



Optimize networking performance with the Dell PowerEdge R750 featuring a modern 100Gb Broadcom NIC

Using a single 100Gb NIC provided better and more consistent performance than four 25Gb NICs

Large digital media files require strong networking to travel from end-user devices to servers and back again. If your organization creates or edits high-resolution video, uses artificial intelligence (AI) on video streams in retail locations to identify buying patterns, or supports safety and security video solutions, optimizing the network speed for moving data is critical to ensuring quality. While choosing to use multiple 25Gb network interface cards (NICs) to achieve 100Gb capability is theoretically possible, our tests show that choosing a single 100Gb NIC can maximize bandwidth for demanding video workloads.

In the Principled Technologies data center, we used the Frametest tool to test the maximum available bandwidth of two solutions:

- A Dell™ PowerEdge™ R750 server with a Broadcom® 57508™ Dual Port 100Gb network interface card
- The same PowerEdge R750 server with four 25Gb NICs (Note: We used two dual-port NICs to achieve our 4x 25Gb NIC configuration)

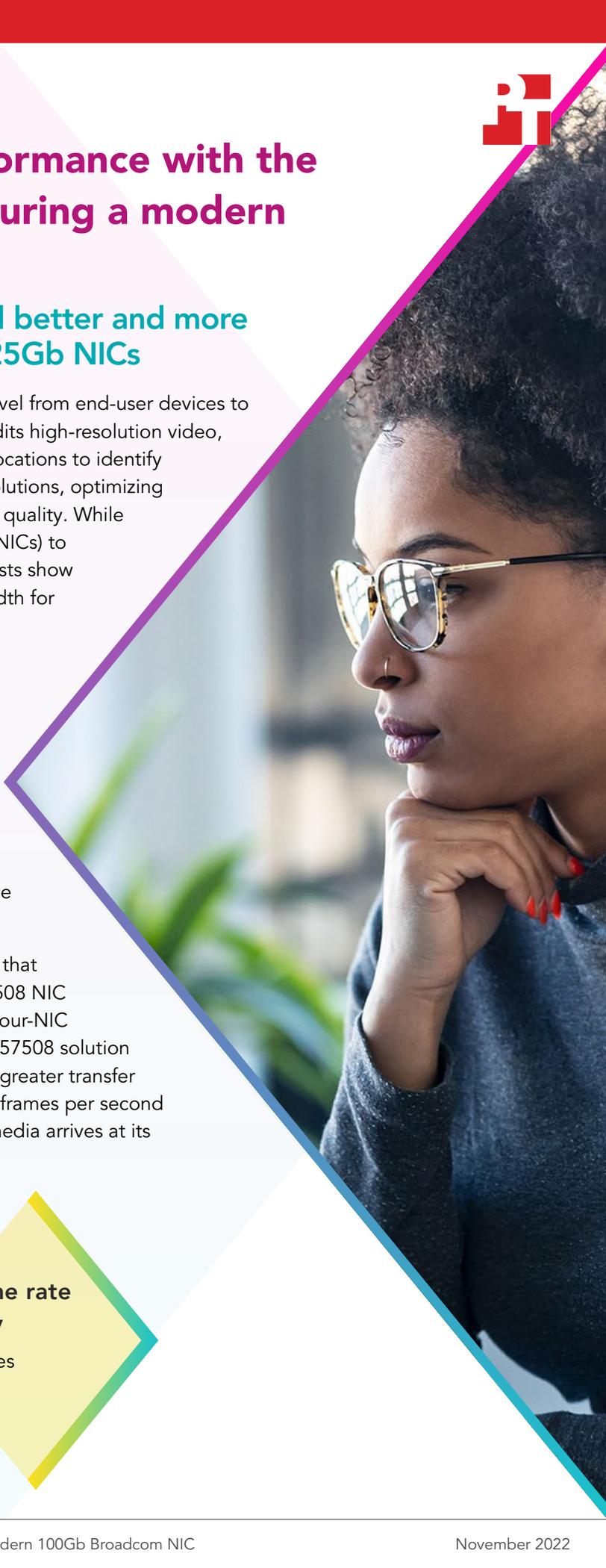
Testing with multiple instances, or data streams, showed that the PowerEdge R750 with a single 100Gb Broadcom 57508 NIC achieved higher frames per second (FPS) rates than the four-NIC solution. For example, at eight instances, the Broadcom 57508 solution achieved 31 percent more FPS on average, and showed greater transfer consistency for each video stream. By transmitting more frames per second over the network, organizations can ensure that digital media arrives at its intended location at the highest possible quality.

Up to 31 percent more FPS

on average at 8 instances

Better frame rate consistency

across instances



Use a Dell PowerEdge R750 with a single 100Gb Broadcom 57508 NIC to move your digital media

Frame rates are a measure of video quality—the more frames per second that a solution can handle, the clearer the information relayed on screen. For content creators working with video, sending large amounts of data quickly over the network is vital for ensuring productivity. For safety and security video solutions, the stakes may be even higher: Sending high quality video streams that provide undisturbed monitoring can better keep your assets secure. Other video workloads, including retail using AI on video streams to gather data about where and how shoppers navigate a store, also benefit from higher video quality and faster file transfer.

In our testing, we used varying numbers of instances, from one to 12. Different instances could mean different numbers of security cameras sending video to a main data center or multiple videographers working at once. Figures 1 and 2 show the average frame rates each NIC solution achieved in both reads and writes. They also include lines for the target frame rate of 24 FPS—the closer to this line, the better.

While both the Broadcom 57508 solution and the four-NIC solution handled lighter loads with similar frames per second, the four-NIC solution began delivering FPS well below target as the video load increased. At eight instances, the Broadcom 57508 solution achieved a 31 percent higher rate of frames per second than the four-NIC solution. Similar differentials continued through 12 instances, where the Broadcom 57508 solution achieved a 22 percent higher rate of FPS.

These results indicate that the 100Gb Broadcom 57508 solution was better equipped to handle the increasing amounts of digital media transfer than the four-NIC solution, ensuring that files can reach their target destination faster, with sharper quality and less degradation.

About Frametest

To test read/write throughput, we used the Frametest utility, which simulates writes and reads at a user-specified number of individual frames at a certain resolution. This emulates raw still frames or frames generated by post-processing or 3D rendering software.

To download Frametest, visit <https://support.dvsus.com/hc/en-us/articles/212925466-How-to-use-frametest>.

Average frames per second: Reads

Higher is better

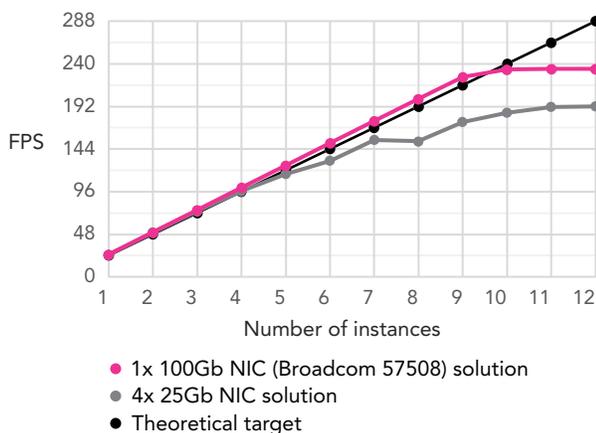


Figure 1: Frametest results, in average read frames per second, for the two NIC solutions from one to 12 instances. Higher numbers are better. Source: Principled Technologies.

Average frames per second: Writes

Higher is better

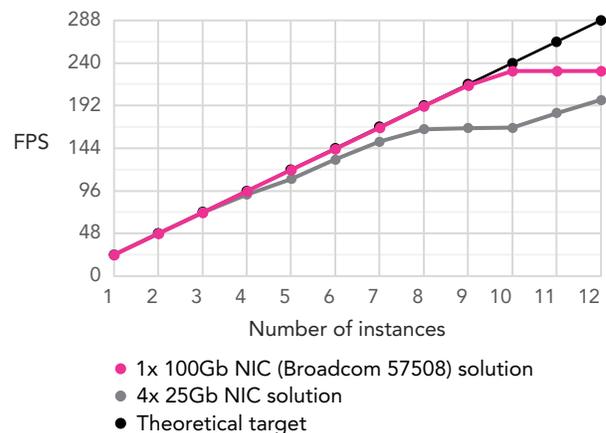


Figure 2: Frametest results, in average write frames per second, for the two NIC solutions from one to 12 instances. Higher numbers are better. Source: Principled Technologies.

About the Dell PowerEdge R750 server

The Dell PowerEdge R750 is a full-featured, general-purpose 2U rack server featuring 3rd Gen Intel® Xeon® Scalable processors. According to Dell, the PowerEdge R750 is purpose-built to optimize application performance and acceleration with PCIe Gen 4.0 compatibility, eight channels of memory per CPU, and up to 24 NVMe® drives.¹ It also includes “I/O bandwidth and storage to address data requirements – ideal for: traditional corporate IT, database and analytics, virtual desktop infrastructure, AI/ML, and HPC.”²

To learn more about the Dell PowerEdge R750, check out the spec sheet at https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-R750-spec-sheet.pdf.



Don't let inconsistent bandwidth impede your streaming video workloads

When you have multiple security cameras transmitting data constantly to your servers, each data stream needs to arrive quickly, without dropped frames due to bandwidth constraints. If data streams place too much load on the network and make data transfer inconsistent for any instance, such as a camera, you may lose moments vital to safety and security. For retail organizations using AI on video streams, clearer video can result in more granular insights on shopping behavior.

Figures 3 and 4 show two such comparisons: the performance for both NIC solutions at both five and nine instances over the various test runs. The Broadcom 57508 solution transferred more data and was markedly more consistent, so that no one data stream had priority over others. This would mean that each data stream—in this example, video—traveled smoothly from the source to the target server. The four-NIC solution's throughput varied widely, which could spell degradation or disruption of digital media transfer. Note: We chose to show the data at five and nine instances because these comparisons made the differences the easiest to see. The 4x25Gb solution theoretically should be able to achieve the same results, but it can't due to the nature of the LACP load balancing algorithm and therefore shows highly inconsistent results with as few as four to five streams.

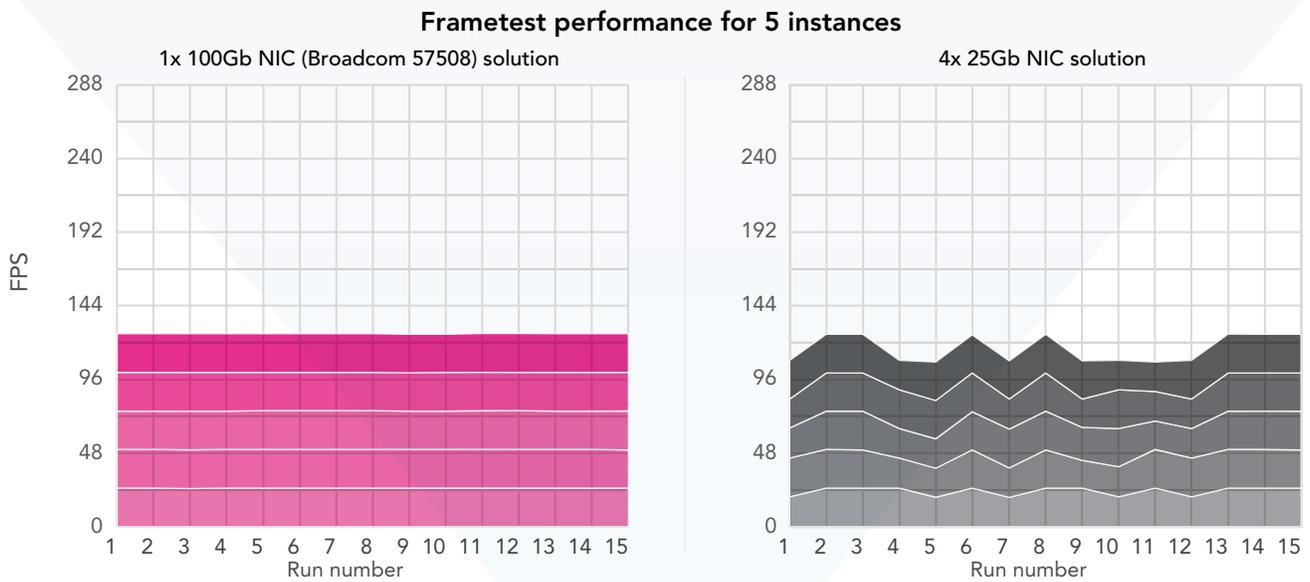


Figure 3: Frametest read results over 15 test runs at five instances. Higher numbers and more consistency is better. Source: Principled Technologies.

Frame test performance for 9 instances

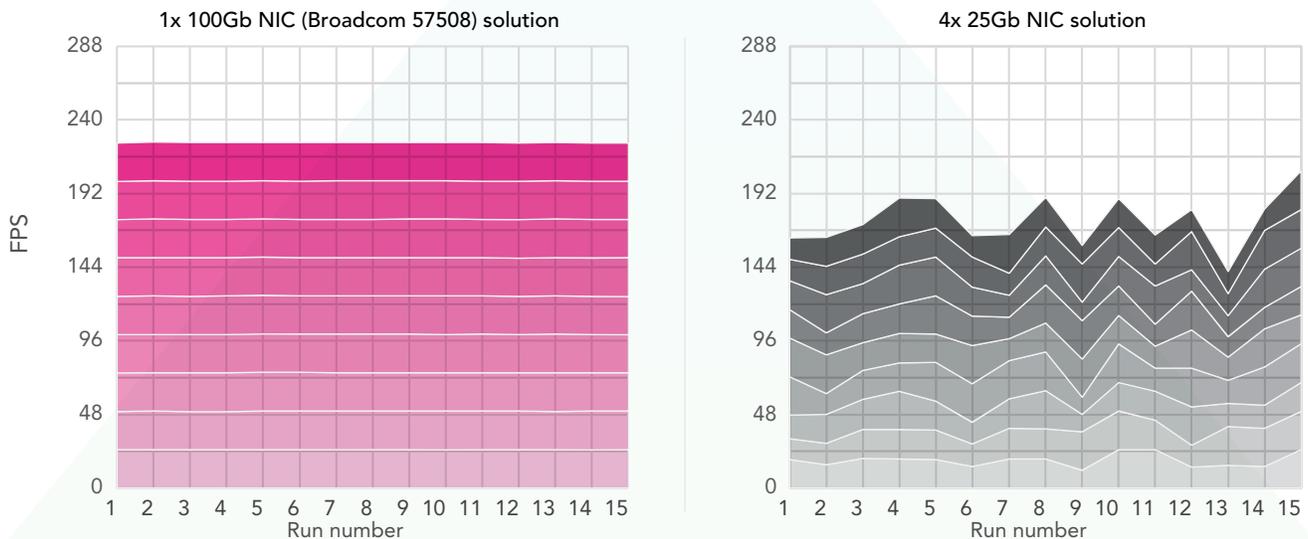


Figure 4: Frametest read results over 15 test runs at nine instances.
Higher numbers and more consistency is better.
Source: Principled Technologies.

This general trend of consistency happened across test runs and numbers of instances transmitting digital media. To see the rest of the data for the other instance counts, visit the [science behind the report](#).

About the Broadcom 57508 Dual Port 100GbE network interface card

Compatible with a wide range of PowerEdge servers, the Broadcom 57508 Dual Port 100GbE network interface card can be ideal for data centers or cloud computing.³ According to a Broadcom data sheet, some features of the NIC include:

- Dual-port pluggable media interface, compatible with a QSFP56/QSFP28 optical transceiver or a copper direct-attach cable
 - Secure PCIe® adapter solution leveraging Broadcom BroadSAFE® technology
 - Multi-host support: Dual-Host x8 mode
 - Compliance with the SFF-8402 standard
 - x16 PCI Express 4.0 compliant
 - SR-IOV with up to 1K virtual functions⁴

To learn more, read the data sheet at <https://docs.broadcom.com/doc/957508-P2100G-DS>.

Conclusion

Video files and other large digital media can be taxing to networking and underlying server hardware. For organizations that frequently transmit these types of data, such as those that work in content creation, retailers that run AI on video to gather shopping data, or those hosting safety and security video solutions, speeding data transfer can make the difference in productivity or video quality. As workloads increased, we found that using four 25Gb NICs to gain 100Gb bandwidth capability did not meet target frame rates as closely as the Broadcom 57508 solution did. The Dell PowerEdge R750 server with a Broadcom 57508 Dual Port 100Gb network interface card offered better and more consistent networking performance than the four-NIC solution—delivering up to 31 percent more FPS for a smoother, faster, video experience.

1. Dell, “Dell EMC PowerEdge R750 Spec Sheet,” accessed October 7, 2022, https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-R750-spec-sheet.pdf.
2. Dell, “Dell EMC PowerEdge R750 Spec Sheet.”
3. Broadcom, “BCM957508-P2100G Dual-Port 100 Gb/s QSFP56 Ethernet PCI Express 4.0 x16 Network Interface Card,” accessed October 5, 2022, <https://docs.broadcom.com/doc/957508-P2100G-DS>.
4. Broadcom, “BCM957508-P2100G Dual-Port 100 Gb/s QSFP56 Ethernet PCI Express 4.0 x16 Network Interface Card.”



Read the science behind this report at <https://facts.pt/Y6dW6vL> ▶



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This project was commissioned by Dell.