



AUGUST 24, 2004
PREVIOUS COLUMNS

Fiber's Sticky Wicket

When will the growth of fiber-to-the-premises (FTTP) finally meet our industry's high expectations?

The answer, I'm afraid, is when the population of [immigrant sports nuts](#) becomes the dominant U.S. consumer group. I'm talking about people who get up at 4 a.m. to watch an Indian-Australian cricket test match or who take the afternoon off to watch Hamburg battle Munich in soccer. This is the kind of demographic that is willing to pay enough to support profitable substitution of fiber for copper.

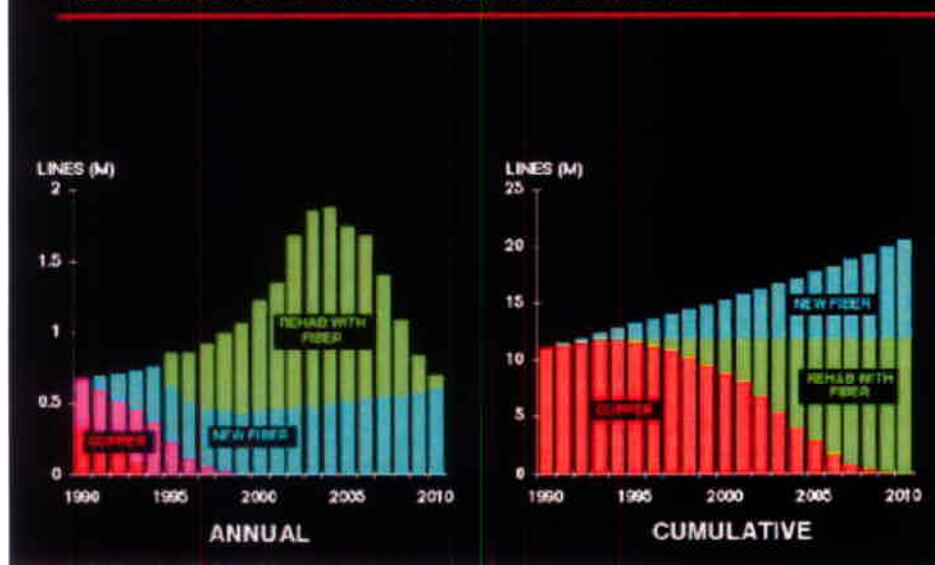
For the other 99 percent of us, all of FTTP's benefits – bandwidth that can, in one glorious package, support real-time transmission of the most distant events, infinite programming, and full-action HDTV – simply aren't worth the extra costs. And those extra costs seem unlikely to go away soon, since they are based on the necessity of digging new trenches for fiber installation by guys making \$22.75 an hour.

So the rest of us will do just fine with copper, thank you, using incremental improvements like ADSL2+ to squeeze out more bandwidth. And what we don't get with copper, we'll make up for with such things as TiVo and other storage devices, which continue to move unimpeded down the most powerful and reliable price/performance curve in all of electronics. (Have you noticed lately that it's less than a dollar a gigabyte on a hard drive and less than 10 cents a gigabyte on a DVD-R?)

It's time to abandon our long-held fantasy about fiber's prospects for rapid growth. Will ubiquitous fiber happen in our lifetime? You bet. Will it happen in the next 10 years? In 20 years? No and no. That's because fiber deployment will grow no more rapidly than the existing copper infrastructure deteriorates. Unless the federal government [intervenes in some unexpected way](#), fiber will be a big industry, but it will be an industry built on incremental growth.

This is heresy, I know, but I feel I have earned the right to state it. I was part of the group that coined the phrase "Fiber-to-the Curb" in the late 1980s. I helped design the first commercial Passive Optical Network that was deployed in Germany in 1992. I still have [BellSouth's](#) late-80s forecast that said 80 percent of homes would be wired with fiber by 2005:

SNELLING'S PLAN FOR SOUTHERN BELL



Source: Raynet & Southern Bell, circa 1989, via Drew Lanza

Like many of my industry peers, I have had my hopes raised as, time and time again, the RBOCs have dangled an RFP hook in front of potential residential broadband system builders, saying, in effect, "We're going to install fiber. Who has the best system?" And, just as we bite, the hook gets pulled back.

One cannot, in a sense, blame the RBOCs. Why should they invest billions of dollars in fiber infrastructure that may not be driving significant revenue for years? Only a (highly unlikely) guarantee of monopoly would provide the 20- to 25-year payback they require.

And remind me again why we are so enamoured of putting fiber in the ground in the first place. It may be smaller and glass and generally "cool." But our ability to drive bits down copper (or wireless, for that matter) continues to expand. Do we really need to install fiber all the way to the premises?

Continuing this line of questioning: How many bits do we really need? If we're sending mere text, we've had enough bits to do that job since we began sending messages with two cans and a string. Voice is also trivial. If we're sending still pictures (like Web pages), we require nothing more than a bit rate of 100 to 200 kbit/s. Even very high quality audio requires no more than 200 kbit/s.

That leaves us with video. To watch a video in real time on HDTV would require about 12 to 15 Mbit/s. If you have three HDTVs operating simultaneously in one home, you could run into requirements of 40 Mbit/s. This extreme scenario might call for fiber to the home.

But [who would ever conceivably need some 40 Mbit/s](#) in real time? The models we have had for video-on-demand have been, first, Blockbuster and, more recently, Netflix. Both suffer from latency, but latency that many people find quite tolerable. For Blockbuster, I have to climb in my car, drive 10 minutes, pick up a hit video or DVD, drive back home and then, after viewing the movie, hop in my car and return it. For Netflix, I trade off climbing into a car for receiving DVDs via the mail. The latency is a minimum of two days, but I get a much wider selection. I can program my Netflix membership so that I automatically receive every first-run romantic comedy and every classic comedy as they come out on DVD.

As the wide range of choices expands, the attractiveness of real-time viewing decreases. In fact, the question of how much bandwidth I need often comes down to just one final question: How impulsive am I? If I've just received the [Marx Brothers'](#) "A Night at the Opera" from Netflix, but decide I'd really rather watch the madcap quartet in another film – say, "Duck Soup" – how much am I really willing to pay to indulge that whim?

With more choice, the answer is becoming an increasingly obvious "not that much." Only our prototypical immigrant sports nut, [craving the instant gratification of real-time, non-local, HDTV cricket action](#), really *needs*, and might be willing to pay for, what only fiber could potentially offer.

The rest of us have more access to entertainment than we know what to do with (or are even that aware of). For decades our cable systems have poured hundreds of simultaneous channels into our homes around the clock – like water from a faucet with no one there to drink. And our DSL connections add ever-expanding Internet programming 24 hours a day at around a megabit per second. It's all there, even though we dip into just one program and one channel at a time.

Why do we let this all go to waste? What we need is a stopper that captures enough flowing data to fill our information bathtub. In other words: storage.

What has hindered this until recently has been the high cost of storage. If storage were cheap, we could all be downloading all the information we want and keep it as long as we like. Even at the lowest-cost DSL transmission rate today, I could download one HDTV movie per day. That that adds up to five HDTV movies I've got ready to watch in your average workweek. Pretty good!

And, guess what? The cost of storage is falling more rapidly and more predictably than those other realms of electronics governed by famous price/performance "laws." Moore's Law for semiconductor performance, which says that the processing power should double every 18 months while costing the same, appears to be slowing. The law of WAN access, which predicts a halving of network costs every two to three years, may face an R&D challenge and VC funding gap. But, like clockwork, the cost of storage drops by half every 12 to 15 months. By the end of the decade, we may see homes connected at only 10 Mbit/s, but we'll be able to store 10 terabytes of information on a device the size of a handheld tape recorder – and it will cost just \$250!

To my mind, that's the "infinity" we'll be accessing. We'll need intelligent agents to sort through it all. (As an example of emerging intelligent agents, take a look at [Akimbo Systems](#), a company in which [Morgenthaler](#) is not an investor.)

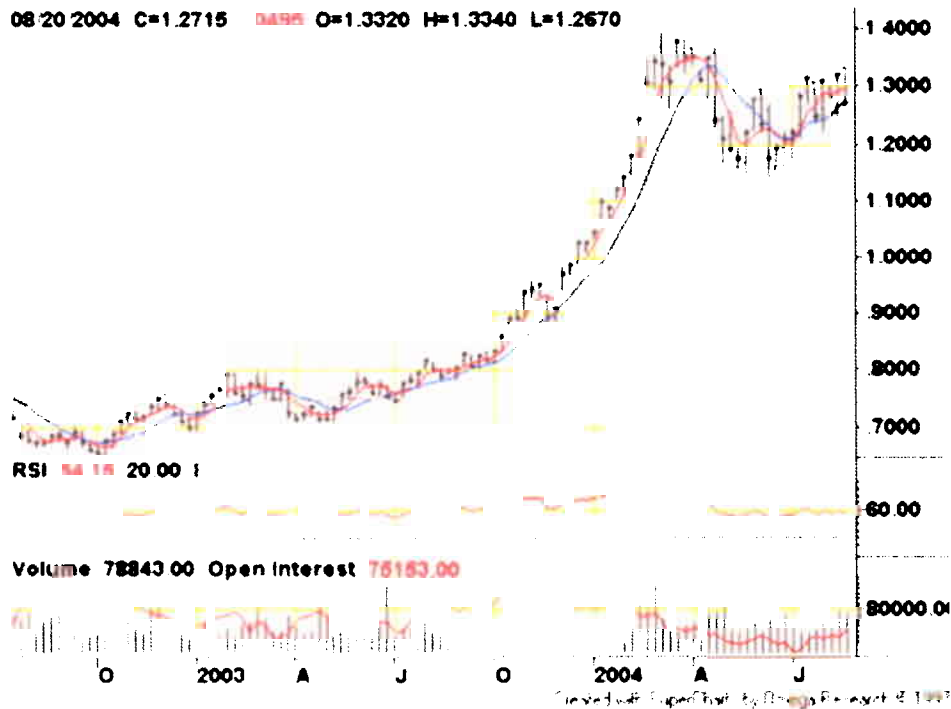
The measly 384 kbit/s typical of today's average household access doesn't even begin to tax copper's capacity. If we could push fiber to within a mile of homes, we could easily get 10 Mbit/s over [twisted pair](#) copper. And at that rate, when you arrive home after a long day, you'd have an unwatchable amount of HDTV movies and other programming waiting for you.

Of course, the current DSL network has not been designed to pump bits 24 hours a day. But making it pump continuous bits does not require digging up everyone's front lawn. The changes that are essential will come in the core of the network and the central office. Some such innovations, like XFP modules and 10-gigabit transmission, are fully productized and on their way to becoming industry standards (see [Jumbo Optics](#)).

So, as long as the copper in the ground is still intact, it can do everything we reasonably want it to do. And when the copper grows so old or becomes so torn up by storms that it needs replacement, then digging trenches and installing fiber is the right step, yes. But, in the meantime, it doesn't make sense to tear up perfectly good copper.

[Editor's note: That is, unless the price of copper keeps rising, in which case it might be nice to sell for scrap – see the chart below.]

High-Grade Copper, Price per Pound



Source: Omega Research

What it all comes down to is that, for most scenarios, the copper plant will provide adequate broadband coverage. As storage costs plummet and the existing network elements find deployment, the rapid, universal uptake of FTTP will be increasingly seen as a purist's dream, a flawed extrapolation of Web-viewing behavior to TV-viewing behavior. It will never materialize. By contrast, the real-world network that we have here today is evolving incrementally before our eyes and will provide us with

— Drew Lanza is a general partner at [Morgenthale](#); and is based in Menlo Park, Calif. He was also a founder of Raynet, E/O Networks, and Lightwave Microsystems, so he actually knows something about fiber.

For another take on the FTTP debate, tune into tomorrow's Light Reading Webinar: [Fiber to the Premises: Closing the Capacity Loop](#), sponsored by Alcatel, Cisco Systems, Entrisphere, and World Wide Packets.