# It's not the end but the beginning

BY PAUL BRISLEN

**Did the science group really have it easy? After all, there's already a plan for an advanced network. Not at all, discovered Paul Brislen. Not everyone is a convert – and life doesn't stop here.**

I was looking for a cushy number, something that would let me get out and about and enjoy my 'paid vacation' in sunny Hastings. Accompanying a group that had already got government funding, had hired a project director and released a 'request for information' seemed the ideal solution. They could chat among themselves and I could bar-hop, stopping occasionally to enjoy the view.

However, the 48 hours I spent with the Science and Advanced User Network group was not to be so much the gentle amble I had hoped for – more a mad dash to keep up. These guys move at light speed, literally, and the only way I was going to understand why it was all so important was to learn to speak their language. Forget kilobits per second; forget gigabytes of data. They terrorised me with terabytes, discussed the best way to pronounce petabytes and mused on the need for real broadband – speeds so fast we had to invent some new numbers just to explain them to everyone else. The group had a plan, and if I wanted to hear about the future I had to play ball.

For starters, there were the names. These guys had invented the Internet, as far as New Zealand was concerned. There were people there who had already fought this battle once, when they saw the need to connect to the Internet in the early 1990s, and were willing to dust off their armour, polish up their swords and ride out one last time. That's not to say this was some pre-ordained, head-nodding, consensus cluster. Far from it. We had representatives from equipment vendors, network providers and telcos and not everyone agreed on the need for an advanced network, nor how best to bring it about if we did decide we needed one.

But what is an advanced network? Put basically, it's a way of connecting New Zealand's universities, tertiary institutes, crown research institutes (CRIs) and any other government facility that wants to conduct research on an international scale.

## TREMENDOUS TRADE IN RAW DATA

Today's scientists need to be able to send and receive huge amounts of information and currently New Zealand scientists are being left out of a tremendous trade in raw data. They're unable to access the data not because we don't have international capacity or because they're in a remote part of the country but because of one simple factor: cost. The model employed by the telcos, both locally and around the world, is based on a 'clip the ticket' model that means customers are charged for every byte of traffic sent or received. That might work well if you're sending email or downloading movie trailers but when you're sending the latest updated version of the human genome, data recorded from some of the world's largest telescopes, magnetic resonance images taken at a medical facility half a world away or the output from a high-energy physics lab in Switzerland, you'll soon find yourself faced with a bill that would shut down all but the most well funded of science projects.

## THEY TERRORISED ME WITH TERABYTES, DISCUSSED THE BEST WAY TO PRONOUNCE PETABYTES AND MUSED ON THE NEED FOR REAL BROADBAND.

We were lucky enough in the group to have a day's input from Bill St Arnaud. He runs the Canadian advanced network, Canarie, and brought with him a wealth of experience with implementing a very fast network capable of sending and receiving such large amounts of data. How much data are we talking about? Terabytes of the stuff? Petabytes? An exabyte a year, or so I'm told.

Well that's lovely, but just how much is a terabyte? Put simply, it's 1,000 GB. Most movies would weigh in at around 4 or 5 GB in size – so, if the contents of your average video store were digitised, it would equate to around 8 TB.

Sending a TB of data across North America or over to Europe on the advanced networks already in place in those countries takes about 20 minutes. That's pretty fast but doesn't seem unreasonable in this day and age, certainly not when you're working on the sort of raw data that scientists and researchers need. Sadly, sending it across New Zealand would take approximately 500 years.

### EXPECTED TO BEGIN IN 2005

Fortunately the New Zealand Government has realised this is not acceptable for our science community and has agreed to put funds into the pot to build an advanced network in New Zealand. An RFI has been released, a request for tender will be sent out early next year with work on the network expected to begin during 2005.

The network itself will consist of 15 points of presence, known in networking terms as POPs. These POPs will be located around the country and are likely to be connected together using fibre-optic cable.

Fibre isn't scarce – there's lots of it in New Zealand. Most of it is owned by the telcos and they remain somewhat sceptical that an advanced science network is needed or that it will be up-and-running any time soon. Bill St Arnaud has encountered this problem in Canada and seen its impact in other countries as well. He said incumbent telcos tend to feel threatened by an advanced network because it offers so much more at such a cheap rate. This is all made possible by the use of what's called 'dark fibre' which is, as the name suggests, just the bare fibre-optic cable in the ground, unpowered and uncontrolled by the telcos. The advanced network users would take control of the fibre, 'lighting' it as they see fit and not charging on a per-MB basis but on a more simple 'per wavelength' model.

The carrying capacity of fibre is incredible, so much so that in Canada researchers are given a wavelength of their own to do with as they will. They can send and receive data from other facilities, exchange information with companies engaged in R&D work and even connect with the Internet as we know it today. They're not charged by the megabyte so they are able to work without fear of being sent a bill that would swallow their research grant whole.

Naturally, incumbent telcos see dark fibre as a threat to their very business model, which currently involves charging customers to make voice calls, to connect to the Internet and to send and receive data.

However, St Arnaud said in Canada and the US once these networks were built the impact on the telcos was largely negligible. Businesses tend to stick with the telcos because they're comfortable with the model and simply don't need the kinds of bandwidth the advanced networks can offer.

Clearly a lot of work needs to be done to communicate the needs of the research institutes with the incumbent telcos to bring them on board.

### OPEN TO ALL-COMERS?

One of the issues hotly debated in the group was whether or not the network should be open to all-comers or closed, as a way of assuring the telcos the network would not try to steal their customers. Currently the plan is to offer access to the network based on defined user groups. Firstly the shareholders, those who are paying for the network, would have access, naturally enough. Any publicly-funded research agency would also have access, and that would extend to libraries and hospitals. Any partners conducting research in conjunction with the shareholders would also have access but only while engaged in research.

In conjunction with the Government's innovation framework, the 'innovation sector' would also be able to make use of the network. Quite how that would be defined is up in the air but presumably it would include the film industry to some degree as well as some cultural and heritage ventures.

However the Advanced Network itself doesn't necessarily run directly to each agency that wants to connect to it. They have to make that 'last mile' connection themselves, and that could well be used as a springboard to deliver broadband services to residential and business users beyond the network.

Bill St Arnaud talked about condominium fibre, but another term for it is a MUSH (Municipal, University, School, Hospital) network. In effect, the Canarie team approached companies that were used to digging trenches to discuss building a fibre-optic network. They approached water companies, sewerage companies and so on. These firms were contracted to lay fibre networks connecting a school, typically used as an anchor tenant to get the project under way, with the Advanced Network or a local ISP or peering exchange.

St Arnaud discussed the costs involved for a school in Canada. Over three years one school district expected to spend C$1.44 million on DSL services. To lay dark fibre connecting 100 schools would cost C$1.35 million. To the school board this was a simple matter of cost saving.

After the initial pay-back period, which in this case was 8 to 16 months, the schools would then have unlimited bandwidth on their own network.

But what's in it for the companies laying the fibre? They were allowed to resell 'spare' fibre to anyone they saw fit. The model is similar to the New Zealand Government's Project Probe. However, instead of delivering 512 Kbps to each school, the Canadian project delivers unlimited bandwidth for the next 20-odd years.

What next? The group agreed to continue to lobby the various government agencies regardless of the progress of the Advanced Network. Why? Because any network progress shouldn't be seen as an end point but as a starting point. Rather than building our entry-level network and calling it a day, the group agreed we should press ahead for more funding for faster connection speeds, for more POPs, for the chance to build MUSH networks. Our schools, our hospitals and ultimately anyone who wanted to, could be included in the network build and we should be prepared for that day.

**TOMMOROW'S EXPECTATIONS**

Government plays a vital role in outlining how the network would be built and operated. There is a clear determination to ensure the network is future-proofed – we must build a network based not on today's expectations but on tomorrow's. If we need 1 Gbps today, we'll need 10 times that next year.

It became quite clear that dark fibre was the only real way of doing this – however, it is also important to realise the telcos do have a huge role to play in any advanced network, if they want to be involved.

Local councils have a huge role to play in either helping or hindering the development of an advanced network and in particular the MUSH networks that may also develop. Even the simplest of actions, like requiring all new subdivisions to be built with conduits for fibre as a standard, would go a long way to future-proofing New Zealand.

WHILE WE TALK ABOUT KILOBITS PER SECOND OF BROADBAND CONNECTIVITY, THE REST OF THE WORLD IS TALKING ABOUT GIGABITS.

The commercial benefits are also plain to see. New Zealand is the gateway to the Antarctic and we heard how projects are already passing New Zealand by through lack of connectivity. Our reliance on the primary produce sector means we have to be at the forefront of biotechnology research.

The farming sector, in the form of companies like Fonterra, Livestock Improvement and Genesis Research, will need access to the data in a timely manner if they're to deliver. Ultimately I think we've come to a major crossroads in this country's development. At the moment our tax base is just too small for New Zealand to fulfil its true potential. We have tremendous natural assets, and our primary sector and tourism sector both take advantage of that; but ultimately if we want to become anything more than a large holiday resort with nice restaurants and a cheap, willing labour force trained to take rich visitors to see exotic locations, we need to do more.

We need the Advanced Network so our tertiary institutes aren't left behind.

We need it so our industries can maintain their competitive advantage when we are so easily challenged by others. We need it so we retain those people with the skills we need to navigate our way forward. We need it for so many reasons it's hard to get them all down; but the most pressing point is we need it so it won't take 500 years to send a terabyte of data across the country when it takes less than half an hour to send it across the world. While we talk about kilobits per second of broadband connectivity, the rest of the world is talking about gigabits. We run the risk of being left too far behind to ever catch up.

**KEY ACTION POINTS:**

**1. Continue to lobby the various government agencies regardless of the progress of the Advanced Network:** This shouldn't be seen as an end point but as a starting point and we should press ahead for more funding, faster connection speeds, and more POPs.

**2. Local councils needed to hear from us:** They have a huge role to play in either helping or hindering the development of an advanced network and in particular the MUSH networks that may also develop.

**3. Communicate the needs of the research institutes to the incumbent telcos:** They have a huge role to play in any advanced network, if they want to be involved. A lot of work still needs to be done to bring them on board.

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