

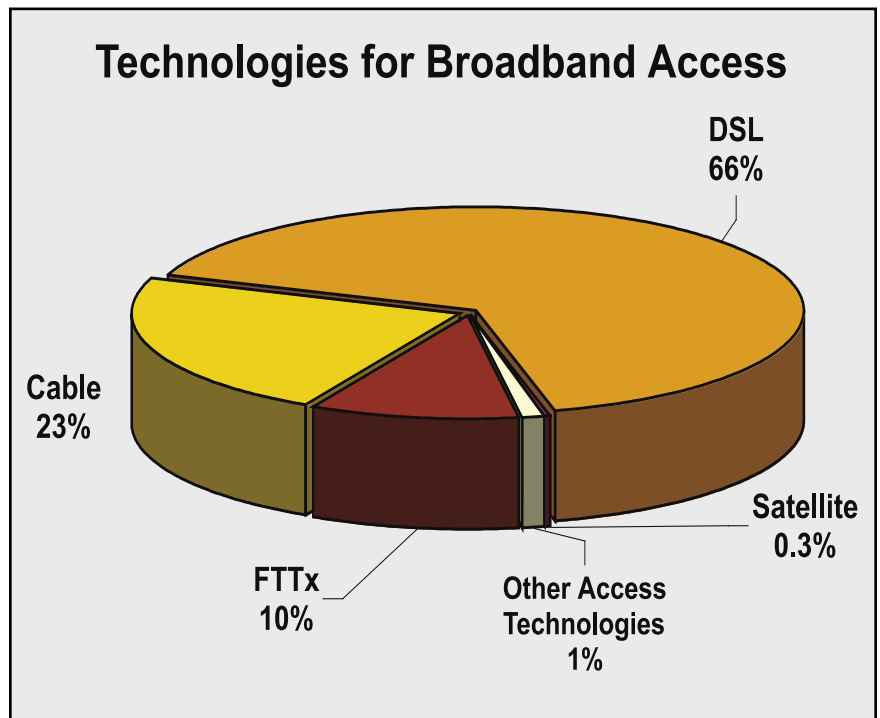
Focus: Broadband demand increases worldwide; capital expenditures follow, especially at customer premises

1.25 Million Signing Up for Broadband Each Week

Global broadband subscribers reached more than 263 million in September, 2006, with an additional 1.25 million people signing up each week, according to statistics prepared for the international DSL Forum by industry analyst Point Topic (www.point-topic.com).

Two thirds of new subscribers chose DSL, the most popular broadband access technology with a 65.6 percent market share globally, rising to 82 percent in the European Union – the world's largest broadband region.

Point-Topic's market research shows that the largest broadband market in the world is the United States, with more than 55.5 million subscribers, followed by China at 48.5 million. Japan (where DSL subscribers are rapidly turning to FTTx), in third place, has almost 26 million. Together, these three countries account for almost half of all broadband connections globally.



Worldwide, fiber to the home is catching up to cable, but DSL still rules the roost.

Why We Need Fiber

Higher DSL Download Speeds Compromise Service

A report in British publication *Comms Business Magazine* suggests that telcos may actually jeopardize quality of service by upgrading from lower-speed ADSL to higher-speed ADSL2+. *Comms* cites a VoIP reseller who explains that ADSL2+ uses a different contention policy from the original ADSL standard. Under the original standard, bandwidth is assigned for the duration of a task, like downloading a file or making a VoIP call. Under ADSL2+, however, bandwidth can be reassigned dynamically when it is needed for another task. According to the reseller, "We have seen upstream capacity decrease to lower than 57 Kbps in peak working hours, which is simply not viable for a VoIP application."

Fiber-to-the-Home Reaches 5.4 Million Subscribers in Japan

Fiber-to-the-home subscribers in Japan increased by 88 percent in 2005, reaching 5.4 million at the end of March, 2006, according to a new report by Japanese market research firm Yano Research Institute (www.yanoresearch.com). Japanese sales of FTTH systems reached \$645 million in 2005, \$555 million of which was for passive optical

networking (PON) systems.

The biggest factor contributing to the increase of FTTH subscribers is lower fees for IP phone service, along with conventional telephone number portability and lower fees for broadband Internet access services. About two thirds of new FTTH subscribers signed up for VoIP at the same time.

Yano estimated that the total number of FTTH subscribers would grow by more than 3 million per year and exceed 27 million by 2011.

They also forecast that the demand for the access systems would hold at approximately the same level as, or even slightly higher than, fiscal 2005 for several more years.

FTTH Will Be Asian "Access Technology of Choice" Thanks to Content

A new study from Frost & Sullivan (www.frost.com) confirms Point-Topic's numbers and finds that the Asia Pacific market for broadband remote access servers is experiencing healthy growth due to broadband subscriber growth, service providers' efforts to deliver differentiated products, and rising demand for higher-speed Internet access.

Current low penetration rates offer immense growth opportunities in the Asia Pacific broadband access market

until 2009, Frost & Sullivan note. Flat-rate and unlimited-access pricing plans by service providers and narrowing differentials for dial-up and broadband services are also expected to boost broadband uptake.

"The availability of an extended list of content has further accelerated growth," notes the analyst. "Governments' initiatives and support are further catalysts for the growth of the broadband industry in Asia Pacific."

Although DSL remains the most popular broadband access technology, fiber-to-the-home subscriptions are catching up in countries such as Japan and South Korea and FTTH is expected to replace DSL as the access technology of choice in future. These factors have aided the rollout of equipment and functionality by service providers across the region and are likely to help the market grow up to \$605.8 million annual revenue in 2011.

Telco TV Increases Demand for Headends

A large number of headends have been built in 2005 and 2006 to support increasing telco TV deployments, and the wide availability of H.264 compression equipment in 2006 has prompted telcos to move forward with deployment plans, reports In-Stat (www.in-stat.com). Growth in telco TV deployments and subscribers will result in the building of more than 800

headends between 2005 and 2010, the high-tech market research firm says.

In addition, telcos that already own headends will upgrade to take advantage of technology advances, further fueling the telco TV headend boom. In the near term, upgrades will come from telcos adding high-definition channels to their existing standard-definition channel lineup. In 2009 and 2010, tel-

cos are expected to replace older equipment, since improved compression algorithms will enable them to offer more channels. Telcos will also want to put an individual stamp on their TV offerings with services like ad insertion.

Total telco TV headend revenue opportunity will reach \$869 million in 2010, In-Stat predicts.

Worldwide Telecom Industry In Growth Mode

Service revenues in the global telecommunications industry will reach \$1.3 trillion by the close of 2007, with continued strong growth in wireless leading the way, says a new report from The Insight Research Corporation (www.insight-corp.com). Wireless service revenues are expected to grow at nearly 10 percent over each of the next few years, while wireline service revenues will grow much more modestly, at two percent. Nearly all of the growth in both sectors is expected to occur in broadband services,

with wireless broadband service revenues expected to grow at a compounded rate of more than 60 percent over the forecast period, while wireline services grow at 10 percent over the same period.

Service providers are trying to create viable business models to deliver new types of IP-based services, including residential video telephony, fixed-mobile convergence, file sharing/downloading, audio/video streaming, location-based services and presence-based services.

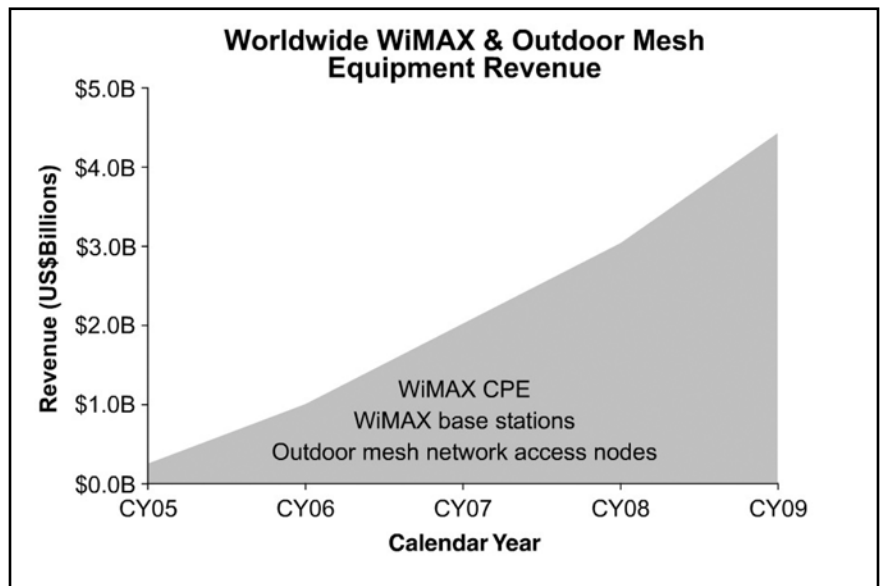
“The telecommunications industry has fully recovered from the malaise of the past few years and is again in a growth mode as it ramps up to build the broadband networks that will provide new service types,” says Insight Research president Robert Rosenberg. “But even with the build-outs going full steam ahead, the overall revenue contribution from these new IP services is expected to be modest. Voice still rules, and will for some time to come,” Rosenberg concluded.

Mobile Equipment Sales Up in Third Quarter of 2006

The worldwide move toward greater mobility continues, says Infonetics Research (www.infonetics.com) in three recent reports tracking the radio access network, WiMAX/outdoor mesh network, and wireless LAN equipment markets.

According to the reports, worldwide RAN equipment sales rose 9 percent to \$9.58 billion between 2Q06 and 3Q06; wireless LAN equipment sales increased 19 percent to \$780.03 million; WiMAX equipment sales shot up 23 percent to \$173.53 million; and outdoor mesh equipment sales jumped 38 percent to \$121.40 million.

“The range of licensed and unlicensed wireless broadband and mobile technologies now available leads to some interesting opportunities for operators, but also some potentially disruptive challenges to existing business models,” said Infonetics Research analyst Richard Webb. “All operators are looking at fixed-mobile convergence, but there are now several ways they can get there.”



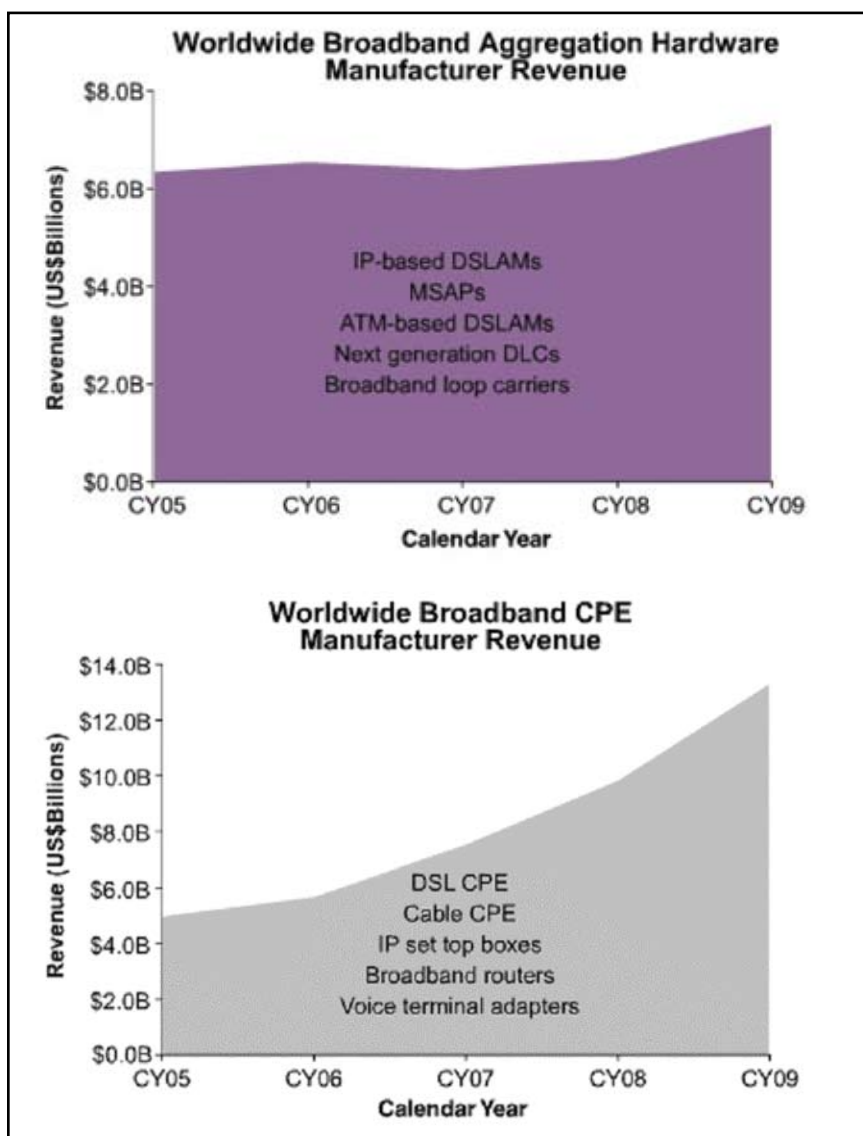
Annual WiMAX equipment sales revenue is expected to reach about \$5 billion by 2009, says Infonetics Research, from a base of almost zero in 2005. Then, virtually all sales were due to fixed WiMAX point-to-point equipment. But the mix now includes mobile WiMAX gear such as outdoor mesh access nodes, along with base stations and customer-premises equipment.

Broadband Use Spurs Equipment Sales; IPTV Growth is High

DSL is not dead yet. DSL port shipments are continuing to grow, but intense competition drove down revenue for DSL aggregation hardware manufacturers, even in the face of high IPTV demand. In the third quarter of 2006, strong worldwide growth in broadband use spurred big revenue increases for manufacturers of customer-premises equipment (CPE) and cable modem termination systems (CMTS).

Three new reports from Infonetics Research found that:

- Worldwide broadband CPE sales increased 8 percent to \$1.5 billion.
- CMTS sales jumped 14 percent to \$256.5 million.
- DSL aggregation hardware sales dropped 16 percent to \$1.5 billion.
- DSL port shipments are expected to increase 19 percent between 2005 and 2006, and will continue increasing quarterly through at least 2009.
- The number of worldwide IPTV subscribers will reach 69 million in 2009.
- The number of worldwide cable broadband subscribers will reach 71 million in 2009.
- The number of worldwide DSL subscribers will reach 274 million in 2009.



Although unit prices are eroding fast, DSL-related broadband equipment sale dollar volumes will rise in 2007 after a flat 2006, and actually accelerate modestly in 2008 on the network side says Infonetics Research. The big revenue growth will be in customer-premises equipment, however, for all forms of broadband access. Some earlier studies by others, blending CPE and network equipment for DSL, sounded more optimistic.

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USA Wireless Data Market Growing Very Rapidly

The top three U.S. wireless carriers – Verizon, Cingular and Sprint Nextel – have each passed the \$1 billion-per-quarter mark in wireless data revenues, according to an update from industry analyst Chetan Sharma (www.chetansharma.com). By the third quarter of 2006, wireless data revenue had already reached \$10.5 billion, compared to \$8.6 billion for all of 2005.

Due to aggressive marketing by Verizon and Spring Nextel, the 3G subscriber base in the U.S. continues to grow and is expected to accelerate, with 2007 being the inflection year. Between the two competing technologies in this area, EV-DO leads WCDMA in both coverage and handset diversity. As of September 2006, 14 of the 15 3G handsets available in the market used EV-DO

technology, and data revenue per user was 20 percent higher for EV-DO handsets. Falling prices for smartphones is expected to spur wider adoption next year.

Several high-profile mobile virtual network operators launched over the last year, but the results were disappointing due to poor execution, crowding and competition. Mobile ESPN was the first to bow out last quarter.

All-in-One Wireless Devices Fuel Industry Growth - Maybe

Telecommunications Industry Association President Matthew J. Flanigan says that consumer demand for multiple services on a single wireless device is fueling a huge worldwide growth in wireless communications.

According to Flanigan's keynote address at the International Wire and Cable Symposium in November, consumers are increasingly seeking all-in-one devices that serve as phone, speakerphone, address book, calendar, still and video camera, e-mail and text messenger, radio, television, calculator, Web browser, voice recorder, currency converter, Bluetooth transmitter, global positioning services unit, business applications device and

game player – with unlimited battery life and maximum security.

However, recent research by In-Stat (www.in-stat.com) found that most users are still carrying redundant devices. More than 15 percent of people carry two wireless phones, 80 percent of camera phone users regularly carry their digital cameras, 75 percent of SmartPhone users also carry a PDA, and more than 50 percent of users of multimedia phones also carry their MP3 player. While almost half of In-Stat's survey respondents believed that they would carry fewer devices by owning a SmartPhone, most end up carrying a PDA anyway.

Flanigan reported that the number

of wireless customers has now surpassed the number of landline customers in the U.S. and in many other countries, including China and India. Looking ahead, Flanigan told the symposium audience to expect tougher competition, more consolidation, new service providers and new manufacturers, a global marketplace driven strongly by the Internet and Internet protocol-enabled services, more pressure on prices and delivery schedules, miniaturization, additional features in one device, shorter product lifecycles, faster-paced innovation, and international partnerships and relationships, as well as many more acquisitions by Chinese and Indian companies.

Asia Pacific Smartphone Market Entering Mass Adoption Stage

The Asian-Pacific smartphone market is entering the mass adoption stage, according to high-tech market research firm In-Stat (www.in-stat.com). In 2006, 18.8 million smart-

phones will be sold in the Asia Pacific region – double the number from 2005 – and that figure is expected to surge to 64.2 million in 2010. This rapid growth is a result of better design,

better functionality, more third-party applications, more WiFi hot spots, the introduction of middle-range smartphone models, better pricing and manufacturers' long-term plans for

product portfolios.

In-Stat found that while more smartphone models will become

available, they will standardize on a smaller number of operating systems. Vendors have been working on an op-

erating system adoption roadmap and a framework for helping application development.

Cable TV Service Revenues Grow Worldwide

While cable TV operators are experiencing only modest growth in the number of households they serve, their service revenues are rising at a much faster clip. Consumer demand for more TV content, combined with the rollout of new voice, video and data services, is fueling growth in both pay-TV services and telecommunications service bundling, according to

high-tech market research firm In-Stat (www.in-stat.com).

Highlights from In-Stat's research include:

- More than a quarter of the world's 1.2 billion TV households are cable TV subscribers.
- Total worldwide cable TV households increased by only about 2 percent in the last year.

- China, with 106 million cable TV households, and the United States, with 69 million cable households, are the two largest cable TV markets.
- Cable modem service continues to be a "cash cow" for cable operators. Worldwide cable modem service revenues are on track to reach \$26 billion in 2006, up from \$22 billion in 2005.



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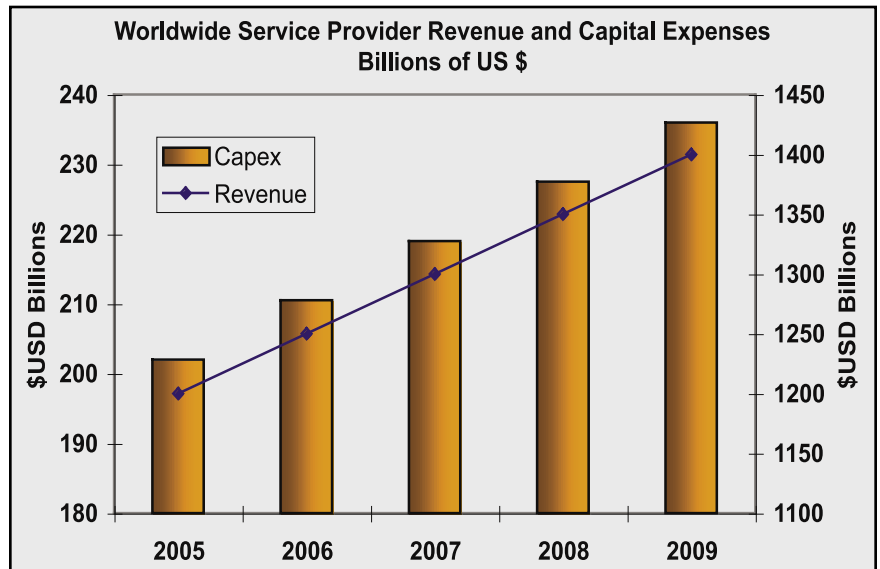
Telecom Carriers Enter A New Investment Cycle

The telecommunications industry has entered a new investment cycle, as demonstrated by the increase in carrier capex in all regions of the world, according to new reports from Infonetics Research (www.infonetics.com)

Publicly owned wireline and mobile service providers in North America, Europe, and Asia Pacific spent a combined \$192.8 billion on capital expenditures in 2005, and are projected to increase their capex 5 percent to \$203.1 billion in 2006.

Voice network spending is generally trending up due to spending on broadband, VoIP, and wireless networks, as well as the move to IP/MPLS/Ethernet networks, says Infonetics. Meanwhile, investments in legacy gear are flat or declining, reflecting incumbents' cap-and-grow strategy.

Opex-to-revenue ratios are higher in Asia and Europe than in North America, due to the rapid consolidation among



Worldwide service provider revenue will continue to grow as customer rolls grow, Infonetics Research predicts, but capital expenses will keep pace, at about 17 percent of revenue. That makes many investors nervous.

US telcos. US incumbent consolidation in turn forced tier-1 vendors to consolidate as well (Alcatel-Lucent, Ericsson-

Marconi, and Nokia-Siemens), who together will see more than \$60 billion in annual revenue in 2006.

Consumers Want New Applications, Will Pay Premium for Better Broadband

Businesses and consumers are willing to pay a premium for mobile high-speed data services such as VoIP, interactive video and video sharing, and for the network to support them, according to a survey conducted by Lucent (www.lucent.com).

Lucent surveyed U. S. consumer mobile phone users and enterprise communications technology decision makers to find out which applications would be of most interest on emerging 3G mobile broadband networks. The survey gauged interest in five applications: VoIP, videoconferencing, communicate and collaborate, multi-

casting and business continuity.

VoIP, consisting of basic VoIP and IP PBX features, was the most popular with business decision makers and was the top driver for switching carriers. Lucent also found that enterprises would be willing to pay a monthly premium for "a new cellular broadband service that offers higher speed, simultaneous voice and data along with reduced latency performance." Companies that use existing mobile high-speed data services are much more willing to pay a premium than enterprises that do not currently have high-speed service.

Among the topics covered with consumers, Lucent evaluated interest in video calling, video sharing, multimedia ring-back, content sharing and "share and discuss." Video calling and video sharing were the two most popular applications.

Nearly half of all consumer survey respondents said they would pay extra for "a cellular broadband service with DSL-like speed and simultaneous voice and data." As with businesses, the willingness to pay for premium service is much greater for those who already spend money on services like SMS text messaging, video/TV, ringtones, games and Internet access.

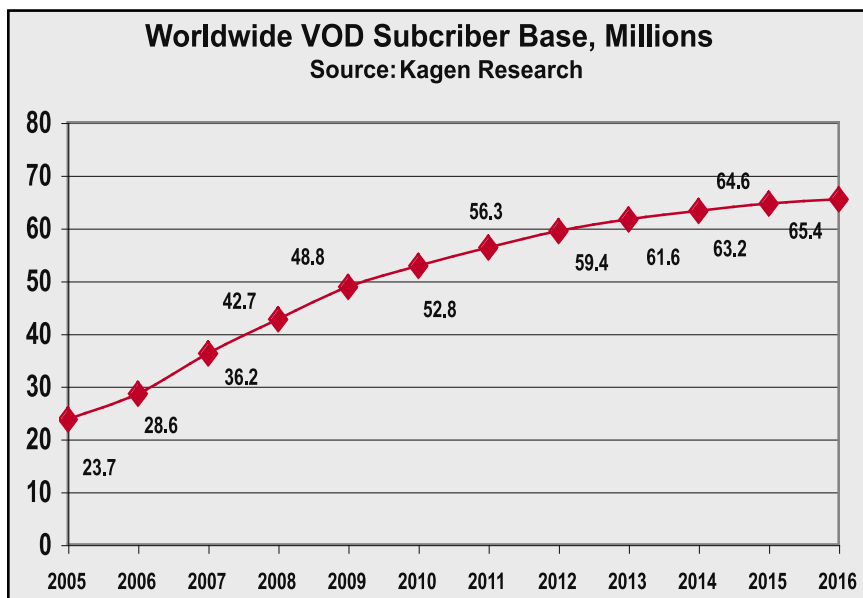
Kagan Forecasts 65.9 Million U.S. VOD Homes by 2016

A new study from Kagan Research reports that in spite of obstacles posed by digital video recorders, digital rights management and bandwidth constraints, on-demand services still offer distributors the potential for a major revenue stream.

The report concludes that the number of cable VOD homes will grow as the number of digital subscribers grows – rather than from new cable systems adding the VOD feature. There were an estimated 26.2 million VOD-capable homes by mid-2006. Approximately \$757 million was spent on cable VOD programming in 2005, and Kagan forecasts that \$1.1 billion will be spent in 2006.

Other key findings include:

- Subscription VOD services, like those from HBO, Showtime and Starz!, had 10.5 million subscribers in 2005, and Kagan sees that number growing to 16.3 million by the end of 2006. Subscription VOD homes should grow at a pace slightly lower than that for total VOD homes over the next decade.
- Network-based on-demand services continue to reach a broader audience using a combination of free, pay and subscription-based models. The increased reach and reliance on free content has resulted in robust usage trends, making the use of advertising models increasingly viable though still technically limited.
- Telco TV initiatives will generate about \$22 million in combined PPV and VOD revenues.



New video subscribers in the US, more so than existing cable subscribers, will be more likely to have video on demand in the coming decade. Even so, growth will be high, Kagen Research predicts.

Experiencing the Possibilities of Broadband

Killer App Magazine

(online at KillerApp.com) is the leading source of information about new applications that take advantage of broadband and ultrabroadband networks, and about the impact of those applications on communities and individuals.

We keep readers up to date with news and insights about network applications that promise to change the way we live, work and play, and we tell you how consumers, businesses, educators, government agencies and others are using these applications today to enhance lives and increase opportunities.

“Nobody’s building fiber for the sake of building fiber. It’s what fiber enables that we’re all so interested in.”

– The editors of Killer App

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