

I**PROVO** UTAH:

100 Mbps For All

Five years in the making, iProvo has started service; we detail the financing and technical choices

By Lawrence Kingsley ■ *Editor, Telepublishing Report*

Five years after it was first announced, Provo's municipal network has started service. The Utah university town was aiming for the conventional triple play and applications like the monitoring of one's home through Webcams. But envisioned services now include connection of people with each other through the school system—for example, parents meeting a teacher online, making a virtual visit to the classroom, attending a school play from the living room, or viewing a 6th-grade Maypole event (already available as video on demand). Provo-based Brigham Young University plans to use iProvo to offer classes on demand.

Much has been misreported about the project. To clear up the misconceptions first:

1. Novell was not the source of iProvo. Until August 2004, network pioneer Novell's headquarters was in Provo, where Novell still maintains major research facilities. When Provo decided to start iProvo, Novell's "home turf" was a logical place to build a citywide network. Novell was certainly consulted about iProvo, but was not the initiator. Leadership, instead, has come from Provo City Power, the local utility company wholly owned by the city. Kevin Garlick, director of Provo City Power and generally considered the driving force behind iProvo, calls iProvo "another utility."

2. Automated meter reading was not the immediate purpose of iProvo. Jeff Wilson, Provo City Power's network engineer, says "The incentive was economic



Provo City Power leases its headend, shown here, to the neighboring Utopia project. Utopia is also using Provo's satellite dishes. Provo is funding its project with a \$39.5 million municipal bond.

development and what it will bring to the community, not automated meter reading" (that is, labor savings in determining the electrical consumption for each account). In fact, Wilson says technology is lagging in terms of the interface at the customer's premises, so that automated meter reading will have to come in future years, despite the cost savings for a utility company and despite the fact that this function is often cited as a reason for a utility to go broadband.

3. Utopia and iProvo are not the same. In November Broadband Properties covered the promising Utopia proj-

ect, a coalition of 14 Utah cities sharing the cost and infrastructure of one of the largest fiber deployments in the United States. Utopia will bring fiber to a potential 166,000 residential and business addresses in a population, at last count, of nearly half a million in the 14 cities. The two most distant cities in the Utopia coalition, Tremonton and Cedar City, are 325 miles apart. Provo lies between the Utopia cities of Orem and Payson, and the rich history of technological innovation in Provo would seem to make it an ideal candidate for Utopia. But Provo City Power began

iProvo before Utopia was under way. Garlick says “we did not want to delay our project for theirs.” Three years ago Provo City Power completed backbone development for iProvo, while operational issues and the political structure of Utopia were still under discussion.

In the words of Mary DeLaMare-Schaefer, Director of Marketing and Customer Relations at Provo City Power, “we have a tradition of taking care of our own infrastructure.” In 1940 Provo passed a referendum to build its own power system. In the same vein, DeLaMare-Schaefer says the consensus emerged that “if we wanted to bring fiber technology to our residents, businesses,

and city services, we would have to build it ourselves.” Provo officials talked to various companies about building iProvo, but in the end Provo Power decided that it should take the initiative itself.

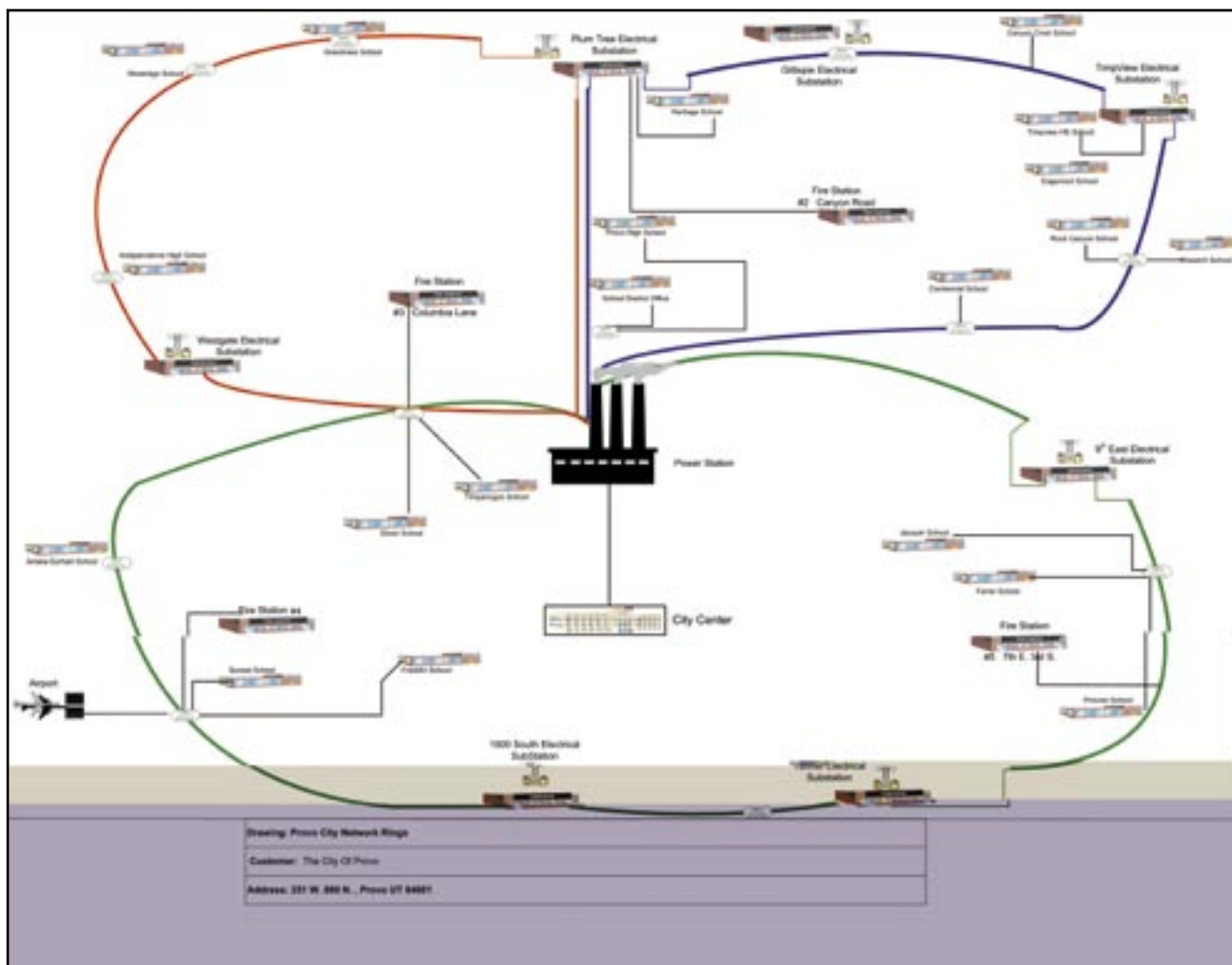
According to Garlick, Provo has left the door open for exploration of the common interests of Provo and Utopia but “union” is not the word he uses. On the other hand, as *Broadband Properties* pointed out last month, Utopia is using Provo’s headend, so that iProvo and Utopia are already connected in this sense.

Three Phases

DeLaMare-Schaefer says iProvo began simply as a way of managing elec-

trical substations. The speed of fiber was advantageous in dealing with electrical outages. Provo City Power then began conversations about the role that fiber should play in monitoring traffic flow and controlling traffic signals, allowing changes of traffic patterns when there are accidents. Another interest was the swift transfer of data between city buildings. After several years of study, fiber to the home was begun as a trial—the city wanted proof of concept, while studying city needs and arranging for funding.

There thus were three phases of iProvo. The first phase in 1999 consisted of three interconnected fiber rings to the electrical substations and schools, which



The World Wide Packets network used by Provo is a ring-based typology, shown schematically here with each backbone ring colored differently. The central office is in a building owned by Provo City Power, represented by the three smokestacks. Access distributors in the central office send voice, video, and data to schools and city buildings. Home and business subscribers use the same network.



Provo uses a combination of underground and aerial wiring. The customer premises equipment, concentrators, and access distributors are from World Wide Packets. Atlantic Engineering is the contractor.

used the fiber for Internet access. The second phase was a pilot begun in September 2002, with deployment of fiber to approximately 400 homes in a single neighborhood.

Customers were offered three months of free service. The third phase, started in July 2004, brought an infusion of \$39.5 million from municipal bonds and a commitment to conclude the construction within 24 months. Atlantic Engineering, home of Leonard Ray, the new president of the Fiber-To-The-Home

Council, was awarded the contract.

For the full rollout, Provo has divided the city into eight areas, intending to light them up as soon as construction in each area permits. In December 2004 HomeNet signed up its 60th customer in the post-trial phase. Eventually, iProvo is expected to have the configuration shown in the illustration, with 100 Mbps allocated to each home. Multiple dwelling units will have enough bandwidth to give each resident 100 Mbps, and businesses can arrange to have multiple

accounts. Jeff Wilson says the city can easily allocate entire trunks to a large customer, such as Brigham Young University. BYU has over 30,000 students and faculty in Provo and is already using fiber for distance learning.

The Open Access Concept

Like Utopia, iProvo aims to be the infrastructure for content providers. Under Utah law, the network owner cannot itself provide content. So far, the only content provider that Provo has announced is HomeNet, an Internet provider (www.gohomenet.net). HomeNet's Chief Operating Officer and VP of Sales, Robert Murtagh, says "cities are going down one of two paths." Either they become a "retail mall" themselves, or they merely build the plant and let third parties like HomeNet become retailers at the "mall." Subscribers thus pay HomeNet, which pays Provo, which, in turn, pays for construction of the project.

The Utah legislature mandated this separation between network ownership and operation of the network after Provo Power bought Provo Cable in December 2000. Insisting that the competition from "City Hall" was unfair, AT&T Broadband (now Comcast) plumped for this measure of protectionism. This legislation, formerly House Bill 149, has become the Municipal Cable Television and Public Telecommunications Services Act, Utah Code 10-18-101.

Any notion that the legislature had to rein in "The People's Republic of Provo" would seem to be unfair, however. City Attorney Robert West says Provo Cable was started as a "Mom and Pop operation" that was trying to overbuild TCI before TCI was acquired by AT&T Broadband. As part of its franchise with the city, Provo Cable had to serve the entire city, not just cherry-pick profitable neighborhoods. However, the Mom and Pop operation was unable to adhere to the timetable specified in the franchise agreement and had begun incurring financial penalties stipulated by the agreement. When the penalties reached about \$400,000, the company was on the verge of going under. The acquisition, there-

fore, was a means of recovering funds owed to the city, while assuring survival of a low-cost cable provider.

Provo was hardly the first municipality that had threatened an incumbent telco, since nearby Spanish Fork had already sold bonds and began construction for its own cable company. AT&T Broadband may have felt that a stand had to be taken before other cities followed suit. HomeNet is now taking over Provo Cable, and the city is replacing Provo Cable's coaxial cable with fiber. DeLaMare-Schaefer expects Provo Cable to be out of business in two years.

Provo expects iProvo to be self-funding, and Garlick anticipates a conservative 12-year payback on the \$39.5 bond issue.

HomeNet is selling three triple-play packages as well as individually priced services such as 5 Mbps Internet access for \$49.99. Each triple-play service includes unlimited calling to the domestic U.S. and Canada, as well as call waiting, caller ID, and voice mail. Additional telephone options are under discussion, but not yet implemented (see sidebar). The basic triple play package costs \$89.99 for 75 TV channels and 500 Kbps Internet access. For \$114.99 the customer receives 140 TV channels and 5 Mbps Internet service. The Premium service, costing \$124.99, provides the same 140 channels, but also 10 Mbps.

Customers can shut off the TV and hang up the phone, gaining up to 100 Mbps for a data connection. Murtagh says: "All three applications intelligently share the full 100 Mbps pipe. We can allow businesses to bond pipes or even provide them a native 1 GB connection which we can scale down as a virtual connection of 100 Mbps/200 Mbps/ or any gradient of 1 GB we choose to market successfully to the subscribers. Down the road we envision customers 'self provisioning' their connections dynamically."

HomeNet had the good fortune of working in Grant County, WA with World Wide Packets, which is providing the network used by iProvo. Moses Lake, WA built one of the first municipi-

pal projects for cable when HomeNet was known under its previous name, VIB.

World Wide Packets

Launched in January 2000, World Wide Packets (Spokane Valley, WA) is established in over 60 networks world-

wide, embracing local government, utility, multiple service operator (MSO), competitive local exchange carrier (CLEC), incumbent local exchange carrier (ILEC), and greenfield developer markets. Barry Kantner, VP of Marketing at World Wide Packets, considers the attraction of WWP the built-in net-



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work management, ability to scale from 100 Mbps to multi-Gigabit solutions, and incorporation of standard Ethernet protocols. A user who has installed a 100 Mbps or Gigabit LAN, for example, could plug an inexpensive standard Ethernet hub directly into WWP customer premises equipment.

WWP uses an active, instead of passive, technology. In a passive optical network (such as in Manassas, described in this issue) one transmitter connects up to 32 terminals through a passive splitter. In WWP's active optical network, one transmitter goes directly to 41 receivers without a splitter. Off-the-shelf components in an active network can balance the cost between long- and short-haul equipment, but a passive network requires uniform equipment, since it is powered only at the transmitter, typically located in a central office. An active network is a point-to-point network in which the strands go directly from the transmitter to each subscriber. On the other hand, tweaking an active network that already exists is not a simple feat.

WWP supplies a system solution in its Lightning Edge product family—all the equipment from the central office to the customer premises (see illustration). Inside the home is a Lightning Edge Portal (LE-46), which is also available in a case (LE-46H) mounted outside the home or in a basement. An MDU would have the LightningEdge 311, which is capable of connecting multiple LE-46 units. Provo schools use a gigabit version of this access portal, called the LE-22. In a neighborhood, located in a hardened cabinet, is the LightningEdge concentrator, such as the LE-307 or LE-327, each of which can connect twenty-four 10/100 Mbps copper connections or four 1,000 Mbps optical connections. Each concentrator is rack-mountable, so there would be multiple units commensurate with the size of the neighborhood.

Between the concentrators and the headend are LightningEdge access distributors. Each rack-mountable LE-407, LE-410, or LE-427 can switch sixteen 1 GB optical interfaces. The network administrator manages the network

through the LightningEdge Network Supervisor software, running on a workstation or PC typically in the network operations center. This software keeps an inventory of all network devices and resources (noting, for instance, the queue capability of each device) and provides such features as automatic device provisioning, configuration of the network, and alarms.

The WWP equipment supports MPLS, but, so far, iProvo has no need for it. MPLS is a core solution, but as a virtual private network, iProvo is able

to keep voice, data, and video separate through Layer 2 switching.

On Course

Although iProvo, like Utopia, is still being built, one detects in it a level of self-reliance, professionalism, and excitement that can only be inspirational for other network builders. ♦

About The Author

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Possible Future Telephone Options from Homenet

Each triple-play package currently includes call waiting, caller ID, and voice mail. Under discussion are the following additional options, yet to be priced or implemented:

Three-way calling: Up to three connections on a conference call.

Music on hold: Music for a caller placed on hold.

Continuous redialing: On busy number.

Unified messaging: Voice messages from telephone, email, or web browser.

Speed dialing: Abbreviated keypad codes.

Selective call forwarding: Forwarding of calls to voice mail or another telephone number based on time of day or caller information.

Call rejection: Rejection or forwarding of selected calls to voice mail, based on "black-lists," "whitelists," or time of day.

Call trace: Logging of selected call activity to prevent harassing telephone calls.

Call return: Redialing of the last call attempted.

Do not disturb: Call blocking during selected hours except for emergency calls.

Call id block: Caller id masked on outbound calls.

Call restriction: Blocking of calls to selected phone numbers or calling destinations.

International call block: (same as above).

Account management: Payment and self-provisioning of services from a web portal; listing of phone number, date and time, calls attempted, completed, received, and missed.

Integration: Pop-up caller id on TV, listening to voice mail from TV, creation of a security and privacy policy covering telephone, Internet and TV.