PROWESS

Virtualization at the Edge

Picking the right edge-computing option from the Dell™ PowerEdge™ XR family of servers.

The Ever-Growing Importance of Edge Computing

Data at the edge is rich with information. For the most actionable insights, especially with power-hungry workloads like data analytics and AI/ML, modern organizations capture and analyze data when and where it's generated—even when that location is in an unforgiving environment far from the data center, such as an oil rig in the North Sea.

Prowess Consulting investigated some of the latest-generation edge-computing servers from Dell Technologies to see how they meet the challenge of keeping up with performance needs in the most hostile environments. We looked at inter- and intra-generational differences, compared specs and VMmark® results, and considered potential use cases.

We found that, for organizations looking for the ideal edge server, the Dell™ PowerEdge™ XR7620 server delivers high performance, including excellent virtualization capabilities and VMware vSAN™ performance, whereas PowerEdge XR4000 series servers deliver excellent density and deployment flexibility.
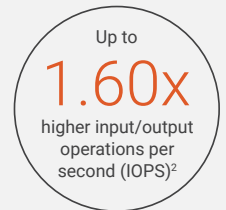
The Unforgiving Edge

Workloads like data analytics and AI/ML, which process data at the edge, drive the need for high performance. And a host of environmental and logistical challenges arise when you move that high performance to the edge. For example, a factory that combines Internet of Things (IoT) and digital twin technologies to automate resource allocation and optimize efficiency through analytics and AI will need servers on the factory floor to generate and capture actionable data. And that means exposure to heat, vibration, dust, and more.

How your organization addresses these considerations of performance and durability inherent to edge computing is key. Regardless of your solution, maximizing performance and safeguarding against harsh environments is critical.
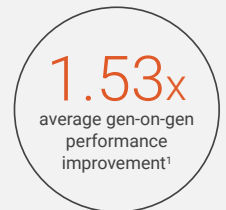
Highlights

The 4th Gen Intel® Xeon® Scalable processors powering the Dell™ PowerEdge™ XR7620 server provide several benefits over the 2nd Gen Intel Xeon Scalable processors powering the PowerEdge XE2420 server.
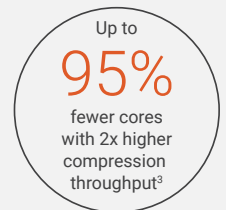
These benefits include:

Up to
1.60x
higher input/output operations per second (IOPS)[2]

versus the prior generation

1.53x
average gen-on-gen performance improvement[1]

Up to
95%
fewer cores with 2x higher compression throughput[3]

versus the prior generation

The PowerEdge XR7620 Server: A Generational Update

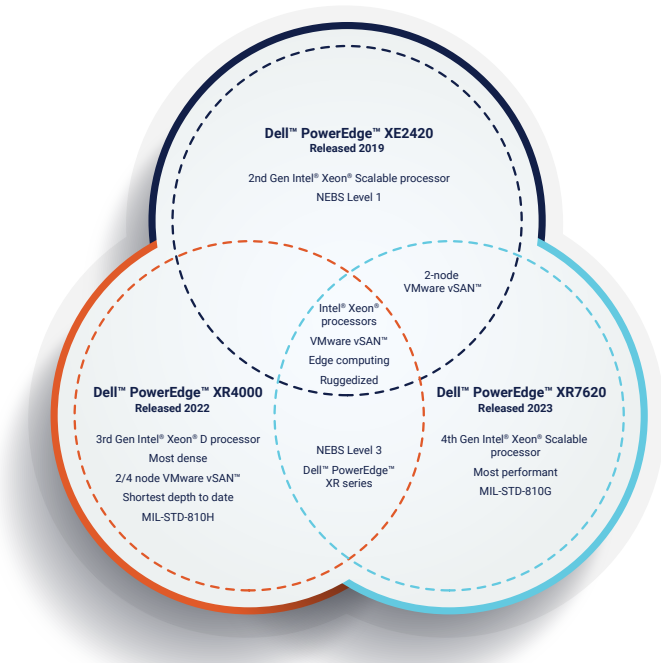Figure 1 provides a quick visual reference for the servers discussed in this abstract.

Figure 1 | Venn diagram of the Dell™ PowerEdge™ XE2420, XR7620, and XR4000 series servers

PowerEdge XR7620 Server vs. PowerEdge XE2420 Server

Prowess Consulting examined the performance difference between the PowerEdge XR7620 server and its previous generation, the PowerEdge XE2420 server.

The 4th Gen Intel® Xeon® Scalable processors powering the PowerEdge XR7620 server provide several benefits over the 2nd Gen Intel Xeon Scalable processors powering the PowerEdge XE2420 server. These benefits include:

- 1.53x average generation-on-generation performance improvement[1]

- Up to 1.60x higher input/output operations per second (IOPS) and up to 37% latency reduction for large-packet sequential reads using integrated Intel® Data Streaming Accelerator (Intel® DSA) versus the prior generation[2]

- Up to 95% fewer cores and 2x higher level-1 compression throughput using integrated Intel® QuickAssist Technology (Intel® QAT) versus the prior generation[3]

This improved performance between generations can also been seen by comparing VMware vSAN deployments. The PowerEdge XE2420 server and the PowerEdge XR7620 server can both implement two-node vSAN deployments. However, as noted previously, the PowerEdge XR7620 server will be more performant with those deployments. This higher level of performance doesn't just come from the upgraded processor, either. The 4th Gen Intel Xeon Scalable processors in the PowerEdge XR7620 server are optimized to take full advantage of the new features and software improvements in VMware vSphere® 8, including GPU- and CPU-based acceleration.

VMmark® Examination of PowerEdge XR7620 and PowerEdge XR4000 Series Servers

The PowerEdge XR7620 server is part of the PowerEdge XR family of servers, all of which are built to handle the most extreme environments while still delivering performance and reliability. We wanted to examine the PowerEdge XR7620 server alongside its "younger siblings," the PowerEdge XR4000 series servers, and investigate the intra-generational differences in the PowerEdge XR family. (While not discussed in this study, the PowerEdge XR8000 series servers provide excellent flexibility and stability, and would be the "elder sibling" in the family.)

The VMmark results show the PowerEdge XR7620 server can achieve more performance across more tiles (fourteen versus four). These results also illustrate what can be achieved at the edge with a full, dual-socket server using the latest-generation processors in a short depth, 2U ruggedized chassis at the edge. While the PowerEdge XR7620 server's overall performance wins are expected, what's missing is how performant at the edge the PowerEdge XR4000 series servers are. Given the smaller size and shorter form factor overall, the PowerEdge XR4000 series servers are very performant relative to size, and they are an excellent option when a smaller, denser, more flexible deployment is called for. Moreover, their redundancy allows for more hardware failures, making them resilient and durable.

VMware vSAN is widely deployed as a virtualization software and hyperconverged infrastructure (HCI) solution, so we compared vSAN deployments inter-generationally as well. While both servers take advantage of vSAN, the PowerEdge XR7620 server will offer more overall performance, whereas PowerEdge XR4000 series servers offer the highest density in the smallest form factor.

There is, however, another significant benefit to the upgraded PowerEdge XR7620 server: power savings and sustainability. As shown in our technical research study, the PowerEdge XR7620 server offers double the cores of the PowerEdge XR4510c server tested, for less than double the wattage, resulting in a smaller power draw when the PowerEdge XR7620 is deployed at the edge. The reduced power consumption can also potentially lower total cost of ownership (TCO) and help meet your business's sustainability goals.

Finding an Edge Within the PowerEdge XR Family

Our research concludes that the Dell PowerEdge XR family of servers is a great option for organizations looking for reliable, high-performing servers in ruggedized, short-depth form factors designed specifically for edge computing. Among the range of PowerEdge XR family servers examined by Prowess Consulting, the PowerEdge XR7620 server represents a solid upgrade from the previous generation, and it is the performance-focused offering in the new PowerEdge XR family of servers. PowerEdge XR4000 series servers are the high-density, performant option when durability and space constraints are primary concerns.

Learn More

For full research results and configuration details, see the technical research report at:
https://prowessconsulting.com/project/230038-dell-poweredge-XR7620-edge-virtualization-technical-research-study

For more information on the Dell PowerEdge XR7620 server, see "Dell's PowerEdge XR7620 for Telecom/Edge Compute" and the PowerEdge XR7620 server product page.

For more information on the new offerings in the PowerEdge XR family, see "Dell PowerEdge Gets Edgy with XR8000, XR7620, and XR5610 Servers."

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[1] Intel. Performance Index (4th Gen Intel Xeon Scalable Processors, G1). Accessed May 2023. www.intel.com/PerformanceIndex.

[2] Intel. Performance Index (4th Gen Intel Xeon Scalable Processors, N18). Accessed May 2023. www.intel.com/PerformanceIndex.

[3] Intel. Performance Index (4th Gen Intel Xeon Scalable Processors, N16). Accessed May 2023. www.intel.com/PerformanceIndex.