

Building a Champagne Network on a Beer Budget

Oregon State University built its own regional dark fiber to meet bandwidth demands—a creative approach helped by collaboration

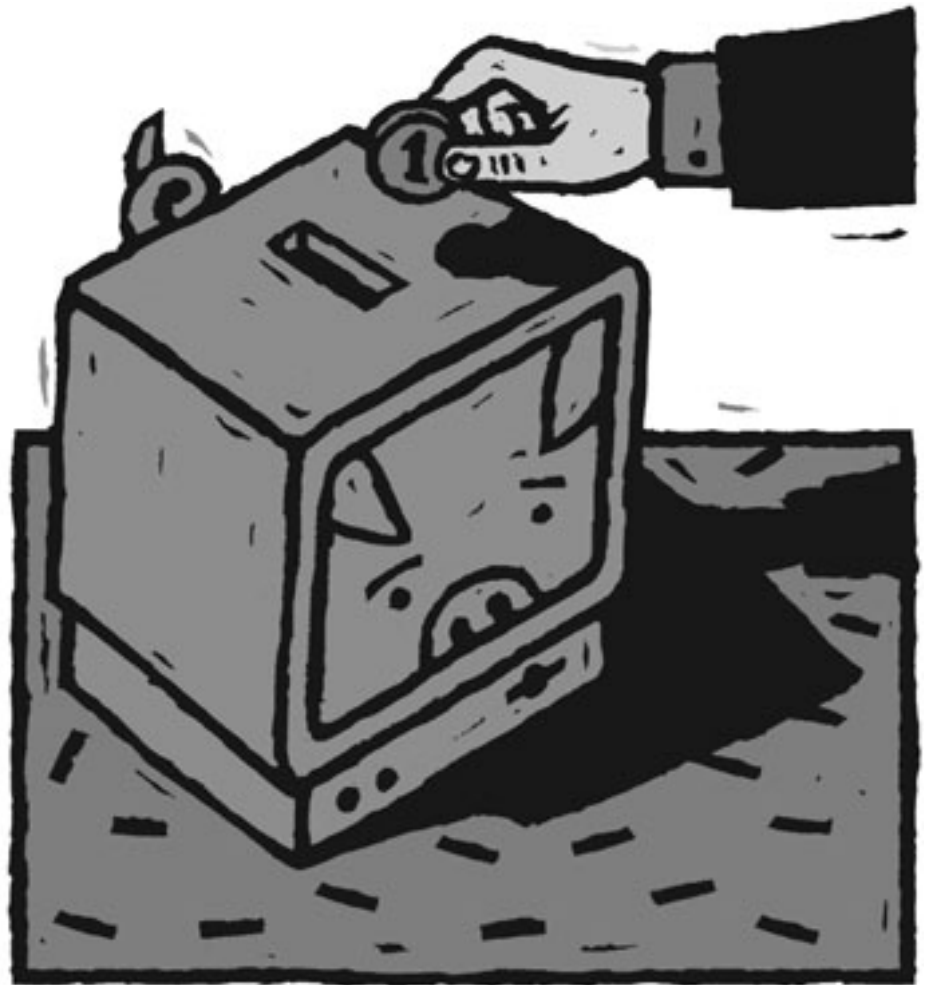
By **Jon Dolan** and **Curt Pederson**

Oregon State University's demand for bandwidth to support scientific collaboration and research continues to grow exponentially, while state funding declines due to hard economic times. Our challenge is to find creative yet fiscally responsible ways to meet OSU's bandwidth demands. Looking at our options for high-capacity bandwidth to the commodity Internet and Internet2, we hit upon just such a creative solution—we partnered with a data service provider to build our own regional dark fiber network.

A Little Background

First, we should provide a little background on how OSU is connected to the Internet and Internet2 today and what the traditional options for connectivity looked like when we began. OSU, located in Corvallis, Oregon, is a member of the Network for Education and Research in Oregon (NERO) consortium, which connects all higher education institutions in the state to each other, to the commodity Internet, and to Internet2 (see Figure 1). Out-of-state connections are made either at the Oregon Internet Exchange in Eugene (run by our colleagues at the University of Oregon) or at the Pittock Internet Exchange in Portland. Of the two Internet exchanges, the Pittock has more options because virtually all major fiber-optic cable in the state connects there. Also, the Pittock is a physical fiber hub for national and international fiber runs.

When we began our inquiries into



higher bandwidth connections, we contacted the traditional telecommunications carriers to price a circuit to the Pittock from OSU. For a circuit that would give us speeds in excess of a gigabit per second (an OC48), we were quoted as much as \$564,000 a month! That would cost OSU more than \$6 million annually, meaning that our overall central IT budget would need to increase

by 50 percent. Obviously, this approach was not feasible given our tight funding.

We decided to explore other approaches, thinking we might leverage our existing partnerships or create new ones to address our problem in a more creative way. We learned that NERO had acquired access to dark fiber installed by Level 3 Communications from Eugene to Portland, landing in the

Figure 1

Existing Regional Fiber

Portland
Salem
Corvallis
Eugene
Roseburg

OREGON	Portland, Corvallis, Eugene, Salem, Roseburg, Medford, Astoria
Level 5	Portland, Salem, Eugene, Medford
100 Networks	Portland, Salem, Eugene, Medford, Astoria, Roseburg
TDS	Portland, Salem, Eugene, Medford, Astoria, Roseburg
Sprint	Portland, Salem, Eugene, Medford, Astoria, Roseburg
AT&T	Portland, Salem, Eugene, Medford, Astoria, Roseburg
BROADBAND	Portland, Salem, Eugene, Medford, Astoria, Roseburg

Based on the Oregonian, "High Tech Connectivity: Access through Oregon," December 14, 1994, p. 10.

Old Friends, New Partnerships

Doty thought Pederson might be interested in having OSU partner with NoaNet somehow. NoaNet is a 503.c.12 nonprofit cooperative that builds and operates “public purpose” data networks. It uses Bonneville Power Administration (BPA) long-haul fiber in the Northwest to bring metropolitan data carrier services to rural Oregon and Washington. As a nonprofit cooperative, its culture and values were very much in line with those of OSU. A partnership seemed

The nearest BPA fiber point-of-presence (POP) was also 20 miles to the east, in the same Interstate 5 corridor where the NERO consortium had fiber. NoaNet was looking for a way to build fiber to Corvallis and service the local area.

The basics of the deal follow:

- The lease fee is 10 percent of revenue generated by NoaNet Oregon from its use of the plant.

As it turned out, finding the money for the project was the easiest part. We commissioned an engineering firm specializing in telecommunications infrastructure to do a feasibility study. They estimated that the entire build-out cost for the most direct route would be \$315,000. Compared to paying commercial carrier fees, this is a bargain basement price. We budgeted \$500,000 out of general funds for the one-time build-out, with the goal of realizing \$60,000 a year in revenue from our 10 percent share. Even if we made nothing, not having to pay the traditional telecommunications carrier fees more than justified the initial investment. With our senior university administration enthusiastically behind us, we were ready to move forward.

We were surprised by where our toughest hurdles came from. The organizations we thought would be the easiest to work with turned out to present the most challenges for us. In retrospect, we were guilty of assuming support from our local city officials, thinking they would see this as a great opportunity for not only the university but the community at large. As it turned out, it took quite a bit of work with the City of Corvallis to find an arrangement that works for both of us. The city had concerns regarding right-of-way access, primar-

ily because Corvallis relies on permits and franchise fees to cover approximately 26 percent of its general fund. We were able, finally, to settle on a standard franchise agreement with the city that entitled Corvallis to 7 percent of our earnings.

Following this experience, we can recommend key points to getting everyone on board:

- Understand the financial stake of each player.
- Start discussions early because they will take time.
- Pay close attention to right-of-way issues with cities and utilities.

The Result

The end result of building our fiber link is that OSU has dramatically and immediately increased our off-campus bandwidth. In addition, we have future options that simply would not have been available had we gone with the standard commercial telecommunications providers. We strengthened our existing partnerships by connecting to the fiber operated by our regional networking consortium and formed a new partnership allowing us to connect to others throughout the Northwest (see Figure 2).

We can summarize our progress and benefits as follows:

- OSU connects to both NoaNet Oregon- and NERO-run fiber.
- OSU and NERO are able to immediately build an OC48 ring among all major research universities in the state, with the ability to increase it as needed.
- NoaNet provides OSU with new networking options, such as being able to connect directly to the Pacific Northwest National Labs in southwest Washington.
- OSU has other opportunities to increase connection speeds through NoaNet to satellite facilities statewide, such as our extension offices, our agricultural experiment stations, our new campus in Bend, Oregon, and our Hatfield Marine Science Center in Newport, Oregon.

As we look to future Internet2 directions, we also feel that we are very strongly placed for whatever might happen on a national scale.

In addition to benefiting OSU, our project has served as a model of cooperation for the local K-12 schools, city governments, and county governments. Those entities have each installed their own sections of fiber in the local area.

After talking with us and each other, they have agreed to work on how they might use their fiber to build a common network. Such a public-purpose network would allow them to provide higher data rates and much better data services to firehouses, libraries, and schools in our local communities without a huge taxpayer investment.

We can summarize the key factors for success of our project as follows:

- **Trust.** NoaNet and OSU built the relationship and wrote the contract on the premise that we were true partners and would succeed, or fail, together.
- **Cultural values.** As a nonprofit cooperative, NoaNet shared the university's community service values.
- **Relationships, relationships, relationships.** This fiber build-out project all started with a handshake and a conversation about how to help each other.

In closing, we cannot stress enough the value of relationships and building them early. Where we had good existing relationships, things went very well; where new ones were needed, we had obstacles to overcome. In hindsight, this process would have been much easier if we already had been working with the City of Corvallis and other local governments on networking issues and had clearly understood their needs in the beginning. Start those relationships now! ☺

Endnote

1. From the OSU-NoaNet Fiber Agreement: "Indefeasible Right of Use" or 'IRU' means an exclusive, unrestricted right to use the relevant capacity of the Cable Plant (including equipment, fibers, or capacity) for any legal purpose under the long-term lease of a portion of the capacity of a fiber optic cable. The grant of an IRU does not convey title or legal ownership of any fibers or equipment, or the property on which they are located."

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Figure 2

