



Edge Computing on Dell PowerEdge XR Servers: Accelerating Insights, Driving Innovation

Dell PowerEdge XR servers are purpose-built to deliver data center performance and flexibility at the edge for retail, telecom and more.

Today, data holds immense value, but only if it can be used quickly and securely. With edge computing, data can be processed and analyzed closer to where it's made, quickly turning data into action. As a result, edge computing is transforming organizations, giving them new capabilities and deeper insights from their data. With edge computing, companies can work efficiently, innovate faster and stay competitive in the modern fast-paced digital world. Such advantages have led to a rise in the global edge computing market, which is projected to grow at a compound annual growth rate (CAGR) of 37.9 percent over the next decade.¹

Yet enterprises face several challenges in deploying and managing edge computing solutions. Edge server devices must be designed specifically for their environments, whether at retail stores, on factory floors, in vehicles or at unstaffed remote locations. They must fit into a small footprint and withstand harsh conditions, limited power supplies and network disruptions—all while providing computing power and storage capacity for demanding workloads, such as AI.

Many servers today are not designed to fit these edge-specific needs. For example, retailers want to capture and analyze data in stores so they can offer customers coupons for their favorite products, customize digital signage and wayfinding and secure self-checkout lines. Manufacturers who want to automate processes need powerful servers that can deliver results in real time while operating in dusty, hot conditions.

Dell PowerEdge XR Servers: Designed and Optimized for the Edge

To harness the full potential of edge computing, Dell PowerEdge XR servers offer a robust and scalable infrastructure that can support diverse and dynamic edge applications with performance, flexibility, durability and simplicity.

Performance

PowerEdge XR servers deliver data center-level performance at the edge, powered by the latest generation of Intel® Xeon® Scalable processors, and with support for GPU acceleration. They can handle demanding workloads such as AI, machine learning (ML), video analytics and edge virtualization with high speed and efficiency. For retail edge applications such as point-of-sale (POS) checkout, these servers can be integrated with other edge-enabled devices, such as digital signage, sensors and smart freezers. This leads to a seamless and personalized shopping journey for the customers, offering them tailored promotions, recommendations and rewards.

Durability

PowerEdge XR servers are built to withstand harsh and unpredictable edge environments, and they are tested to MIL-STD-810H and NEBS Level 3 specifications. They are shock, vibration, dust and thermally rated, and they can operate in temperatures ranging from -20°C to 65°C, depending on the model and configuration. In hot and dusty factories, for example, manufacturers can implement predictive maintenance solutions that collect data from machines and equipment using deep sensor networks to detect anomalies or defects in real time. This can help prevent breakdowns, reduce downtime and improve efficiency and worker safety.

Flexibility

PowerEdge XR servers are modular, scalable and available in 1U or 2U form factors, with short depth for easy deployment. These servers can be small and compact enough to fit into the back closet of a retail store to ultimately deliver more immersive and interactive shopping experiences. For example, virtual reality and augmented reality can be used for virtual fitting rooms, product demonstrations and gamified promotions. These capabilities require high bandwidth, low latency and large amounts of data, which can be challenging to achieve with cloud computing but possible with PowerEdge XR servers.

Simplicity

PowerEdge XR servers are easy to install, configure and manage, thanks to their front input/output (I/O) design. The chassis design also helps with serviceability, with full- or half-width sleds on certain models that can be easily reused and replaced without removing the chassis or power supply unit (PSU). PowerEdge XR servers can also be more reliable and less expensive to operate in remote or rural areas compared to other servers, due to their durability and remote management features. Integrated Dell Remote Access Controller (iDRAC) allows secure remote monitoring and control over servers and helps IT administrators deploy, update and monitor PowerEdge servers from any location. Dell OpenManage, a systems-management solution, helps IT admins optimize server performance, security and availability from a single console. And Dell NativeEdge is an edge-operations software platform that helps enterprises securely scale edge applications across locations using automation, open design, zero-trust security and multicloud connectivity.

PowerEdge XR4000 Server: Compact and Powerful

The PowerEdge XR4000 server is a high-performance, multi-node server that is purpose-built for the edge. It is designed for ultra-short depth and low power, making it ideal for rack- and wall-mount configurations. It can enable organizations to run more workloads at the edge thanks to its low power consumption and low total cost of ownership (TCO). The PowerEdge XR4000 server also supports the latest generation of Intel Xeon Scalable processors and GPU acceleration, making it capable of handling demanding edge applications with ease.

Use Cases

The PowerEdge XR4000 server is suitable for many use cases across multiple industries:

- **Retail:** Deploy solutions in space-limited retail areas, such as self-checkout and computer vision, inventory tracking and data analysis, interactive mirrors and immersive experiences and POS virtualization for a better return on investment (ROI). The size of the PowerEdge XR4000 server is comparable to a shoebox, so it can sit on a desk or hang on a wall. The server can also be combined with popular edge platforms such as VMware Edge Compute Stack (ECS). VMware ECS helps retailers create an optimal store experience by making use of technologies such as 5G, computer vision, and the Internet of Things (IoT).
- **Manufacturing:** Enable machine aggregation and virtualization, operational technology (OT)/IT translation, predictive maintenance, simulated manufacturing and digital twinning, industrial automation, AI inferencing and computer vision for defect detection. The PowerEdge XR4000 server can include a lockable bezel, with intelligent filter monitoring that alerts iDRAC when the filter needs to be changed. This helps keep the unit free of dust, pollen and other contaminants common on commercial sites.
- **Government:** Deploy tactical edge solutions such as real-time analytics and vehicle-based mobile edge solutions for military/defense, law enforcement and emergency response. The PowerEdge XR4000 server features the Nano Witness Server, which replaces the need for a virtual witness node. The Nano Witness Server functions as an in-chassis witness node, for a native, two-node VMware vSAN cluster. This feature is critical for emergency responders because it allows for virtual machine (VM) deployments in areas with latency or bandwidth constraints.

The PowerEdge XR4000 server delivers 120 percent better performance per watt for the price of the CPU, compared to the previous-generation PowerEdge XR11 server.²



PowerEdge XR5610 Server: All-Purpose Compute in 1U

The PowerEdge XR5610 server is one of the most versatile Dell Technologies 1U servers, featuring generational enhancements designed to deliver high-performance compute for AI, 5G vRAN and Open RAN (O-RAN) and smart cities workloads.

The server is built for high-performance computing (HPC) applications and AI workloads, with up to 8 DDR5 memory DIMM slots, up to four drives, up to two PCIe Gen 5 expansion slots and one OCP 3.0 slot. AI operations and data can be deployed with built-in security features including Dell Technologies Secured Component Verification (SCV) and a silicon-based Root of Trust.

Use Cases

The PowerEdge XR5610 server is a versatile, multipurpose server suitable for a variety of industries:

- **Retail:** Optimize computing at the retail edge with this short-depth, rugged server designed for video monitoring, POS analytics and IoT device aggregation/analytics in locations constrained by space or environmental challenges. The PowerEdge XR5610 server is powered by a 4th Gen Intel Xeon Scalable processor with 8 to 32 cores and up to eight DDR5-4800 megatransfers per second (MT/s) DIMMs to deliver high speed and memory capacity for retail applications.
- **Telecommunications:** Run demanding networking and communications workloads, such as 5G, vRAN, O-RAN, content-delivery networks (CDNs) and remote private network AI/ML/deep learning (DL) at remote edge locations. The PowerEdge XR5610 server excels in telecom deployments by offering Precision Time Protocol (PTP), synchronous Ethernet (SyncE) via add-in network interface controllers (NICs), Intel® CPUs with Intel® vRAN Boost featuring integrated forward error correction (FEC) and NEBS Level 3 (SR3580) testing.
- **Government:** Deploy smart city solutions that use AI and computer vision, such as real-time traffic monitoring. With 4th Gen Intel Xeon Scalable processors and up to 32 cores, the PowerEdge XR5610 server processes large amounts of data from various sensors and cameras. GPU acceleration can be integrated, along with support for Serial Attached SCSI (SAS) drives and a variety of RAID controllers.

The PowerEdge XR5610 server provided 2.5x better AI inference on images in real-time traffic safety tests than the previous-generation PowerEdge XR11 server.³



PowerEdge XR7620 Server: AI/ML at the Edge

The PowerEdge XR7620 server is a compact 2U, two-socket server designed for high performance, high capacity and reduced latency at the edge. It supports up to two double-wide GPU accelerators for AI/ML workloads, delivering fast and more accurate insights from data. It also offers high memory bandwidth, optimized I/O performance and enhanced storage options to easily handle large and complex datasets.

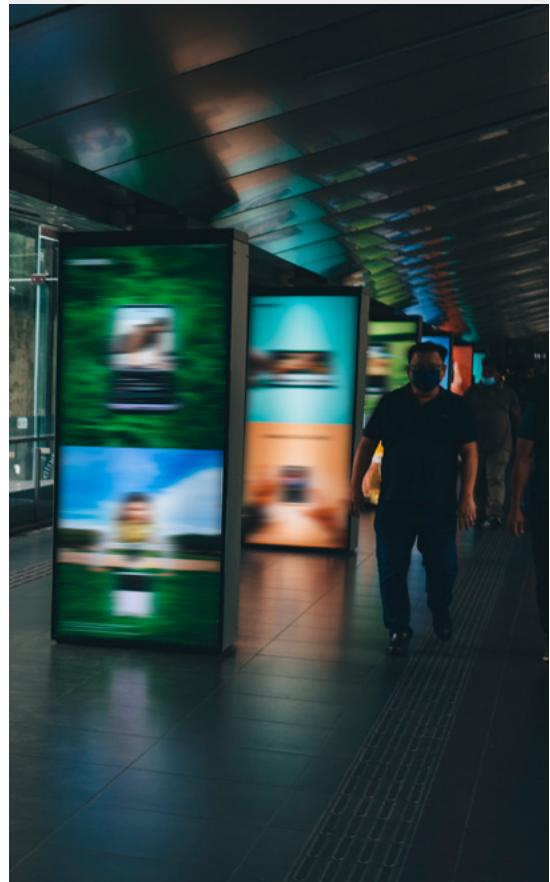
The PowerEdge XR7620 server is powered by the latest Intel Xeon Scalable processors that offer significant improvements for AI workloads. The processors feature built-in Intel® Advanced Matrix Extensions (Intel® AMX) technology that boosts AI inference throughput.

Use Cases

The PowerEdge XR7620 server is ideal for analytics, data aggregation, AI inferencing and more:

- **Retail:** Improve warehouse operations, POS aggregation/analytics, digital signage, inventory management, robotics, video analytics and AI inferencing with the PowerEdge XR7620 server. It features two 4th Gen Intel Xeon Scalable processors with up to 32 cores and two accelerators (at up to 300 W each) for optimal AI performance. With the addition of GPU support, the PowerEdge XR7620 server processes AI workloads faster, such as image classification, object detection, speech-to-text, and language processing.⁴
- **Digital manufacturing:** Enable industrial automation and machine aggregation with support for up to eight NVMe Express (NVMe) drives and rating for extreme temperatures (−5°C to 55°C). Monitor and control production processes, improve product quality and reduce operational costs and risks. This 2U dual-socket workhorse also has integrated networking and enhanced storage, making it ideal for areas where data must be collected and rapidly analyzed at the edge.
- **Government:** Edge capabilities such as patrolling the battlefield and conducting field inspections are possible with the PowerEdge XR7620 server. Run mission-critical applications such as real-time analytics, surveillance and communications with confidence. Tested to MIL-STD-810H and NEBS Level 3 standards, the PowerEdge XR7620 server can withstand dusty and hot/cold conditions, vibrations and high altitudes.

With up to 2 x 300 W accelerator cards for GPUs, the PowerEdge XR7620 server provides a 45 percent faster image-classification workload, compared to the previous-generation data center PowerEdge XR12 server.⁴



PowerEdge XR8000 Server: Multinode Edge-to-Edge Compute

The PowerEdge XR8000 server is a compact 2U, four-socket server that supports up to four nodes with flexible I/O sled options, allowing customizable server configurations. It features an innovative sled-based chassis design to allow greater configuration flexibility than other edge servers. It also offers broad I/O expansion support per node, making it suitable for telecommunications use cases, with up to three NICs, up to three O-RAN L1 accelerators and up to one 300 W GPU.

Use Cases

The PowerEdge XR8000 server is compact and flexible, making it a good fit in a wide range of industries:

- **Retail and manufacturing:** Enhance POS analytics, video analytics, AI inferencing and OT/IT translation with the PowerEdge XR8000 server to improve customer experiences and product quality, manage inventory and increase operational efficiency. The PowerEdge XR8000 server is a short-depth class-1 server for high-performance compute in harsh, space-constrained environments, with a ruggedized design and a chassis depth of 430 mm (16.92 inches).
- **Telecommunications:** Optimize centralized hub sites and transition to vRAN and O-RAN. The PowerEdge XR8000 server is extensible to cell-site deployments of distributed and centralized units in building cabinets and telecom shelters. Powered by 4th Gen Intel Xeon Scalable processors with Intel vRAN Boost, the PowerEdge XR8000 server brings significant TCO reduction for workloads like O-RAN and multi-access edge computing (MEC).
- **Networking:** Enable MEC and user plane functions (UPFs) for network optimization, cloud services at the edge and mobile user applications with reduced latency, lower bandwidth costs and enhanced security. With multiple sled configurations of up to four nodes per chassis, telecom providers can meet changing needs with optimum compute configurations for core, edge and RAN use cases.
- **Government:** Deploy field-ready, remote support for military field operations and reconnaissance with mission-critical applications using real-time analytics, surveillance and communication. The PowerEdge XR8000 server offers easy serviceability with front I/O and power, along with a security rating of NEBS Level 3 Class 1, Trusted Platform Module (TPM) 2.0 silicon-based root of trust and multi-factor authentication (MFA) access controls.

The PowerEdge XR8000 server scales to 33 percent more compute and more I/O with a 2U sled than a Supermicro SuperServer SYS-211SE-31 server, delivering superior performance and efficiency.⁵



Simplify and Optimize Edge Operations

Dell PowerEdge XR servers can be deployed and managed with flexibility thanks to Dell OpenManage and Dell NativeEdge. Dell OpenManage provides enterprises with a next-generation systems-management console that enables centralized management of PowerEdge infrastructure. IT teams can complete tasks in less time and fewer steps with a web-based graphical user interface (GUI) and elastic search engine, the ability to manage up to 8,000 PowerEdge servers and monitoring capabilities for networking, storage and third-party devices. They can also automate tasks on a single console and automatically deploy devices in minutes.

Dell NativeEdge is an edge operations software platform that centralizes the deployment and management of edge infrastructure and applications across geo-distributed locations. Dell NativeEdge helps enterprises securely scale their edge operations using automation, an open design, zero-trust security principles and multicloud connectivity.

Choose Ultimate Performance and Flexibility at the Edge Today

The growing demand for edge computing shows no signs of slowing down. The amount of data processed outside the traditional data center or cloud is growing, much of it processed using on-premises infrastructure at critical edge locations. To support this growth, more IoT devices are being deployed, and organizations rely on the speed and capacity of 5G networks to achieve near real-time performance. PowerEdge XR servers are innovatively designed to support a broad range of these edge computing workloads in compact and harsh environments.

Take a deeper dive on the PowerEdge XR server family by reading the ebook, ["Take Your Workload to the Edge."](#)

¹ Grand View Research. ["Edge Computing Market Size, Share & Trends Analysis Report By Component \(Hardware, Software, Services, Edge-managed Platforms\), By Application, By Industry Vertical, By Region, And Segment Forecasts, 2023 – 2030."](#)

² Dell Technologies. ["Optimizing Performance Per Watt with Dell PowerEdge XR Servers."](#) August 2023.

³ Dell Technologies. ["Dell PowerEdge XR Edge AI Smart City Solutions."](#) April 2023.

⁴ Dell Technologies. ["Next Generation Dell PowerEdge XR7620 Server Machine Learning \(ML\) Performance."](#) March 2023.

⁵ Based on internal Dell Technologies testing comparing PowerEdge XR8000 servers and Supermicro SuperServer SYS-211SE-31 servers.



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