Why Fiber is the Best Solution for Today's Web 2.0 World – and for Developers

Consumers are not in denial about their bandwidth needs, but builders and developers may be. The landscape is changing – and fast.

By Irit Gillath ■ *Telco Systems*

Years ago, while working for a company that offered 0.5 Mbps data access to its customers, we had a big debate with radio amateurs who were asking why someone would need connectivity speeds higher than 9.6 Kbps. Today we are having these same discussions with our customers and service providers about the need for fiber.

As Web 2.0 applications like YouTube, MySpace, LinkedIn and Facebook have boomed, more and more people are purchasing HD-enabled TVs and embracing video conferencing (whether in the boardroom or at home with grandparents talking to their grandchildren), VoIP and instant messaging. All signs are pointing to the fact that residential users' bandwidth needs will soon equal, if not match, business use. Most consumers assume that their current networks can handle this high video and Web 2.0 content demand. They quickly become frustrated and dissatisfied with service quality as soon as it does not match their expectation.

According to iSuppli research, AT&T has changed its strategy and is now going deeper into the neighborhood (closer to the customer's house) than what it first had planned. Why? AT&T saw the market for additional bandwidth needs and is seizing on the opportunity.

Below are just a few examples of applications that require more bandwidth and are in common use in the home and in the office. More new applications are being introduced almost on a daily basis:

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- HDTV channels require roughly 20 Mbps per channel more bandwidth than standard TV.
- Games are hot! While many readers may not realize it, according to *Business Week*, the online gaming market will reach $13 billion by 2011. This would be a 400 percent increase from the $3.4 billion market last year. The popularity of games like World of Warcraft and Halo continue to gain, and this continues to drive the demand for higher bandwidth.
- While voice doesn't require that much bandwidth, a high percentage of "telephone" communication these days is accompanied by video, using applications like Skype, MSN Messenger, AOL or Yahoo IM for both private and business communications as well remote learning, virtual conferences and webinars. This requires not only bandwidth but also high quality of service.
- While the bottleneck in the past was more in the downlink toward the end-user, the increase in video telephony and growing user population uploading video (did we say YouTube?), we need a bigger uplink pipe as well.
- Webcams are gaining acceptance, whether for home security systems, parents observing their kids playing in preschool, surveillance systems for business (perhaps a small business, monitored from the owners' home or vacation spot), or broadcasting the traffic at a congested intersection.
- The iPod, other MP3 players and now iPhones have increased exponentially the amount of music and movies downloaded worldwide, as has the increasing willingness of television networks to provide the

latest episodes of their series on their Web sites. Even HDTV is being offered on network Web sites.

- Storage of business information on remote servers is becoming a critical need for companies, one that requires very high uplink bandwidth.

Bandwidth, Technologies and Solutions

Since the case for increased bandwidth has been established, the question now becomes just how much? And how do we get it done?

If you ask anyone who plays an online game, the answer would be as much as possible. A research report from RVA showed that a home with three HDTVs needs over 50 Mbps. And because networks are built to serve not only the current requirements but also the future needs of the home, we will need a technology that will support the current demand and the bandwidth need in the next 5 to 10 years and beyond. While some of the technologies provide longer ROI, they give bandwidth that will suffice for many more years.

The access technologies that are available or becoming available for developers and builders are mostly the following:

1. Copper (xDSL)- based solutions – Typically a fiber must be run to the DSLAM (the xDSL concentrator), which connects to a copper-based local loop; xDSL throughput is highly dependent upon the length of the local loop. The shorter it is (the closer the fiber is located to the end user's house), the higher the bandwidth the service provider can offer. Providers need to limit their copper distribution loops to 4,000 or 5,000 feet in order to offer bandwidth in the range of 15 to 22 Mbps. Indeed, because of the distance issues, xDSL technology is not even available in large parts of the country. In order to move to it the service provider will need to forklift a lot of its equipment. Inside the home the copper wires are connected to a splitter that separates the data and the voice, and to a modem that provides data connectivity.

2. Cable broadband access – As with xDSL, in order to offer broadband cable service, fiber optic lines need to be deployed to the cable concentrator – the CMTS, which connects to a copper coax infrastructure within 6,000 feet of the user. The current DOCSIS standard supports 30 to 40 Mbps, resulting in end users getting service of 4 to 8 Mbps (actual speeds vary because bandwidth is shared with other customers). New standards based on DOCSIS 3.0 suggest bandwidth capabilities of hundreds of Mbps, but since the bandwidth is being shared by multiple households, it will be lower, resulting in a best-case service

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of about 50 Mbps per house. In order to support the new standard, providers will need to replace most of their cable equipment, at substantial expense.

3. Fiber to the Home – The two predominant technologies in the FTTH market are Active Ethernet networks and Passive Optical Networks (PON). While both technologies use an all-fiber infrastructure, there are some significant differences.

The PON architecture is based on active components in the central office and at the customer premises, but uses a passive splitter in the outside plant. The splitter divides the bandwidth between all the houses connected to that splitter. PON deployments now offer bandwidth of up to 60 Mbps, with much more available on the same fiber as the need arises.

An Active Ethernet architecture is based on active components in the central office and at the customer premises with an option to aggregate a group of houses in the outside plant using active switches. This technology can offer above 1 Gbps now, and more as the need arises. It is typically price competitive to PON, but allows for the most future growth.

Copper infrastructures are common throughout the US because they provided the initial switched phone service. The phone companies will continue to use this infrastructure until they realize that they are experiencing a high rate of consumer churn as consumers switch to alternate providers that can offer higher bandwidth and more reliable service. In order to preserve their customer base, providers need to decide today how they are going to support the demands of tomorrow.

Fiber, they may say, is expensive to buy and to deploy. The fact is that the price of fiber is actually going down while the price of copper is going up. Existing copper cabling, except perhaps in rare instances and over very short distances, won't support gigabit speeds. So, if cabling needs to be replaced, why not replace it with fiber? With a fiber-based solution, the bandwidth and the capabilities are already in place to support long-term demand and future applications. This is something that no copper hybrid or cable hybrid (HFC stands for Hybrid Fiber Cable) solution can offer. Unfortunately, infrastructure changeovers are a slow process, so many consumers and businesses must wait for fiber, even though the demand is significant.

Technologies and Developers/Builders

While some developers and builders will argue that they don't really care which access technology end users will choose to use after they buy the house, studies show that the FTTH option actually increases the value of the home. RVA surveys show that the price premium for a fiber-to-the-home (FTTH) connected house is estimated by both developers and homeowners to be as much as $4,000 to $5,500. And, in some deployment models, the builder benefits from residual income for many years after the house is sold.

Not long ago I spoke with a builder who had just completed an entire neighborhood. He mentioned the headache that he had just coordinating all the different companies that were laying down networks and connecting the houses in the area to coax and copper lines. He then mentioned that if he could have contracted everything from one source, he could have saved a lot of money. Did he also realize that laying fiber to these homes himself or in partnership with a provider could have provided him with residual income?

Business Models

There are several models in which developer and residential communities choose to deploy FTTH. One is "open access," where the end user can choose among service providers. The service provider leases the fiber from the company that owns the network (which may be the developer) and can in turn offer value-added services.

The other model locks in the service provider as part of the homeowner association contract. This is a win-win-win situation where the homeowners get all the services bundled together in an attractive price with bandwidth that they couldn't get anywhere else, and the service provider can provide better service because it has a contracted user base. The developer gets both a higher price as well as residual income on the houses sold. In this market, the differentiator of fiber may help the developer sell houses faster as well.

Companies bringing FTTH to master-planned communities are rapidly expanding nationwide, chasing a recent wave of demand in the space. More than 40 percent of the planned communities under construction today have chosen FTTH, according to RVA. The top motivator cited has been a desire to "future proof" their communities. In 2011, according to forecasts by ABI Research, 70 percent of new planned communities will opt for FTTH.

FTTH provides not only the bandwidth but also the ease of offering converged services combining voice, video and data as well as home security and other products.

It's really a win-win for all involved, but until enhanced services are accessible to all, consumers and business will have to play the waiting game. **BBP**

About the Author

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