



PowerEdge R740 Family of Servers

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SUMMARY

The PowerEdge R740 rack server family is comprised of three members: R740, R740xd, and R740xd2.

This tech note compares and contrasts these three servers, giving an overview of their technical specifications and capabilities, and calling out key workloads for which they are optimized.

Servers, optimized

Designing servers optimized for purpose and workload is part of the PowerEdge design process. A highly-adaptable server like the PowerEdge R740 provides extensive configuration flexibility, allowing it to be tailored to the specific demands of a wide range of workloads. Yet even more differentiated designs in the same 2-socket space are needed to meet the emerging demands of highly data-intensive workloads. Thus we see additional servers (the PowerEdge R740xd and R740xd2) in the same general space, in order to provide peak capabilities for those data-abundant use cases.

PowerEdge R740

The PowerEdge R740 is a 2u rack server providing a balanced architectural design for driving peak 2-socket performance and cost-efficient operation. It supports up to two processors from the broad range of offerings in the Intel Xeon Scalable Processor family; 24 DIMM slots for RDIMMs/LRDIMMs or alternatively for up to 12 NVDIMMs; and up to eight PCIe Gen 3 I/O slots (one of which will be taken by the PERC adapter). Large, front-accessible storage capacity is provided by up to 16 x 2.5" SAS or SATA (HDD/SSD) drives, or up to 8 x 3.5" SAS or SATA HDD. Furthermore, the innovative PowerEdge Boot Optimized Storage Subsystem (BOSS) in the R740 offers up to two M.2 SSD's for the segregation of operating system from data.

The R740 offers broad configuration flexibility, allowing it to be tailored for the requirements of a wide range of workloads and applications including OLTP, Decision Support, XaaS, web tech, server virtualization, desktop virtualization (VDI), and HPC. For users needing to drive application performance beyond the 2-socket range, the R740 also supports numerous GPU and FPGA options, enabling users to stay at the forefront of emerging application areas such as ML/DL, AI, and business-oriented HPC.

In the realm of high availability features, the R740 offers multiple hot-plug power supplies for full redundancy, and these power supplies can be chosen from a range of wattages, allowing users to choose the appropriate type of power supply based on the needs of their workloads and server configuration. Cooling comes from up to six fully-redundant hot-plug fans.



Image 1: PowerEdge R740 (left) and PowerEdge R740xd (right). Yes, they look the same from the outside.

PowerEdge R740xd

The PowerEdge R740xd is a workload-optimized variant of the R740, where the “xd” stands for “*extreme density*” and the meaning is “extreme internal storage density in a rack server”. Thus, the R740xd is a differentiated platform excellent for data-heavy workloads like Software Defined Storage (SDS), Big Data (Hadoop, Data Analytics, etc.) and various data-intensive HPC workloads. The R740xd offers similar processor and memory support as the R740, but internal storage is considerably more in the R740xd: Up to 50% more front-accessible drives, either up to 24 x 2.5” SAS or SATA (HDD/SSD) drives (vs. 16 in the R740), or up to 12 x 3.5” SAS or SATA HDD (vs. 8 in the R740). The R740xd also offers NVMe SSD storage options, as well as mid-bay and rear-bay storage possibilities, as listed in its Spec Sheet.

Similar to the R740, the R740xd also supports GPU and FPGA options for workload acceleration. Also like the R740, the R740xd supports BOSS as well as hot-plug and fully redundant power supplies and fans. Systems management for the R740xd is accomplished with Dell EMC OpenManage systems management solutions and/or integrated solutions from partners, the same as for the R740 discussed above and the R740xd2 discussed below.

R740xd2

The PowerEdge R740xd2, as the nomenclature implies, is a variant of the R740xd, offering even greater internal storage density, along with enhanced access to the additional internal storage drives. In an expandable chassis (shown in Image 2 below), the R740xd2 supports up to 24 front-accessible 3.5” SAS/SATA HDD, or up to 16 x 3.5” SAS/SATA HDD plus up to 8 x 2.5” SAS SSD. The chassis can be expanded as shown in the image while mounted in a server rack, for ease of access and serviceability. Two additional drive bays are accessible from the rear of the chassis, supporting up to 2 x 3.5” SAS/SATA HDD or up to 2 x 2.5” SAS SSD. Thus, the R740xd2 supports up to 26 drives (up to 24 front-accessible and up to 2 rear-accessible), plus an additional two M.2 BOSS SSD’s for operating system segregation.



Image 2: PowerEdge R740xd2 showing chassis expanded for easy access to and serviceability of all drive bays. Note also in the rear section that the fans are arranged horizontally across the breadth of the chassis, for smooth airflow and highly efficient cooling.

The R740xd2 provides 16 DIMM slots for DDR4 RDIMMs, in contrast to both the R740 and R740xd which each provide 24 memory slots. Thus, one can say that for achieving peak performance for computational workloads, especially where avoiding becoming memory-bound is a concern, users should lean toward the R740 or R740xd. The

R740xd2 is best positioned and used as an enterprise content server for data-abundant workloads. These workloads include those involving unstructured data (Hadoop; Data Analytics); media retention and streaming; and Mail & Messaging. For example, the R740xd2 can hold up to 500,000 hours of HD video content, making it a platform of choice for video surveillance or online education. The R740xd2 is also excellent for Mail & Messaging, able to scale up to 50,000 Microsoft Exchange 10GB mailboxes in a single 2u chassis.

Multi-Vector Cooling

Given that higher performance components and denser configurations can create challenges for server cooling, PowerEdge Engineering developed Multi-Vector Cooling, which brings an innovative, new approach to server thermal control. Implementing custom-designed heat sinks and fans, combined with sophisticated system layout and fan zone mapping, Multi-Vector Cooling increases airflow and cooling through the chassis of PowerEdge 14G enterprise servers including the R740 family. Multi-Vector Cooling optimizes fan operation in response to a range of parameters including thermal state, fan power, airflow consumption, and acoustics. In addition, a new PCIe airflow customization capability enables users to specify delivery of airflow to each PCIe slot. Links to more information about PowerEdge Multi-Vector Cooling are available in the Notes section at the end of this tech note.

Built-in Security

To protect, detect and recover from cyber attacks, security is built into the PowerEdge server design (not bolted on after the fact). The importance of server security can't be overstated: cyber intrusions and attacks can result in system and business downtime, lost revenue, lost customers, corrupted data, the inability to comply with government regulations for data protection, and damaged corporate reputation.

While much cybersecurity concern focuses on protecting the OS and applications, PowerEdge Engineering goes extra miles to address the underlying server infrastructure including hardware and firmware. The Security Development Lifecycle (SDL) model makes security an integral part of the PowerEdge server design process. This results in innovative silicon-based security and cryptographic capabilities including Hardware Root of Trust; Secure Boot; Signed Firmware Updates; Configuration and Firmware Drift Detection; and System Lockdown. Interested readers can find more information about PowerEdge built-in security in the tech notes [Security in Server Design](#), and [Cyber-Resiliency in Chipset and BIOS](#).

	R740	R740xd	R740xd2
Target Workloads	Application performance and acceleration: Virtualization, cloud apps, Web tech, HPC, XaaS	Application acceleration and storage scalability: SDS, service providers, big data servers	Mid-to-large-scale data-intensive workloads: Media Streaming (Video Surveillance, CDN) Exchange, SDS(S2D)
Processors	Intel Xeon Scalable processors – 28 cores (205W) per socket		Intel Xeon Scalable processors – 22 cores (140W) per socket
Memory	DDR4: Up to 24 x DDR4 Slots, RDIMMS/ LRDIMMS (3TB); up to 12 NVDIMMs		16 DIMMs=512GB
Storage	16 x 2.5" or 8 x 3.5" (max total 122.88TB for 2.5" or 112TB for 3.5")	24 x 2.5" or 12 x 3.5" either SSD, HDD, or NVMe max 184.32TB 4 x 3.5" or 2.5" 56TB 2 x 3.5 or 4 x 2.5" max 30.72TB (max total 245.76TB for 2.5" or 252TB for 3.5")	Front drive bays: Up to 24 x 3.5" SAS/ SATA (HDD) max 336TB, or up to 16 x 3.5" SAS/SATA (HDD) plus up to 8 x 2.5" SAS (SSD) max 285.44TB Rear drive bays: Up to 2 x 3.5" SAS SATA (HDD) max 28TB or up to 2 x 2.5" SAS (SSD) drives max 15.36TB (max total 364TB for 26 3.5" or 313.44TB for hybrid configuration)
GPU	Up to three 300W GPU or up to six 150W GPU, or up to 4 FPGA		N/A
PCIe slots	8	8	5
Form factor	2U	2U	2U

Table 1: PowerEdge R740 family - Key features and targeted workloads

Conclusion

All 2-socket 2u rack servers are not the same. The three members of the PowerEdge R700 family provide users with choice, allowing them to select the most appropriate IT resources for their key enterprise workloads. The powerful and reliable R740 delivers peak 2-socket performance and features broad configuration flexibility, allowing it to be tailored to the requirements of a wide range of workloads and applications. The R740xd is a workload-optimized variant of the R740 and is excellent for data-heavy workloads and various data-intensive HPC workloads. The R740xd2 is best positioned and used as an enterprise content server for data-abundant workloads. All of these servers deliver PowerEdge Engineering differentiators including BOSS, Multi-Vector Cooling, built-in security, and simplified, comprehensive systems management.

For further information:

Spec Sheets:

- PowerEdge R740 Spec Sheet: <https://www.emc.com/collateral/software/data-sheet/poweredge-r740-spec-sheet.pdf>
- PowerEdge R740xd Spec Sheet: https://i.dell.com/sites/csdocuments/Shared-Content_data-Sheets_Documents/en/poweredge-r740xd-spec-sheet.pdf
- PowerEdge R740xd2 Spec Sheet: https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-r740xd2-spec-sheet.pdf

Tech notes:

- PowerEdge R740 Accelerates Microsoft SQL Server Performance <https://downloads.dell.com/solutions/servers-solution-resources/DfD%20-%20PowerEdge%20R740%20Accelerates%20Microsoft%20SQL%20Server%20Performance%20.pdf>
- PowerEdge R740 SQL Server Performance with NV-DIMMs https://www.dell EMC.com/en-us/collaterals/unauth/briefs-handouts/products/servers/direct_from_development_poweredge_r740_sql_server_performance_with_nvdimms.pdf
- PowerEdge R740xd2 for Video Surveillance https://www.emc.com/en-us/collaterals/auth/briefs-handouts/products/servers/poweredge_r740xd2_for_video_surveillance.pdf
- Security in Server Design https://www.dell EMC.com/resources/en-us/asset/briefs-handouts/products/servers/direct_from_development_security_in_server_design.pdf
- Cyber-Resiliency at the Chipset and BIOS <https://downloads.dell.com/solutions/servers-solution-resources/Direct%20from%20Development%20-%20Cyber-Resiliency%20In%20Chipset%20and%20BIOS.pdf>

Tech talk videos:

- PowerEdge R740/R740xd tech talk video: <https://www.youtube.com/watch?v=xdq4GLlqNKc&feature=youtu.be>
- PowerEdge R740xd product video: <https://www.youtube.com/watch?v=COIk2GNr2U>
- PowerEdge R740xd2 tech talk video: https://youtu.be/_0pzlO5Lq2Y