ARISTA
case-study

Real-World Deployments

Laboratory of Molecular Biology deploys Arista 10GbE

Low latency and rock solid performance at a quarter of the price of comparable switches

MRC | Laboratory of Molecular Biology

"We are effectively running the Arista switches as core networking switches and so far we have had no issues around latency or reliability. The cost per port is around a quarter of what anybody else could match, even with educational discounts, and we are only using 26 of the 48 ports giving us plenty of scope to grow.

-- Dr. Jake Grimmett

Based in the heart of Cambridge in the United Kingdom, The Medical Research Council's Laboratory of Molecular Biology (LMB) has long been, and remains, a world-class research facility. Its aim is to understand biological processes at the molecular level, through the application of methods drawn from physics, chemistry and genetics. The scientists working at LMB study the individual macromolecules, through their interactions and beyond to the functioning of sub-cellular systems, cells and multi-cellular systems in whole organisms, with the ultimate aim of using this knowledge to tackle specific problems in human health and disease.

Project Background

The LMB is one of the birthplaces of modern molecular biology. Many techniques were pioneered at the laboratory, most notably methods for determining the three-dimensional structure of proteins and DNA sequencing. Whole genome sequencing was initiated at the LMB; another landmark discovery was the invention of monoclonal antibodies. Over the years, the work of LMB scientists has won 9 Nobel Prizes, shared between 13 LMB scientists, as well as numerous other prizes and scientific awards. Many of the current staff members are internationally recognised leaders in their fields. Furthermore, the scientists have founded several very successful biotechnology start-up companies and continue work on translational research to develop diagnostic and therapeutic agents.

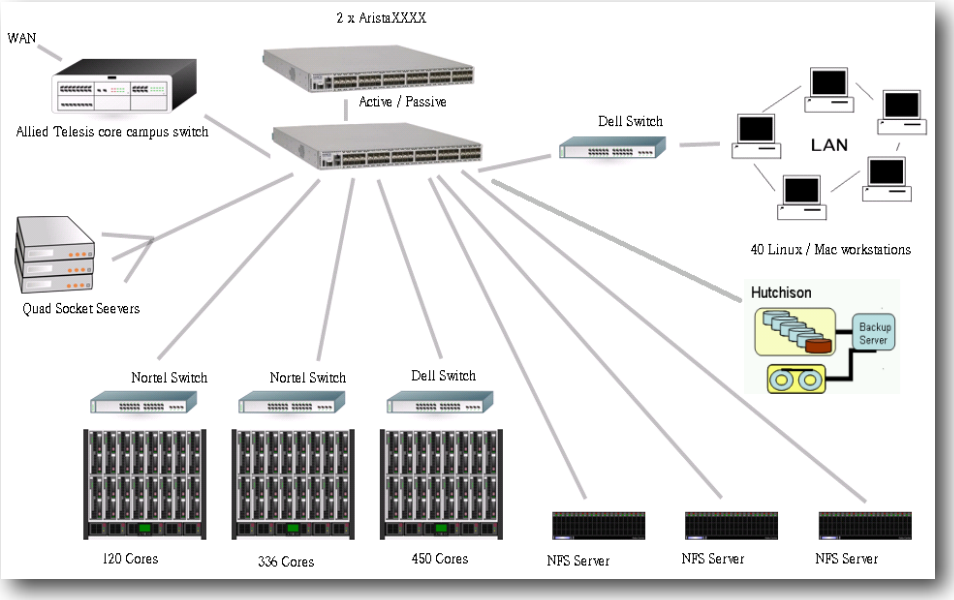
There are 20 research groups currently using the facilities at the Laboratory of Molecular Biology. For the last few years, the lab has used a 120-core compute cluster as a primary resource allocated to each group on a scheduled basis. However, advances in life sciences imaging and sequencing technologies have increased the volume of data requiring analyses as well as more CPU intensive processes. In response to both

drivers, the IT department began a programme to upgrade to its compute cluster.

With the old cluster, the network was often a bottleneck with data moving into local storage or from separate network attached storage arrays over Gigabit Ethernet. With the prospect of multiple clusters and more demand, the IT department needed to revaluate its core switching technology to eliminate this growing bottleneck.

Solution

The lab was planning to add another 336-core cluster followed by a third 450-core cluster later in the year. The existing Gigabit Ethernet was barely coping with the original 120-core cluster and in the view of Dr. Jake Grimmett, Head of Scientific Computing for MRC, "Gigabit Ethernet simply wasn't going to work for the upgraded compute cluster, so we started looking at alternatives."



Dr. Grimmett and his team started evaluating a number of options including InfiniBand interconnect but the consensus was that although it offered good throughput, the complexity and limited interoperability across the wider campus environment proved to be major limiting factors. With a major expansion to the campus planned for the next few years, a move to InfiniBand would provide less flexible option for interconnect with the compute cluster.

"We started assessing the 10Gb Ethernet market and contacted a number of vendors," explains Dr. Grimmett. "Most were offering us core switches that fully configured would cost in the hundreds of thousands of pounds and latency was also rather high."

When MRC contacted Arista, it was ahead of the launch of the Arista 7100 product but Dr. Grimmett was still keen to test a beta unit based on its claims of extremely low latency and cost per port which was "considerably less then any other vendor we had approached" he remarks.

The Benefits

With a beta Arista 7100 - 48-port unit in place, the LMB began to test the throughput and performance of the unit. "The first units had a few small bugs but the technical guys at Arista were incredibly quick in resolving issues and by the third revision, the unit was stable and this was months ahead of the official launch of the switch," explains Dr. Grimmett.

Over the year, LMB added two more compute clusters to the lab. The first was a 42 IBM Blade rack running 2 sockets, quad core Xeon's giving 336 cores. This rack was shipped with a Nortel switch with a 10Gb uplink. The second was a 450 Core Dell rack connected to a Dell Switch with 10Gb uplink. The two Arista 7100

switches are connected to all three compute clusters via 10Gb Ethernet optics and run in an active configuration for high availability.

The Arista switches are also managing data from three NFS file servers which each control 10TB of storage. In addition, further 10Gb ports on the Arista 7100 units are also connected to the core campus switch and a standalone suite of quad socket Intel Xeon servers, which are used for long duration projects.

“We are effectively running the Arista switches as core networking switches and so far we have had no issues around latency or reliability,” comments Dr. Grimmett, “The cost per port is around a quarter of what anybody else could match, even with educational discounts, and we are only using 26 of the 48 ports giving us plenty of scope to grow.” Over the last 16 months, the Arista switches have delivered 100% uptime through the high availability deployment as well as solid levels of performance.

Key advantages of the upgrade to the network, cluster and move to 10Gb switching have included a five-fold performance improvement in single-threaded NFS, more effective load balancing to spread heavy users across the servers and a better queuing system using new Gridengine software. In addition, approximately 40 Linux workstations are plugged into two Dell 1Gb switches, each of which has 2x10GbE uplinks to the Arista 7100 Series. This allows users to access the NFS servers at high speed, necessary as the home areas are located with the LMB.

The MRC has invested in a new LMB building, which will cost about £200 million that will ensure that the institute remains globally competitive and attracts and retains the best researchers. The LMB IT department is evaluating full 10Gb networks for both the new building and to certain desktop environments that are used for major analysis projects.

As part of a longer-term consolidation strategy, Dr. Grimmett is considering standardising all its 10Gb switching around the same vendor as the Lab starts to move more of its servers to virtualised environments. “Ethernet is a good choice for us in the longer term and as 10 Gigabit over copper starts to become more of a reality, we will be looking at other potential projects using Arista technology.”