The Golden Egg?

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By Shane Peterson

Though broadband normally gets cast as a tool of consumerism, some observers see broadband as a productivity elixir. Perhaps nowhere is this elixir more needed than in rural local governments' efforts to revitalize their economies, often devastated by layoffs as companies close up shop.

But even as officials investigate their options, they confront an unpleasant economic reality: Getting broadband services from incumbent telecommunications companies is proving difficult because those companies, after examining potential business for their services, don't see a sufficient return on their investment.

As a result, the answer is usually "no" when rural leaders call on incumbent telecommunications providers to build out broadband infrastructure to their cities and towns. Nowadays, rural governments ask a different set of companies, such as EarthLink, Tropos Networks, Azulstar Networks or even Google, to bring wireless broadband to their cities and towns.

These companies gladly say, "Yes."

To these local governments, broadband is the new foundation on which to build, and economic development efforts across the country have come to rely on communitywide broadband networks.

In some cases, such networks are wired. The Click! Network in Tacoma, Wash., runs on Tacoma Power's SONET-based carrier-grade network with a redundant, fiber architecture that extends throughout Tacoma, providing businesses with local point-to-point services.

The Utah Telecommunication Open Infrastructure Agency (UTOPIA) is a consortium of 14 Utah cities that deployed and now operate a fiber-optic network that serves approximately 140,000 businesses and households.

In other cases, cities such as Rio Rancho, N.M., and Cerritos, Calif., built wireless networks through partnerships with the private sector, partnerships made possible because of inexpensive and easy-to-deploy wireless infrastructure.

The problem many communities encounter when jump-starting economic development is how limited existing broadband infrastructure can be. When a community looks to lure telecommuters and teleworkers, they must make sure these 21st-century workers can rely on a network that supplies sufficient bandwidth -- upstream and downstream -- to support true telework applications.

In the United States, the FCC defines broadband as telecommunications services of 256 Kbps or higher. This isn't good enough, according to some sources, who argue that true telework requires at least 350 Kbps, upstream and downstream.

The Chicken or the Egg

Because of widespread layoffs in rural areas, people leave in droves to search for economic opportunities elsewhere.

"There are just no jobs where they are," said Chuck Wilsker, president and CEO of the Telework Coalition, a nonprofit entity that promotes telework and telecommuting, and addresses policy issues, such as broadband Internet access, that impact telework and telecommuting. "It's about bringing jobs to people, instead of bringing people to jobs."

AAA and Office Depot have outsourced call center duties to virtual call centers staffed by people across the nation, Wilsker said, and JetBlue Airways employs 800 to 900 ticket agents, all of whom work from home.

Wireless broadband networks can be lifelines for rural communities, he said, because companies will relocate facilities such as call centers to rural areas if those areas have broadband Internet access. In some ways, the situation mirrors the age-old argument: What came first, the chicken or the egg?

"They [incumbent telecommunications providers] say, 'If you can show us there will be enough business for us, then maybe we'll put broadband services in,'" Wilsker said of the dilemma facing local governments. "Then you have the businesses saying, 'If you had broadband, maybe we'll come.' So what's going to happen here?"

Alternatively, incumbents seem well aware of the problems facing rural communities that want to invigorate economic development and need broadband to do so.

"We've been trying to push out DSL as far we can, economically," said Link Hoewing, vice president of Internet and technology policy at Verizon. "Obviously it is distance-limited."

Hoewing said the problem, at least for Verizon, is that putting in the hardware required to support DSL in a sparsely populated area gets expensive. The company calls this hardware an "electronics box," and it contains a digital subscriber line access multiplexer (DSLAM), which takes connections from many customers and aggregates them onto a single, high-capacity connection to the Internet, and related circuitry that needs to be wired for power.

"The economics of it do get more challenging in rural areas, no question about it," he said. "Instead, we've been trying fixed wireless technology."

Verizon worked with government officials of Grundy, Va., a town of approximately 1,100, and a local Internet service provider to put together a broadband network based on WiMAX, he said, and the company is doing the same thing in Emmaus, Pa.

"WiMAX is particularly attractive," Hoewing said. "We think we can lower the capital cost a lot in rural areas because you don't have to do a truck roll for most of the houses you would serve. With Wi-Fi, you have to put a transponder in the house, and that means you have to go out and do an install of some type."

With WiMAX, he noted, customers' PCs more than likely already have a network interface card capable of receiving the signal, especially since Intel, for example, is building WiMAX capabilities into some of its PC chipsets.

Loudoun County, Va., is tapping its own employees to test telecommuting and telework. Last summer, the county launched a pilot in partnership with the Telework Consortium for testing software designed to create a virtual office through video conferencing and document sharing capabilities via an online whiteboard,

said William Mularie, CEO of Telework Consortium Inc., a nonprofit research organization focused on telework.

"We considered Loudoun County government as a whole, and started talking to the county's IT director," Mularie said. "We decided on a small pilot with county government. We showed him what we could do over the public Internet, in terms of the quality of video conferencing, the quality of voice over Internet protocol and the whiteboarding."

The Telework Consortium started with the Loudoun County Department of Management and Financial Services Budget Office, because its employees are dispersed across the county in branch offices. The pilot worked well, Mularie said, but primarily because the branch offices used the county's internal network -- if it's a matter of getting sufficient bandwidth to employees' houses, things get more complicated.

"We had to upgrade a DSL link in the northern neck of Virginia here for the budget director to interact from home rather than having to drive in 100 miles," Mularie continued. "That's really the Achilles' heel of Loudoun County and most of the areas here."

The Telework Consortium soon discovered that Loudoun's broadband infrastructure isn't sufficient to support telework and telecommuting -- especially the upload speeds.

"What we require with the software -- since you're sitting at a desk and people are seeing you -- is sufficient uplink speed," said Mularie. "That's one of the problems with some of the so-called broadband connectivity here in Loudoun County. You need symmetric bandwidth, with a minimum of 350 Kbps in both directions."

This problem isn't unique to Loudoun. Much of the broadband service available in cities across the country offers faster download speeds than upload speeds. In California, for example, SBC's DSL Pro service offers 1.5-3.0 Mbps downstream and 384-512 Kbps upstream. This sort of asymmetric service, however, won't work for video conferencing.

Mularie said he lives in a rural town with a population of 300, and the town has been attempting to get broadband services for some time.

"I live 62 feet from a Verizon central switching office here in Waterford," he said. "I could only get dial-up. They wouldn't put in a DSLAM so I could get DSL. They said, 'It's not cost-effective for a town of 300 to give you DSL.' Because it's part of my business, I have to pay them $575 per month to run a T1 line into my premises."

A situation of this sort, with an unhappy consumer more than likely willing to share that unhappiness with people he or she meets, isn't something that makes any incumbent telecommunications provider happy.

"We really want to promote and deploy broadband as widely as we can," Hoewing said. "Obviously these kinds of situations are ones we'd rather avoid. There are some places that economically -- because there's so many places we have had to deploy and maintain the network and so forth -- that it's just hard to justify.

"Frankly we can't solve everything, and there are some places that are difficult to try to immediately address, given all the other investments we're doing," he said.

Taking Over
The Loudoun County Economic Development Committee, which Supervisor Lori Waters chairs, is making the county's broadband infrastructure a high priority. One of the committee's first steps was determining the extent of the existing infrastructure, Waters said, because the county hadn't exhaustively mapped where cable companies or telephone companies laid cabling.

"We're also exploring whether there's a role for county government to be involved in infrastructure -- to make sure broadband does happen," Waters said. "We're seeing it piecemeal, often neighborhood by neighborhood, and that leaves an uncertainty when it comes to businesses trying to locate to the county.

"If they go to a particular piece of land, will they be able to get broadband? And at what price?" she said. "Even as people move to various communities, what type of infrastructure is in place so they can have something more than dial-up? As we have more transportation problems -- traffic is a huge concern for our residents because gridlock is a problem not only just during rush hour but all day -- utilizing telework more so that people don't have to fight the traffic becomes a quality-of-life issue as well."

Waters said the county is considering all infrastructure options, and after visiting the UTOPIA project in Utah, she said a mixed infrastructure seems best: a fiber-optic ring to support bandwidth-intensive applications, such as teleworking software, and perhaps wireless connectivity for the last mile.

One thing the county discovered is that an all-wireless broadband network might not be the best approach. Loudoun County doesn't own the light poles in the various cities, said Scott Bashore, the county's director of broadband services.

"Those light poles are either part of homeowners' associations or belong to the power companies," Bashore said. "Loudoun County covers 519 square miles. In terms of putting a wireless network up for the entire county, the average cost I've seen is anywhere from $75,000 to $150,000 per square mile."

Loudoun County is considering owning the backbone itself, Waters said, mostly to help spur competition and provide broadband choices for residents and businesses.

"We have a lot of defense contractors," she said. "We have a lot of tech businesses. I have a business located in my district; they're just a couple hundred feet away from George Washington University's Loudoun campus, which has a major fiber-optic system. Yet when this business moved into its new building, Verizon wasn't able to tell the business owners if they would even be able to have DSL.

"This business located from Leesburg, Va., and it moved just 5 miles east into my district," Waters said. "They thought for certain they would have DSL. After they got into their building, they went round and round with Verizon and ended up having to put in a T1 line. That costs a little more than DSL. They told me they wish they would have known before moving their business that that was going to be an added expense they would have to account for."

Without knowing the particulars of this situation, Verizon's Hoewing said the number of business customers in an area plays a big role for an incumbent telecommunications provider.

"It depends on how many businesses there are in an area, and what kind of usage we're talking about," he explained. "If they use a lot of broadband and they need higher speeds, the higher speeds will be priced higher so you can get a better return, depending on what kind of businesses those are."

Friends in High Places
Despite the economic benefits that wireless broadband can bring to cities and towns, some states seem dead-set against municipal involvement in these projects. Bills in 14 state legislatures during 2005 targeted municipal broadband efforts, though only Nebraska enacted a law further restricting municipalities' creation of their own broadband networks.

Three bills are currently active in Congress, two of which would restrict municipalities from building their own broadband networks. The third, from Sens. John McCain, R-Ariz., and Frank Lautenberg, D-N.J., would bar states from passing anti-municipal broadband legislation.

As representatives of cities and counties trooped to state capitols to fight for the right to install their own wireless broadband networks, unexpected allies joined the fray.

There's no doubt municipalities need the help when locking horns with heavyweights like Verizon, Comcast and SBC, which tend to see government-sponsored broadband initiatives as unfair competition.

It's good to have big guns of your own, and when the likes of Intel, Cisco, Dell and SAP join local government's side, the battle becomes more evenly matched. These companies stand to gain as much from municipalities building their own wireless broadband networks as incumbent telecommunications companies stand to lose.

"We're very supportive of the McCain/Lautenberg bill in Washington, D.C.," said Paul Butcher, marketing manager of Intel's State and Local Government division. "From a state perspective, running up till the last few months, we were very vocal on HB 789 out of Texas."

HB 789 was a major rewrite of Texas telecommunications law, and its original language contained provisions that would have extended and broadened the existing barrier to municipalities building their own broadband networks. The bill went through several amendments, and was ultimately passed out of the House with restrictions in place against municipal broadband networks.

The Senate version of the bill contained no such restrictions, and died in conference committee after the two branches of the Legislature couldn't agree on a single bill.

Besides corporate heavyweights, a surprising number of trade associations and consumer groups have sided with municipal governments on the issue, said Jim Baller, senior principal of the Baller Herbst Law Group, a Washington, D.C.-based law firm that represents municipalities in telecommunications lawsuits at the local, state and federal levels.

He credits what happened in Pennsylvania as the reason. In mid-2004, Philadelphia announced its ambitious plan to provide citywide wireless broadband services at very low prices. Later that year, a moribund bill to amend the state's Public Utilities Code suddenly revived itself and zipped through both houses of the state Legislature.

The bill contained an amendment that will make it very difficult, though technically not impossible, for other municipalities to do what Philadelphia is doing.

Organizations that previously had mildly supported community broadband now saw such laws as a growing threat, and raised community broadband to the top of their priority lists, Baller said.

Also, he added, consumer groups that built a powerful coalition to fight FCC media ownership rules several years ago turned their attention to the community broadband fight. That coalition was so successful on the media ownership issue that it caused Congress to take the rare action of overriding an FCC ruling.

"Particularly important at the state level was that a number of major American corporations, especially in the high-tech industry, saw that restrictions of this kind were not only bad for the communities involved, they were also bad for a private sector that wanted to partner with communities," Baller said. "These were the sellers of equipment, the writers of programming, the network builders, anybody who had any product that would have a larger market if broadband were more widely available."

Driving Productivity
When speaking with state and federal lawmakers about the benefits of municipal broadband networks, Butcher said that Intel's representatives emphasize four points:
- Broadband is good.
- More broadband and affordable broadband is better.
- Blanket restrictive legislation at the federal and state levels doesn't take into account the diverse business models available to municipalities.
- Public/private partnerships present an ideal solution for a shortage of broadband in municipalities, and a transparent process for creating these partnerships is key to success.

The impetus behind municipal broadband networks has changed over the last year, Butcher said.

"A year ago, it was free networks in the name of fixing the digital divide," he explained. "If you look at it

now, it's more of an economic or business model perspective, where we can deploy solutions and tools under this wireless cloud that enable us to enact programs that will address the digital divide."

On a practical level, a wireless broadband network enables a municipal government to make better use of its mobile staff because the network matches its needs. Remotely monitoring gas or electric meters is one way to save staff time, he said, and using a wireless network to track vehicles to ensure the safety of law enforcement officers, firefighters and social workers saves thousands of dollars.

"To track an individual vehicle using current satellite technology costs you about $9,000 per year per vehicle," Butcher said. "If you could take advantage of some of the simple, standards-based Wi-Fi technologies out there to link a GPS unit and to feed information back over an existing Wi-Fi infrastructure, the cost to do that drops dramatically."

In Corpus Christi, Texas, he said, city officials use a solution from SAP to track city vehicles via combined GPS and Wi-Fi technologies for pennies on the dollar. It's not just government agencies that can put Wi-Fi networks to use. The private sector is well acquainted with what a mobile work force can do for the bottom line.

"If you look at the United States, according to some of the numbers I recently saw, as much as 60 percent or better of our work force is going to be traveling or out of the office more than three days per month in the coming years," Butcher said. "That's a huge fact of life for everybody. We see these wireless clouds enabling people to do their jobs more efficiently and effectively."

But if there's no broadband, nobody benefits, and it's the lack of bandwidth and the cost of existing bandwidth that's driving municipalities to work toward getting a wireless broadband network off the ground, he said.

"In Portland, Ore., the CTO for the community told me that 50 percent of their outbuildings -- fire stations, precinct offices and whatnot -- don't have access to broadband," said Butcher. "That's a staggering statistic. When you look around the country and talk to these communities, their No. 1 complaint is, 'I can't get broadband here or there, and I can't get a response from my service provider.'"

It's the reality of wireline broadband networks. Because of the cost of providing service to each house, service providers can't afford to run it everywhere. When they adopt a defensive posture -- deploying only to neighborhoods that may give them a better return on investment -- local newspapers or community-activist organizations accuse them of cherry picking or red lining.

In marked contrast is the reality of wireless networks.

"The cost per home passed for standards-based wireless networks is so affordable that municipalities are able to actually take these projects on," Butcher said. "That's one piece of the formula. Yes, the technology is affordable to deploy. But the real cost here, and an opportunity for business and government to work together, is on the customer support side."

More than half of the cost of running a municipal wireless network is going to be picking up the phone when customers call and need to be talked through accessing the network or configuring some aspect of their PC's operating system or related quirks, he said.

This is where working with companies such as EarthLink -- leader of a finalist consortium on the RFP put out by Philadelphia to build and maintain a citywide Wi-Fi network -- makes sense for the public sector, Butcher said, because these companies know how to handle customer service calls.

Speed Matters
It's a given that, to be at its most productive, a mobile work force needs fat pipes carrying voice, video and data. But just how fat do those pipes get in the United States? Not fat enough, according to some observers.

In the United States, broadband is defined as telecommunications services of 256 Kbps or higher, a substantial difference to how the rest of the world defines broadband -- services delivered at 1 Mbps or higher.

"If we start suggesting to ourselves that we're doing OK on a broadband deployment scale, if you will, because we're counting everything 256 Kbps and up, and the rest of the world is measuring everything a megabit per second and up, we obviously are lying to ourselves," said Butcher. "We're not comprehending the fact that we're more quickly falling further and further behind."

The problem with relatively slow speeds is what can't be done on such a network, which limits companies' telework and telecommuting options for staff interested in working remotely.

Broadband wireless infrastructures can solve this problem, Baller said.

Remote workers need not only robust download capacity, they need robust upload capacity even more, Baller said, and incumbent telecommunications providers' networks haven't yet satisfied the need for blazing fast upload speeds at affordable prices that would make telework and telecommuting more attractive.

"We're sorely in need of an ability to do a better job of getting people off the roads because they can't afford it," Baller said. "Look at the jump we've seen in gas prices. We're definitely going to have people looking for ways to cut down on their commuting costs and expenses. It seems like a no-brainer that we should be looking at telecommuting as a way to help address that problem."