

PON Markets Surge as Vendors Prepare Next-Gen Products

Worldwide sales of passive optical networking (PON) central-office equipment increased by more than 50 percent in the first quarter of this year, driven by a surge in EPON and GPON deployments, says a new report by the Dell'Oro Group (www.delloro.com). The report forecasts a continuation of this trend throughout 2008.

Tam Dell'Oro, President of Dell'Oro Group, says, "PON is being driven by new GPON deployments, especially by Verizon, as well as the resumption of EPON deployments in Japan after a pause in 2007 when operators planned for next-generation networks." Japan's resumption of EPON deployments helped Mitsubishi and Sumitomo overtake Tellabs for the top two spots in the PON OLT market.

But the growth of the PON equipment market is likely to force a shakeout among component suppliers. Light Reading's

Components Insider research service (www.lightreading.com/commchip), which expects worldwide sales of GPON equipment alone to reach \$4.7 billion by 2011, says falling equipment costs are largely due to the introduction of better-integrated, higher-performance products by semiconductor and optical component vendors. However, Simon Stanley, research analyst for Light Reading, notes that the components market "is a very competitive market with lots of competitors, but few vendors can offer complete solutions across the varied PON technologies."

Stanley says, "There are now ten or more vendors in each component segment, including controllers, transceivers, and optical modules. As the industry moves forward with growing volumes of GPON solutions and moves to develop 10 Gbps PON solutions, these vendors are jostling for position. We are likely to see some significant consolidation over the next three to four years, with a small number of vendors taking the top positions."

Key findings of the PON Components User Survey include the following:

- PON is now established as the leading technology for high-speed broadband access.
- Early BPON deployments in North America and EPON in Asia/Pacific are now being superseded by GPON and WDM PON.
- With carriers demanding ever-higher bandwidths, the race is on to provide 100+ Mbps to subscribers. **BBP**

Frost & Sullivan: Fiber Networks a "Viable Long-Term Solution"

New analysis from Frost & Sullivan (www.technical-insights.frost.com) finds that fiber optic networks, despite their high capital expenditure requirements, are looking like an increasingly viable long-term solution for providing a sustainable customer experience without straining the network.

The report finds that broadband networks are to some degree the victims of their own success. "The availability of rich multimedia content and services such as VoIP is driving the growth of broadband services across the world," notes analyst Zachariah Thomas. "Governments and policy makers are

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actively adopting broadband-friendly policies and offering incentives across the board to improve their standings in Broadband League tables.”

Governments across the world have begun to view the Internet and access to it as a positive influence on their populace and the economy in general. Local loop unbundling policies outside the US have led to the emergence of new participants and increased competition in the broadband market, resulting in lower prices and higher user uptake.

The availability of flat-rate pricing

models has also influenced the adoption of broadband services. While this was a good move in the early days, the report says, it poses challenges as users demand greater bandwidth. This is putting pressure on access networks, both from an operational and financial perspective.

“The services and applications the consumers use on their broadband service have changed from activities such as Web browsing and e-mail to more latency-intolerant applications such as streaming video and VoIP,” says Thomas. “This has had a negative impact on the

variable costs of service providers without providing additional revenue.”

Going forward, the success of broadband access services will depend on their ability to support and monetize the increasing demand from bandwidth-intensive applications such as peer-to-peer and streaming video. Broadband service providers must be open to innovative business models and pricing schemes to survive the challenges posed by these trends. **BBP**

Broadband Subscriptions to Reach 415 Million This Year

Worldwide broadband subscriptions will reach 415 million in 2008, representing one billion discrete broadband users, according to a report just released by Strategy Analytics (www.strategyanalytics.com). The number of broadband subscriptions will continue to grow to 621 million by 2012.

While DSL remains the dominant access technology, accounting for two thirds of worldwide subscriptions, newer access

technologies are taking hold. “Fiber and WiMAX will increasingly displace traditional broadband access technologies such as DSL and cable,” says Ben Piper, Director of the Strategy Analytics Broadband Network Strategies service. In the Asia Pacific region, WiMAX is expected to grow from 4.8 million subscriptions in 2008 to 23 million by 2012.

Worldwide, broadband service revenues will increase from \$130 billion

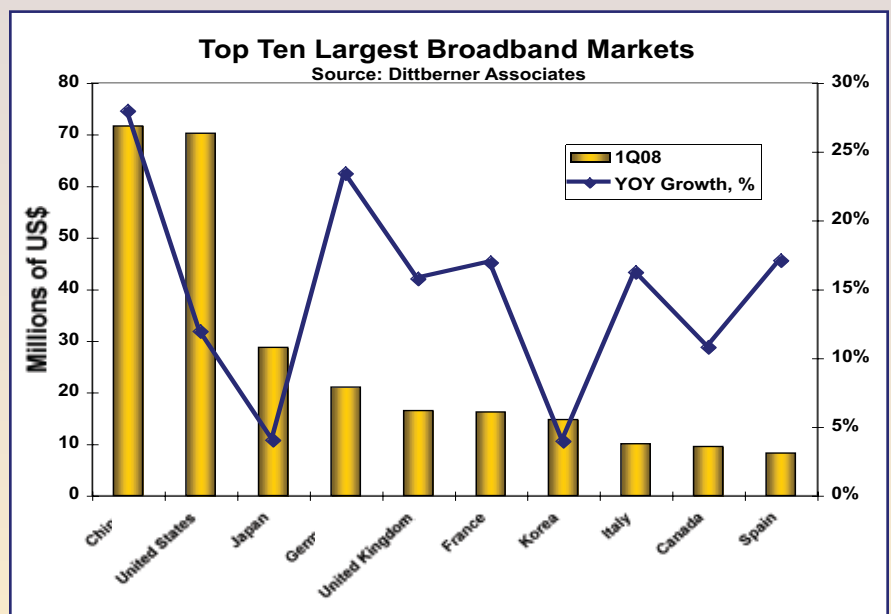
in 2008 to \$190 billion in 2012, with Europe, Asia Pacific and North America leading the way. Globally, average revenue per user (ARPU) for broadband is expected to remain relatively stable.

Global household penetration rates will continue to grow at a steady pace, approaching 35 percent in the next five years, with Latin America and Asia Pacific making up half of all global broadband subscriptions by 2012. **BBP**

China Leads the Broadband Pack...

China overtook the US this year as the largest fixed broadband subscriber market, according to a new report from research firm Dittberner (www.dittberner.com). In the first quarter, China added 4.8 million subscribers, or more than all the subscribers in Australia. Overall, global fixed broadband subscribers increased 5 percent in 1Q08 to reach 355 million.

With China adding 2 million subscribers more than the US each quarter, it had been expected to take the lead. And because China’s broadband potential is still largely untapped – household penetration is only 20 percent, PC households are growing at over 20 percent annually, and cable TV operators are poised to jump into the fixed broad-



Top Ten Largest Broadband Markets

Market	1Q07	1Q08	YOY Growth
China	55,970,000	71,603,400	27.93%
United States	62,727,506	70,211,328	11.93%
Japan	27,585,431	28,694,000	4.02%
Germany	17,028,705	21,011,563	23.39%
United Kingdom	14,244,236	16,484,973	15.73%
France	13,863,001	16,209,096	16.92%
Korea	14,182,554	14,742,485	3.95%
Italy	8,632,000	10,032,500	16.22%
Canada	8,562,917	9,486,175	10.78%
Spain	7,042,940	8,244,136	17.06%

Source: Dittberner Associates, Inc.

band services market – it is likely to continue gaining on the US. Germany also had strong annual growth because it had been slow to deploy broadband in

the past. It will partially close the gap with third place Japan, but Dittberner says it is unlikely to overtake Japan.

DSL now accounts for 67 percent of broadband households, while cable's share slipped to 20 percent. However, Dittberner says cable may be set to grow again in the near term with the adoption of DOCSIS 3.0 – South Korea's Hanaro Telecom, the leader in this technology, has added more than 400,000 "100 Mbps HFC" subscribers since 2Q07. Other service providers, such as JCOM in Japan, Essent in the Netherlands, and Videotron in Canada recently launched "100 Mbps HFC" services as well, and MSOs in the United States are trialing it. **BBP**

...And South Korea Takes the Prizes for Speed and Connectivity

Even though China and the US are the largest broadband markets, they are not the most connected nations by a long shot. The first quarterly "State of the Internet" report published by Akamai (www.akamai.com), the operator of a content delivery network, identifies South Korea as having both the highest Internet penetration and the highest percentage of over-5-Mbps connections. The US is sixth in terms of penetration and seventh in terms of over-5-Mbps connectivity. Akamai's numbers are based on actual traffic flowing through its servers; the company estimates that it sees approximately 1 billion users a day.

Nearly 64 percent of connections from South Korea to Akamai occurred at over 5 Mbps, putting the country far ahead of Japan, which occupies the second slot with 48 percent over 5 Mbps. The percentages drop off rapidly after that; the United States has just over 20 percent of the connections at "high broadband" speeds. If a lower cutoff speed of 2 Mbps is used to define high bandwidth, South Korea is still at the top of the list but the United States moves down to the 24th position.

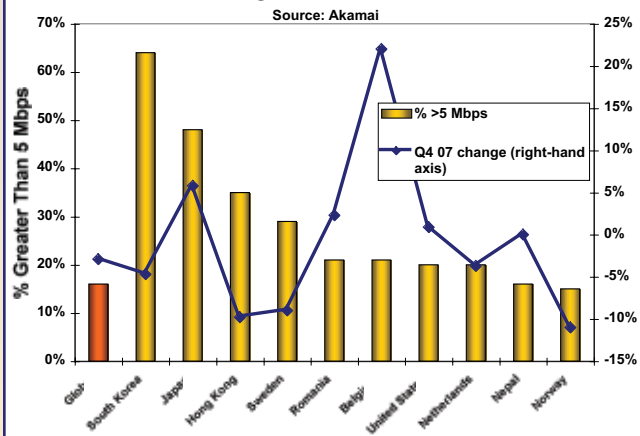
Quarter-to-quarter changes varied across countries, with Belgium showing the greatest increase and Norway showing the

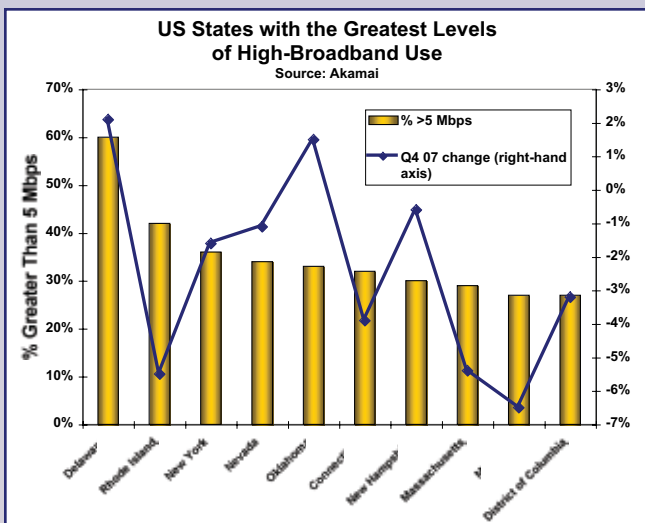
Countries with the Greatest Levels of High-Broadband Use

Rank	Country	% >5Mbps	Q4 07 change
-	Global	16%	-2.9%
1	South Korea	64%	-4.7%
2	Japan	48%	+5.8%
3	Hong Kong	35%	-9.8%
4	Sweden	29%	-9.0%
5	Romania	21%	+2.3%
6	Belgium	21%	+22%
7	United States	20%	+0.9%
8	Netherlands	20%	-3.7%
9	Nepal	16%	n/a
10	Norway	15%	-11%

Source: Akamai

Countries with the Greatest Levels of High-Broadband Use





greatest decline. The United States showed a slight gain quarter over quarter, which Akamai attributes to increased adoption of fiber-to-the-home services.

Many of the same countries also appear at the top of the Internet penetration list, which is based on unique high-broadband IPs per capita. South Korea, Sweden, Japan, and Hong Kong occupy the four top slots in both lists.

Within the United States, most of the over-5-Mbps connectivity is found on the East Coast, in Verizon's FiOS territory. Delaware holds a commanding lead, with 60 percent of connections from the state connecting to the Akamai network at speeds over 5 Mbps. Rhode Island comes in second, with 42 percent of the connections occurring at speeds over 5 Mbps. Given the small size and high population density of both states, as well as their proximity to major East Coast cities, it is not entirely surprising that they show such high levels of broadband connectivity. Seven states had less than 10 percent of their connections to Akamai occur at speeds greater than 5 Mbps, with Hawaii at the bottom of the list at 2.4 percent. **BBP**

Countries with the Greatest Number of High-Broadband IP Addresses Per Capita

Rank	Country	% >5Mbps IP Addresses Per Capita
-	Global	0.005
1	South Korea	0.16
2	Sweden	0.12
3	Japan	0.09
4	Hong Kong	0.08
5	Netherlands	0.07
6	United States	0.06
7	Norway	0.06
8	Iceland	0.05
9	Belgium	0.05
10	Denmark	0.05

Source: Akamai

US States with the Greatest Levels of High-Broadband Use

Rank	State	% >5Mbps	Q4 07 change
1	Delaware	60%	+2.1%
2	Rhode Island	42%	-5.5%
3	New York	36%	-1.6%
4	Nevada	34%	-1.1%
5	Oklahoma	33%	+1.5%
6	Connecticut	32%	-3.9%
7	New Hampshire	30%	-0.6%
8	Massachusetts	29%	-5.4%
9	Maryland	27%	-6.5%
10	Dist. of Columbia	27%	-3.2%

Source: Akamai

Home Networking Goes Mainstream

Today's broadband consumer is increasingly becoming a networked consumer, and more than half of broadband users in the United States today have some form of home network, according to a recent survey conducted by ABI Research (www.abiresearch.com). This growth – up from one third of broadband subscribers in 2006 – comes as service providers increasingly push more advanced gateways with embedded WiFi, and consumers look to extend their broadband connections beyond the original single connection in the home office.

“The home network is no longer an early adopter technology, as increasing numbers of consumers look to laptops and PCs as well as newer devices such as gaming consoles and even WiFi-enabled mobile handsets,” says ABI research director Mike Wolf. “Our research shows that more than one quarter of home network owners say they have a game console on their home network, while another 8 percent say they have connected their mobile phone.”

This maturing of the core home networking business has resulted in home

network vendors looking for new areas of growth beyond their gateway and home router product lines. Results from new areas of focus such as media adapters and network-attached storage are mixed thus far, as consumers have yet to adopt these new product categories en masse.

“Fifteen percent of home network owners today are streaming music over the network and another one in ten is streaming video,” notes Wolf. “These are early indicators that there will be consumer interest in these next-generation applications around the network. The key over time will be to create easy-to-

Gartner's latest report says that IPTV faces an uphill struggle to penetrate the consumer market if it remains a stand-alone pay-TV service.

use products that integrate seamlessly with the living room, an area of the home that carries with it different expectations regarding usability and end-user experiences. Ultimately, we expect more integration with existing consumer electronics products as well as a greater role for the service provider in managing networked media applications.”

INTEGRATING HOME NETWORKS WITH IPTV

Research firm Gartner Inc. (www.gartner.com) looks forward to the integration of home networking with IPTV. Gartner's latest report says that IPTV faces an uphill struggle to penetrate the consumer market if it remains a stand-alone pay-TV service. In an industry dominated by incumbent cable and satellite operators, as well as traditional terrestrial free-to-air network broadcasters, Gartner says IPTV operators need to entice consumers with a range of bundled services, including IP-based home networking, offering a one-stop, whole-home solution.

“Although today's newest, leading-edge PC-based home networks are able to deliver high-quality video and audio around the home, most consumer electronic products, such as TVs, digital set-top boxes and DVD players, remain stubbornly isolated in their ability to communicate with other equipment over a wide area,” says Paul O'Donovan, principal research analyst at Gartner. “As the Internet increasingly becomes a source for video consumption by a wider family audience, there is a need to address this issue and expand home networking options.”

Gartner believes that the set-top box is well placed to become a core component of an entertainment-based home network, particularly in countries with a high number of cable TV homes (penetration of 40 percent or above) or countries with a large number of homes passed by cable TV.

In the US, cable companies have already introduced home networking solutions using cable STBs linked by existing coaxial cable. This has distinct advantages, because in many US homes most rooms are already connected with coaxial cable, so no new wires are required to bring the home network together.

IPTV pay-TV services can also use the existing coaxial networks in US homes; many homes have multiple coaxial sockets. However, few houses in Europe, Japan and Asia/Pacific have multiple TV sockets around the home, so a networking solution based on coaxial cabling using pay-TV STBs from cable or IPTV operators is less likely to be commercially viable in these regions. Instead, STBs with wireless connectivity – using, for example, 802.11n – could be an opportunity for pay-TV operators in these regions.

“As long as it was simple for consumers to set up and gave a good quality of service, this would also have the advantage of being able to connect into an existing PC wireless network,” says O'Donovan. “However, for ease of installation and consistency of service in the home, a network combining wired and wireless technologies will be the most successful topology.”

The real commercial advantage for the telecom companies will be their ability to offer consumers bundled services, such as broadband Internet access, mobile cellular services, and voice and IPTV services, including voice over IP. This combination of services can be networked around the home, offering flexibility and one-stop provision from a single supplier, which will be enticing for the average customer.

Gartner expects home networking to become commonplace in consumer electronic hardware in the next five to six years, predicting that whether consumers need the functionality or not, it will be

embedded in many products. O'Donovan says that in North America, digital cable and IPTV will be the mainstay of entertainment-based home networking, while in other regions, a mixture of PC-based media centers, game consoles, DVD players and recorders, and pay-TV cable and IPTV STBs will be how home networking reaches the mass market.

“The PC is an important part of the entertainment-based network, and most networks will contain one, but the PC is not a crucial part of the future home network,” he says. “Consumer electronics companies are aiming to build connectivity to components with or without the PC being present.”

USING EXISTING WIRING

Research from In-Stat (www.in-stat.com) finds that approximately 90 percent of all US homes have at least one coax cable outlet (not including those used solely for a roof antenna), while almost 99 percent have one or more telephone wall jack, and 37 percent have at least one Ethernet cable outlet. As a result, the number of North American households with in-home provider network nodes over coax or phone wiring will climb dramatically from 2007 to 2009.

“The cost of deployment is the primary driver behind the use of existing residential wiring,” says Joyce Putscher, In-Stat analyst. She says that while some rewiring is necessary because coax is sometimes in poor condition or not installed in a way that will support home networking, the cost of using existing coax is still significantly lower than running Ethernet.

Recent research by In-Stat found the following:

- Networking of set-top boxes will be driven by telco TV and the whole-home DVR.
- Global cumulative chipsets/nodes over coax and phone wiring will see growth above 100 percent in 2008.
- The ITU-T G.hn international effort is expected to make a positive impact in terms of standardizing an existing-wire solution for coax, phone wiring/twisted pair, and powerline. **BBP**