Take the Green Train: NVIDIA BlueField DPUs Drive Data Center Efficiency

In tests with Ericsson, Red Hat and VMware, data processing units enabled faster, more energy-efficient networks.

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The numbers are in, and they paint a picture of data centers going a deeper shade of green, thanks to energy-efficient networks accelerated with data processing units (DPUs).

A suite of tests run with help from Ericsson, Red Hat and VMware show power reductions up to 24% on servers using NVIDIA BlueField-2 DPUs . In one case, they delivered 54x the performance of CPUs.

The work, described in a recent whitepaper , offloaded core networking jobs from power-hungry host processors to DPUs designed to run them with greater power efficiency .

Accelerated computing with DPUs for networking, security and storage jobs is one of the next big steps for making data centers more power efficient. It's the latest of a handful of optimizations, described in the whitepaper, for data centers moving into the era of green computing .

Seeing the trend toward energy-efficient networks, VMware enabled DPUs to run its virtualization software, used by thousands of companies worldwide. NVIDIA has run several tests with VMware since its vSphere 8 software release this fall.

For example, on VMware vSphere Distributed Services Engine — software that offloads and accelerates networking and security functions using DPUs — BlueField-2 delivered higher performance while freeing up 20% of the CPU's resources required without DPUs.

That means users can deploy fewer servers to run the same workload, or run more applications on the same servers.

Few data centers face a more demanding job than those run by telecoms providers. Their networks shuttle every bit of data that smartphone users generate or request between their cellular networks and the internet.

Researchers at Ericsson tested whether operators could reduce their power consumption on this massive workload using SmartNICs , the network interface cards that handle DPU functions. Their test let CPUs slow down or sleep while an NVIDIA ConnectX SmartNIC handled the networking tasks.

The results, detailed in a recent article , were stunning.

Energy consumption of server CPUs fell 24%, from 190 to 145 watts on a fully loaded network. This single DPU application could cut power costs by nearly $2 million over three years for a large data center.

In the article, Ericsson's CTO, Erik Ekudden, underscored the importance of the work.

"There's a growing sense of urgency among communication service providers to find and implement innovative solutions that reduce network energy consumption," he wrote. And the DPU techniques "save energy across a wide range of traffic conditions."

Results were even more dramatic for tests on Red Hat OpenShift , used by half of all Fortune 500 banks, airlines and telcos to manage software containers.

In the tests, BlueField-2 DPUs handled virtualization, encryption and networking jobs needed to manage these portable packages of applications and code.

The DPUs slashed networking demands on CPUs by 70%, freeing them up to run other applications. What's more, they accelerated networking jobs by a whopping 54x.

A technical blog provides more detail on the tests.

Across every industry, businesses are embracing a philosophy of zero trust to improve network security. So, NVIDIA tested IPsec, one of the most popular data center encryption protocols, on BlueField DPUs.

The test showed data centers could improve performance and cut power consumption 21% for servers and 34% for clients on networks running IPsec on DPUs. For large data centers, that could translate to nearly $9 million in savings on electric bills over three years.

NVIDIA and its partners continue to put DPUs to the test in an expanding portfolio of use cases, but the big picture is clear.

"In a world facing rising energy costs and rising demand for green IT infrastructure, the use of DPUs will become increasingly popular," the whitepaper concludes.

It's good to know the numbers, but seeing is believing. So apply to run your own test of DPUs on VMware's vSphere.

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