

VEP4600 Technology Guide

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About this guide

This guide provides site preparation recommendations, step-by-step procedures for rack mounting and desk mounting your switch, inserting modules, and connecting to a power source.

⚠ **CAUTION:** To avoid electrostatic discharge (ESD) damage, wear grounding wrist straps when handling this equipment.

⚠ **WARNING:** Only trained and qualified personnel can install this equipment. Read this guide before you install and power up this equipment. This equipment contains two power cords. Disconnect both power cords before servicing.

⚠ **WARNING:** This equipment contains optical transceivers, which comply with the limits of Class 1 laser radiation.



Figure 1. Class 1 laser product tag

⚠ **WARNING:** When no cable is connected, visible and invisible laser radiation may emit from the aperture of the optical transceiver ports. Avoid exposure to laser radiation. Do not stare into open apertures.

ⓘ **NOTE:** Read this guide before unpacking the Dell EMC Virtual Edge Platform (VEP) 4600.

Information symbols

This book uses the following information symbols:

ⓘ **NOTE:** The Note icon signals important operational information.

⚠ **CAUTION:** The Caution icon signals information about situations that could result in equipment damage or loss of data.

⚠ **WARNING:** The Warning icon signals information about hardware handling that could result in injury.

⚠ **WARNING:** The ESD Warning icon requires that you take electrostatic precautions when handling the device.

Overview

The Dell EMC Virtual Edge Platform (VEP) 4600 is a networking platform that is purpose-built, future-ready, and validated for next generation access deployments.

The VEP4600 is a single-socket, 1RU platform that offers hosted virtualized network functionality, with applicability for the Service Provider Edge and Enterprise Branch. The VEP4600 uses the latest Intel Xeon D-2100 x86-based processor.

The VEP4600 features:

- Intel Xeon-D 2100 processor product family—4-, 8-, and 16-core
- Four dual in-line memory module (DIMM) slots, up to 128 GB, field replaceable unit (FRU)
- Two M.2 solid-state drive (SSD) slots, FRU
- Two mezzanine slots based on PCI3 x16 gen 3
- Two 10G small form-factor pluggable plus (SFP+) network ports
- Four 1GE ports
- Out-of-band management ports
- Kernel-based virtual machine (KVM) and ESXi hypervisors and native Linux support

 **NOTE:** For a complete list of VEP4600 features, see [Specifications](#).

Features

VEP4600 is an ideal solution that provides simplified deployment and validated hardware and software options. VEP4600 provides the necessary headroom for hosting network function virtualization (VNF) services. As universal customer premise equipment (uCPE), VEP4600 is ideal for hosting SD-WAN and other VNF services such as routing, firewall WAN optimization, or deep-packet inspection. Use VEP4600 with Service Provider Edge and Enterprise Branch.

The VEP4600 platform offers:

- Open and disaggregated networking
- Best-in-class x86-based networking platform
- Virtualized uCPE services such as a bare metal application or on top of a virtualized environment
- Front-facing I/O ports
- QuickAssist Technology (QAT) on 8-core and 16-core systems
- M.2 SATA SSD high-performance storage
- Out-of-band (OOB) management via Intelligent Platform Management Interface (IPMI)
- Baseboard management controller (BMC)
- KVM support
- ESXi hypervisors and native Linux

Topics:

- [Specifications](#)
- [Configurations](#)
- [VEP4600 IO-side](#)
- [VEP4600 PSU-side](#)
- [Architecture](#)
- [uCPE](#)
- [SD-WAN deployment](#)
- [MPLS off-load](#)
- [Dual Internet WAN](#)
- [LTE backup and tertiary path](#)
- [Multipath interconnect transit](#)
- [Software](#)

Specifications

Table 1. VEP4600 specifications

Feature	Specification
CPU	Intel Xeon-D 2100—4-, 8-, and 16-core
Networking ports	<ul style="list-style-type: none"> • 4x1GbE

Feature	Specification
Management ports	<ul style="list-style-type: none"> • 2x10GbE <p>Two 10/100/1000Base-T ports:</p> <ul style="list-style-type: none"> • One port for the CPU • One port for the BMC
USB ports	<ul style="list-style-type: none"> • Two USB Type-A receptacle female ports that support USB 3.0 • One Micro USB Type-B receptacle female port for the console port
Console ports	<p>Two serial console ports:</p> <ul style="list-style-type: none"> • One port for the CPU • One port for the BMC
Storage option	Two M.2 SATA up to 1TB FRU
OOB management	BMC IPMI 2.0-compliant
Memory	Four DIMM slots, up to 128 GB, FRU
TPM	2.0
QAT	Yes, except for 4-core CPU
Expansion slots	Two mezzanine slots based on PCIe x16 gen 3
BMC	IPMI 2.0-compliant
PSUs	Two hot-swappable PSUs
Fans	<p>Hot-swappable and redundant:</p> <ul style="list-style-type: none"> • Maximum five fans for the 16-core CPU • Maximum four fans for the 4- and 8-core CPUs
Airflow	I/O-side to PSU-side
Optic support	Both SFP+ ports support 10G SR, LR, USR, ZR, and 10GBT
Operating system	<ul style="list-style-type: none"> • Linux—Ubuntu OS and Red Hat/CentOS • VMware ESXi
Dimensions and weight	<ul style="list-style-type: none"> • Height: 41.25 cm - 1.75 in • Depth: 38.1 cm - 15 in • Width: 43.4 cm - 17.1 in • Weight: 13.75 lbs. (6.34 kg)—One PSU and four fans • 15.75 lbs. (7.14 kg)—Two PSUs and five fans

Table 2. AC power specifications

Parameter	Specification
AC power input	100 VAC-240 VAC, 50/60 Hz
Typical AC current draw per system	<ul style="list-style-type: none"> • 110 VAC: 1.8A for the 16-core processor • 240 VAC: 0.85A for the 16-core processor

Parameter	Specification
	<ul style="list-style-type: none"> • 110 VAC: 1.5A for the 8-core processor • 240 VAC: 0.7A for the 8-core processor • 110 VAC: 1.35A for the 4-core processor • 240 VAC: 0.65A for the 4-core processor
Typical power consumption	<ul style="list-style-type: none"> • 200 W for the 16-core processor • 170 W for the 8-core processor • 160 W for the 4-core processor
Maximum power consumption	<ul style="list-style-type: none"> • 300 W for the 16-core processor • 230 W for the 8-core processor • 220 W for the 4-core processor
Power available for optics per SFP+ port	1 W

Table 3. Cooling specifications

Parameter	Specifications
Thermal dissipation	<ul style="list-style-type: none"> • Typical: 682.43 BTU/hr (200 W) • Maximum: 1023.64 BTU/hr (300 W)
Number of hot-swappable fans	Four or five, depending on the configuration ordered
Minimum number of operational fans before shutdown	<ul style="list-style-type: none"> • Three fans for the 4- to 8-core processor • Four fans for the 16-core processor
Minimum CFM	<ul style="list-style-type: none"> • Five fans: 35.4 • Four fans: 28.5
Maximum CFM	<ul style="list-style-type: none"> • Five fans: 107.2 • Four fans: 82.2

Table 4. Environmental Specifications

Parameter	Specifications
Operating temperature	0°C to 45°C (32°F to 113°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating relative humidity	<ul style="list-style-type: none"> • 5% to 85% (RH), non-condensing, continuously • 5% to 90% (RH), non-condensing, short term (< 1% of operational hour per year)
Storage relative humidity	5% to 90% (RH)
Operating altitude	No performance degradation to 10,000 feet (3,048 meters)
Storage altitude	35,000 feet (10,688 meters)

Table 5. Acoustic noise with four fans and one PSU

Test location	Acoustic noise (dBA)
Front	48.7
Back	56.2
Left	49.4
Right	49.5

Table 6. Acoustic noise with five fans and two PSUs

Test location	Acoustic noise (dBA)
Front	49.8
Back	57.7
Left	51.0
Right	51.6

Configurations

VEP4600 is a single-socket, 1RU platform available in the following configurations:

Table 7. VEP4600 configurations

VEP 4600 configuration	CPU	RAM	M.2 SATA SSD	PSUs	Fans	SKU
Intel Xeon-D 2100 4 core, 16 GB, Non-QAT, 2x10GbE SFP+, 4x1GbaseT	Intel Skylake-D Cores: 4 Speed: 2.2 GHz Cache: 1MB/core QAT: No	1x16 DDR4 RDIMM	128 GB	1	4 maximum	210-APGJ
Intel Xeon-D 2100 8 core, 16 GB, QAT, 2x10GbE SFP+, 4x1GbaseT	Intel Skylake-D Cores: 8 Speed: 1.9 GHz Cache: 1MB/core QAT: Yes	1x16 DDR4 RDIMM	256 GB	1	4 maximum	210-APGT
Intel Xeon-D 2100 8 core, 32 GB, QAT, 2x10GbE SFP+, 4x1GbaseT	Intel Skylake-D Cores: 8 Speed: 1.9 GHz	1x32 DDR4 RDIMM	960 GB	1	4 maximum	210-APGU

VEP 4600 configuration	CPU	RAM	M.2 SATA SSD	PSUs	Fans	SKU
	Cache: 1MB/ core					
	QAT: Yes					
Intel Xeon-D 2100 16 core, 32 GB, QAT, 2x10GbE SFP+, 4x1GbaseT	Intel Skylake-D Cores: 16 Speed: 2.0 GHz Cache: 1MB/ core QAT: Yes	1x32 DDR4 RDIMM	256 GB	2	5 maximum	210-APGV
Intel Xeon-D 2100 16 core, 64 GB, QAT, 2x10GbE SFP+, 4x1GbaseT	Intel Skylake-D Cores: 16 Speed: 2.0 GHz Cache: 1MB/ core QAT: Yes	2x32 DDR4 RDIMM	960 GB	2	5 maximum	210-APGW

VEP4600 IO-side

The I/O-side of the VEP4600 platform contains the access and uplink ports.



Figure 2. VEP4600 I/O-side view

- | | | | |
|---|------------------------------|---|--|
| 1 | Status LED icons | 2 | RS-232 console ports (top) and 10/100/1000 Base-T ports (bottom) |
| 3 | SFP+ ports | 4 | System luggage tag |
| 5 | 1000 Base-T networking ports | 6 | Processor power on/off button |
| 7 | Micro USB-B ports | 8 | USB Type-A ports |

VEP4600 PSU-side

The VEP4600 PSU-side is the default location for PSUs, including the power connections, and fans.

The VEP4600 system provides two backplane options:

- Four hot-swappable redundant fans for 4- and 8-core configurations
- Five hot-swappable redundant fans for 16-core configurations

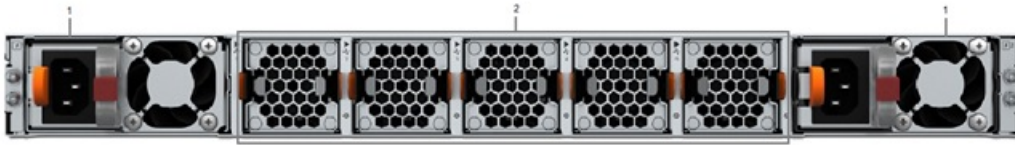


Figure 3. VEP4600 PSU-side

1 PSUs

2 Fans

Architecture

The VEP4600 platform consists of an Intel processor complex with these high-level features:

Table 8. VEP4600 processor features

Feature	Specification
Storage	Two M.2 SATA SSDs with support up to 960 GB
Memory	Tour DDR4 RDIMM slots
Primary management ports	10/100/1000Base-T ports for system access: <ul style="list-style-type: none"> One for the CPU One for the BMC
USB ports	<ul style="list-style-type: none"> Two USB Type-A receptacle female ports supporting USB 3.0 with maximum data rates of 640 Mbps One USB Type-B receptacle female port used as a console port. You can connect a laptop to this port using a standard male USB-A to a standard male USB-B cable
Console ports	<ul style="list-style-type: none"> Two serial ports for system CPU access: An RJ-45 and a USB-B console port. The USB-B port acts as the console port. The terminal settings are the same for both. One serial port available for system BMC access: An RJ-45 console port. The terminal settings are the same for the USB-B port and the console port: <ul style="list-style-type: none"> 115200 baud rate No parity 8 data bits One stop bit Flow control disabled by default When the USB-B port is connected, it becomes the primary connection. The system then sends all messages to the USB-B port.
PSUs	The PSUs are located opposite to the I/O-side. Depending on the configuration you select, the platform ships with one or two AC PSUs.
Fans	Depending on the configuration that you select, the platform ships with four or five field replaceable fan trays.

uCPE

Universal customer premise equipment (uCPE) is a disaggregated hardware-based solution that supports NFV-like workloads at the edge, such as the customer or branch. The device is a remotely manageable platform that service providers can deploy, modify, or delete VNFs from a customer site over a wide area network (WAN).

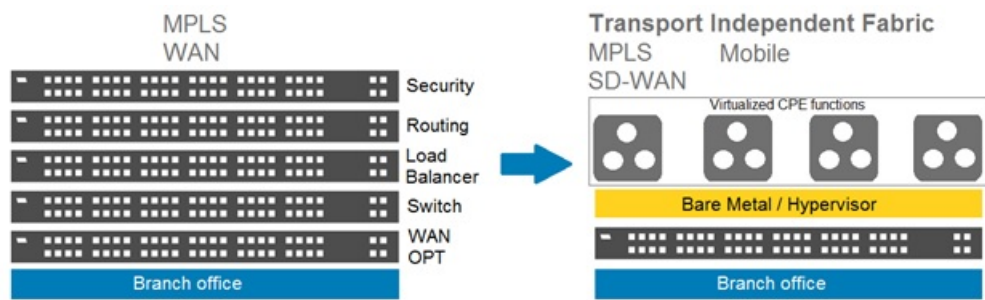


Figure 4. uCPE

Table 9. uCPE advantages

Current model	uCPE
Proprietary architecture, disjointed solution, and hardware that results in high total cost of ownership	Open architecture and commercial off-the-shelf hardware
Complex operation model that cannot scale with growing demand.	Agile technology and services
Every application requires an individual CPE, each with long upgrade cycles.	<ul style="list-style-type: none">Independent hardware and software life cycles that enable agility in new services deliveryDynamic scale-up and scale-out

SD-WAN deployment

Traditionally, wide area networks (WANs) were built over private multiprotocol label switching (MPLS) connections. This provided the security, quality, and class of service (QoS/CoS) that is required by dominant client/server communications from branch-to-data center traffic. Although this configuration is secure and deterministic, it is highly rigid and expensive.

SD-WAN provides a secure and encrypted software-defined virtual network that overlays existing physical network technologies. This overlay provides a transport/access solution that allows you to manage the disparate underlay networks such as MPLS, Broadband, and LTE as a single intelligent fabric. The overlay also provides application-aware routing, zero-touch provisioning, traffic steering, SLA verification, self-healing, visualization, and common centralized policy management of the network.

The examples that are shown are the most common SD-WAN use cases. The SD-WAN solution in these examples provides a common transport/access agnostic, centrally managed, dynamic application-aware routing solution that you can use in many different ways.

MPLS off-load

To reduce the investment in MPLS bandwidth, when using low-cost broadband against higher-cost MPLS, less mission-critical traffic is typically off-loaded onto lower-cost Internet. Services that require QoS/CoS such as VoIP, are sent over MPLS where edge-to-edge prioritization is supported.

You can firewall Internet traffic via local Internet breakout at the premise or use as a low-cost transport alternative for linking branch locations to each other or centralized data centers over an encrypted tunnel. Through centralized policy management and application-based aware routing, the overlay network can make decisions dynamically and intelligently.

This example may also serve as a primary/back-up option if you want to use MPLS as primary and Internet as a secondary back-up.

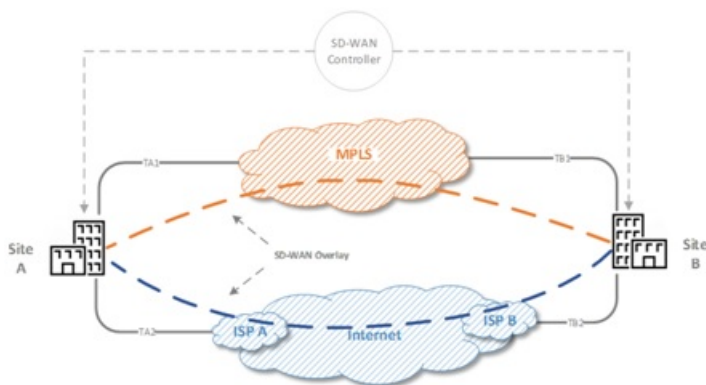


Figure 5. MPLS off-load

Dual Internet WAN

This solution offers support for a *bring your own access* (BYOA) deployment model.

Due to the nature of the Internet, underlying transports offer only best effort, no edge-to-edge QoS/CoS. However, you can offset this limitation by selecting redundant providers that offer different peering points to the Internet. As network conditions fluctuate, the dynamic routing intelligence constantly searches for the best possible path and routes traffic accordingly. This dynamic routing ensures better performance than a single broadband link or broadband links of the same carrier.

The integrated firewall features and overlay link encryption provide a high level of security. Also, recent SD-WAN software innovations include self-healing and packet-loss recovery capabilities that improve Internet and MPLS.

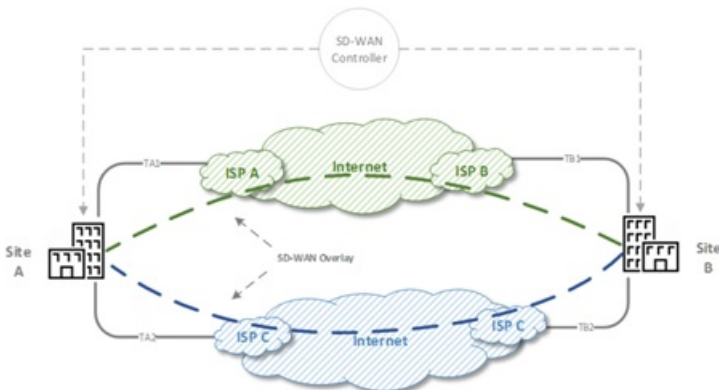


Figure 6. Dual Internet WAN

LTE backup and tertiary path

Zero-touch provisioning (ZTP) is a benefit of SD-WAN. Traditional access takes 60 to 90 days for wireline service delivery. LTE access allows for rapid delivery of service. After the uCPE device arrives, the SD-WAN software boots and starts a `CallHome` to the controller over LTE. The controller then loads the traffic, security, and management policies that are needed to join the branch to the existing SD-

WAN overlay. You can use this service until the wireline service installation completes. After the wireline service is delivered, you can convert the LTE to a backup or tertiary access/transport.

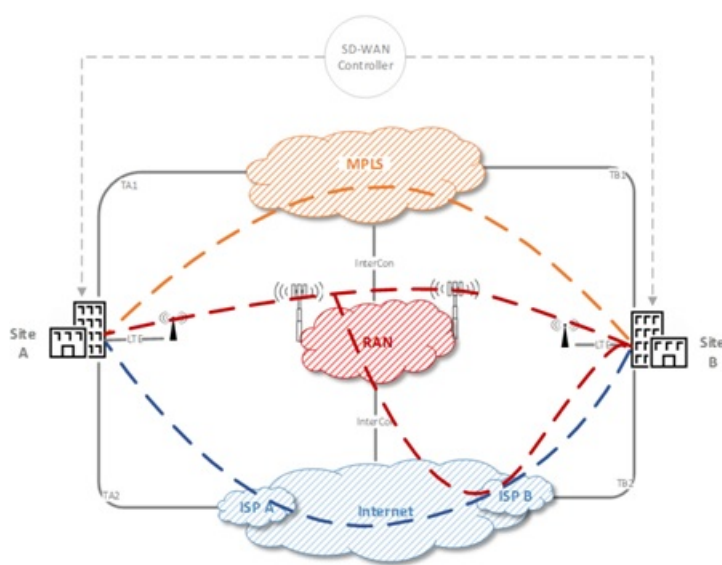


Figure 7. LTE backup and tertiary path

Multipath interconnect transit

This example shows SD-WAN capabilities that are used to their maximum potential. The overlay network meshes and interconnects between three different clouds and their related access. Traffic steering implements to use any connection to accomplish the policies that the controller mandates.

The previous examples were accomplished through point-to-point tunnels between the source and destination. In this case, the tunnels terminate at intermediate points in the network. This routing provides more routing options for resiliency and performance.

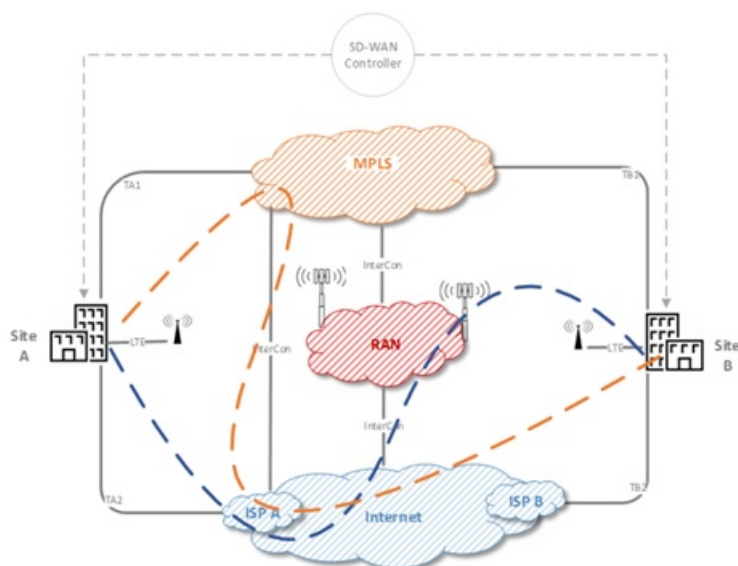


Figure 8. Multipath interconnect transit

Software

As a general-purpose system, the VEP4600 supports various hypervisor and operating system (OS) configurations so long as the Intel Xeon-D architecture supports it. Built primarily for SD-WAN and uCPE, the VEP4600 validates key partners such as VeloCloud by VMware, Versa, and Silverpeak, and documents them as validated solutions. These prevalidated and orderable solutions integrate industry-leading Dell EMC hardware and partner software.

Dell EMC is continually testing and validating preconfigured infrastructures for SD-WAN service workloads. The validated solutions include Dell EMC infrastructure recommendations, with bill of materials (BOMs) and partner software stock keeping units (SKUs) for the appropriate use cases. Moreover, the correct versioned firmware, firmware settings, and drivers are installed. Preconfiguring the workload on the VEP4600 reduces installation work and provides confidence that the combined hardware and software configurations are ready for production. These validated solutions are ideal for access or branch locations.

Power, cooling, acoustics

With energy costs rising and the increase of data center density, Dell EMC provides technologies to help you realize greater performance with lower energy cost and waste.

Topics:

- [PSUs](#)
- [Cooling and environment](#)
- [Acoustics](#)

PSUs

The VEP4600 supports two AC hot-swappable power supply units (PSUs) with I/O-side to PSU-side airflow. Two PSUs are required for full redundancy. Depending on the configuration you order, the VEP4600 ships with one or two PSUs.

The VEP4600 platform comes preinstalled with one AC PSU (4- and 8-core units) and four field-replaceable fan modules or two AC PSUs (16-core units) and five field-replaceable fan modules, depending on the configuration that is purchased. When the VEP4600 runs with full redundancy, which consists of two PSUs installed and running, you can remove and replace one PSU while the other PSU is running without disrupting traffic.

For AC power specifications, see [Specifications](#).

Cooling and environment

The thermal management for the VEP4600 delivers high performance through optimized component cooling at the lowest fan speeds across a wide range of ambient temperatures. These environmental optimizations result in lower fan power consumption for lower total system power and data-center power consumption.

For cooling and environmental specifications, see [Specifications](#).

Acoustics

Dell EMC focuses on sound quality and the sound power and sound pressure levels.

- Sound quality describes how disturbing or pleasing a sound is interpreted. Dell EMC references various psycho-acoustic metrics and thresholds. For example, tone prominence is one such metric.
- Sound power and pressure levels increase with greater populations or higher utilization. Sound quality remains good even as the frequency content changes.

Dell EMC uses ISO 7779 to measure A-weighted sound pressure levels. For acoustic noise and vibration specifications, see [Specifications](#).

Additional specifications

The following information applies to the VEP4600 platform:

Topics:

- [Product specifications](#)
- [Regulatory compliance](#)

Product specifications

The following are product specifications for the VEP4600 platform:

Table 10. VEP4600 product specifications

Feature	Overview
Processor	<p>Xeon microprocessors based on the Intel Skylake micro-architecture with up to 16 cores and several platform-level innovations:</p> <ul style="list-style-type: none"> • Up to 16-core Intel Skylake technology • Integrated 10GbE/1GbE Ethernet with RDMA • Integrated QAT on both the 8-core and 16-core processors
Socket and TDP	FCBGA 45 mm x 52.5 mm; Up to 110 W
Memory	<ul style="list-style-type: none"> • DDR4 2400 MT/s • Four DIMM Slots • Up to 128 GB
Out of band management	BMC IPMI 2.0 compliant
Accelerators (QAT)	<ul style="list-style-type: none"> • Crypto: Up to ~100 Gb/s IPSec/SSL • Compression: Up to ~100 Gb/s • Public Key: Up to RSA2K 100K Ops
Port configuration options	4x1GE + 2x10GE
Management ports	1x1G Mgmt port to CPU
Design	1RU
Dimension (HxWxD)	1.75 in x 17.1 in x 15 in
Weight	<ul style="list-style-type: none"> • 13.75 lbs. (6.24 kg)—1 PSU and 4 fans • 15.75 lbs. (7.14 kg)—2 PSUs and 5 fans
Power consumption	<ul style="list-style-type: none"> • 16-core: 300 W—maximum • 8-core: 230 W • 4-core: 220 W

Feature	Overview
Airflow	I/O-side to PSU-side
Power Supply units	495 W
Trusted platform module	2.0
Serviceability	<ul style="list-style-type: none"> • Hot swappable fans and PSUs • 10 screws to open the top chassis cover • Memory is field replaceable by Dell EMC technicians
USB	Two USB Type-A
BIOS	Legacy or UEFI
BMC	IMPI 2.0-compliant
Hypervisor	VMware ESXi and KVM
VNF	SD-WAN, security, WAN optimization, routing

Regulatory compliance

Safety

- UL/CSA 60950-1, Second Edition
- EN 60950-1, Second Edition
- IEC 60950-1, Second Edition including all national deviations and group difference
- IEC 62368-1
- EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide
- EN 60825-2 Safety of Laser Products Part 2: Safety of Optical Fiber Communication Systems FDA Regulation
- 21 CFR 1040.10 and 1040.11

Emissions

- Australia/New Zealand: AS/NZS CISPR 32, Class A
- Canada: ICES-3/NMB-3, Class A
- Europe: EN 55024 (CISPR 24), Class A
- Japan: VCCI Class A
- USA: FCC CFR 47 Part 15, Subpart B, Class A

Immunity

- EN 300 386 EMC for Network Equipment
- EN 55024
- EN 61000-3-2: Harmonic Current Emissions
- EN 61000-3-3: Voltage Fluctuations and Flicker
- EN 61000-4-2: ESD
- EN 61000-4-3: Radiated Immunity

- EN 61000-4-4: EFT
- EN 61000-4-5: Surge
- EN 61000-4-6: Low Frequency Conducted Immunity

RoHS

- EN 50581:2012 All S9999 components are EU RoHS compliant

Dell EMC support

The Dell EMC support site provides documents and tools to help you effectively use Dell EMC equipment and mitigate network outages. Through the support site you can obtain technical information, access software upgrades and patches, download available management software, and manage your open cases. The Dell EMC support site provides integrated, secure access to these services.

To access the Dell EMC support site, go to www.dell.com/support/. To display information in your language, scroll down to the bottom of the web page and select your country from the drop-down menu.

- To obtain product-specific information, enter the 7-character service tag, known as a luggage tag, or 11-digit express service code of your switch and click **Submit**.
To view the chassis service tag or express service code, pull out the tag or enter the `show chassis` command from the CLI.
- To receive more technical support, click **Contact Us**. On the Contact Information web page, click **Technical Support**.

To access switch documentation, go to www.dell.com/manuals/.

To search for drivers and downloads, go to www.dell.com/drivers/.

To participate in Dell EMC community blogs and forums, go to www.dell.com/community.