CASE STUDY

Intel® Ethernet 10 Gigabit Converged Network Adapter
Intel® Xeon® Processor E5 and E7 Families

Healthcare
Big Data

Converging server and storage network traffic for cost-effective and reliable cloud computing services

Carestream Health reduces management overhead by deploying a single high-speed data center network based on Intel® Ethernet 10 Gigabit Converged Network Adapter

Carestream Health is a global leader in medical imaging IT. It provides workflow solutions such as picture archiving and communication systems (PACS), vendor-neutral archiving (VNA) and a universal imaging viewer for referring physicians. Besides supplying on-site solutions, Carestream provides cloud-based services managed through a cost-per-procedure operational model. For its new UK data center, it is deploying Intel® Ethernet 10 Gigabit Converged Network Adapter to support both server traffic and image data saved on its storage area network (SAN). By converging its hardware infrastructure onto a single high-speed Ethernet network, Carestream will benefit from a platform that is easier to manage and more reliable and cost-effective.

Carestream

www.carestream.com/cloud

"Upgrading and streamlining the fibre network supporting our data center operations ensures our infrastructure is even better prepared for the delivery of cloud services, now and in the future. Converging our server and storage domains provides us with a more manageable and reliable system that offers greater flexibility for future growth."

Ishai Tal,
Platform Manager,
Carestream

CHALLENGES

- **Simplifying network:** Carestream was interested in unifying the network underpinning its data center platform to avoid having to maintain separate network links for both server and storage hardware
- **Efficiency gains:** It aimed to simplify the maintenance of its data center operations and boost the cost-effectiveness of the technology underpinning its cloud services
- **Maintain performance:** With a growing user base and the challenge of processing ever-rising volumes of image data while preserving service quality, Carestream needed to ensure its cloud services could still deliver high performance

SOLUTIONS

- **Strong connections:** Carestream tested the potential for Intel Ethernet 10 Gigabit Converged Network Adapter to support its server and storage hardware
- **Converged platform:** This provided the capacity to support both local area network (LAN) and storage traffic (using Fibre Channel over Ethernet, FCoE) on the same network, helping streamline and increase the reliability of data center operations at a lower cost
- **Processing power:** Carestream decided to deploy servers powered by the Intel® Xeon® processor E5 and E7 families to deliver the processing performance to provide effective cloud services from its new UK data center

TECHNOLOGY RESULTS

- **Greater simplicity:** Intel Ethernet 10 Gigabit Converged Network Adapter and FCoE have allowed Carestream to route data traffic from both virtualized server and storage environments across the same high-speed Ethernet network. It has consolidated multiple Gigabit Ethernet ports onto the new platform, and has eliminated Fibre Channel cards in its servers
- **Reduced overhead:** It's easier for IT administrators to manage a single Ethernet infrastructure as opposed to separate Ethernet and Fibre Channel networks, making it easier to respond quickly to any issues
- **Keeping up:** Using the Intel Xeon processor E5 and E7 families ensures Carestream can process and deliver high-quality medical image services to a growing user base, with its new UK data center platform capable of managing 2 million studies per year

BUSINESS VALUE

- **Lower costs:** Carestream expects to reduce its data center deployment and operating costs by almost half by having a more efficient, consolidated network platform, eliminating costly common SAN infrastructure and reducing the need for high-availability solutions, enabling its services to stay profitable and competitive
- **Service quality:** The processing power and reliability of Carestream's server and networking hardware help preserve the quality of the end user experience
- **Future proof:** Upgrading to more flexible and manageable infrastructure helps Carestream ensure it can continue to innovate and enhance its service in response to changes in future technology and usage requirements

Maintaining its position

As a global leader in the medical imaging IT sector, Carestream Health must ensure the technology behind its services can deliver the quality of service customers expect. Providing these services using a cloud computing model intensifies this challenge. Carestream needs to ensure its data center infrastructure can seamlessly accommodate rising user numbers and the additional processing burden created by higher image resolutions and ever larger file sizes, while continuing to operate cost-effectively.

Carestream increases the efficiency of its data center infrastructure while preserving service quality

To meet these growing technical challenges while staying profitable, Carestream must ensure the efficiency of its systems. It had previously deployed servers based on the Intel Xeon processor E5 family in its data centers and optimized its applications to enhance the performance these could deliver. Recently, its research and development (R&D) team identified the potential to streamline its infrastructure by converging the network hardware supporting its servers and storage area network (SAN) arrays using Intel Ethernet 10 Gigabit Converged Network Adapter.

A consolidated approach

By migrating data traffic from both its server and storage platforms onto a single high-speed Ethernet network, Carestream planned to eliminate storage-specific networking hardware within its data center. As a result, the infrastructure would be easier to manage and offer greater flexibility and reliability as a result of fewer components. With a single network platform, it would also be less costly to build redundancy into the system. Previously, this would have involved installing back-ups for both the server and storage domains.

Intel Ethernet technology also provided a potential platform for Carestream to enhance the performance and efficiency of its storage infrastructure by facilitating the move to a virtualized storage environment, in line with the virtualized approach it had adopted for its server resources.

Practical tests

Carestream needed to ensure that the converged network model worked as expected with real-world data center conditions, and that it could preserve the optimized performance it had previously achieved with its hardware infrastructure.

Its R&D team undertook a proof of concept (PoC) to verify this. Its tests showed that a single network based on Intel Ethernet 10 Gigabit Converged Network Adapter could support data traffic from both SAN over Ethernet protocol-based traffic (using Fibre Channel over Ethernet) and IP traffic-based resources.

The next step was to ensure that migrating to the new network platform would not impact the performance of Carestream's services. It benchmarked the performance of its applications when running on the converged platform, and established that the infrastructure was capable of accessing and processing images at the same rate as common SAN-based traffic based on Fibre Channel technology.

Carestream designed its tests to simulate the day-to-day conditions in which its new data center infrastructure would be required to deliver Carestream Vue* PACS/VNA services. This included serving medical images to a single user, as well as workloads involving 500,000 and 700,000 transactions per year and additional loads shared across 100 and 140 users on Carestream's refereeing Web portal, Carestream Vue Motion*. The performance of its server and storage hardware running on the new Ethernet network ensured that Carestream's infrastructure passed all the tests that were set. All workloads were completed within the time frames needed to maintain the quality of the service.

New data center

After establishing the technical and business case for migrating its data center hardware onto a single network domain, Carestream is now in the process of deploying the infrastructure in a new facility to deliver its cloud services in the UK. It is basing its platform on Dell PowerEdge* R820 servers, powered by the Intel Xeon processor E5 family. Whereas Carestream previously had to use two Fibre Channel and two Ethernet network interface controllers (NIC) per server to support data traffic, it has now consolidated this onto two Intel Ethernet 10 Gigabit Converged Network Adapter on each of the new servers.

By verifying the ability of Intel Ethernet 10 Gigabit Converged Network Adapter to preserve the optimized performance levels it had previously established for its applications, Carestream has ensured that it can continue to deliver the high quality of service customers require. Performance tests on the converged infrastructure have shown that it is possible to converge over 200 I/Os throughput from the SAN with an average of 100 MB per second network traffic throughput on a single domain.

Improvements to the design of the Intel Xeon processor E5 family also provide additional processing bandwidth, helping reinforce the overall performance of the service. Carestream's tests have shown that the loading rate for images delivered through its platform has been maintained across the move to the new Ethernet infrastructure. With the support provided by the new technology, Carestream has designed its UK data center platform to handle 2 million studies per year.

Lessons learned

Carestream's tests with Intel Ethernet 10 Gigabit Converged Network Adapter demonstrated that it is possible to simplify the networking technology underpinning cloud computing deployments while preserving the high performance needed to serve a growing global user base. By converging its server and storage resources to run on the same network domain, Carestream was able to increase the cost-effectiveness of its data center infrastructure while benefiting from increased reliability.

Greater Efficiency

Moving to a converged networking model based on Intel Ethernet 10 Gigabit Converged Network Adapter will enable Carestream to reduce the cost of operating its cloud services infrastructure. With greater control over server and storage resources and processes, it can reduce the management resources that need to be deployed to maintain its systems. Carestream's new system is now based on a single Ethernet infrastructure, rather than the separate Ethernet and Fibre Channel networks it relied on previously, making it easier for administrators to manage the technology.

With its consolidated solution, Carestream expects to reduce its data center deployment and operating costs by nearly half, based on the lower cost of a single consolidated infrastructure for data and networking. The reduction in cost is mainly the result of eliminating expensive common SAN infrastructure and requiring fewer high-availability solutions to cover potential points of failure in the solution.

The more efficient infrastructure will enable Carestream to cost-effectively deliver cloud services on a global scale, both for its current customer base and as it adds subscribers. This will help reinforce the profitability of its offering and maintain the competitiveness of its pay-per-use proposition to customers.

The greater reliability of the converged infrastructure will also help Carestream enhance the quality of its service. Besides this, by providing the opportunity to introduce new technologies within its infrastructure, such as storage virtualization, the Intel Ethernet 10 Gigabit Converged Network Adapter offer the potential to further enhance its services.

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