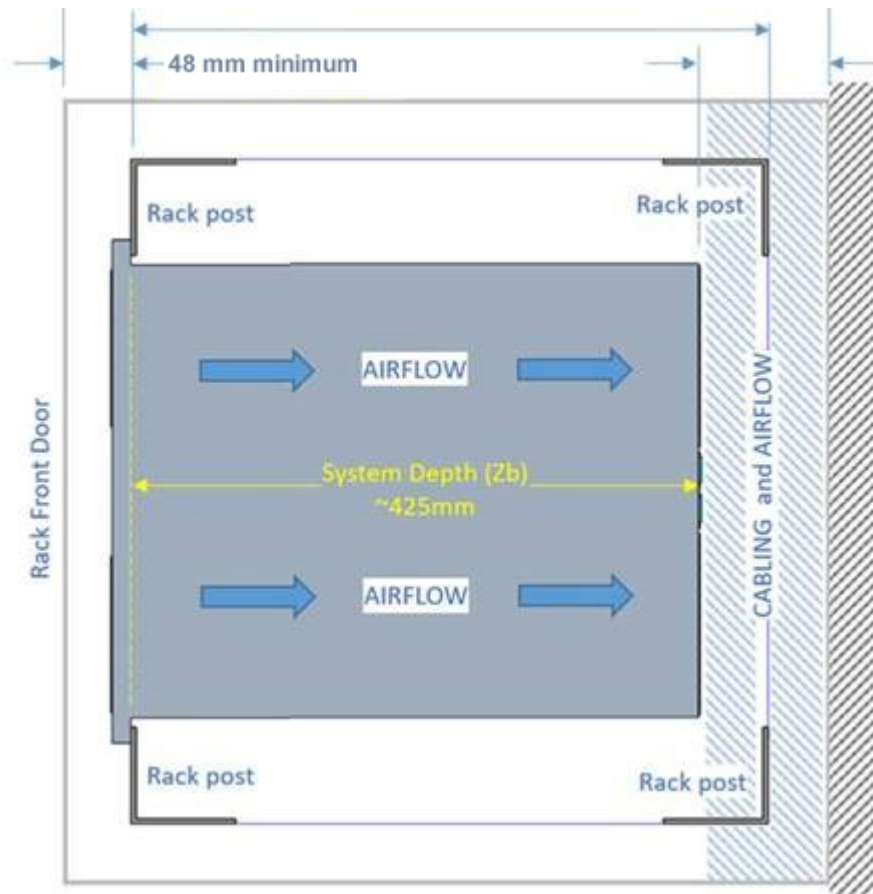
Chassis weight

Table 32. XR11 and XR12 Maximum chassis weight

Dimensions	Rear Access		Front Access	
	XR11	**XR12**	**XR11**	**XR12**
Maximum weight (with all drives/ SSDs/rails/ bezel)	13.8 kg	19.5 kg	13.6 kg	20.5 kg

Video specifications

The platform supports the following video resolution and refresh rates:

Table 33. Video resolution and refresh rate

Resolution	Refresh Rate	Freq.	Pixel Clock	DVO Display Port
1024 x 768	60 Hz	48.4 kHz	65.0 MHz	Yes*
1280 x 800	60 Hz	49.7 kHz	83.5 MHz	Yes*
1280 x 1024	60 Hz	64.0 kHz	108.0 MHz	Yes*
1360 x 768	60 Hz	47.71 kHz	85.5 MHz	Yes*
1440 x 900	60 Hz	55.9 kHz	106.5 MHz	Yes*

Table 33. Video resolution and refresh rate (continued)

Resolution	Refresh Rate	Freq.	Pixel Clock	DVO Display Port
1600 x 900	60 Hz	55.54 kHz	97.75 MHz	Yes*
1600 x 1200	60 Hz	75.0 kHz	162.0 MHz	Yes*
1680 x 1050	60 Hz	64.7 kHz	119.0 MHz	Yes*
1920 x 1080	60 Hz (RB)	67.158 kHz	173.0 MHz	No
1920 x 1200	60 Hz (RB)	74.556 kHz	193.25 MHz	No

*DVO - DP is for investigation only, dependent on Nuvoton DVO capabilities to support up to 165 MHz. Rear Panel Performance is TBD subject to final board design and losses to rear VGA connector.

*(RB) - Reduced Blanking for Digital Displays requiring less blank time. This was introduced for Signal Integrity improvements by reducing Pixel Clock rates for VGA- Analog input devices.

USB ports

USB ports specifications for XR11

Table 34. PowerEdge XR11 USB ports specifications for Rear Accessed configuration

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	One	USB 2.0-compliant port	One	Internal USB 3.0-compliant port	One
Micro-USB 2.0-compliant port for iDRAC Direct	One	USB 3.0-compliant port	One		

Table 35. PowerEdge XR11 USB ports specifications for Front Accessed configuration

Front		Internal	
USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	One	Internal USB 3.0-compliant port	One
USB 3.0-compliant port	One		
Micro-USB 2.0-compliant port for iDRAC Direct	One		

(i) **NOTE:** Internal USB port is available on Riser 1B.

USB ports specifications for XR12

Table 36. PowerEdge XR12 USB ports specifications for Rear Accessed configuration

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	One	USB 2.0-compliant port	One	Internal USB 3.0-compliant port	One

Table 36. PowerEdge XR12 USB ports specifications for Rear Accessed configuration (continued)

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
Micro-USB 2.0-compliant port for iDRAC Direct	One	USB 3.0-compliant port	One		

Table 37. PowerEdge XR12 USB ports specifications for Front Accessed configuration

Front		Internal	
USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	Two	Internal USB 3.0-compliant port	One
USB 3.0-compliant port	One		
Micro-USB 2.0-compliant port for iDRAC Direct	One		

ⓘ **NOTE:** Internal USB port is available on Riser 1B.

Power Supply Units for XR11 and XR12

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion, advanced thermal-management techniques, and embedded power-management features including high-accuracy power monitoring.

Supported power supply units

The table below shows the power supply unit options that are available for the PowerEdge XR11 and XR12.

Table 38. Power supply unit options

Wattage	Frequency	Voltage	Class	Heat dissipation
800 W (WRAC & MM 240V)	50/60Hz	100-240 Vac/ 9.2-4.7 A	Platinum	3139 BTU/hr
	N/A	240 Vdc/ 3.8 A	N/A	3139 BTU/hr
*1100 W -48 VDC	N/A	-48-60 Vdc/ 27A	N/A	4266 BTU/hr
*1400 W (WRAC & MM 240V)	50/60Hz	100-240 Vac/ 12-8 A	Platinum	5459 BTU/hr
	N/A	240 Vdc/ 6.6 A	N/A	5459 BTU/hr

ⓘ **NOTE:** 1100 W -48 VDC and 1400 W AC come in Front Accessed Configuration PSUs.

ⓘ **NOTE:** Lotes PSU connection is included with the DC PSU. Part number is RN5T2.

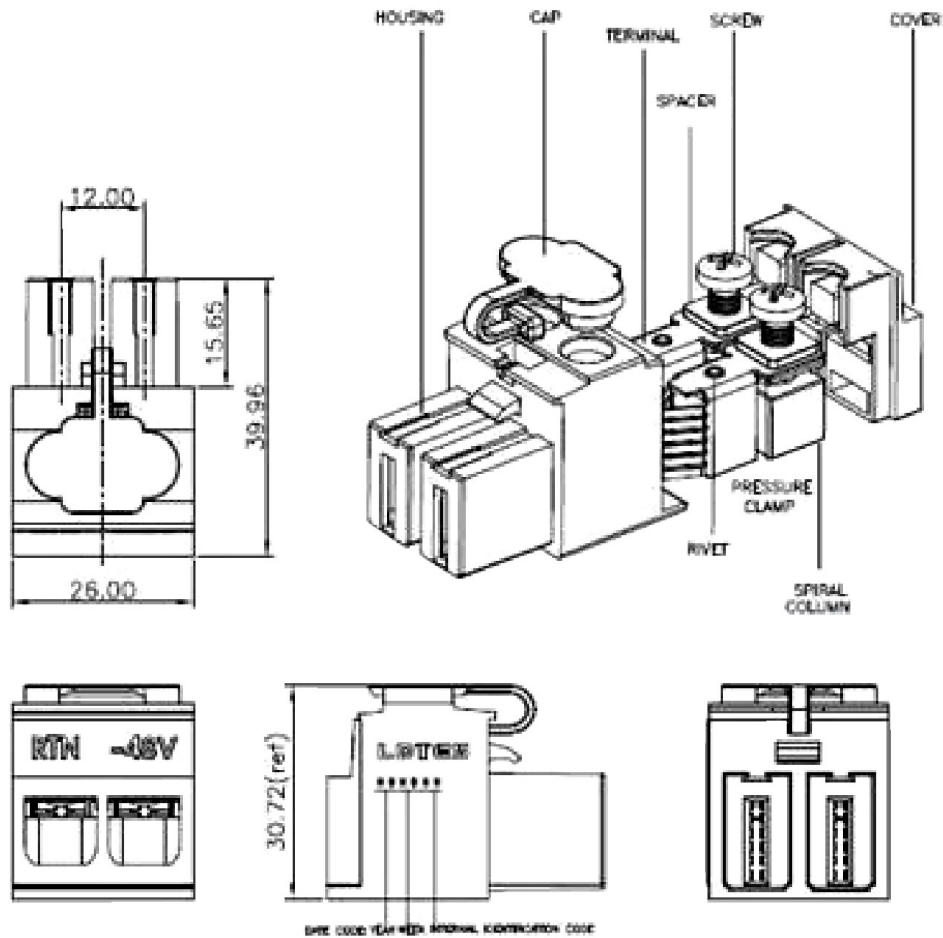ⓘ **NOTE:** MM is "Mix Mode". PSUs are designed to support both AC and DC.

Figure 52. Lotes connector

Table 39. PSUs highline and lowline ratings

—	800 W Platinum	1100 W -48 VDC	1400 W Platinum
Peak Power (Highline)	1360 W	N/A	2380 W
Highline	800 W	N/A	1400 W
Peak Power (Lowline)	1360 W	N/A	1785 W
Lowline	800 W	N/A	1050 W
Highline 240 VDC	800 W	N/A	1400 W
Highline 200-380 VDC	N/A	N/A	N/A
DC -48--60 V	N/A	1100 W	N/A

The PowerEdge XR11 and XR12 support up to 2 AC or DC power supplies with 1+1 redundancy, autosensing and auto-switching capability.

If two PSUs are present during POST, a comparison is made between the wattage capacities of the PSUs. In the event that the PSU wattages do not match, the larger of the two PSUs is enabled and there is also a PSU mismatch warning displayed in BIOS and iDRAC.

If a second PSU is added at run-time, in order for that particular PSU to be enabled, the wattage capacity of the first PSU must equal the second PSU. Otherwise, the PSU will be flagged as unmatched in iDRAC and the second PSU will not be enabled.

The PowerEdge XR11 and XR12 Rear Accessed Configuration will only support normal airflow PSUs. Rear Accessed Configuration PSUs cannot be installed in a Rear Accessed Configuration due to a specific keying mechanism on the chassis and PSU. Similarly, reverse airflow PSUs are only allowed in Front Accessed Configuration. Rear Accessed Configuration PSU cannot be installed in a Front Accessed Configuration due to the same mechanical restrictions (keying mechanism) outlined above.

Power supply efficiency for XR11 and XR12

Dell PSUs have achieved Platinum efficiency levels as shown in the table below.

Table 40. PSU efficiency levels

Efficiency targets by load						
Form factor	Output	Class	10%	20%	50%	100%
Redundant 60 mm	800 W AC Platinum	Platinum	89.00%	93.00%	94.00%	91.50%
	1100 W -48 Vdc Power Supply efficiency at (-48 Vdc)	N/A	85.00%	90.00%	92.00%	90.00%
	1400 W AC Platinum	Platinum	89.00%	93.00%	94.00%	91.50%

Environmental specifications

The PowerEdge XR11/XR12 system operates in these environmental categories: ASHRAE A2/A3/A4 and Rugged.

(i) **NOTE:** For additional information about environmental certifications, refer to the Product Environmental Datasheet located with the Documentation > Regulatory Information on www.dell.com/support/home.

Table 41. Continuous operation specifications for ASHRAE A2

	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (33.8°F/984 Ft) above 900 m (2953 Ft)

Table 42. Continuous operation specifications for ASHRAE A3

	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (33.8°F/574 Ft) above 900 m (2953 Ft)

Table 43. Continuous operation specifications for ASHRAE A4

	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft)

Table 44. Continuous operation specifications for Rugged

	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	(-5)–55°C (23–131°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/80 m (33.8°F/410 Ft) above 900 m (2953 Ft)

Table 45. Common environmental specifications for ASHRAE A2, A3, A4 and Rugged

	Allowable continuous operations
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape ⓘ **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-104 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,048 meters (10,000 feet)

Table 46. Maximum vibration specifications for the system

Maximum vibration	Specifications
Operating	MIL-STD-810H, Method 514.8, 1.04 Grms, 2-500Hz, Random Vibration, Figure 514.8D-11
Storage	XR11 ● MIL-STD-810H, Method 514.8, Category 4, Figure 514.8C-2, 10-500 Hz, 60 minutes/axis ● MIL-STD-810H, Method 514.8, Category 24, Figure 514.8E-1, 20-2000Hz, 60 minutes/axis XR12 ● MIL-STD-810H, Method 514.8, Category 4, Figure 514.8C-2, 5-500 Hz, 60 minutes/axis ● MIL-STD-810H, Method 514.8, Category 24, Figure 514.8E-1, 20-2000Hz, 60 minutes/axis

Table 47. Maximum shock pulse specifications for the system

Maximum shock pulse	Specifications
Operating	● MIL-STD-810H, Method 516.8, Procedure I, 11ms, 20G ● MIL-STD-810H, Method 516.8, Procedure I, 11ms, 40G (SSD)
Operating (Navy)	MIL-DTL-901E, Grade A, Class 2, Type A, in approved military transit case
Storage	● MIL-STD-810H, Method 516.8, Procedures I, 11 ms, 40G (with SSD) ● MIL-STD-810H, Method 516.8, Procedures I, 11 ms, 40G

Table 48. NEBS Level 3 and ETSI

NEBS Level 3 and ETSI	Specifications
Temperature	Continuous operating temperature of -5°C to 40°C; 96 hour operating excursions from -5vC to 55°C
Humidity	Operating Humidity of 5% to 85% with excursions of 5% to 90%, but not to exceed 0.24 kg water/kg of dry air

Table 48. NEBS Level 3 and ETSI (continued)

NEBS Level 3 and ETSI	Specifications
Altitude	Up to 4000m; Sea Level -60M to 1800M; -61m to 1829m at 40°C; from 1829M to 3960m at 30°C
Dust	Dust filter rated 80% per ASHRAE Std52.1
Seismic	Operational resiliency up to Richter 7.5 seismic event (Zone 4 seismic event)
EMI	Immunity up to 8kV/15kV or air/contact
Fire resistance	Built with fire retardant material to contain and extinguish fire if any occurs inside the box

ASHRAE A3/A4/Rugged support restriction for XR11 and XR12

ⓘ **NOTE:** All XR11 and XR12 configurations meet thermal restrictions of ASHRAE A2 for rear and front access configurations.

Thermal Restrictions for ASHRAE A3 for Rear Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 is not supported
- High temperature spec 85°C active optics cables are required
- PERC with battery is not supported
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- CX-6 100GB NIC card is not supported (XR11)
- SAS SSD is not supported (XR11)

Thermal Restrictions for ASHRAE A4 for Rear Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 is not supported
- High temperature spec 85°C active optics cables are required
- PERC with battery is not supported
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- CX-6 100GB NIC card is not supported (XR11)
- SAS SSD is not supported (XR11)

Thermal Restrictions for Rugged Rear Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Two PSUs are required in redundant mode. System performance may be reduced in the event of a PSU failure

- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 is not supported
- High temperature spec 85°C active optics cables are required
- PERC with battery is not supported
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- CX-6 100GB NIC card is not supported (XR11)
- SAS SSD is not supported (XR11)

Thermal Restrictions for ASHRAE A3 for Front Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 greater than 480 GB is not supported
- High temperature spec 85°C active optics cables are required
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- SAS SSD is not supported (XR11)

Thermal Restrictions for ASHRAE A4 for Front Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 greater than 480 GB is not supported
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- SAS SSD is not supported (XR11)

Thermal Restrictions for Rugged Front Accessed configuration

- Do not perform a cold startup below 5°C
- Processor TDP greater than 150 W are not supported
- 128 GB or greater capacity DIMMs and DCPMM are not supported
- Non-Dell qualified peripheral cards are not supported
- GPU is not supported
- PCIe SSDs are not supported
- BOSS M.2 is not supported
- PERC with battery is not supported
- NVMe drives (Samsung PM1725B/PM1735 and Kioxia CD6/CM6) are not supported (XR11)
- SAS SSD is not supported (XR11)
- Kioxia SAS SSD at 55C ambient is not supported (XR12)
- Hynix PE8010 NVMe SSD at 35°C ambient is not supported (XR11)

Other Thermal Restrictions

- DIMM blanks are required on empty slots
- HDD blanks are required on empty slots

- PCIe blank is required on empty slot 1 (XR11)
- PCIe blank is required on empty slot 3 (XR12)
- Processor TDP greater than 150 W are not supported for Riser 1A configurations (XR11)
- NVMe drives not supported for Riser 1A configurations
- Riser 1A is only supported in Front Accessed configurations
- All XR11 configurations require Standard heatsink with processor of 150 W and lower
- Processor above 150 W TDP are restricted to 35°C ambient or lower

(i) **NOTE:** The 6330N and 6338N CPUs have been tested and are supported at an ambient temperature of 55°C.

Particulate and gaseous contamination specifications

The following table defines the limitations that prevent any equipment damage or failure from particulate and gaseous contamination. If the levels of particulate or gaseous pollution exceed the specified limitations and results in equipment damage or failure, you must rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 49. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. (i) **NOTE:** This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. (i) **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles. (i) **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. (i) **NOTE:** This condition applies to data center and non-data center environments.

Table 50. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper Coupon Corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-2013
Silver Coupon Corrosion rate	<200 Å/month as defined by ANSI/ISA71.04-2013

(i) **NOTE:** Maximum corrosive contaminant levels measured at ≤50% relative humidity.

Rugged certifications and specifications

The PowerEdge XR11/XR12 support the rugged environment space for temperatures from -5°C to 55°C through custom configurations. These configurations are geared for the Telecom (or Telco), Military, and Marine industries and hence meet industry-specific standards in addition to the minimum temperature requirement of -5°C and the maximum temperature requirements of 55°C. The Telco configurations will be tested to the NEBS requirements outlined in the GR-63 and GR-1089 Telcordia specifications. The Military configurations will be tested to: MIL-STD-810H, MIL-DTL-901E and MIL-STD-461G. The Marine configurations will be tested to : DNVGL-CG 0339.

Table 51. Rugged certifications and specifications

Certifications	Specifications
Operational Temperature	-5ºC to 55ºC
	55ºC continuous operation per MIL810H Method 501.7 Proc II
	-5ºC continuous operation per MIL 810H Method 502.7 Proc II
Operational Shock	MIL-STD-810H, Method 516.8, Procedure I, 11ms, 40 G (SSD)
Operational Shock (Navy)	MIL-DTL-901E, Grade A, Class 2, Type A, in approved military transit case
Non-Operational Shock	MIL-STD-810H, Method 516.8, Procedures V, 11 ms, 40 G (with SSD)
Operational Vibration	MIL-STD-810H, Method 514.8, 1.04 Grms, 2-500Hz, Random Vibration, Figure 514.8D-11 with SSD
Non-Operational Vibration	MIL-STD-810H, Method 514.8, Category 4, Figure 514.8C-2, 5-500 Hz, 60 minutes/axis with SSD
	MIL-STD-810H, Method 514.8, Category 24, Figure 514.8E-1, 20-2000 Hz, 60 minutes/axis with SSD
Operational Altitude	MIL-STD-810H, Method 500.6, Proc.II (Operational, Air carriage) 15,000 ft for 1 hour after stabilization
Non-Operational Altitude	MIL-STD-810H, Method 500.6, Proc. I (Storage, Air transport), 40 Kft for 1 hour after stabilization
Conductive/Radiative Immunity	MIL-STD-461G
Sand and Dust (tested with filtered bezel)	MIL-STD-810H, Method 510.7, Procedure I, Blowing dust at 25ºC for 6 hours , and an additional 6 hours at 49ºC (Climatic Category A1)
	MIL-STD-810H, Method 510.7, Procedure II, Blowing sand at 49ºC (Climatic Category A1), wind velocity of 29 m/s, sand concentration of 2.2 g/m^3, 6 hours
NEBS Level 3	GR-63-CORE and GR-1089-CORE

Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 52. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v2.0c	https://uefi.org/specsandtesttools
Ethernet IEEE 802.3-2005	https://standards.ieee.org/
HDGHardware Design Guide Version 3.0 for Microsoft Windows Server	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR4 Memory DDR4 SDRAM Specification	jedec.org/standards-documents/docs/jesd79-4.pdf
PCI Express PCI Express Base Specification Rev. 2.0 and 3.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_I_Rev_1-1_20070205.pdf
SAS Serial Attached SCSI, v1.1	http://www.t10.org/
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.1	uefi.org/specifications
USB Universal Serial Bus Specification, Rev. 2.7	usb.org/developers/docs

Appendix C Additional resources

Table 53. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	This manual, available in PDF format, provides the following information: ● Chassis features ● System Setup program ● System indicator codes ● System BIOS ● Remove and replace procedures ● Diagnostics ● Jumpers and connectors	Dell.com/Support/Manuals
Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: ● Initial setup steps	Dell.com/Support/Manuals
Rack Installation Guide	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell EMC contact information.	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	The Dell EMC online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc