New Zealand’s first fiber-based LAN brings cost savings and better performance to Environment Canterbury
A new-build office development provides the opportunity to move from traditional copper Ethernet LAN to a future-proof, high-performance Passive Optical LAN
Environment Canterbury is the council responsible for the Canterbury region’s air, water and land. Working in partnership with the communities in the region, Environment Canterbury promotes sustainable management of natural and physical resources using innovative, cost-effective and technically excellent methods, ensuring that decision making is based on high quality information.

Following the devastating earthquake in 2011, much of the city of Canterbury needed to be rebuilt, including several locations that housed Environment Canterbury’s staff. They took this as an opportunity to modernize. A new office building was commissioned to bring more than 400 employees together, designed to live up to the organization’s environmental responsibilities as well as providing a stimulating and attractive place to work.

Environment Canterbury’s Director of Finance and Corporate Services, Miles McConway, recognized that a new-build office was a perfect opportunity to introduce state-of-the art IT infrastructure. This is entirely in keeping with New Zealand government’s reputation as an early adopter of leading-edge technology. They are IPv6 ready, their data centers are fully redundant across both islands of New Zealand, their Skype setup is so advanced that Microsoft chose them for a case study, and they provide fully cloud-based remote working facilities for every employee.

**Seizing the opportunity**

To this end, McConway asked his ICT team to investigate the use of fiber as an alternative to a traditional copper-based Ethernet local area network (LAN). Team Leader ICT Operations Alan Warne had been involved in a few other new build projects where fiber had been discussed and so he was aware of its potential. The primary consideration was the speed of installation. Nothing could be allowed to compromise the on-time delivery of the building. Secondarily, Warne saw fiber as a future-proof solution better suited to Environment Canterbury’s growing IT demands than traditional copper Ethernet.

“We have some bandwidth hungry applications and we use a lot of video conferencing,” explains Warne. “From the outset, a key consideration was to provide Wi-Fi access throughout the building. The latest wireless technologies already exceed the speeds supported by copper Ethernet and as Wi-Fi improves we need a LAN that is capable of soaking up the increased bandwidth demand.”

Other operational considerations for Environment Canterbury included simpler management of moves and changes, particularly in an open-plan office, a seamless user experience for employees, and the greater energy efficiency of a fiber-based LAN compared to traditional copper Ethernet.

**Challenges**

However, the first challenge was finding partners able to support the project. Environment Canterbury is the first organization in New Zealand to deploy a fiber-based LAN and so there were no experienced cabling, equipment and service providers to call.

The project was broken into two parts, separating the cabling of the building from the LAN equipment and services. Firstly, Environment Canterbury worked with local consultants Torque IP, through CommScope, to design the cabling solution. Companies already working on a copper cabling tender were then asked to offer a fiber alternative. That tender was won by NZ Data.

Tony Gibbs, Chief Executive Officer for NZ Data: “Fiber optic cable is much lighter and more flexible than copper so it’s faster and easier to install. Its capacity means several services can be combined on one fiber, so far less of it is required to cover an equivalent office. Compared to Ethernet copper cabling, it took us about three weeks less to install..."
“When we designed the network, we wanted to ensure we exceeded the 80 Mb/s bandwidth that employees were used to with a traditional Ethernet LAN. Currently, every employee gets a 1 Gb/s connection to the desktop. Even my Wi-Fi connection is 130 Mb/s. So we’re well in excess of what we hoped.”

Alan Warne, Team Leader ICT Operations
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As well as the speed of the installation, the fiber cabling required less drilling through beams and walls than copper cabling. Fewer holes mean better containment in the event of a fire. And unlike copper, fiber cabling can run alongside power cabling, so separate cabling trays were not required. And of course one fiber can carry the equivalent amount of data as several dozen copper cables. This, combined with a lower cost per meter, made fiber significantly cheaper than copper cabling.

Separately, Environment Canterbury approached companies known for providing commercial fiber-to-the-home services to see who could offer both the technology and the services to manage a fiber-based LAN. The winning bid came from 2degrees, Environment Canterbury’s existing LAN service provider.

Sam Brock-Smith, Head of Fixed Technology for 2degrees, says, “We have a long-standing relationship with Environment Canterbury, providing a comprehensive, albeit traditional, Ethernet managed LAN solution. But as an early proponent of New Zealand’s Ultra-Fast Broadband program, we’ve gained extensive experience working with GPON based networks, so we knew what a fiber-based LAN could potentially offer.”

To provide the technology, 2degrees turned to Nokia and its Passive Optical LAN (POL) solution. This was primarily because of Nokia’s proven track record from their involvement in the Ultra-Fast Broadband initiative, but also, according to Brock-Smith, the exceptional level of support provided by Nokia throughout the sales and delivery process.

The solution

At the heart of the POL solution is the Nokia 7360 ISAM Optical Line Terminal (OLT) with 24 ports each delivering 2.4 Gb/s. This serves 230 Nokia 7368 ISAM G-240G-C Optical Network Terminals (ONT) which provide gigabit connections to every desk for voice and data services. A further 20 Nokia 7368 ISAM G-040P-Q ONTs with Power over Ethernet (PoE) connect the multiple Aerohive wireless access points (another first for New Zealand) around the building.

After evaluation and consultation between Environment Canterbury, 2degrees and Nokia, the Passive Optical LAN design was tailored to Environment Canterbury’s bandwidth, wireless, and VoIP requirements. 2degrees supplied and installed the equipment and also provides a managed LAN service to Environment Canterbury. Brock-Smith: “2degrees has a 24/7 managed services team staffed with skilled level 2 engineers. This team is the first line support for Environment Canterbury’s network allowing first call resolution for faults and move/add/change requests.”

Despite being a new technology, there were no major issues for either Environment Canterbury or 2degrees during deployment and commissioning of the POL. However, one particular incident highlighted another operational benefit of a fiber LAN.

Warne: “During some other work for setting up the offices, one of the network fibers was broken. It’s very simple to find breaks in a fiber just by plugging in a laser and seeing where the light comes out, and replacing the cable was also very easy. There was a bit of a learning curve to understand the different way of patching in a passive optical LAN, but after that it was so much quicker than a traditional LAN for patching in new equipment.”
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The benefits

Environment Canterbury has converged many different services onto one POL. IP telephony, internet and data services including 100% Wi-Fi coverage, a building management system, closed circuit television and door security, digital signage, and Internet of Things services such as smart lighting and heating management all run on a single, centralized network. Convergence makes network management simpler and saves costs associated with running parallel networks.

In terms of services for employees, there has been a significant improvement. “When we designed the network, we wanted to ensure we exceeded the 80Mb/s bandwidth that employees were used to with a traditional Ethernet LAN,” explains Warne. “Currently, every employee gets a 1 Gb/s connection to the desktop. Even my Wi-Fi connection is 130 Mb/s. So we’re well in excess of what we hoped.”

Not that anyone noticed.

The plug-and-play simplicity of POL meant it was a completely seamless transition for most employees, which was a good thing. The only employees that did notice a change (for the better) from a traditional LAN were superusers. Environment Canterbury uses a geographic information system (GIS) for mapping the region. This is one of the most high-bandwidth applications any organization can use as it deals with a lot of aerial and satellite imagery.

“Initially, we intended to throttle the bandwidth available to some employees to ensure there was enough capacity for our GIS users. But we haven’t needed to do that. So far we haven’t even touched 10% of the capacity of the network, so every employee currently has the same level of service. That makes things simpler to manage,” Warne reveals.

Another benefit of the POL is its low power consumption.

Warne: “Our central network server runs at 5 amps, 55 volts – about the same as a desktop computer. That’s already tiny, and in addition it doesn’t require any cooling. We have just the one central switch whereas with a copper Ethernet LAN we’d need twelve distribution points to cover our new building. Hand on heart, I can say we’re saving a considerable amount of energy.”

Fiber future

As reconstruction continues in Canterbury, there are many new-build projects on the go. Since moving into their building Warne has given several tours, showing off the benefits of the Nokia Passive Optical LAN to both government organizations and private companies.

“We’re really pleased with how it’s turned out and proud to be the first organization in New Zealand to adopt this cutting-edge technology.”

Click here for more information on our Passive Optical LAN solution
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