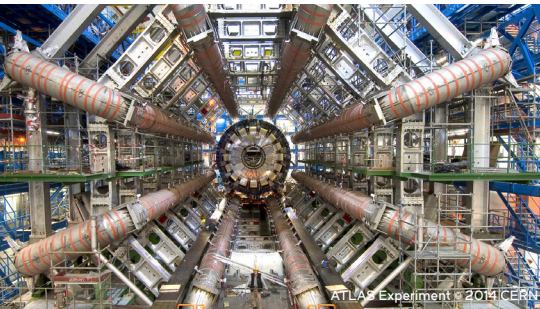


University of Victoria



EXECUTIVE SUMMARY

Challenge

Support advanced scientific research over international peer networks with high-speed connections and a migration path to innovative SDN orchestration and applications

Solution

- Brocade MLX Series Core Router for high-performance routing and OpenFlow capabilities
- Brocade Network Subscription for as-a-service acquisition

Results

- Deployed 100 Gbps loss-free network path between research locations
- Reduced downloads of multi-terabyte data samples from days to minutes
- Enabled SDN-ready infrastructure to deliver future flexibility
- Implemented network ahead of schedule with limitless long-term agility

The Fast Path to International Research Collaboration

The University of Victoria (UVic), located in British Columbia, Canada, is a globally recognized, research-intensive university offering innovative programs for more than 20,000 students. Approximately 1,000 research faculty teach and conduct work in a wide range of areas, including oceans and climate, genomics and proteomics, physics, astronomy, chemistry, engineering, and computational modeling. UVic research teams connect to colleagues, cutting-edge projects, and powerful resources around the world through a number of networks.

UVic connects to BCNET, a regional education network that provides connectivity to Canada's Research and Education Network (CANARIE) backbone, which connects 12 network partners. In turn, CANARIE connects to peers across Canada and to more than 100 global research and education networks, such as Internet2, Pacific Wave, ANA-200, GÉANT, and more, enabling Canadian participation in collaborative, data-intensive global research initiatives. CANARIE carries more than 95,000 terabytes of data annually and has recently been upgraded to 100 Gbps speeds.

Many research departments at UVic require access to CANARIE, including the particle physics group. UVic's particle physicists collaborate over the network with the international research community enabled by the HEPnet organization.

"Canadian researchers are involved in numerous large-scale global physics projects, and it's HEPnet's job to make sure that they can connect with the bandwidth they need," said Randall Sobie, Institute of Particle Physics Research Scientist and Adjunct Professor.

Addressing a 10 Gbps Bottleneck

One of HEPnet's most visible projects is ATLAS at the CERN Laboratory in Geneva, Switzerland. ATLAS is a particle physics experiment at the Large Hadron Collider (LHC), the world's largest and

most powerful particle accelerator.

The LHC consists of a 27 km ring of superconducting magnets with a number of accelerating structures to boost the energy of the particles along the way. Inside the accelerator, two high-energy particle beams travel at close to the speed of light before they are made to collide. The ATLAS detector is an ultra-high-resolution digital camera that records these collisions—which can occur up to 40 million times per second. ATLAS scientists currently capture data for 200 ATLAS events per second, totaling 170 petabytes of data to date.

Until recently, downloading a multi-terabyte data sample took hours or days, and slow transfer times slow down science. UVic researchers are among 3000 physicists in 35 countries, all of

WHY BROCADE

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— Ian Gable, Technical Manager at HEPnet Canada

whom are looking for answers to complex physics questions and publishing their findings. A saturated connection reduces the university’s competitive positioning among researchers’ peers.

Researchers’ data transfers were consuming the 10 Gbps connection that was shared between not only the particle physics group, but all other researchers at UVic as well. While particle physics researchers need to transfer high volumes of particle collision data, there are astronomers that also need to transfer large image files. Ocean sciences teams also need to move large amounts of video data. Research across the university was being affected. UVic wanted to maintain a leading-edge network in order to attract potential research partners.

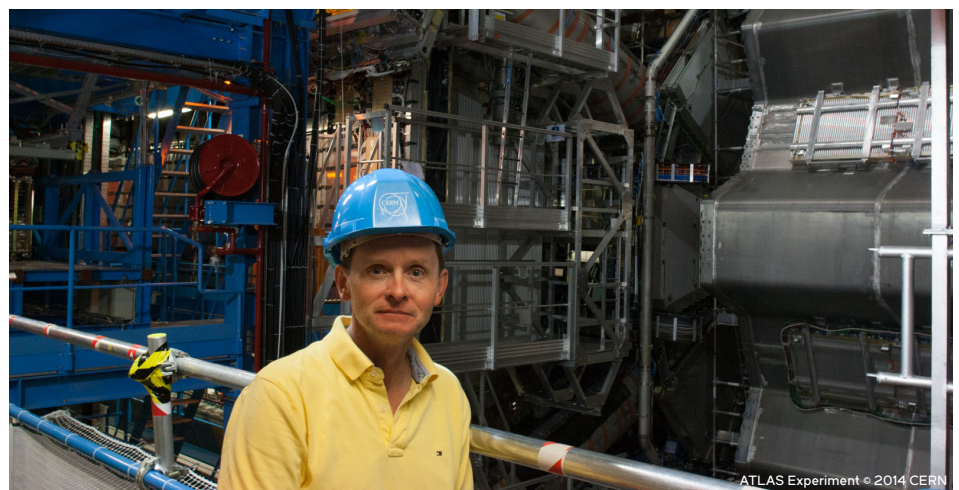
To add capacity, the university briefly considered adding another 10 Gbps link, but decided that another link primarily added complexity and was not the right long-term solution. Instead, UVic decided to upgrade to a 100 Gbps optical connection to CANARIE/BCNET in order to provide that speed to all of its research teams.

Getting to the Future Faster

For its upgrade, UVic needed a network router that could deliver line-rate performance on all ports with zero loss. Unlike typical enterprise or service provider environments that route thousands of small traffic flows, UVic has fewer traffic flows, but each flow is much larger. The team also wanted support for the OpenFlow standard. OpenFlow offers a great deal of flexibility for improving UVic’s responsiveness to the changing demands of global research partners.

After evaluating its options, UVic chose the Brocade® MLX® Series Core Router for its high performance and built-in OpenFlow 1.3. The university also took advantage of the Brocade Network Subscription, an open-ended solution that enables organizations to acquire network infrastructure with pay-as-you-go flexibility. It offers unlimited upgradability when the university is ready, making it easy for the UVic team to align IT infrastructure capacity and project costs with network demands.

“We would not have been able to obtain the Brocade MLX Router if it were not for the Brocade Network Subscription



program,” said Sobie. “If we had to purchase a 100 Gbps switch outright using capital funds, it would have delayed us for one to two years.”

Faster Data Transfers, Bigger Opportunities

The Brocade MLX Router was placed into the production network, where it serves networking research and development needs, as well as researchers’ production data transfer needs. It connects all of the research computing facilities at UVic. Researchers with large data samples in astronomy, ocean science, engineering,

and other disciplines will benefit from more capacity, higher speeds, and fast connections over the CANARIE network to research networks in Canada and abroad. Adding 100 Gbps connection also has placed the university at a competitive advantage for attracting research grants and private partnerships.

“With 100 Gbps routing capabilities, we can now download multi-terabyte data samples in a matter of minutes,” said Gable. “These speeds will allow us to analyze new data from the LHC as soon as it has been recorded.”

UVic is now the fastest-connected university in Canada, positioning it to attract attention from potential collaborators, industry, and government funding agencies.

Looking To SDN Opportunities

“We’re very excited about the Brocade Vyatta® Controller,” said Gable. “We’ve been working with the OpenDaylight software, and the Brocade Vyatta Controller would give us a quality-assured OpenFlow controller that can be easily used in a production environment.”

The Brocade Vyatta Controller enables users to freely optimize their network infrastructure to match workload demands and develop network applications that can be run on any OpenDaylight-based controller. The UVic team is looking at creating solutions that can dynamically allocate bandwidth between sites, build circuits on the fly, and establish protected, high-performance science DMZs for their researchers. With Software-Defined Networking (SDN), they could bypass a firewall for traffic flows that match characteristics of their large data transfers.

A Strong Working Relationship

“Brocade made it possible for us to take advantage of industry-leading performance and features thanks to the ability to acquire infrastructure with Brocade Network Subscription,” said Sobie. “Brocade has been a responsive and helpful organization with us over quite some time. Together, we’re enabling science at UVic to move forward faster.”

For more information, visit www.brocade.com.

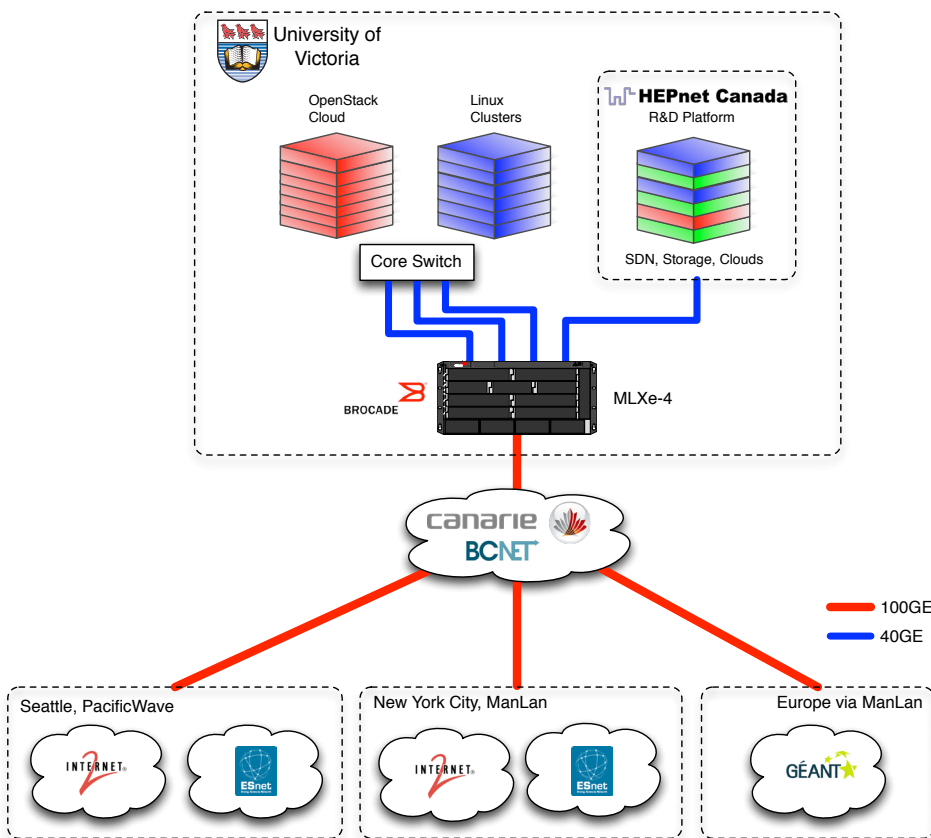


Figure 1: University of Victoria’s Production Network Using the Brocade MLXe-4 Series Core Router

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