

Las Vegas Attendees Learn that

FTTH is No Gamble

Consensus builds that public-private partnership is needed to push fiber

By Lawrence Kingsley ■ *Contributing Editor*

This year's Fiber to the Home Council conference in Las Vegas saw a sharpened emphasis on the technical and financial details of running fiber networks, and on the potential for public-private partnerships.

A scattering of dramatic price reductions demonstrated the rapid growth and maturation of the FTTH market, along with the belief that at least some buyers are price-sensitive. For example, Wave7 Optics demonstrated a small client device, a data-only EPON ONT, which represents at least a 50 percent reduction in cost compared to the company's triple-play ONT.

The start of commoditization of mainstay equipment, especially at the customer premises, was evident with "indoor" optical-to-cat 5 converters below \$100 each in quantity from several vendors. Still, companies like Alloptics are not yet prepared to reduce costs "just to buy market," in the words of Mike Serrano, Alloptics Director of Marketing.

There was a 73 percent increase in attendees and a 51 percent growth in exhibitors from last year's show in Orlando. Show organizers reported 1,899 attendees in Las Vegas and 148 exhibitors. The FTTH conference was co-located with the Connected@Home conference, sponsored by the Continental Automated Buildings Association (CABA), the ZigBee Alliance, which is promoting low-power-consumption wireless protocols for the home, and the New England FiberOptic Council.

At the conference, Michael Render of Render Vanderslice Associates reports that there are 652 fiber communities serving residential customers today, up from 398 communities just six months ago. These communities are in 46 of the 50 states in the U.S. (see his detailed report in this issue).

The prevailing mood at the conference was a sense of destiny: Attendees said the DSL and cable modems that pass for broadband today are expected to be obsolete within five years, leaving fiber optic networks as the standard "pipe" to triple play (television, telephone, and Internet), and also the enabler of telework, telemedicine, distance learning, e-commerce, secure elections, and what-not. For Patrick Simms, Senior Project Systems Engineer at ADC, the killer app will be 3D television, with its high bandwidth consumption.

Increasingly, there is recognition that fiber networks are the

interstate highways that enable commerce. Towns like Bristol, Tennessee and the Utopia towns in Utah perceive fiber infrastructure as a means of competing with cities in a digital economy.

Dr. Michael Browder, past chairman of the American Power Association and head of Bristol's utility, said fiber makes every house "a potential incubator for a business." In contrast, communities that are indifferent to digital infrastructure are taking a risk, just as towns bypassed in the 1950s by the interstate highways tended to lose their economic vitality.

New Products

Among the many products on display:

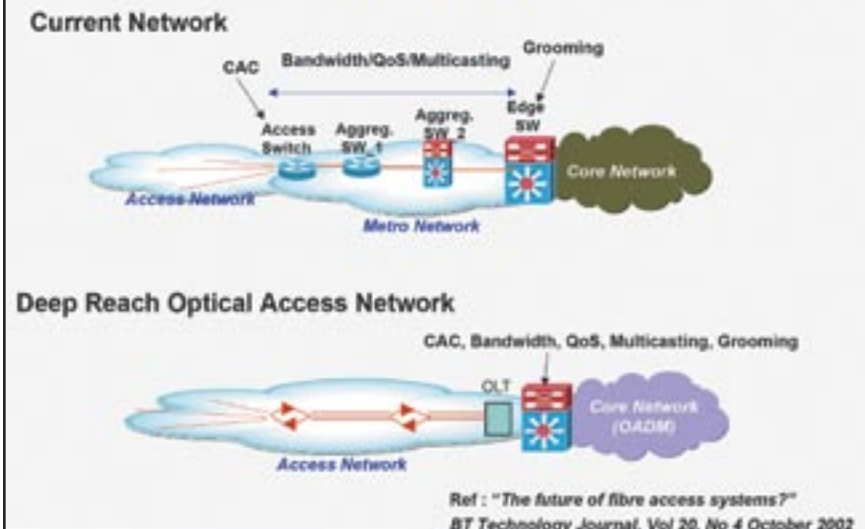
- Hitachi Telecom demonstrated its AMN1220 FTTP platform, which provides 2.488Gbps downstream, 1.244Gbps upstream, and offers both 10/100 Ethernet and gigabit Ethernet interfaces on each ONT.
- Wave7 Optics showed its Trident7 system, which supports GPON, EPON, and GEAPON. The Trident7 includes Wave7's Last Mile Link, which provides for RF video.
- Alcatel introduced its customer premises 7250 Service Access Switch, intended to deliver voice and data services to enterprises.
- Allied Telesyn unveiled Version 7 of its Integrated Multi-service Platform (iMAP) for remote, as opposed to central office, deployment. The iMap can contain three blades; ADSL, GEAPON, and Ethernet.
- Alloptic demonstrated its line of ONUs like the bizGear 2000 and MDUGear. Alloptic combines TDM voice, VoIP, IP video, RF video, and GEAPON, eliminating the need for other gateways and protocol conversion.

Predicting Future Growth

Despite all that, there was acute awareness that the 652 fiber communities represent only a small part of the overall population. The story of how these communities, their networks, and experiences to date are distinguished from one another is still evolving. The emphasis seemed to be on planting the garden, not on harvesting the fruits.

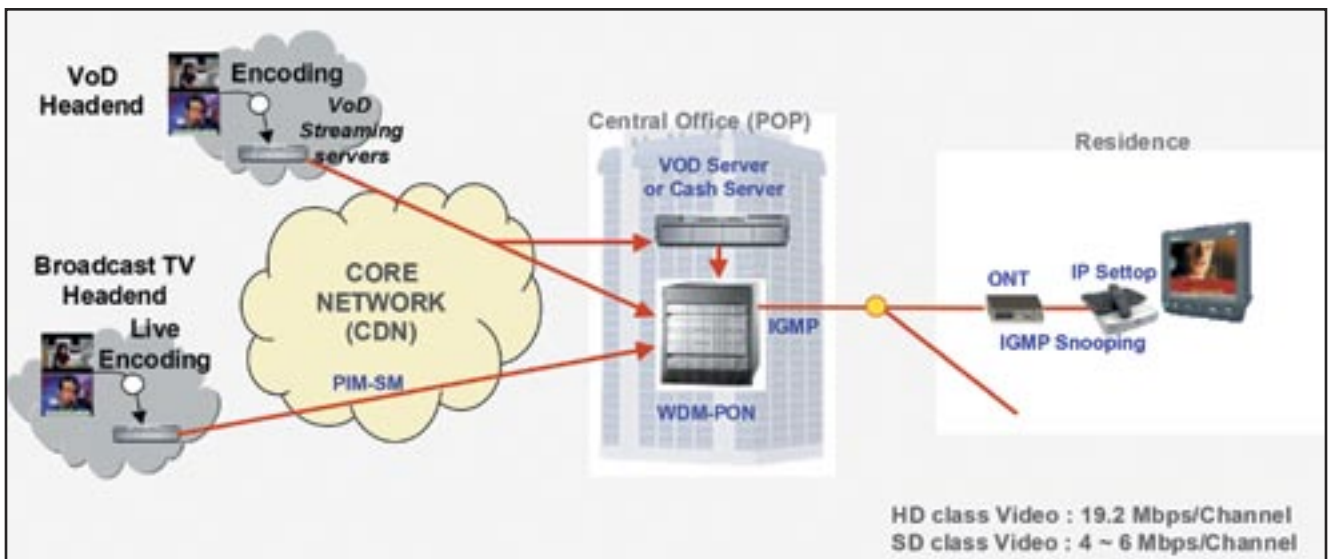
James Salter, founder of Atlantic Engineering, observed that tomorrow's leading examples of fiber networks are likely to be

Next Generation Optical Access/Metro Network



Top: Soo-Jin Park of KT Telecommunication Network Labs described Korea's march toward this ideal (originally from British Telecom) for municipal network deployment.

Bottom: Korea's Soo-Jin Park also described this 30 subscriber, 12 month field test of a WDM-PON using spectrum slicing and mode locking; the PON transmitted 32 channels at 125Mbps over 20 km. It's multicast and QoS enabled and delivered IPTV(HD 1ch/SD 20ch), Time-Shifted TV, VoD(HD/SD), Interactive Video Education, Internet on TV and so forth. Video on demand is by far the service customers most wanted to pay for.



found in the home communities of attendees at this conference.

Over the last year the U.S. has dropped from 11th to 16th place among countries ranked by the number of fiber installations per capita. Fiber superpowers like Portugal, Luxembourg, and Denmark are well ahead of the U.S., which stands to gain on Europe but fall even further behind leading Asian countries.

Hyung Jin Park of Korea Telecom explained his company's plans to make a minimum 50 Mbps and maybe as much as 100 Mbps available to all subscribers by the year 2007. A trial of 100

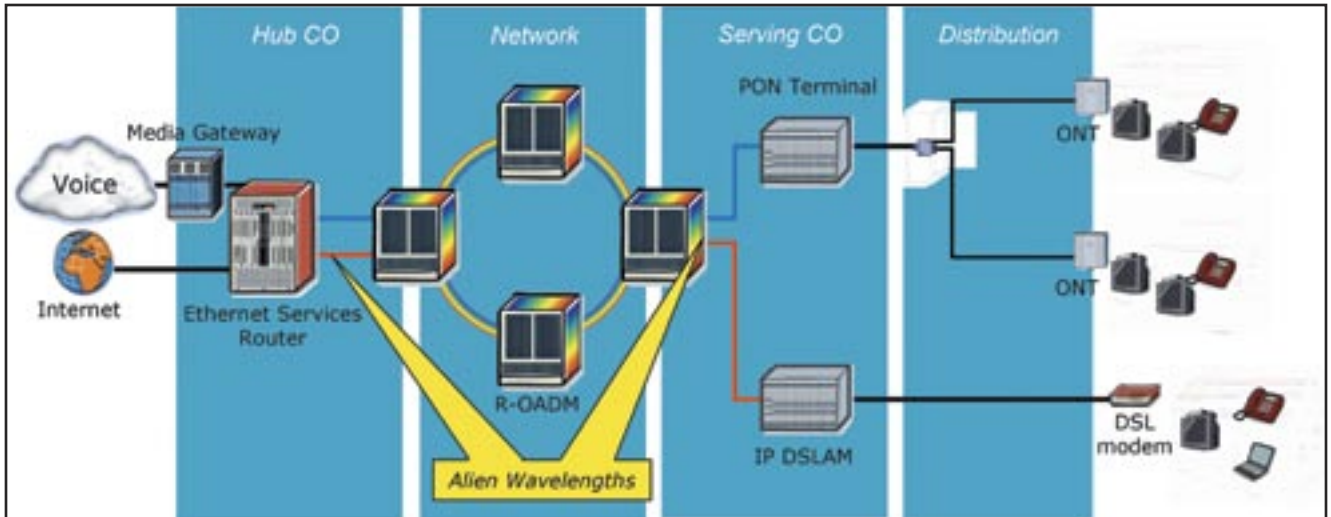
subscribers, he reported, is underway in Kwangju, Korea.

The Public Role

Municipal officials at the conference said they have become increasingly dissatisfied with cable TV and incumbent telephone companies. Cities would like residents to have state-of-the-art fiber, at 100 Mbps/household, as compared to 1-5 Mbps typical for today's cable and DSL modems. While greenfield deployment, lower cost for routine maintenance, competitive pressure from the incumbents themselves, and ambitions to be at the forefront of

telecommunications are gradually moving the entire country to fiber, the transition, attendees said, is expected to take decades unless public funds are brought to bear.

Lafayette, LA won a referendum in late summer allowing it to build a fiber network (Broadband Properties, September News & Views). Joey Durel, Lafayette's mayor, and James Baller, Lafayette's legal counsel, elaborated on the victory in separate keynotes. But within days of his address Lafayette was hit with two lawsuits, including one by Bell South, challenging the city's bond ordinance for the new network.



Alcatel also envisioned multiple wavelengths on fiber, with a potential for up to 2,000 users on a single subscriber host terminal and multi gigabit per serving area.

- **Brownfield FTTH**
 - Alcatel IP DSLAMs Attached to SAIs
 - High Speed VDSL2 With GigE Fiber Uplinks
 - TDM Voice, if Requested, is Combined with Data by a Splitter
- **Greenfield FTTH**
 - Access Network Made of a PON OLT, Fiber SAI, and ONT
 - PON Splitters Serve up to 32 Customers
 - OLTs May be Located In Remote Terminals

The diagram shows a fiber network topology. It starts with a Central Office containing an Ethernet Switch and an IPDSLAM at SAI. This is connected to a Fiber SAI Web-Coupler, which then feeds into a Fiber Serving Terminal. The network also includes an IPON OUT and a COP Enclosure.

Details of SBC's fiber technology – FTTH in brownfield, FTTH for greenfield developments. SBC believes GPON is the evolutionary strategy for FTTH due to its higher bandwidth capabilities (downstream 2.488 Gbps, upstream: 1.244 Gbps). Data overhead for Ethernet transport using GPON Encapsulation Method, GEM, seems acceptably small. TDM via circuit emulation is preferred solution. GPON has same physical specifications as BPON.

PON or Active?

There is no final consensus about network typologies. As elsewhere in the computer industry, competing standards fragment the market, inhibiting growth. But there are also real differences in needs, especially in overbuild situations.

Passive deployments have outpaced active. But passive networks come in many flavors, and the latest versions, GPON and GEAPON, have their advocates. GPON, which handles both Ethernet and IP traffic, seems to have momen-

tum and is taking over the functionality of ATM networks. Mike Wearsch, Wave7's VP of Business Development, explains: "People have moved away from the ATM-based version since VoIP, high-speed Internet data, and IP video are all in an IP format already . . . so why format it into ATM?"

Sometimes, as in the belief that Ethernet is no longer cutting-edge technology, the disparity between standards may be more ideological than practical. James Mustarde, VP of Marketing Communi-

cations at Allied Telesyn, observes that "GPON is just a medium for delivery of Ethernet."

Mark Abrams, Director of Marketing, at Passave Technologies, calls Ethernet "the protocol of choice for general data transport." GEAPON, he says, is "Ethernet in a PON," while GPON relies on Ethernet as its primary framing interface.

Intel has invested in Passave, which makes chips for both GPON and GEAPON and has been active in the 802.3ah standards process. Different regions of the world, says Abrams, prefer different technologies: "A lot has to do with timing – i.e., what technology was mature when the carrier was ready to deploy it," he notes.

Costs Hard to Pin Down

Although deployment costs are generally declining, there is no adequate yardstick for what you should expect to pay per household, mile, or gigabit. Thus, vendor-to-vendor comparisons are difficult to quantify. AFL and Corning are among the vendors who quote costs in greater detail, but their approach is hardly universal. Tellus Venture CEO Steven Blum, who spoke at the conference, cautioned that the buyer has to be wary of hidden costs (see sidebar).

Mark Abrams of Passave says "end-to-end cost per user" is generally the best way to quantify fiber costs. But the comparison would still have to assume the

Evaluating Costs

If you are sorting through bids and proposals for a new fiber deployment and come from a technical, instead of financial, background, the presentation by consultant Steven Blum, President of Tellus Venture Associates (Seaside, CA), offered simple advice. In evaluating a new fiber project, according to Blum, you cannot look merely at the hardware and software costs, which often are all that is in the proposal.

You should go further and take vendor-dependent capital costs and normalize them to get an apples-to-apples comparison, Blum advises. Costs should be broken out into items like the fiber plant, video headend, set-top boxes, software, system management, central office facilities, telephone facilities, etc., and then compared for each vendor. Necessary items such as IP router switches, video-on-demand servers, and ATM switches, can add hundreds of thousands of dollars. When omitted by the vendor, these costs should be factored into the proposal.

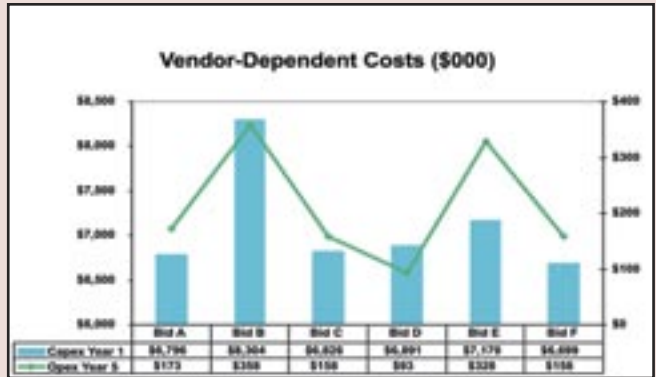
Different fiber plants, headends, and vendors require different types of services. “Who will I buy it from and what will I be charged?” are pertinent questions. Operating cost, not just the initial capital costs, drive up the overall expenditure. For example, an electronic programming guide may be listed as a software cost, but not the recurrent monthly cost for the guide’s contents. Similarly, management of conditional access is an ongoing cost of running the system.

“Higher capital expense can lead to lower operating costs, sometimes, but not always,” Blum warned. Some operators may submit a low bid for capital costs and then try to get money on the back end through licensing fees. The strategy is certainly ethical, but has to be understood.

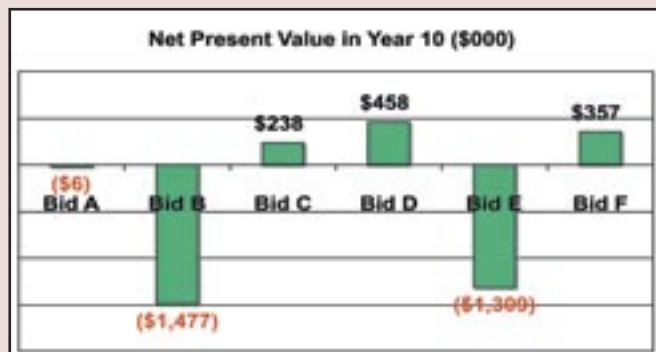
The first year’s cost provides an insufficient basis for decision-making – you also need to consider licensing fees based on activity (revenue, number of subscribers, clicks, and so forth), which increases over time. Licensing fees may be mandatory: Make sure you know what they are and insist on a complete breakout of costs. Sometimes these costs are bundled with support and maintenance.

Watch out for “vendor mandates” – for example, an agreement to buy video through a certain supplier. Make sure that vendors are adding value where they are adding cost. Similarly, if a bidder says that you can run the system with just the people whom you already have, verify the claim.

You should model cash flow – how fast customers will subscribe, less wholesale service and operating costs. You then can calculate financial metrics such as NPV and IRR important to an investor. Whether the system will pay for



Stephen Blum compared six hypothetical bids drawn from actual cases. He notes dryly that higher up-front capital costs do not always lead to lower annual operating costs.



Blum also notes that construction time matters greatly, especially as cost of money is rising; in his six examples, it is not obvious from vendor documents which bids will actually give you positive net worth 10 years out.

itself and how long it will take to recover the capital investment have to be determined.

You, not the system integrator, will be running the system, and you need to develop an ongoing relationship with third-party software providers so that you efficiently can deal with changes in the technology and in the market.

A 30 percent return on investment within 5 years is typical. Municipalities have a longer planning horizon, whereby a 10-year payback might be sufficient. Bonding requirements and lease options might be key considerations.

Private communities look at assessments—for example, a mandatory \$50/month from every resident in the community. It simplifies planning if you have the 100 percent take rate this implies, but the project itself can be subject to a vote of the owners. Older property owners tend to focus more on personal cost flow than on technology.

And that is to say, there is always more in a proposal than meets the eye.



Guy Swindell at the AFL booth.



Larry Wood shows off rugged pedestals at Charles Industries booth.



Diane Kruse new FTTH Council president, and CEO of Zoomy Construction.



Mayors Joey Durel, of Lafayette, LA (left) and Graham Richard of Ft. Wayne at press conference. Durel opted to build his own network, Richard is relying on Verizon.



Hitachi's AMN1220 OLT is GPON, for the North American market. A week after the Las Vegas conference, Hitachi announced that the first deployment will be in Bandon, Oregon. ComSpanUSA, in association with its development partner, Ledcor Technical Services (LTS), will design, build and operate an FTTP network in Bandon and the surrounding area. The system will reach over 2,500 homes and businesses.



Wave7 Optics' Trident 7 OLT will be available in GPON and GePON flavors.



Wave7 Optics' tiny indoor ONT will cost around \$100 in high volumes.



EtherWan optical-to-Cat-5 Ethernet ONT for indoor use; there are several versions of this compact design.



Precise construction documentation from Precision Valley Communications.



Inside Corning's OptiSheath aerial terminal.

same data rates and number of splits in the PON itself to get apples to apples. What end-to-end cost per user specifically includes will depend on the local service provider, including its expertise and resources.

“For the building blocks of a FTTH network, this would minimally include the cost of the ONT at the home, the OLT in the central office, plus software to manage the network. To turn up services beyond that starts to get into external equipment, such as home/residential gateways, set top boxes, and video headend and encoding equipment,” Abrams notes.

Why No Indoor “Fiber Modem?”

Unlike for a LAN, DSL modem, or wireless access point, the U.S. is a long way away from self-installation which, at

least at the customer premises, could drive down costs. Here, the standard seems to have evolved from telephony, where the “demarc,” the equipment connecting the customer premises and the network, is just outside the home. In Europe and Asia, it is often inside, despite the fact that fiber is more fragile than Ethernet or coax cable.

The ability to open up a PC and add cards and components made the PC an object of affection for techno-savvy users, who helped to evangelize the PC. But until the average homeowner has reason to fondle the actual wiring, PC-kind of fetishes are unlikely to develop for FTTH.

The “wonders” of fiber are not how you get it, but the applications that you can run after it arrives. There, too, the industry has a long way to go, for as long as we focus on the connection—i.e., layer 2 protocols—we might as well be trying to talk up the plumbing. **BBP**

About the Author

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