

Why We Need Fiber

Reports: FTTN, Wireless Broadband Won't Satisfy Capacity Needs

Two recent reports have called into question whether incumbent telecom providers' fiber-to-the-node strategies would meet consumer needs in the near future.

The Convergence Consulting Group (www.convergenceonline.com), in its fifth annual "Battle for the North American Couch Potato" report, says FTTN will have a tough time competing with cable, let alone with fiber-to-the-home. After hundreds of interviews with access, content, service and equipment providers, these industry analysts conclude, "We believe AT&T/BellSouth's

content providers and users increasingly expect. In addition, the report states, a number of competitor nations are now deploying networks that are capable of delivering much higher access speeds than are currently available in the UK.

The Broadband Stakeholder Group calls on the government to ensure that the UK remains in the upper quartile of OECD nations in terms of the qual-

first mile. Steve Methley, a Plextek senior consultant, comments: "Future high-definition TV services are likely to demand undiluted access to streaming content at 10-15 Mbps, per channel, which is massively in excess of what today's ADSL systems can support. Not enough people understand that today's ADSL is a contended service – delivered rates may fall to only hundreds of Kbps."

After ruling out ADSL, Plextek suggests that upcoming wireless standards show a bias toward small-screen mobile content delivery and are not attempting to address the challenge of the UK's Broadband 2.0 requirements. It investigates three approaches to the physical technology: mesh and multihopping systems, UHF/TV band working and hybrid schemes with fiber or Gbps "wireless fiber" (point-to-point beamed laser, ultra-high-band transmitters, etc.). It also considers fresh approaches for licensing.

Plextek concludes that the Broadband 2.0 solution must be based on fiber, which must reach farther into the access network, potentially all the way to the customer premises. It says fiber can solve contention issues by increasing backhaul capacity, and can solve the first-mile issue by acting as a point-to-point solution alone, or as a feeder to DSL distribution technologies - thus effectively reducing the length of DSL lines required.

The study concludes that wireless has application as a last-mile feeder element, using Gbps wireless as a fiber replacement and within the home. In addition, the report says, wireless broadband may be the most practical solution in some rural areas.

Will fiber to the node or wireless be capable of meeting broadband requirements over the next few years? Several new studies say that fiber to the home is the only adequate solution.

current capex commitment to network upgrades will not be enough to satisfy capacity needs in the long term. Without pushing fiber closer to the customer premise and/or pair bonding [to combine multiple VDSL feeds], we forecast that AT&T/BellSouth will not have the capacity to offer both higher speed Internet access and multiple HD streams."

In the UK, telecom provider BT's assertions that its ADSL infrastructure meets the country's requirements were disputed in a new report by the Broadband Stakeholder Group, an advisory board to the British government. The report finds that the UK's current and planned broadband infrastructure may not meet the future needs of the most intensive users, and the market may not deliver the ever-increasing bandwidth that

ity and reach of broadband services, and also recommends that Ofcom (the UK's counterpart to the FCC) balance investment incentives with the competition needed for the market to deploy next-generation broadband.

Wireless Won't Do It, Either

Ofcom has commissioned its own study of first-mile wireless solutions from engineering firm Plextek, which concludes that wireless falls short of what is needed for what the report calls "last-mile communications."

Ofcom asked Plextek to consider the feasibility of economic, ubiquitous broadband wireless access, given that previous solutions have had marginal business cases. Plextek's study finds that wireless cannot realistically compete with fiber in the

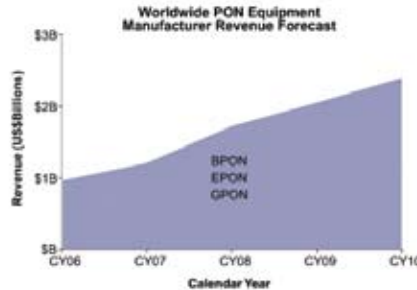
2006 Was a Banner Year for Worldwide FTTH Equipment Sales

Worldwide passive optical network (PON) equipment sales grew by 71 percent in 2006, reaching \$965 million, says Infonetics Research (www.infonetics.com) in a new report.

BPON equipment sales are tanking while EPON and GPON sales are growing rapidly, with GPON equipment revenue and ports forecast to grow at triple-digit 5-year compound annual growth rates between 2006 and 2010. Healthy EPON and GPON sales will continue fueling the overall PON market, which is forecast to reach nearly \$2.4 billion in 2010. The active Ethernet market is also growing; Ethernet has become the preferred technology for smaller North American operators as well as for cities, municipalities and many competitive operators in EMEA (Europe, the Middle East, and Asia).

Report highlights include:

- Fiber-to-the-home (FTTH) equipment revenue, which represents 60 percent of the PON market, grew 72 percent in 2006, and fiber-to-the-business (FTTB) equipment revenue, representing 40 percent of the market, grew by 69 percent.



Worldwide PON Equipment Forecast

- Worldwide Ethernet FTTH equipment revenue jumped 58 percent and will grow in the double digits annually through 2010.
- After more than doubling between 2004 and 2005, worldwide PON subscribers nearly doubled again in 2006 to 6.5 million, and are expected to swell to over 40 million in 2010.
- Worldwide FTTH subscribers grew 86 percent in 2006 to about 7.5 million, and are forecast to climb to almost 47 million in 2010, fueled by strong growth in both PON FTTH and Ethernet FTTH subscriber numbers.
- Mitsubishi maintains its strong lead

in worldwide EPON revenue and port market share, followed by Sumitomo and Fujitsu.

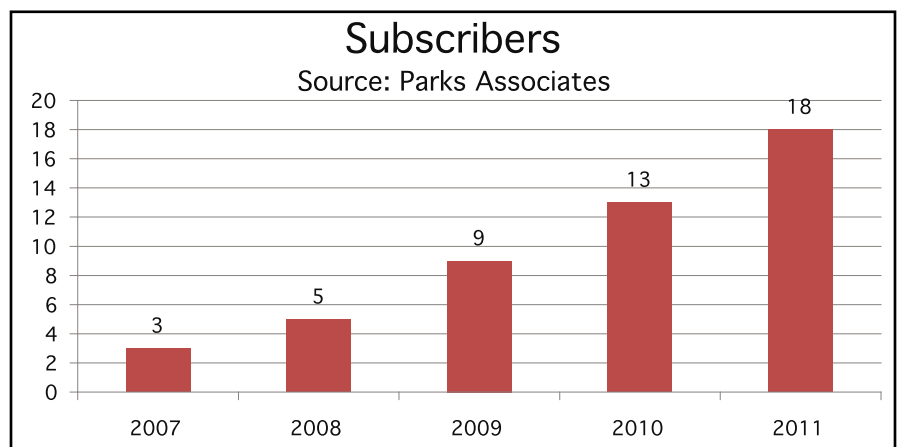
- Tellabs maintains its commanding lead in worldwide BPON revenue and port market share, followed by Hitachi and Motorola.

Industry analyst firm Dittberner (www.dittberner.com), measuring volume of shipments rather than revenues, reached similar conclusions, finding that worldwide FTTH shipments grew 58 percent in 2006 to a record 4.6 million optical network terminal (ONT) and optical line terminal (OLT) ports.

Domestic Japanese GePON suppliers dominate the world FTTH market, because Japan has by far the largest number of FTTH subscribers. Mitsubishi, Sumitomo, Hitachi and UTStarcom had a combined market share of nearly 82 percent in 2006. In 2007, the sales of these companies will remain steady, but Siemens' sales in Korea and Tellabs' and Alcatel-Lucent's sales in France and the United States should make the market both larger and more diverse; Japanese suppliers' shipments will total 55 percent of 6.8 million ports.

Parks Associates: U.S. Fiber Subscribers to reach 18 million by 2011

The number of U.S. households subscribing to fiber connections will increase from 3 million at the end of 2007 to 18 million by the end of 2011, according to a new report from Parks Associates (www.parksassociates.com). Parks says fiber subscriptions will join DSL and cable as mainstream broadband access methods over the next five years, driven by aggressive deployment plans from the telcos and increased consumer demand for new services such



Forecast of U.S. Residential Fiber Subscribers

as video-on-demand and IPTV. Parks expects FTTH to achieve a faster growth

rate than DSL and cable broadband services did after their inception.

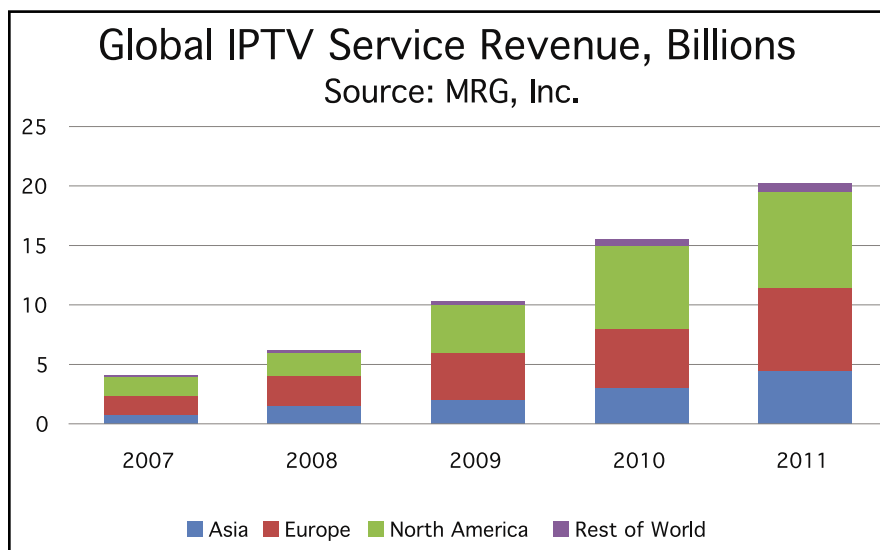
By Any Measure, the IPTV Market Is Booming

Telecom companies are entering the pay-TV market with aggressive Internet Protocol Television (IPTV) offerings that will spur an arms race in pay television and in quadruple-play services, says market intelligence firm iSuppli (www.isuppli.com). iSuppli calls IPTV the fastest-expanding segment of the pay-TV market – which is currently dominated by satellite and cable offerings – and it expects revenue from IPTV to increase to \$23.5 billion in 2010, from \$681 million in 2005.

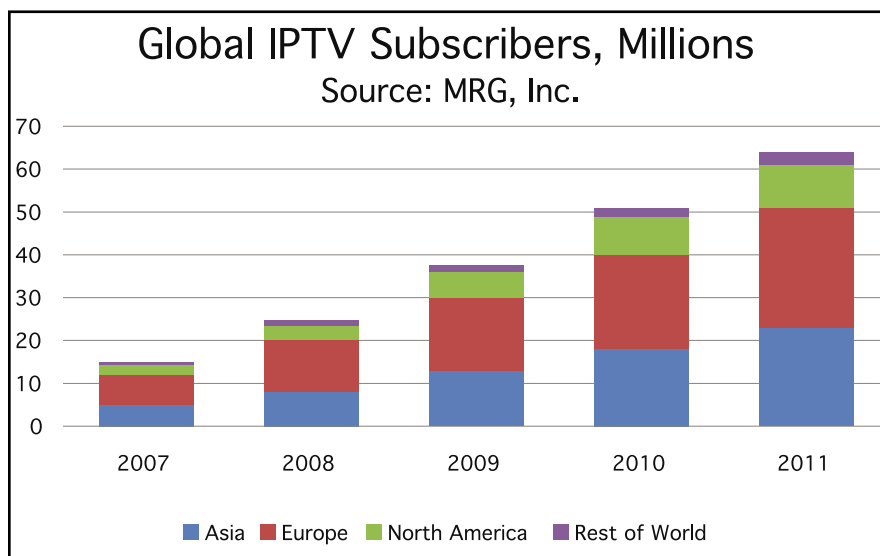
iSuppli, along with other analysts, says telcos' major motivation for investing in IPTV is the weakness of the traditional voice communications market. Suffering under the onslaught of wireless and VoIP competition, telecommunications companies have lost an average of 4 percent annually from their landline subscriber base, and more than 4 percent per year from voice revenues. This phenomenon is universal, with no region and no telecommunications company unaffected.

The telcos hope that their massive investments in IP broadband networks and IPTV will replace this revenue loss with sales of video and other multimedia services to consumers. Analysts seem to think they have a fighting chance of success.

Market research firm MRG (www.mrgco.com) has an outlook similar to iSuppli's, forecasting global IPTV service revenue rising from \$3.6 billion in 2006 to \$20.3 billion in 2011, at a compound annual growth rate of 71 percent. And Infonetics Research (www.infonetics.com) says that IPTV service provider revenue jumped 178 percent in 2006 to \$2.8 billion worldwide (different analyst firms don't always measure revenue in exactly the same way); Infonetics analysts say this growth rate will moderate but continue strong at least until 2010.



Global IPTV Service Revenues



Global IPTV Subscribers

Infonetics estimates the number of global IPTV subscribers grew 166 percent in 2006, hitting 7.2 million worldwide; MRG says the subscriber base will reach 14.3 million in 2007 and grow to 63.6 million in 2011, at a compound annual growth rate of 45 percent. Europe

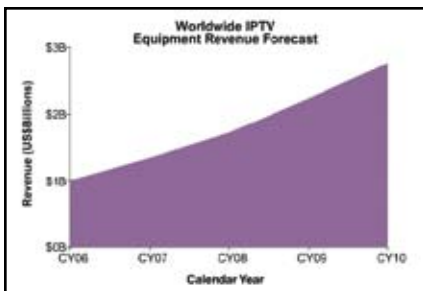
remains the leading region for IPTV, but Asia's prospects have continued to improve as tests in China and India have blossomed into successful deployments.

iSuppli is even more optimistic about subscriber growth, forecasting that global IPTV subscribers will soar to 105

million in 2011, rising at a stunning 98 percent compound annual growth rate from 3.4 million in 2006. To serve this huge base, the telcos' IPTV budget must grow to account for 20 percent of their total capital spending by 2011, including networking equipment, software and customer premises equipment.

Infonetics finds equipment sales and service provider capex posting "phenomenal growth" in 2006, and expects them to continue surging through 2010. IPTV equipment manufacturer revenue jumped 150 percent in 2006, easily passing the \$1 billion mark, Infonetics says.

Infonetics also states that worldwide IP set-top box revenue nearly tripled from 2005 to 2006, reaching \$455 million (up 195 percent). Motorola maintains its worldwide lead in the IP set-top box market in 2006, followed by Amino Communications and Yuxing. Last month, Motorola announced that it had shipped its millionth IP set-top box (a



Worldwide IPTV Equipment Revenue Forecast

statistic due in part to its recent acquisition of competitor Kreatel Communications); the company's IPTV product line also includes network infrastructure, video headend and transport, MPEG-4 encoding, and connected home devices.

iSuppli says the telcos' massive investments in IPTV infrastructure reflect their desperation in the face of the historic decline of their core business in voice communications. But, it adds, for telecom equipment suppliers, the decline in voice and the rise of IPTV represents a boon. There will be plenty of opportunities for suppliers who know where to look.

Good News, Bad News for Telco Suppliers

The good news – according to market analyst firm iSuppli – is that 2007 will mark a recent record high year for telecommunications company equipment spending. The bad news is that growth will be relatively anemic compared to recent years, at only a 1.6 percent rise.

In 2007, telcos are expected to spend nearly \$41 billion on equipment, the highest level since 2002. However, this spending will be up only 1.6 percent from \$40.4 billion in 2006. In comparison, telco equipment spending rose by 10.7 percent in 2006 and by 8.3 percent in 2005. The major reason for the slowdown is focused spending and a "pay-as-you-grow" strategy among telcos.

The marginal increase in 2007 spending is being driven largely by telcos' purchases of equipment to deploy Internet Protocol Television (IPTV) services.

Telcos spent their capex funds in 2006 primarily on access equipment. For 2007, iSuppli expects carriers to continue access-equipment spending at 2006 levels, while significantly increasing investments in their core networks. This shift will be necessary to provide the bandwidth and quality of service necessary to support IPTV growth. The future of carrier capital spending depends on the success of the telecommunications companies' push into IPTV.

North America and Europe will be the beneficiaries of most of these carrier expenditures due to the rapid establishment of IPTV services in those regions. However, IPTV isn't the only factor driving telecom equipment spending worldwide; in developing nations, incumbent carriers are expanding their spending on broadband infrastructure as they focus on increasing data revenue.

High-Definition TV Sweeps Across Asia

Although barriers remain for HDTV delivery in the Asia/Pacific region, consumer revenue from HDTV content will jump from \$3.2 billion in 2006 to \$8.1 billion by 2012, reports In-Stat (www.in-stat.com). More than 9.9 million TV households in Australia, China, Japan, South Korea and Singapore received and watched HDTV programming by the end of 2006, the high-tech market research firm says. In-Stat expects that number to climb rapidly over the next three years.

- HDTV households in Asia/Pacific will reach 42.1 million by 2012.
- Japan is currently leading in HDTV content development, with over 8.5

million households receiving and watching HD service as of the end of 2006.

- HDTV content is being marketed as a premium in Asia/Pacific, with the hope of increasing monthly revenues for cable and satellite operators, as well as providing terrestrial TV broadcasters with a new weapon in the fight against pay-TV services.
- Government initiatives are playing an important part in stimulating the transition from analog to digital in the free-to-air services domain, which will accelerate market development for HDTV content in some countries, including China.

U.S. Sinks Further in the OECD Broadband Top 30

New broadband statistics from the Organization for Economic Co-operation and Development (OECD, www.oecd.org) show the continued progress of broadband overall and the continued decline in the United States' position. The number of broadband subscribers in the OECD increased 26 percent during calendar year 2006, from 157 mil-

lion to 197 million, increasing penetration rates from 13.5 to 16.9 subscriptions per 100 inhabitants. Denmark and the Netherlands surpassed 30 subscribers per 100 inhabitants, and six other countries had more than 26 subscribers per 100 inhabitants. The U.S. is fifteenth, with fewer than 20 subscribers per 100 inhabitants.

Fiber-to-the-home and fiber-to-the-

building subscriptions now comprise nearly 7 percent of all broadband connections in the OECD, and the percentage is growing. Korea and Japan each have more than 6 fiber-based broadband subscribers per 100 inhabitants. Fiber subscribers alone in Japan outnumber *total* broadband subscribers in 23 of the 30 OECD countries.

Rank	Country	DSL	Cable	Fiber	Other	Total	Total Subscribers
1	Denmark	19.6	9.4	2.6	0.4	31.9	1,728,359
2	Netherlands	19.5	12	0.4	0	31.8	5,192,200
3	Iceland	28.8	0	0.2	0.6	29.7	87,738
4	Korea	11.4	10.7	7	0	29.1	14,042,728
5	Switzerland	18.8	8.8	0	0.9	28.5	2,140,309
6	Norway	21.7	3.8	1.5	0.6	27.7	1,278,346
7	Finland	23.5	3.5	0	0.3	27.2	1,428,000
8	Sweden	16	5.2	0	4.8	26	2,346,300
9	Canada	11.4	12.3	0	0.1	23.8	7,675,533
10	Belgium	14	8.4	0	0.1	22.5	2,353,956
11	United Kingdom	16.5	5.1	0	0	21.6	12,993,354
12	Luxembourg	18.2	2.2	0	0	20.4	93,214
13	France	19.1	1.1	0	0	20.3	12,699,000
14	Japan	11.1	2.8	6.2	0	20.2	25,755,080
15	United States	8.5	10.3	0.3	0.6	19.6	58,136,577
16	Australia	15	3.3	0	1	19.2	3,939,288
17	Austria	10.6	6.4	0	0.3	17.3	1,427,986
18	Germany	16.4	0.5	0	0.1	17.1	14,085,232
	OECD	10.5	4.9	1.1	0.3	16.9	197,463,934
19	Spain	12.1	3.1	0	0.1	15.3	6,654,881
20	Italy	13.8	0	0.4	0.6	14.8	8,638,873
21	New Zealand	12.7	0.6	0	0.7	14	576,067
22	Portugal	8.7	5.1	0	0	13.8	1,460,341
23	Ireland	9.1	1.3	0	2	12.5	517,300
24	Hungary	6.1	3.8	0	2	11.9	1,198,709
25	Czech Republic	4.8	2.1	0	3.7	10.6	1,086,620
26	Poland	5.2	1.6	0	0.1	6.9	2,640,000
27	Slovak Republic	3.4	0.7	0.9	0.2	5.1	274,108
28	Greece	4.4	0	0	0.2	4.6	512,000
29	Turkey	3.8	0	0	0	3.8	2,773,685
30	Mexico	2.7	0.8	0	0	3.5	3,728,150