

Race To Bring Fiber To The Premises

Fiber, delivering broadband over long distances, is the technology choice in rural areas

By Masha Zager

While regional Bell operating companies like Verizon and SBC and huge municipal systems like UTOPIA may have grabbed the headlines on fiber, independent telephone companies all over the United States have been quietly bringing FTTP to their customers.

In the latest Render, Vanderslice compilation of optical communities (*Broadband Properties*, June), an independent telephone company was the infrastructure supplier in three quarters – 299 out of 398 – of the communities listed. President Michael Render says a third of the independent telcos surveyed in 2004 expected to build FTTP infrastructure within five years.

In these days of convergence, what *is* an independent telephone company? In 67 of those 299 communities, developers were listed as joint infrastructure providers. While there is no universally accepted definition, we apply this term to:

- Incumbent local exchange carriers, the non-RBOC phone companies that have been providing local telephone service since before 1996;
- Competitive local exchange carriers that are subsidiaries of ILECs;
- CLECs that are not ILEC subsidiaries; most specialize in providing “triple-play” (voice, video, and data) services, not stand-alone telephony.

The ILECs are mostly small telephone companies serving rural areas; many of them are subscriber-owned. Their CLEC subsidiaries often provide service in areas near their ILEC territories, where they have name recognition. “Pure” CLECs, on the other hand, tend to be less geographically identified.

Sometimes, telephone companies and other service providers are brought in at the end of the process, after a property developer or an intermediary has built the FTTP infrastructure. In this article,

however, we focus on projects that were actually initiated and built by telcos.

Between January 2004 and July 2005, independent telcos announced at least 44 new FTTP projects, ranging from a few hundred customers up to 75,000. This sample isn’t complete; not all FTTP projects are publicly announced. Nor does it match up easily to the Render, Vanderslice list; announcements are usually made at the beginning of a project, and many announcements cover multiple communities. The Ren-

Greenfield Communications

Greenfield Communications (San Juan Capistrano, CA) was founded in 2001 to provide FTTH solutions to new master-planned residential communities. It currently serves 1,000 homes in the Amerige Heights community in Fullerton, CA, and 700 homes in the Lincoln Crossing community in Lincoln, CA. At full buildout, Amerige Heights will have 1,200 homes and Lincoln Crossing will have 3,000. An additional six projects in Southern California and two projects in Arizona are in the design or construction phase.

While the demographics of Greenfield’s communities vary – average housing prices range from \$150,000 to \$2 million – all new houses are equipped with FTTH connections capable of high-speed Internet, telephone, and video services. The Amerige Heights community has 3 Mbps symmetrical Internet service, but Greenfield plans to standardize its Internet offering at 4.5 Mbps downstream and 1 Mbps upstream.

In both Amerige Heights and Lincoln Crossing, Greenfield’s Internet service (including email accounts and a community intranet) is bundled into the community association’s monthly fee for homeowners. However, the company competes with local providers in offering telephone and video services.

der data includes only projects under way. But the 44 are certainly sufficient to draw some conclusions about what the telcos are doing.

FTTP by the Numbers

Of the 44 telcos initiating FTTP projects during this period:

Most are traditional telephone companies; 33 projects were undertaken by ILECs or their CLEC subsidiaries, and only 11 by CLECs that were not affiliated with any ILEC.

Most are providing triple-play services; 40 of the telcos were planning to provide voice, video, and Internet data services. A few offer additional services such as gaming, home security, videoconferencing, or virtual LANs. The remaining four telcos, one of which serves only business customers, provide voice and data services only. Though the details of their offerings and prices vary widely, most telcos offer higher Internet speeds and more video channels at similar or lower prices than competing broadband or video providers.

Most are market-financed. Only five of the 44 companies announced that they had financed their projects with government-subsidized loans.

Nearly all use PON technology; 43 telcos used some type of passive optical network, or point-to-multipoint technology, while only one made use of active Ethernet, or point-to-point technology. Some of the PON users have so-called hybrid systems, where active components extend up to 40 miles beyond the central office to a temperature-hardened PON terminal in the field. Although not all announcements specified the PON standard being used, ePON and GPON appear to be the two most prevalent standards being sold today.

Most work with one of two vendors; 18 telcos cited Optical Solutions, Inc. as their primary solution vendor, while 10 used Wave7 Optics. ADC, Alcatel, Alloptic, Corning, Entrisphere, FONS (which announced what was apparently the largest project), Motorola, Telco Systems, and Zhong Technologies accounted for the remaining 16. Telco officials we interviewed for this article said that once they had made their first investment, they

Horry Telephone Cooperative

In the early 1950s, South Carolina's remote Horry County was one of the last places in the United States without telephone service. Today, with the South Carolina coast a popular vacation destination, Horry County is home to some of the most advanced fiber-connected communities in the country. HTC (Conway, SC), the company formed to bring telephone service to Horry County and now the largest telephone cooperative in the U.S., is delivering FTTH to the developments that are "sprouting up almost as quickly as hurricanes," in the words of Brent Groome, HTC's chief executive for customer operations.

HTC's first project, announced in November 2004, was for Grande Dunes, a private, gated community that lies partly within HTC's ILEC area. By the time Grande Dunes is completed, 2,100 of its residential units will have access to voice, video, and data over FTTH. An even larger project – 3,600 homes in Prince Creek – is under construction now, and five additional projects are on the drawing board. Once these developments are built out, HTC will consider whether bringing FTTH to existing subdivisions makes economic sense.

HTC is working with several different developers under a variety of financial arrangements. In most cases, video services are bundled into homeowner fees, but Internet access is optional and voice service is provided competitively.

were unlikely to switch vendors in the absence of a compelling reason, because of the additional training costs involved.

Most are outside major metropolitan areas. Projects were announced in 24 different states, representing every region except the Northeast. Ohio led the way

with five announced projects.

What's Driving Telcos' Adoption of FTTP

Independent telco FTTP projects can usually be sorted into "growth" and "no-growth" scenarios. During the last

Rural Telephone

A telephone cooperative in northwest Kansas, Rural Telephone (Lenora, KS) became a FTTP pioneer in 2001 when it brought triple-play services to a small town in its CLEC territory. That first project was such a success, yielding a 95 percent take rate, that when the company needed to replace its cable TV infrastructure in the town of Osborne, it decided to install fiber instead, adding phone and Internet to the existing video services.

Because Rural Telephone had to install wiring in Osborne's old houses, installation costs were higher than they would have been in a greenfield development. However, according to director of operations Ron Ellis, the cost of installing twisted-pair and coax in the same area would have been higher still, so the company was able to offer service at competitive prices. Today, it serves a substantial proportion of Osborne's homes and businesses, despite competition from an ILEC's phone service and from satellite TV and wireless Internet.

Going forward, Rural Telephone is considering using FTTP in other areas where infrastructure needs to be replaced. Where its existing infrastructure is still economically viable, the company is building fiber out to neighborhood nodes, in preparation for an eventual shift to FTTP.

FTTH Communications

Contractor Property Developers Corporation (CPDC), a residential-community developer in the Twin Cities area, is so enthusiastic about fiber to the home that it formed a subsidiary, FTTH Communications, just to install and operate fiber networks in its communities. Evermoor, a development in Rosemount, MN, went live with fiber to the home in 2002, followed by developments in nearby Albertville and Hugo. A fourth CPDC/FTTH development, Harmony, in Rosemount, is under construction.

Except in the Hugo development, where video will be launched later this year, FTTH provides voice, video, and data services. The company is a CLEC (although it is the only triple-play provider); about two-thirds of residents subscribe to at least one service.

After several years of building fiber networks for its developer owner, FTTH Communications is on the verge of entering a larger arena. The company is about to be acquired by Superwire, a California-based broadband provider. FTTH general manager John Schultz sees great potential for the combined company to build new installations in the rapidly expanding Twin Cities region and to acquire installations that developers have built but do not wish to operate.

five years, housing has been built at a rapid clip on the outskirts of metropolitan areas and in destination regions that attract vacationers, second-home owners, and retirees.

In these growth scenarios, which account for nearly half of our sample, FTTH is seen as an amenity that will

help sell houses, and either local telcos or outside CLECs will provide FTTH in greenfield developments. Some developers even form CLEC subsidiaries of their own to bring fiber to their developments. In a few cases, local telcos that use fiber to the home in new developments later adopt fiber for plant replacements.

Most of rural America, however, is not growing. Many independent telcos serve areas that are losing jobs and population, where other providers have failed to invest in high-speed Internet or video services. Curtis Anderson, acting administrator of the USDA's Rural Utilities Service, compares the role of broadband to the roles played by rivers, railroads, and highways in earlier eras. Without broadband, he says, "your community won't attract or retain businesses that could go somewhere else."

In these under-served communities, broadband is seen as the lifeline to the modern digital economy. Rather than just play catch-up, local telcos may leapfrog past DSL and cable to overbuild nearby territories, and replace their own exhausted plant, with FTTP. Outside CLECs generally avoid these "no-growth" regions.

While the motivations for building FTTP networks may be different in growth and no-growth areas, both scenarios are affected by many of the same trends:

Falling prices. Construction costs for FTTP networks have been falling rapidly. Today, fiber costs average about 15 percent more than for competing technologies, says Paul Whittlesey, VP for product marketing at Wave7 Optics. After several installations, some telcos find that their experience with the technology and economies of scale push costs down even further.

Maintenance costs are usually lower than for competing technologies. PON outside plant doesn't need electric power, and telcos can turn services on and off without sending personnel to the customer's premises – a big plus in vacation-home communities, where tenants are always arriving and leaving.

FTTP also has a cost advantage in low-density areas, where copper loops cannot be used efficiently. Chad Olson, plant manager at BEK Communications in sparsely populated North Dakota, says, "We needed to get away from operating 18,000-foot copper loops – they became too expensive."

Competitive pressures. Traditional telcos face competitive pressure from wire-

Hancock Telecom

In 1895, an Indiana factory worker strung a wire across the back fence from his mother's house to his sister's house so the two families could talk by telephone. When his neighbors joined in, a telephone company was born. In 2003, Hancock Telecom (Maxwell, IN), still as forward-looking as the neighborhood cooperative from which it is descended, decided to provide FTTH in every new subdivision in its service area.

Because Hancock's once-rural territory is becoming part of the Indianapolis sprawl, with as many as 3,000 new homes being built, the company has made a major commitment to fiber. Its triple-play services with 5 Mbps Internet speeds have proved popular; take rates for video and broadband are higher in FTTH subdivisions than in the rest of its territory.

As ambitious as its greenfield program is, Hancock didn't stop there. The company is planning to bring FTTH to a new subdivision in its CLEC territory in 2006. It is applying for an RUS loan that will allow it to overbuild its entire ILEC area and bring FTTP to nearly 9,000 homes and businesses.

less companies and cable companies. With a weak market for voice service, their best option is to offer data and, especially, video services, in order to increase their average revenue per customer.

At the same time, Whittlesey points out, many of them have older plant that does not support DSL well. If adding or upgrading video and data services will require heavy investments in copper or coax, then FTTP could well be the least expensive solution.

Maturing technology. Five years ago, only Optical Solutions offered an FTTP solution suitable for small telcos; today, the list has grown to include about a dozen companies. Problems with early versions of optical equipment have largely been resolved, according to early adopters. In addition, vendors such as Tellabs, Calix, and Catena are selling equipment that offers a migration path to FTTP.

With every passing year, more telcos have successfully implemented fiber, and the remaining companies are taking note. Alan Terrell, president of early adopter Rochester Telephone, says that more than 30 companies considering FTTP have come to visit his installation.

The RBOCs' interest in FTTP has also impressed both telcos and developers: "It becomes real technology when the big boys are doing it," says John Schultz, general manager of FTTH Communications.

Futureproofing. Telcos make their business cases for FTTP on the basis of standard triple-play services – sometimes on only one or two of those services. Today, offering more television channels and faster Internet access than their competitors may be sufficient to make a profit. But that doesn't mean the telcos aren't looking further down the road.

They know that the all-IP network enabled by fiber will make it easy to offer customers different bandwidths for different applications, and develop a far wider range of packages than they can offer today. Wave7 Optics' Whittlesey says that nearly all the requests for proposals he receives require upgrading legacy TDM switches to IP soft switches in the central office.

Rochester Telephone Company

Five years ago, Rochester, Indiana was on the wrong side of the digital divide. Residents had poor options, or none, for high-speed Internet and cable television. Although the ILEC, Rochester Telephone Company, wanted to serve the community better, it was doubtful about investing heavily in copper or coax. "DSL was short-term," says Ron Riggle, RTC's vice president for operations. "You would be looking at changing it in the not-too-distant future."

Starting in 2002, RTC began wiring the entire town with fiber to the home. By this fall, when the project is completed, about 3,800 homes and businesses will have the option of receiving video, voice, and 5 Mbps Internet service over FTTP. Residents who are satisfied with their existing service may keep their copper wiring; due to the cost and complexity of wiring customer premises for FTTP, RTC is not yet doing a wholesale replacement of copper. Digital television will follow next year, along with video on demand. Eventually, RTC hopes to push fiber into less densely populated areas.

The local cable provider reacted to RTC's announcement of FTTP by rebuilding its network, improving service, discounting prices, and stepping up advertising – competition that kept FTTP take rates somewhat below RTC's projections. At least, as Riggle points out, town residents have benefited from the broadband war.

More importantly, it appears that even continuing improvements won't give DSL the bandwidth for such future applications as high-definition television and 3-D gaming. "Fiber is the endgame for all the telcos," says Timm Bechter, an analyst at Legg Mason Wood Walker. "They won't be able to do it with copper."

Max Kipfer, president of the FTTP advocacy group FOCUS, points out that we can't even imagine most of the applications that will exploit fiber's huge bandwidth. "How many software manufacturers are sitting and drooling, waiting for homeowners to have the capacity?" he asks. "There's a wealth of applications and technology waiting."

Customer interest. Optical Solutions' executive vice president John Griffin says most of OSI's clients are achieving higher take rates than they anticipated. Interestingly, the industry has discovered that there's no general correlation between community income and take rates. FTTH appeals to home-office workers at any income level.

Though there's no outright proof that fiber sells houses, there is plenty of anecdotal evidence. Mike Powers, CEO

of Greenfield Communications, says customer response cards at the developments he has wired often cite FTTH as a reason for purchase. Some homebuyers are impressed with blazing Internet speed and high-quality video while others, according to Horry Telephone Cooperative executive Brent Groome, just like the fact that there's no pedestal in the yard.

Government encouragement; 10 to 15 percent of telco FTTP projects are financed with loans from the USDA Rural Utilities Service (see sidebar). Since RUS doesn't favor any particular broadband technology, and requires recipients to make a well-crafted business case, an RUS loan by itself won't tip the balance toward FTTP. However, it is a welcome source of funding for organizations that have difficulty obtaining access to capital.

The Public Utilities Commission of Ohio recently adopted a rule allowing small ILECs to apply to "edge out" into neighboring territories without forming a separate CLEC affiliate. The rule has been used specifically to encourage broadband service in rural areas, and several telcos have taken advantage of

Rural Telephone brings video, data and even VoIP to northwest Kansas



The wide-open spaces of Northwest Kansas make it easy but not cheap to lay fiber. Here's how Rural Telephone (www.ruratel.net) builds the system that delivers broadband services to homes and businesses throughout the region. There's a lot of heavy equipment involved, but there's a personal touch, too: Many homes have to be rewired to use the service to best advantage, and the Website includes free classified ads and kids' games. Spurred by competition from satellite vendors and even other telcos, the company sees no choice.

Greenfield Communications does new master-planned communities

Laying fiber to homes in greenfield communities is easier than in overbuilds. But these photos show that even greenfield requires attention to detail, especially when doing business in environmentally conscious San Juan Capistrano, California. The firm is building in master-planned communities with housing prices ranging from \$150,000 to \$2 million. Every dwelling unit gets broadband, however. Note the wiring cabinet to the immediate left and satellite-fed headend (interior and exterior shots) at the bottom of the page.



South Carolina's Horry County has come a long way on phone service



Pictures from Wakefield, a Horry FTTH community in Longs, SC, built by Beazer. About 150 homes are being served. A punchdown block in each home's garage carries CATV, voice and data. The cabinet at upper left can actually handle 216 homes. Horry Telephone Cooperative is also working with developers of larger communities.

Rochester, Indiana, started rewiring with fiber this way, in 2002



Rochester Telephone's fiber-to-the-premises system includes buried and aerial network access points. Also shown is the inside of a cross-connect cabinet and a site with core installed. The project, which started in 2002, was about to be completed as we went to press. Equipment is from Corning and Wave7 Optics.



FTTH Communications is serving the Twin Cities area in Minnesota



Not your father's triple play. FTTH Communications is building this headend and network operations center to serve voice, video and data services in Minnesota's Twin Cities region. The watchword is "digital," and services include IPTV. It is technically a CLEC, one of many to assume the role of a private cable operator in the emerging telecommunications environment. The company has worked with many equipment providers, including Tut Systems and Optical Solutions.

FTTH Communications started as a subsidiary of CPDC, a local developer of planned communities. But it is being acquired by California-based Superwire, a broadband provider.



Comporium Communications

Comporium's slogan is "Making life easier," and that's what the company hopes to do with its FTTH installations. Comporium (Rock Hill, SC), an ILEC serving a fast-growing region south of Charlotte, NC, decided in mid-2004 to install FTTH networks in all new subdivisions in its territory.

Since then, it has begun building FTTH in 27 new housing developments, and expects to start in 20 more by the end of 2005. It will offer triple-play services in all of the developments. In the first group, which will contain about 3,200 homes by the time they are completed, about 500 homes have already been built. Although Comporium is facing competition from the local cable provider, nearly all homeowners have signed on to at least one of Comporium's services.

The move to FTTH, which required Comporium to upgrade its video headend, also gave the company the ability to provide video over DSL. This, in turn, made its DSL plant more valuable, and postponed the date when existing plant would have to be rewired with FTTH.

Because Comporium has been able to put structured wiring in homes as they are built, it can sign up homebuyers remotely and have services working the day they move in. "We're in this for the long haul," says Dan Smith, Comporium's VP of engineering. "There are cheaper ways to do it, but, in the end, the customer benefits with fiber to the home, and that's our motivation to go on."

it to overbuild other ILECs' territories with FTTP.

In addition to these common factors, other issues apply specifically to "growth" and "no-growth" regions – or, more specifically, to installing FTTP in greenfield developments or settled brownfield areas.

Settled areas. Building FTTP infrastructure in settled areas has its advantages and disadvantages. On the one hand, telcos don't have to run fiber to non-subscribers or install terminal equipment in their houses. A "home passed" is simply a home passed. On the other hand, the cost of installing fiber for those who do subscribe can be high. Copper or coax inside homes is intended to work with older connections, and may not be sufficient for FTTP; some telcos have found themselves rewiring more than they anticipated. This may change as more builders and more communities require structured wiring in new construction.

Another issue in settled areas is competition from satellite television service. "Don't assume you can compete head-on with satellite," warns Rochester

Telephone's Terrell. Because satellite television may offer more channels at low cost, and sometimes more reliable video service than cable, wooing satellite subscribers may be difficult. Gauging the competition correctly is important in determining what level of video service to offer.

Greenfields. Putting fiber into greenfield developments is usually far more efficient than rewiring settled areas. Sharing trench costs with other utilities can reduce costs significantly.

One advantage of fiber in new developments is that investments can be timed to match revenue generation. Developments aren't always constructed sequentially; homes can go up in any order. Wiring new developments with copper often forces telcos to put in expensive central office equipment that won't be fully used for months or years. With FTTH, much of the expensive equipment is at the customer premises, and doesn't have to be installed until it's ready to be used.

The biggest difference between overbuilding and greenfield development, however, is the telco's relationship with

the developer. When homeowners are interested in FTTH, developers are, too. Some see it as a way to differentiate their developments, others as an amenity, like a swimming pool or tennis court, that they need in order to remain competitive. Telcos report that a few years ago they were contacting developers and selling them on using fiber in their developments; today, they say, the developer is just as likely to contact them first.

Because developers tend to have easier access to capital than telcos do, many of them have provided loans or equity financing for FTTH infrastructure that could not otherwise have been built. As far as we can determine, all developer financing has been for CLECs. ILECs have to provide basic services with or without help, and may form CLEC subsidiaries for broadband.

Some telcos prefer developer financing not only for access to capital but also because they want the developer to help assure the project's success. Without the developer's investment, Greenfield Communications' Powers says, "We're just another contractor to them."

Developers with a stake in FTTH projects may offer such advantages as

- Exclusive access in private communities.
- Access to the building site 9 to 12 months ahead of public rights of way in non-private developments.
- Close coordination with contractors to facilitate placement of outside plant during site preparation.
- Close coordination with building contractors to facilitate structured wiring inside buildings.
- Demonstrations of FTTH in model homes.
- Agreements with homeowner associations to bundle data or video services into monthly maintenance fees.
- Ability to sell services to homebuyers as part of the home-sales process.
- Other kinds of marketing assistance, such as allowing the cost of optional wiring to be included in mortgages, or allowing broadband services to be sold in the same room as financing and the homes themselves.

Some telcos have found that developers will facilitate construction and provide marketing assistance even without having a stake in the investment, but other developers prefer open access and a level playing field among competing service providers.

What developers expect in return varies from case to case. Some of those who invest in the infrastructure retain their investment, hoping to share in revenues over the long term. Others, who invested in FTTH simply in order to sell houses faster and for higher prices, may sell back their stakes to the telco.

Developers who don't invest in infrastructure may still ask telcos for "door fees" or for revenue sharing agreements of 3 percent or more, according to Kipfer, in exchange for their facilitation and assistance. Others prefer to negotiate reductions in service fees, as an added inducement to homebuyers.

In upscale or resort communities, developers may require advanced service offerings, according to Kipfer. Depending on the type of development, they may specify features such as ultra-high-speed Internet access, home security monitoring, in-house wiring that accommodates multimedia outlets and communications devices in every room, or a community intranet and community video with broadcasting from schools, businesses, and community centers. Developers also may require "concierge-level" customer service, with 24/7 response and maintenance.

What Are They Waiting For?

According to estimates by Michael Render, less than 10 percent of independent telcos are currently providing FTTP service. What are the others waiting for?

Some telcos may be uninterested simply because they face no competition and have little customer demand for the service, Bechter says. They may not believe it is worthwhile to adopt a new technology – and a new business, if they've never provided video before – when customers aren't pushing them to do so. Eventually, Bechter says, as FTTP becomes more widespread, these

Obtaining Financing from the Rural Utilities Service

Financing for fiber-to-the-home projects is available through three programs operated by the U.S. Department of Agriculture's Rural Utilities Service (RUS). The three programs are all technology-neutral, but they have different eligibility requirements and funding.

1) Under RUS' traditional infrastructure loan program, which has been in place since 1947, ILECs and CLECs can finance communications infrastructure in communities with populations of 5,000 or less. A substantial proportion of the \$700 million per year lent through this program is for broadband delivery, including FTTP.

2) Under the new broadband loan program authorized by the 2002 farm bill, RUS lends money to ILECs, CLECs, and cable operators specifically to install broadband capability in communities with populations of 20,000 or less. Nearly half of the applicants are startup companies. RUS obligated \$743 million this year, about one-third of it for FTTP, and expects to have about \$2.5 billion to spend over the next two fiscal years. Communities with no broadband service are given priority, followed by underserved communities.

3) The Community Connect grant program provides outright grants for building broadband infrastructure in low-income, unserved communities. Projects focus on giving residents high-speed access to essential services such as police and fire protection, hospitals, local government, libraries, and schools. Annual funding for this program is only \$8.9 million.

More information about these programs can be found at <http://www.usda.gov/rus/telecom>, or by calling (202) 720-9540. RUS field staff are available to help applicants develop the business cases for their loans.

companies will begin to feel pressure from their customers. That eventuality is approaching fast, however, with fiber in the neighborhood, at least, to 20 million homes by 2008.

Other telcos may be playing what Bechter calls a "waiting game," expecting that prices for FTTP, and especially for the GPON technology that enables IPTV, will continue to fall relative to other technologies. Still others may be interested in providing FTTP but may be unable to obtain funding for their projects.

But those who wait may discover that they have missed their chance to expand their subscriber base and revenues. John Schultz of FTTH Communications says there is only a five- or

six-year window of opportunity before fiber becomes so widespread that it is no longer a differentiating factor. At that point, he says, the balance of power between telcos and developers will shift in favor of the developer.

Telcos that wait may also find that competitors have cherry-picked their most profitable neighborhoods, and it's too late to compete. "The race is on to see who gets the first fiber," says OSI's John Griffin. "It will be a long time before anyone justifies a second one." **BBP**

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