

# VEP4600 Technology Guide

September 2019

© 2018 - 2019 Dell Inc. or its subsidiaries. All rights reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners.

<b>1 About this guide</b> .....	<b>4</b>
Information symbols.....	4
<b>2 Overview</b> .....	<b>5</b>
<b>3 Features</b> .....	<b>6</b>
Specifications.....	6
Configurations.....	8
VEP4600 IO-side.....	9
VEP4600 PSU-side.....	10
Architecture.....	10
uCPE.....	11
SD-WAN deployment.....	11
MPLS off-load.....	12
Dual Internet WAN.....	12
Multipath interconnect transit.....	12
Software.....	13
<b>4 Power, cooling, acoustics</b> .....	<b>14</b>
PSUs.....	14
Cooling and environment.....	14
Acoustics.....	14
<b>5 Additional specifications</b> .....	<b>15</b>
Product specifications.....	15
Regulatory compliance.....	16
VEP4600 Expansion Card antennas.....	17
Agency compliance.....	18
USA Federal Communications Commission statement.....	18
Industry Canada Statement.....	18
Brazil – Aviso da Anatel.....	20
European Union EMC directive conformance statement.....	20
Japan VCCI compliance for class A equipment.....	21
Korean certification of compliance.....	22
Mexican certification of compliance.....	22
Taiwanese certification of compliance.....	22
Singapore certification of compliance.....	23
<b>6 Dell EMC support</b> .....	<b>24</b>

# 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.

**ⓘ NOTE:** 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.

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



Figure 1. Class 1 laser product tag

**ⓘ NOTE:** 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.

## Topics:

- [Information symbols](#)

## 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.

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

**ⓘ NOTE:** 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
- Two M.2 solid-state drive (SSD) slots
- 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](#)
- [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"> <li>• 4x1GbE</li> <li>• 2x10GbE</li> </ul>
Management ports	Two 10/100/1000Base-T ports: <ul style="list-style-type: none"> <li>• One port for the CPU</li> <li>• One port for the BMC</li> </ul>
USB ports	<ul style="list-style-type: none"> <li>• Two USB Type-A receptacle female ports that support USB 3.0</li> <li>• One Micro USB Type-B receptacle female port for the console port</li> </ul>
Console ports	Two serial console ports:

Feature	Specification
	<ul style="list-style-type: none"> <li>One port for the CPU</li> <li>One port for the BMC</li> </ul>
Storage option	Two M.2 SATA up to 960GB per slot
OOB management	BMC IPMI 2.0-compliant
Memory	Four DIMM slots, up to 128 GB
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	Hot-swappable and redundant: <ul style="list-style-type: none"> <li>Maximum five fans for the 16-core CPU</li> <li>Maximum four fans for the 4- and 8-core CPUs</li> </ul>
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"> <li>Linux—Ubuntu OS and Red Hat/CentOS</li> <li>VMware ESXi</li> </ul>
Dimensions and weight	<ul style="list-style-type: none"> <li>Height: 41.25 cm - 1.75 in</li> <li>Depth: 38.1 cm - 15 in</li> <li>Width: 43.4 cm - 17.1 in</li> <li>Weight: 13.75 lbs. (6.34 kg)—One PSU and four fans</li> <li>15.75 lbs. (7.14 kg)—Two PSUs and five fans</li> </ul>

**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"> <li>110 VAC: 1.8A for the 16-core processor</li> <li>240 VAC: 0.85A for the 16-core processor</li> <li>110 VAC: 1.5A for the 8-core processor</li> <li>240 VAC: 0.7A for the 8-core processor</li> <li>110 VAC: 1.35A for the 4-core processor</li> <li>240 VAC: 0.65A for the 4-core processor</li> </ul>
Typical power consumption	<ul style="list-style-type: none"> <li>5-fan 16-core CPU: 200W</li> <li>4-fan 8-core CPU: 170W</li> <li>4-fan 4-core CPU: 160W</li> </ul>
Maximum power consumption	<ul style="list-style-type: none"> <li>5-fan 16-core CPU: 300W</li> <li>4-fan 8-core CPU: 230W</li> <li>4-fan 4-core CPU: 220W</li> </ul>
Power available for optics per SFP+ port	1 W

**Table 3. Cooling specifications**

Parameter	Specifications
Thermal dissipation	<ul style="list-style-type: none"> <li>Typical: 682.43 BTU/hr (200 W)</li> <li>Maximum: 1023.64 BTU/hr (300 W)</li> </ul>

Parameter	Specifications
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"> <li>Three fans for the 4- to 8-core processor</li> <li>Four fans for the 16-core processor</li> </ul>
Minimum CFM	<ul style="list-style-type: none"> <li>Five fans: 35.4</li> <li>Four fans: 28.5</li> </ul>
Maximum CFM	<ul style="list-style-type: none"> <li>Five fans: 107.2</li> <li>Four fans: 82.2</li> </ul>

**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"> <li>5% to 85% (RH), non-condensing, continuously</li> <li>5% to 90% (RH), non-condensing, short term (&lt; 1% of operational hour per year)</li> </ul>
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	1x16 DDR4 RDIMM	128 GB	1	4 maximum	210-APGJ

VEP 4600 configuration	CPU	RAM	M.2 SATA SSD	PSUs	Fans	SKU
	Cache: 1MB/ core QAT: No					
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	240 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 Cache: 1MB/ core QAT: Yes	1x32 DDR4 RDIMM	960 GB	1	4 maximum	210-APGU
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	240 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.

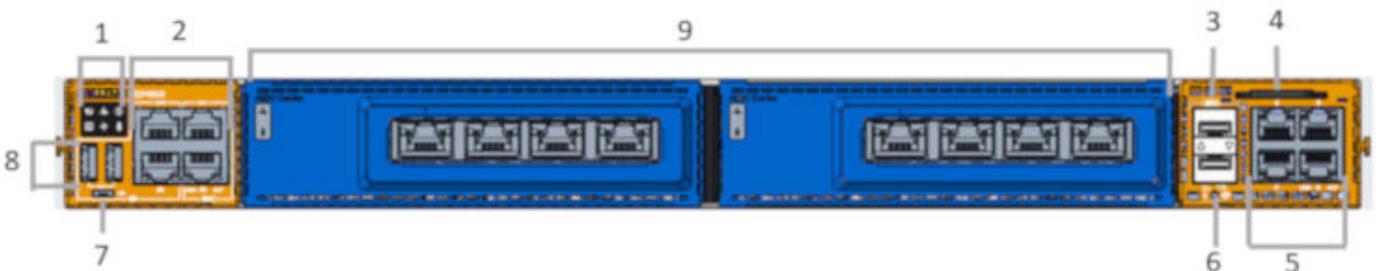


Figure 2. VEP4600 I/O-side view

1. Status LED icons
2. RS-232 console ports (top) and 10/100/1000 Base-T ports (bottom)

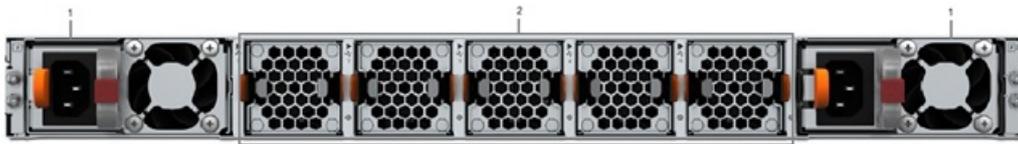
3. SFP+ ports
4. System luggage tag
5. 1000 Base-T networking ports
6. Processor power on/off button
7. Micro USB-B ports
8. USB Type-A ports
9. (Optional Upsell) - VEP4600 Expansion Cards

## 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, upgradable to 1.92TB with custom upgrade
Memory	Four DDR4 RDIMM slots up to a total of 64GB in standard configuration, upgradable to 128GB with custom upgrade
Primary management ports	10/100/1000Base-T ports for system access: <ul style="list-style-type: none"> <li>· One for the CPU</li> <li>· One for the BMC</li> </ul>
USB ports	<ul style="list-style-type: none"> <li>· Two USB Type-A receptacle female ports supporting USB 3.0 with maximum data rates of 640 Mbps</li> <li>· 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</li> </ul>
Console ports	<ul style="list-style-type: none"> <li>· 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.</li> <li>· One serial port available for system BMC access: An RJ-45 console port.</li> <li>· The terminal settings are the same for the USB-B port and the console port: <ul style="list-style-type: none"> <li>· 115200 baud rate</li> <li>· No parity</li> <li>· 8 data bits</li> </ul> </li> </ul>

Feature	Specification
	<ul style="list-style-type: none"> <li>One stop bit</li> <li>Flow control disabled by default</li> <li>When the USB-B port is connected, it becomes the primary connection. The system then sends all messages to the USB-B port.</li> </ul>
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).

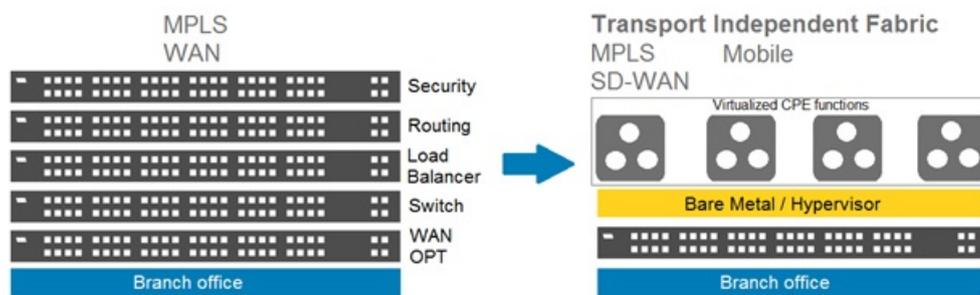


Figure 4. uCPE

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"> <li>Independent hardware and software life cycles that enable agility in new services delivery</li> <li>Dynamic scale-up and scale-out</li> </ul>

## 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 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.

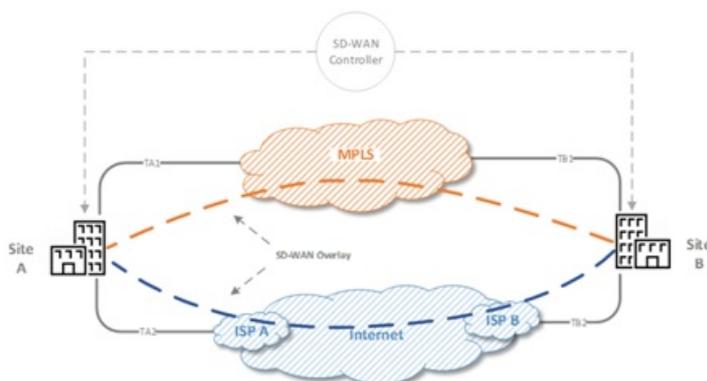


Figure 5. MPLS off-load

# 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.

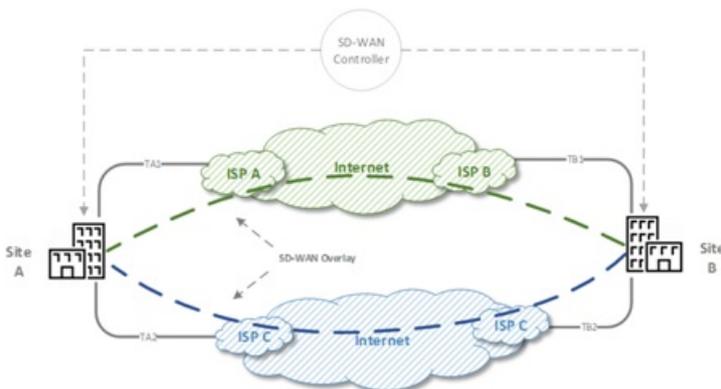


Figure 6. Dual Internet WAN

# 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.

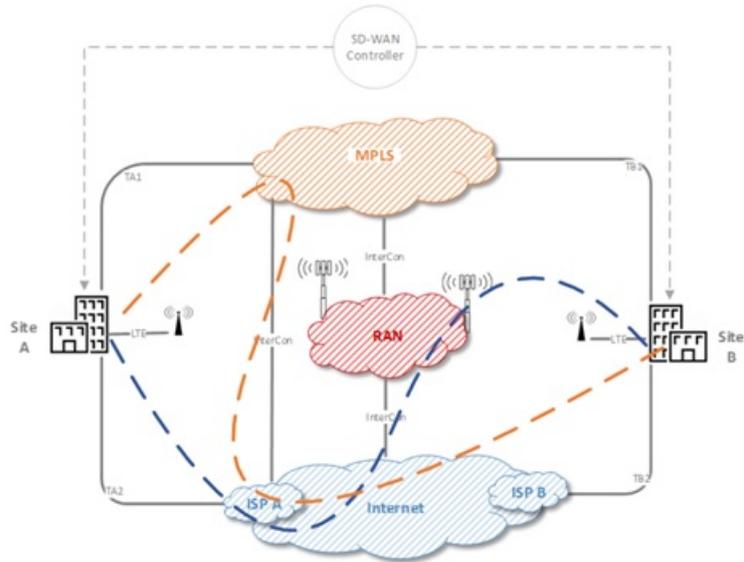


Figure 7. Multipath interconnect transit

## Software

Built primarily for SD WAN and uCPE the general purpose VEP4600 provides hypervisor operating system (OS) configurations if supported by the Intel Xeon architecture.

Dell EMC is continually testing and validating software for the VEP4600. Currently, Velocloud, Versa, ESXi and Adva Ensemble are validated. Plans to offer these as pre-loaded bundles are in progress. Announcements when ready.

# 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](#)
- [VEP4600 Expansion Card antennas](#)
- [Agency compliance](#)

## Product specifications

The following are product specifications for the VEP4600 platform:

**Table 10. VEP4600 product specifications**

Feature	Overview
Processor	Xeon microprocessors based on the Intel Skylake micro-architecture with up to 16 cores and several platform-level innovations: <ul style="list-style-type: none"> <li>• Up to 16-core Intel Skylake technology</li> <li>• Integrated 10GbE/1GbE Ethernet with RDMA</li> <li>• Integrated QAT on both the 8-core and 16-core processors</li> </ul>
Socket and TDP	FCBGA 45 mm x 52.5 mm; Up to 110 W
Memory	<ul style="list-style-type: none"> <li>• DDR4 2400 MT/s</li> <li>• Four DIMM Slots</li> <li>• Up to 128 GB</li> </ul>
Out of band management	BMC IPMI 2.0 compliant
Accelerators (QAT)	<ul style="list-style-type: none"> <li>• Crypto: Up to ~100 Gb/s IPSec/SSL</li> <li>• Compression: Up to ~100 Gb/s</li> <li>• Public Key: Up to RSA2K 100K Ops</li> </ul>
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
Chassis weight with factory-installed components	16.40lbs (7.43 kg), (2 PSUs, and 5 fans, 1 rNDC card)
Power supply	100–240 VAC 50/60 Hz
Typical current draw per platform	<ul style="list-style-type: none"> <li>• 110VAC: 1.89A (16 core) 240VAC: 0.86 A (16 core)</li> <li>• 110VAC: 1.5A (8 core ) 240VAC: 0.7A (8 core)</li> <li>• 110VAC: 1.35A (4 core) 240VAC: 0.65A (4 core)</li> </ul>
Maximum power capability	<ul style="list-style-type: none"> <li>• 5-fan 16-core processor: 311W</li> <li>• 4-fan 8-core processor: 230W</li> <li>• 4-fan 4-core processor: 220W</li> </ul>
Typical power consumption	<ul style="list-style-type: none"> <li>• 5-fan 16-core processor: 206.5W</li> </ul>

Feature	Overview
Serviceability	<ul style="list-style-type: none"> <li>4-fan 8-core processor: 170W</li> <li>4-fan 4-core processor: 160W</li> </ul>
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

# VEP4600 Expansion Card antennas

The following explains the best antenna position for maximum signal reception.

- CAUTION:** The external antennas are certified for indoor use only.
- CAUTION:** The use of external signal amplifiers in-line with the transceiver antennas is strictly prohibited.
- CAUTION:** The product shall be installed in a location where the radiating antenna is kept 20 cm from nearby persons in its normal operational condition to meet global regulatory RF exposure requirements.
- CAUTION:** Use only the antenna(s) which have been approved by the applicant. Non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to a violation of FCC/IC limits and is prohibited.
- CAUTION:** The certified Wi-Fi antennas provided with this product are dipole type with a maximum gain per the following table.

Table 11. Antenna specifications

## Antenna specifications

### WIFI Antenna

Frequency	2400 - 2500 MHz	5150 - 5850 MHz
Gain	2 dBi	2.5 dBi

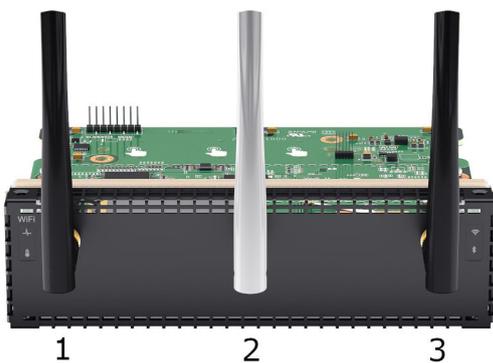
### BLE Antenna

Frequency	2400 - 2500 MHz
Gain	2 dBi

## Whip antennas on the VEP4600 WIFI card

All antennas should be articulated to upright position for optimal performance. There should not be large metal objects within a three foot radius of the antenna.

1. WIFI 1
2. BT/BLE
3. WIFI 2



VEP4600 WIFI Card whip antennas

# Agency compliance

The VEP4600 is designed to comply with the following safety and agency requirements:

## USA Federal Communications Commission statement

**⚠ CAUTION: The use of external signal amplifiers in-line with the transceiver antennas is strictly prohibited.**

**⚠ CAUTION: Use only the antenna(s) which have been approved by the applicant. Non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to a violation of FCC/IC limits and is prohibited.**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

**1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

**This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.**

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures.

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

## FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

**ⓘ NOTE: The country code selection is for non-US model only and is not available to all US model. Per FCC regulation, all WiFi product marketed in US must fixed to US operation channels only.**

## Industry Canada Statement

**⚠ CAUTION: The use of external signal amplifiers in-line with the transceiver antennas is strictly prohibited.**

**⚠ CAUTION: Use only the antenna(s) which have been approved by the applicant. Non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to a violation of FCC/IC limits and is prohibited.**

**⚠ CAUTION: L'utilisation d'amplificateurs de signal externes en ligne avec les antennes de l'émetteur-récepteur est strictement interdite.**

**⚠ CAUTION: Utilisez uniquement les antennes approuvées par le demandeur. Une ou plusieurs antennes non approuvées peuvent produire une puissance de transmission RF parasite ou excessive, susceptible d'entraîner une violation des limites FCC / IC et est interdite.**

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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

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

This device complies with RSS-247 of Industry Canada. Operation is subject to the condition that this device does not cause harmful interference.

Cet appareil est conforme à la norme RSS-247 d'Industrie Canada. L'opération est soumise à la condition que cet appareil ne provoque aucune interférence nuisible.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter, except tested built-in radios.

Cet appareil et son antenne ne doivent pas être situés ou fonctionner en conjonction avec une autre antenne ou un autre émetteur, exception faites des radios intégrées qui ont été testées.

The County Code Selection feature is disabled for products marketed in the US/Canada.

La fonction de sélection de l'indicatif du pays est désactivée pour les produits commercialisés aux États-Unis et au Canada.

**Radiation Exposure Statement:** This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

**Déclaration d'exposition aux radiations:** Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

## Caution:

1. The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
2. The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the eirp limit; and
3. The maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the eirp limits specified for point-to-point and non point-to-point operation as appropriate.
4. The worst-case tilt angle(s) necessary to remain compliant with the eirp elevation mask requirement set forth in Section 6.2.2(3) shall be clearly indicated.
5. Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

## Avertissement:

1. Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
2. Le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.;
3. Le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5825 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.
4. Les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, et énoncée à la section 6.2.2 3), doivent être clairement indiqués.
5. De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

# Brazil – Aviso da Anatel

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.



Brazilian certificante

# European Union EMC directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Dell EMC cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of this product, including the fitting of non-Dell EMC option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 32/ CISPR34 and EN55032 / EN55034. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

**NOTE: This is a Class A product. In a domestic environment, this device may cause radio interference, in which case, you may be required to take adequate measures.**

European Community Contact  
 Dell EMC, EMEA - Central  
 Dahlienweg 19  
 66265 Heusweiler  
 Germany  
 Tel: +49 172 6802630  
 Email: EMEA Central Sales

## Japan VCCI compliance for class A equipment

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Figure 8. Japan: VCCI compliance for class A equipment

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

**NOTE:** Use the AC power cords with Dell EMC equipment only. Do not use Dell EMC AC power cords with any unauthorized hardware.

本製品に同梱いたしております電源コードセットは、本製品専用です。本電源コードセットは、本製品以外の製品ならびに他の用途でご使用いただくことは出来ません。製品本体には同梱された電源コードセットを使用し、他製品の電源コードセットを使用しないで下さい。

Figure 9. Japan: warning label

## WiFi+BT compliance certificate

電波法により5GHz帯は屋内使用に限ります。

Japanese WiFi, Bluetooth compliance certificate

## BTE compliance certificate

タブレットコンピュータの使用目的オリエンテーション

使用者の体に対してタブレットコンピュータ画面側を抱き抱えることは、タブレットの使用可能な方法ではありません。

WWAN トランスミッタがアクティブであるために、使用者の身体からタブレットコンピュータを 20 センチ以上の距離を確保してください。

製品の他の 5 つの側面は、デルの特徴としてタブレットの使用可能な向きを指定し使用者の身体に密着しながら使用することができます。

ありがとうございます。

## Korean certification of compliance

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
------------------------	---

Figure 10. Korean certification of compliance

	 [equipment type]
품명(Product Name)	Ethernet Switch
모델명(Model)	[model number]
신청인(Applicant)	Dell Technologies
제조자(Manufacturer)	[Manufacturer]
제조년월(Manufacturing Date)	[date]
제조국(Country of Origin)	China

Figure 11. Korean package label

## Radio compliance certificate

Korea (Korean warning statement is only required for devices contain 2400~2483 and/or 5725~5825 MHz radios)

해당 무선설비는 운용 중 전파혼신 가능성이 있음

Korean radio compliance certificate

## Mexican certification of compliance

Mexican compliance.

La operación de este equipo está sujeta a las siguientes dos condiciones:

1. es posible que este equipo o dispositivo no cause interferencia perjudicial y
2. este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

## Taiwanese certification of compliance

Taiwanese radio compliance.

台灣: 國家通訊傳播委員會

低功率電波輻射性電機管理辦法

第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發

現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

在 5.25-5.35 兆赫頻帶內操作之無線資訊傳輸設備，限於室內使用。

Taiwanese radio compliance certificate

## **Singapore certification of compliance**

Singaporean radio compliance.

Complies with IMDA Standards

XXXXXX (xxxxxx = Dealer Code)

Certification pending.

## 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/](http://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/](http://www.dell.com/manuals/).

To search for drivers and downloads, go to [www.dell.com/drivers/](http://www.dell.com/drivers/).

To participate in Dell EMC community blogs and forums, go to [www.dell.com/community](http://www.dell.com/community).