# Fiber Is The High-Bandwidth Path To The Greenfield Community

By Carl Furgusson ■ *Tandberg Television*

The broadcast television industry is a business of constant flux. Look no further than direct-to-home video delivery for a concrete example. Driven by market competition and technological advances, companies traditionally rooted in markets ranging from telephony to utility power are exploring broadcast video as a new means of revenue generation, customer retention, and customer growth.

Using new and existing infrastructures, more organizations are packaging television with telephony and high-speed data services to provide three services to the home over one line and combined onto one bill in what is commonly touted as the "triple play package."

While many telcos focus on direct-to-home video services over DSL infrastructures, the fiber-to-the-home (FTTH) platform continues to generate interest as a platform for other non-traditional broadcasters like real-estate developers, municipalities, and power utility companies to deliver triple play services.

The FTTH platform basically allows any entity that owns or is willing to build out an optical fiber infrastructure to provide a true broadcast television alternative to cable and satellite services.

## FTTH Eliminates Bottlenecks

The FTTH platform improves on DSL infrastructures by eliminating bottlenecks with its generous bandwidth. This allows for a generally hassle-free deployment of advanced services like HDTV.

This is particularly useful for non-traditional broadcasters as they work to compete with established competitors in the cable and satellite sectors. Where HDTV may struggle to reach the home due to the bandwidth-restricted infrastructure of ADSL, there is no such problem in the FTTH infrastructure.

Real-estate developers building out new communities seem to be on the leading edge of FTTH deployments in the United States. Builders continue to establish new communities in rural and suburban areas throughout the nation, entering areas without the typical housing services of water, sewage, telephone, power, and cable. The developer is responsible for bringing these services

into the new community.

Services such as telephone and broadcast television typically have more than one provider available in an area. Very rural regions may find that there is no true cable TV service and must instead rely on satellite or terrestrial reception. Establishing triple play-enabled homes can potentially increase the value of the homes being built by several thousand dollars, in comparison to just offering basic TV and Telephony provision.

The developer in this case can develop an economical business plan for an FTTH infrastructure. If the fees for the basic tier of the triple play services are rolled into home association or related compulsory fees then the FTTH business plan can provide a very positive return on investment as a 100% customer base is achieved irrespective of whether the customer actually wants the service.

Some real estate developers are bringing in triple play operators to provide telephone, high-speed data, and video in lieu of doing it themselves — making the ROI attractive for both organizations.

## Placing The Headends

A community development is typically insular, so the headend is likely to be placed within the community. A builder or common service provider servicing multiple sites close together may be able to utilize a single video headend for multiple communities to save on head-end costs, but some form of infrastructure to link the sites together will be needed.

With the need to transport 500-1000 Mbps of data, or more, the cost of this inter-site link may be prohibitively expensive. Typically, a service building or garage is all the room needed to build out and maintain an operable video headend.

When it comes to deploying the video service over fiber, operators have three head-end alternatives. The decision on which solution is best will usually come down to local competition and costs incurred to launch and operate the service. The first two choices are essentially the same as running a traditional cable system, in that video is transmitted to RF frequencies and these signals are then carried across the fiber network as RF over fiber.

The least expensive solution is to broadcast analog video over the fiber infrastructure in the same manner as an analog cable system. The obvious advantage here is cost: a wealth of analog cable products are available at a low price to build out the head-end. Also,

no set-top boxes are required to decode the video inside the customer's home, further reducing the cost of implementation.

### Evaluating The Drawbacks

Unfortunately, this route has an equal number of drawbacks. Analog cable over fiber offers no compelling advantage over traditional cable company services. While a triple-play package of analog video, phone and Internet is possible, traditional cable companies migrating to digital infrastructures will eventually gain the competitive edge by offering more channels and services. Likewise, satellite television will also offer a direct-to-home package that far exceeds that of an analog cable system in terms of channel count.

Beyond the limited channel lineup, analog cable lacks a future upgrade path. Adding Video on Demand, high definition television and other advanced services is not technically possible without upgrading the system with digital technology.

The second alternative is to launch a digital cable head-end or an upgradeable hybrid analog/digital system. Unlike an analog cable system, homes connected to the fiber infrastructure will need set-top boxes to decode the incoming signals since the video is digitized. This will add an incremental cost per household that far exceeds the analog model.

To counterbalance that expense, a digital cable service will produce a far more competitive channel package that can compete with traditional cable and satellite providers. Content or content licensing aggregators like the all-digital HITS (Headend In The Sky) and the National Cable TV Cooperative (NCTC) — which provides a mixture of analog and digital feeds — offer upwards of 80-100 channels distributed via satellite that can be easily turned-around for digital broadcast into the FTTH infrastructure. The addition of local channels to these multiple-channel packages creates a full channel lineup that can compete with other digital service providers.

As with analog cable, there are disadvantages to the digital cable option, although not as severe. The main issue centers on Video on Demand services. Adding VOD to a digital cable head-end requires an added infrastructure cost to enable this service to be transmitted simultaneously with the regular video stream.

Not only are VOD servers required, but also "EdgeQAM" transmission products that transmit the VOD video into the RF over fiber infrastructure. An IP return-path is also required to

allow the STB to talk to the VOD server. If not provided within the fiber infrastructure, then the traditional cable solution of DOCSIS modems in the home and CMTS (Cable Modem Termination System) in the head-end would be necessary.

Cable systems also tend to run low on bandwidth when offering one-to-one connections such as VOD: 100 customers ordering a movie at the same time is the equivalent of broadcasting 100 channels. In this area there is ultimately a scaling issue with the number of homes that can receive VOD simultaneously before the fiber network needs to be cut into separate nodes to free bandwidth, which raises infrastructure costs.

The alternative is to offer "near VOD." Here, the operator broadcasts the same movie with different start times requiring the equivalent of four to eight TV channels per movie in bandwidth. The downside here is consumer-related: the viewer's movie begins and ends at a set-time, and offers no control over fast-forward, rewind and other control functions that are common with the direct server connection of true VOD. Also the total number of movies offered as NVOD is ultimately limited by capacity on the fiber.

The third, and most attractive alternative if advanced services are planned is to offer switched digital video using IP over fiber. The high-bandwidth pipe exercised through IP over fiber far exceeds the limits telcos face with certain DSL infrastructures and offers a more cost-efficient and consumer-friendly VOD platform than digital cable. Service providers can offer virtually unlimited channels to the home (services are switched into the fiber infrastructure as requested by the consumer) along with high definition television and other advanced services.

Furthermore, since an IP pipe is being provided into the home, then TV, Internet data, and voice over IP services can utilize the same infrastructure — saving on any possible need for CMTS and cable modems. And since VOD servers deliver their video directly into IP, EdgeQAM devices are unnecessary in the switched digital video over fiber solution.

As with analog and digital cable head-ends, a satellite dish is placed on top of the building to receive video and other digital services, such as VOD movie assets, premier sports channels and digital radio services. To include local VHF/UHF TV channels some antennas placed on top of the head-end building will also be required.

A small antenna tower may be needed to get good VHF/UHF reception if a high enough building is unavailable. Most digital video feeds from satellite will require descrambling to remove content protection from received signals; this can be achieved with a combined demodulator and descrambler unit.

## Digitizing The Analog Channels

After passing through a demodulator, analog channels accepted off of satellite or the local UHV/VHF TV stations are sent to an encoding card to be digitized. An IP streamer is then responsible for multicasting the digitized video channel over IP to the home.

Channels that are already digital can be passed straight through to the IP streamer. For FTTH installations it is unnecessary to change the digital data rate of the channel as there are no bottlenecks in the system.

Digital cable head-ends require that the signals be multiplexed into one stream before being modulated for transmission in the RF/optical network. Multiplexers and scramblers are eliminated in the IP delivery over fiber approach.

A middleware server, which provides electronic program guide information and navigation points to other services such as VOD, is hooked into the stream as well. An IP switch accepts the services leaving the streamers and VOD servers, along with middleware services, and connects to a fiber transmission point to establish the FTTH connection.

Advanced video encoding is also unnecessary. MPEG-2 compression can send multiple HD and standard definition channels into the home using IP over fiber, whereas advanced algorithms such as Windows Media 9 or MPEG-4 Part 10 encoding might be needed to do HD in other bandwidth-restricted platforms like DSL.

As with the digital-cable /RF-over-fiber solution, the need to supply a set-top box in the customer's home is the biggest drawback to this option. MPEG-2 IP set-top boxes are readily available and are comparable in price to two-way cable STBs.

FTTH infrastructures have an advantage over ADSL systems in that they can offer high definition today to compete with cable and satellite providers, whereas ADSL systems in most cases would require an advanced-compression set-top box not yet available to consumers. (The data rates available with VDSL today would enable high-definition services.)

## FTTH Has A Broad Potential

The FTTH platform is clearly having an impact on Greenfield developments. The potential is there to have a similar impact on small/medium-sized towns and larger cities.

Regardless, the flexibility of the infrastructure allows FTTH to be equally effective in rural and urban vicinities alike.

The best choice for enabling video on your FTTH infrastructure will depend on numerous factors, including budget, location and future plans.

The investment into the infrastructure and video head-end will be representative of the product going into the future. ❖


## About The Author

*Carl Furgusson is the head of Broadband Business Development for Tandberg Television.*