Digital Entertainment in the Home:
The Home Computer & Connectivity

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1.1 The Market Opportunity

The home networking industry stands at a crossroads between early successes and future growth opportunities. With an established footprint of approximately 30 million U.S. households with broadband connections, 22 million each with digital cable or direct-broadcast satellite (DBS) television service, nearly 17 million households with data networking solutions, and more than 40 million households with DVD players, the number of companies with a stake in the future of delivering home networking solutions has grown exponentially. The list of companies poised to exploit the opportunities that this market is expected to provide is a veritable "Who's Who" of the Fortune 500, including content producers and providers; broadband and television service companies; chipset and software vendors; and hardware developers in the personal computer (PC), consumer electronics (CE), and home networking sectors. In fact, only a small minority of companies are not actively interested in partaking of the digital entertainment pie.

At its core, this market is driven by the continuing consumer appetite for entertainment content and products, which is substantial. Including consumer electronics and home computer equipment (including related accessories and peripherals); consumer expenditures for movies, music (CDs and downloads); and monthly pay television subscription revenues, total revenues for consumer entertainment totaled nearly $200 billion in 2003.[1] Parks Associates' projections to 2009 indicate that consumers will increase this spending by approximately 50% (see figure below). Based on our recent research, we anticipate that a significant amount of these outlays will be aimed at products and services that capture consumer demand for entertainment on their terms, that is, content anytime and anywhere within the home.

[1] The estimates and revenue projections for consumer entertainment expenditures are based on estimates from the Consumer Electronics Association (CEA), subscriber revenue figures derived from various cable television providers, DIRECTV (Hughes), DISH Network (EchoStar), the Recording Industry Association of America, the Motion Picture Association of America, and PriceWaterhouseCoopers.

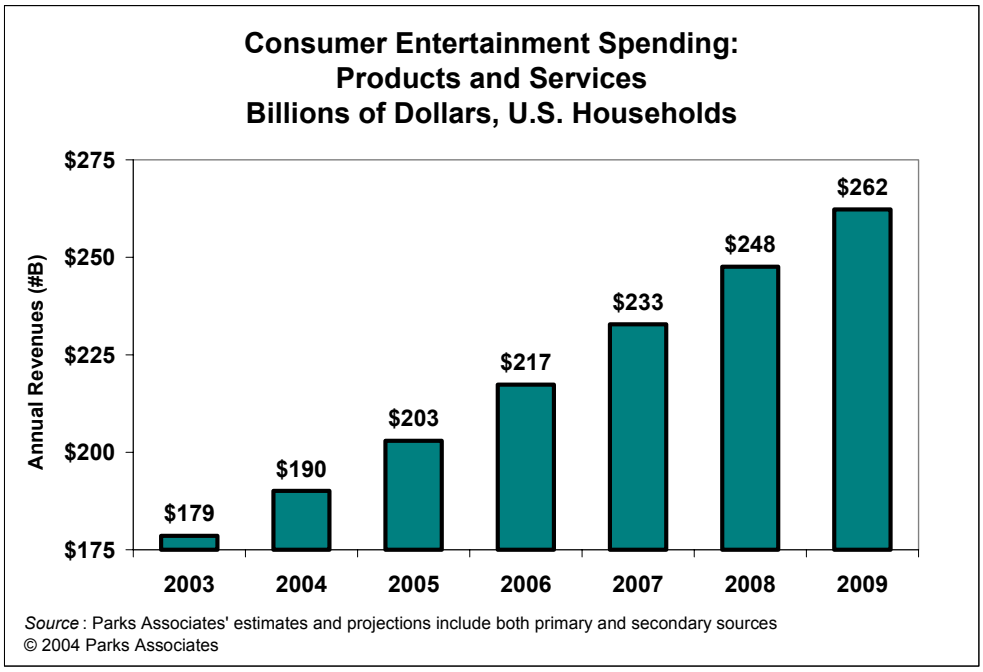

Figure 1 Consumer Entertainment Spending: Products and Services

This white paper analyzes the market for home multimedia network products and services. In addition to drawing on Parks Associates' primary consumer research, it provides an industry overview of the drivers and inhibitors to multimedia networking from the perspective of the content providers to the home and the developers of networking hardware and equipment in the home.

1.2 The Role of "Multimedia Ecosystems"

A popular argument among industry pundits whether the bulk of consumer spending for entertainment products will be geared toward products such as the home computer or traditional consumer electronics platforms (DVD players, stereos, TVs, etc.). There also exist many opinions from observers about how rapidly consumers can be expected to purchase convergence platforms for digital entertainment applications. These devices may resemble home computers in their styling (and brand name), but they'll include sufficient hardware and software capabilities to facilitate television recording and viewing as well as the organization and editing of such content as music, photos, and home videos. Devices such as set-top boxes and other consumer electronics platforms are also growing in sophistication as well, incorporating more powerful processors, larger hard drives for content storage, and unique

software capabilities to allow them to serve more of a role for entertainment and content viewing and sharing beyond television and movies.

In the end, digital entertainment is going to revolve around both the home computer and consumer electronics platforms, both stand-alone devices and integrated "media hubs." The development of different types of platforms for media interaction will be based largely on the habits that consumers are developing today in using different types of media for entertainment, communication, and sharing. This digital content can be organized into "multimedia ecosystems" (as pictured below), and understanding consumer behavior as it relates to interaction with the content below will determine the development, design, and sale of a variety of digital entertainment platforms.

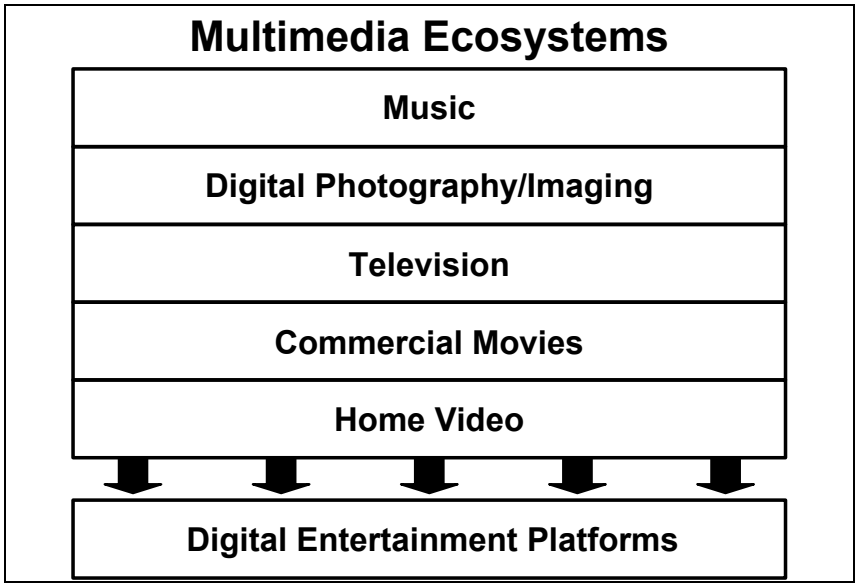

Figure 2 Multimedia Ecosystems

Commercial and self-created/personalized media content will be a driving force behind consumer acquisition of digital products and services, including home networking. The early market for the development and deployment of digital home solutions will follow a very platform-specific approach, as large numbers of consumers are not going to partake in a wholesale replacement of their existing PC and CE platforms, substituting them a single device that functions as media rendering, storage, aggregation, and streaming platform for the home.

Usage scenarios will dictate this fairly application-specific platform deployment for the foreseeable future. For example, home computers are just now reaching the point where

large numbers of consumers view and use them as music storage/personalization/copying tools (Figure 3).

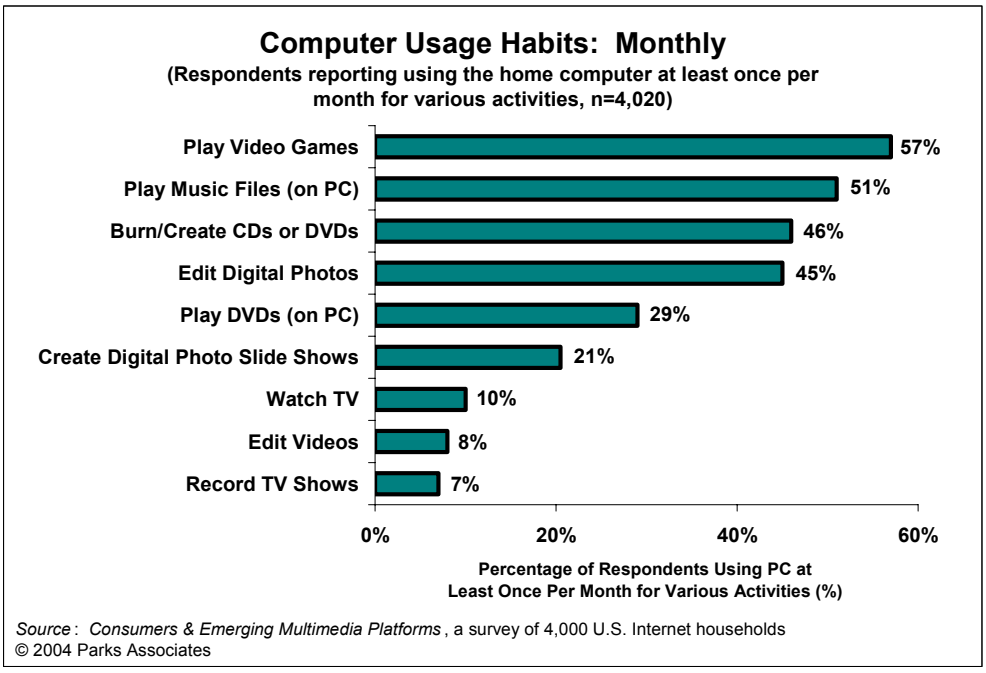

Figure 3 Computer Usage Habits: Monthly

The same can be said for digital photography – the home computer is and will remain the primary platform to which end-users will download pictures (from a stand-alone digital camera or an integrated camera phone), store and edit them, and share them via e-mail. The home computer's advantages for these roles are fairly straightforward – plenty of hard drive storage, intuitive (at least for the practiced user) input devices such as the keyboard and mouse, simple interfaces (USB and to a lesser extent IEEE 1394) to connect portable media devices such as MP3 players and digital cameras/camcorders, software for media creation and playing is fairly easy to find, and a growing number of home computers include the capability to copy/burn CDs and/or DVDs. Figure 4, shown below, points out that a growing number of primary home computers include these and other entertainment/media-related applications.

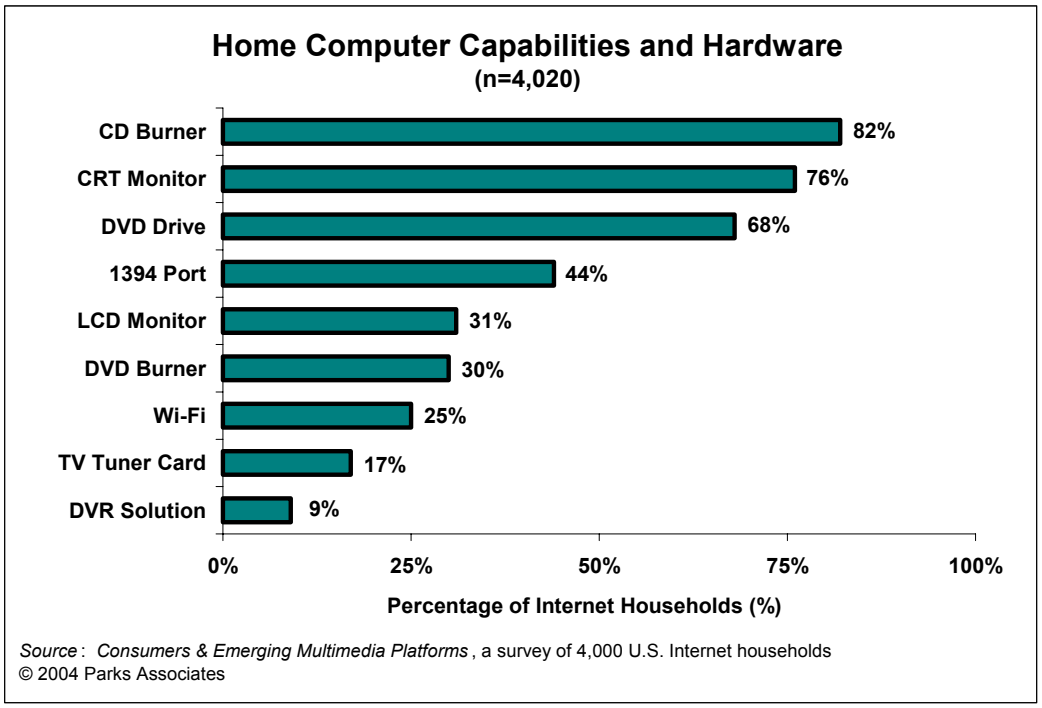

Figure 14 Home Computer Capabilities and Hardware

Meanwhile, the set-top box remains for the foreseeable future the dominant video reception and storage device, certainly for incoming video from cable and satellite television connections. Given the intense competition taking place between cable and satellite vendors, these service providers have quickly acknowledged that the deployment of more advanced set-top boxes – particularly those with DVR capability – is a key to customer acquisition and retention. Services that have been slow to emerge, such as true video-on-demand (VOD) and high-definition television (HDTV) will be deployed in greater numbers as valued-added offerings.

Given the proliferation of digital music in the home, the traditional stereo system is likely to go the way of the dodo. How quickly will the hi-fi become the "di-fi" (a digital fidelity receiver)? Manufacturers of music systems – including Philips, Kenwood, Pioneer, Onkyo, et. al. are among a growing number of companies that are seeking to deploy next-generation audio systems that incorporate network and broadband connectivity, storage, and streaming capabilities for distributing digital music content throughout the home.

Finally, there exist a host of additional products that will connect to both the PC and the CE platforms and be used for media access and interaction. These include the network-

capable DVD players (Apex Digital, Oritron, et. al.) that function as digital media receivers to pull content from the home computer and display it on a television screen for viewing and interaction. As Sony and Microsoft seek to roll out their next game consoles, it is widely anticipated that they will be network-capable, connecting to broadband Internet services/content as well as other platforms in the home. Handheld user interfaces and media rendering devices – from remote controllers and Internet-capable wireless display devices to cameras, camcorders and MP3 players – will be used for media interactivity and for the portable enjoyment and capturing of content.

The creation of entire multimedia ecosystems – the linkage of multiple products and services within the home to provide for the creation, storage, and sharing of all kinds of digital content – commercial and self-created – begins with consumer uses and purchases of single-purpose platforms and services (the digital music-phile uses a home computer, portable music player, CDs, and online content; the video-phile uses the television, set-top box, and owned, rented, and ordered movies via pay-per-view; the digital photography-phile primarily uses a camera and the PC).

2.0 Digital Entertainment from the PC Perspective

The PC industry has delivered stunning gains (Figure 5) by following a development path based on standardization, low costs driven by high volumes and differentiation based on customer service and support. The rapid growth of data networks has followed the success of the PC industry by targeting a very practical need (sharing a broadband connection among multiple computers at home). Like the PC industry, however, the take-off point for data networks did not occur until a critical mass of standardized products were widely available at lower costs and with (relatively) painless installation procedures. Wi-Fi® certification of products in 2000 was the beginning of a significant uptake in 802.11b networking products for the home. Figure 6 provides an overview of key success metrics of the PC, Internet, and data networking industries in recent years.

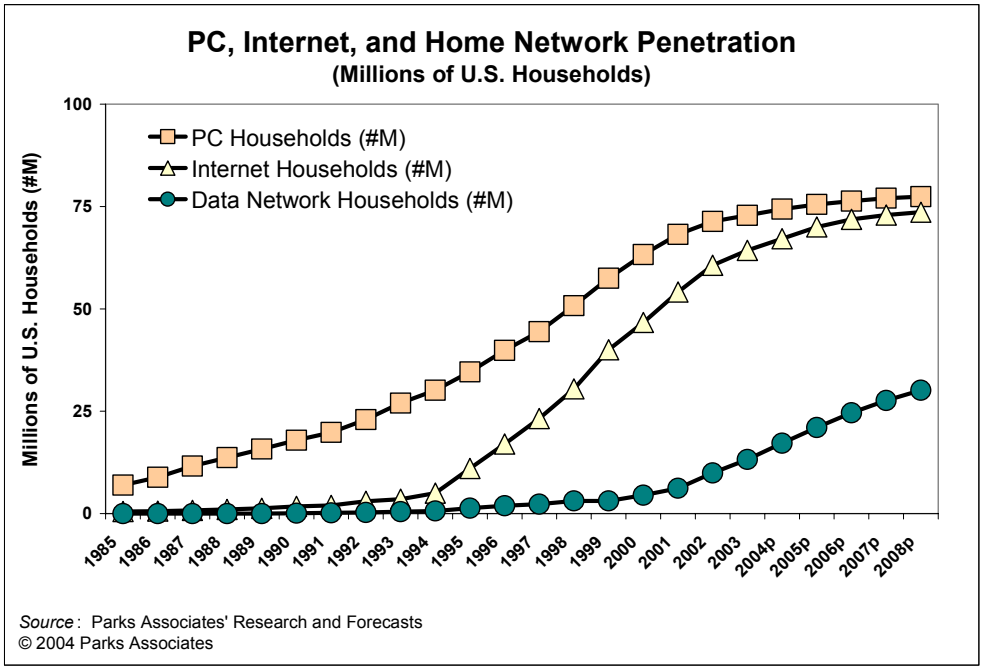

Figure 5 PC, Internet, and Home Network Penetration

Key Success Metrics: PCs, the Internet, and Data Networks	
PCs	• An estimated 73 million U.S. households had at least one PC at year-end 2003; this will surpass 80 million by year-end 2008. • An estimated 35 million U.S. households had two or more PCs at year-end 2003; this will grow to 46 million by year-end 2008.
Internet	• More than 64 million U.S. households had Internet services at the end of 2003; this will grow to 74 million by year-end 2008.
Data Networks	• Thirteen million U.S. households used home data networking solutions at year-end 2003; this will grow to more than 30 million by year-end 2008. • Wireless data networking nodes will account for more than one-half of all data network nodes installed in 2008.
Data Sources: Parks Associates' estimates and forecasts, 2004	

Figure 6 Key Success Metrics: PCs, Internet, and Data Networks

With the standardization of PC and data networking components, the market has opened to a great many vendors. As production ramped upwards and the volume of products being sold increased, prices for components have dropped dramatically. Figure 7 tracks the rapid decrease in PC prices – from more than $1,400 in 1997 to $750 in 2004. Prices for data networking components have followed a similar decline. Already, giant discount retailer Wal-Mart is selling wireless networking access points for around $50 and PC cards for as little as $40.[2]

[2] *Source*: Wal-Mart Web site Q4 2004.

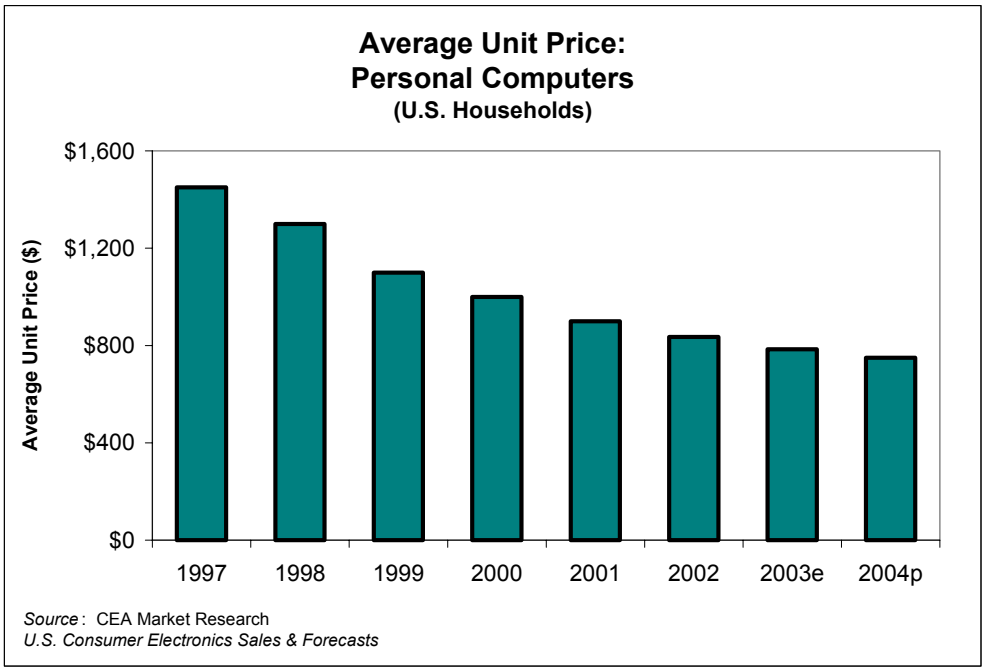

Figure 7 Average Unit Price: Personal Computers

The dramatic drop in end-user prices has PC and data networking manufacturers scrambling to develop hardware and services that can boost overall revenues, margins, and profits. In delivering solutions that address multimedia connectivity – connecting to content, storing, and streaming it throughout the home – product developers believe that they can execute an end-run on commoditization and challenge traditional CE vendors on their home turf. Figure 8 provides an overview of the plans by several major home computer vendors to enter the digital entertainment arena.

Digital Entertainment Strategies: The Home Computer Industry	
Company	**Recent Strategies**
Apple Computer Inc.	• iPod® personal music players provide Apple with more sales (and margin) than home computers at present. Apple will continue to aggressively market and sell these players and likely offer home networking solutions to link Macintosh® computers to stereos.
Dell Inc.	• "We recognize that large digital displays, high-quality, high-value televisions are the centerpiece of the digital home experience, but we also recognize that digital content – the music, the movies, the photo, and the games – are migrating to the PC. And the PC remains the most versatile invention in history and continues to play a vital role in the digital home and will so for many, many years." *Source*: Michael Dell, Dell Chairman and CEO, remarks at the Consumer Electronics Show January 8, 2004 • "Dell is also innovating its own consumer electronics, including digital music players and LCD television/computer monitors, as well as Axim handheld computers and digital projectors." *Source*: Letter to Shareholders from Michael Dell, Dell Chairman and CEO, *Dell Fiscal 2004 in Review*.
Gateway Inc.	• "We led the industry in recognizing the integration that's taking hold between the PC and consumer electronics (CE) world, and delivered 118 new Gateway-branded products in 22 categories. CE and non-PC products grew to 28 percent of total revenue from 19 percent in 2002." • "Our new product range brought award-winning convergence products such as sleek media-center PCs and connected DVD players that offer tremendous flexibility. By year's end, Gateway had America's top selling plasma TV, and *Fortune* magazine named our 42-inch HDTV the best TV of the year. We also entered the digital camera market aggressively and took sizable market share almost overnight." *Source*: Letter to Shareholders from Ted Waitt, Gateway Chairman, 2003 Annual Report
Hewlett-Packard Co.	• "As processes become digital, mobile, and virtual, traditional consumer electronics devices, such as TVs and stereos, are merging with IT products, including PCs and digital projectors. HP has a unique opportunity to lead in the growing digital photography and digital-entertainment markets. • "Complexity is one of consumers' biggest barriers to using new technology. With this in mind, in August 2003, HP introduced more than 100 digital-photography and digital-entertainment products, including the instantly popular DVD Movie Writer, new notebook PCs, Media Center PCs, all-in-ones, the industry's first consumer 8-ink photo printer and improved digital-photography software, digital cameras, scanners and supplies. These products and solutions were designed to work easily together, with the intent of radically simplifying the customer experience." *Source*: Letter to Shareholders from Carly Fiorina, HP Chairman and Chief Executive Officer, 2003 Annual Report
Sony	• "The VAIO PC is another center of the home network Sony is building. Simply by using the RoomLink network media receiver, users can enjoy television programs, music, photos, and other digital content stored on the VAIO's hard disk drive from remote locations, such as on their televisions or stereos in the living room. With the included VAIO Media software, AV content on one VAIO can also be accessed from another VAIO located in a different room." *Source*: Sony 2003 Annual Report

Figure 8 Digital Entertainment Strategies: The Home Computer Industry

2.1 Consumers, the Home Computer, and the Ecosystems

2.1.1 The PC-Music Experience

2.1.1.1 An Overview of the PC-Music Ecosystem

The home computer is growing in its role as a music station. Nearly 25% of Internet consumers are on the Internet downloading music files or listening to streaming broadcasts of music from radio stations (Figure 9). They also use their computers to rip – or copy – CDs into digital files. They can then take those digital music files and create their own custom CDs, with exactly the songs that they want. MP3 players, now in at least 13% of U.S. households, also are important, as they allow consumers to take many digital music files and listen to them anywhere.

Digital Music Sources, U.S. Households	
Source	**Facts and Figures**
CDs	• More than eight billion unrestricted sold since 1990; • 33% of broadband households are ripping CDs to PCs
P2P Networks	• 20% of Internet households (26% of broadband households) are downloading files at least once per month
Legal Downloads	• 10% of Internet households (13% of broadband households) likely to purchase Internet music via *a la carte* downloads • 6% of Internet households (11% of broadband households) likely to purchase Internet music via subscriptions.
Music Services	• An estimated 400,000- 600,000 subscribers to on-demand music services[3]
Internet Radio	• 20% of Internet households (31% of broadband households) listen to Internet radio broadcasts at least once per month
Satellite Radio	• More than three million subscribers as of Q3 2004
Data Sources: Broadband Networked Households survey of more than 3,000 U.S. broadband households (Q4 2003); *Consumers & Emerging Multimedia Platforms* survey of 4,000 U.S. Internet households (Q2 2004); music services subscriber estimates from providers (2004); satellite radio subscriber figures from SIRIUS and XM Satellite Radio Q4 2004 financials.	

Figure 9 Digital Music Sources, U.S. Households

[3] This figure is a compilation of the reported subscribers (Q4 2004) to various music services, combined with Parks Associates' estimates.

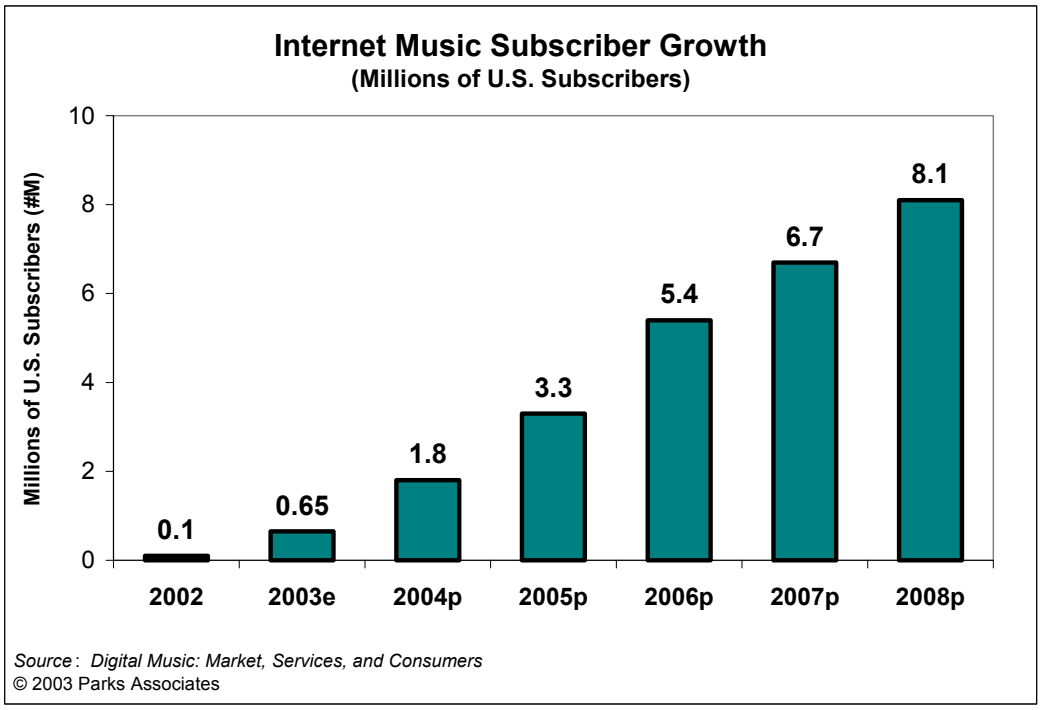

Figure 10 Internet Music Subscriber Growth

2.1.1.2 The PC-Music Ecosystem: Key Drivers and Conclusions

Given consumer familiarity and comfort with the PC as a music hub, PC-Music Ecosystem solutions will drive consumer adoption of a growing number of music products and services, with the home computer as an integral platform for content reception, storage, and listening. Music on and from the PC meets basic consumer desires for music choice and distributed audio throughout the home. Key findings from our research include:

- Self-created and subscription/paid music service growth will drive PC-Music Ecosystem solutions. Subscribers to music-on-demand and satellite radio services will grow from 5.3 million at the end of 2004 to more than 16 million by the end of 2008.
- Software vendors providing middleware solutions to link content platforms (including PCs to audio clients) will experience significant growth in the acquisition of their connectivity solutions in the next five years.

- The link between digital music content services and audio clients in the home will provide a win-win for both the content service providers and manufacturers of Digital Media Receiver (DMR) and Digital Music Adapter (DMA) solutions. Companies that offer easy-to-use transactional solutions and content delivery mechanisms from music serviced to PCs and their audio clients will be the winners in this space over the next five years.
- "Content peripherals" in the form of portable MP3 players will penetrate U.S. households at a remarkable clip, surpassing 40% of U.S. households by the end of 2008.

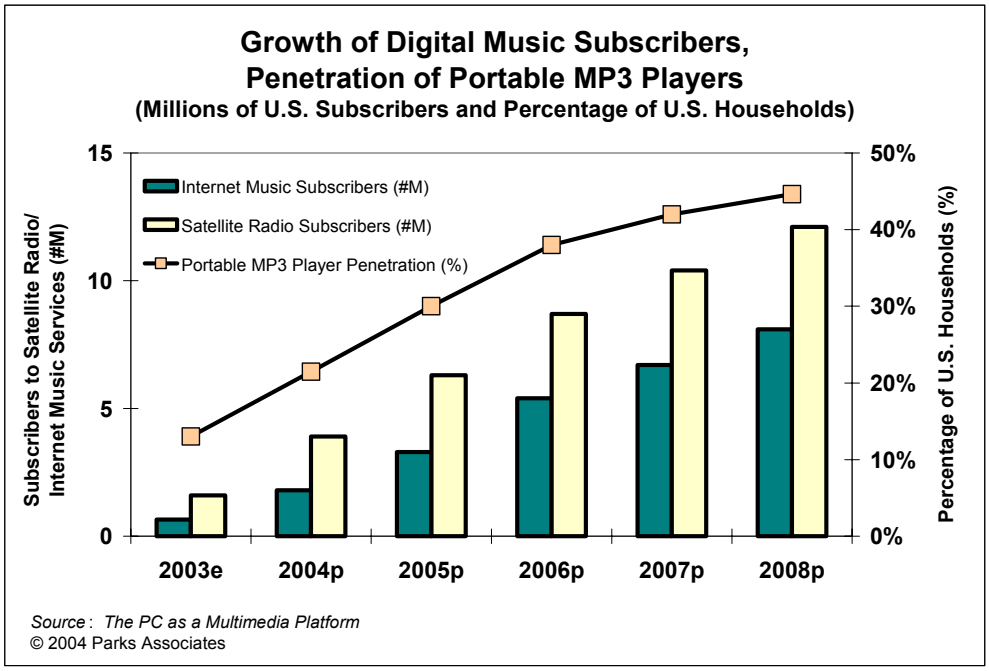

Figure 11 Growth of Digital Music Services, Penetration of Portable MP3 Players

The importance of consumer use of such "content peripherals" as portable MP3 players in driving adoption of Media Center PCs and related hardware and services cannot be understated. Figure 12 provides a glimpse at some key characteristics of portable MP3 owners.

Characteristics of Portable MP3 Player Owners	
Music from the Internet	▪ 27% of MP3 owners download music at least weekly (compared to 16% all Internet households). ▪ 25% listen to Internet radio at least weekly (compared to 17% of all Internet households)
Use of the Home PC	▪ 30% create/burn CDs/DVDs at least weekly (compared to 18% of all Internet households) ▪ 54% listen to music at the PC at least weekly (compared to 34% of all Internet households)
Online Music Purchases	▪ 21% are likely to pay for *a la carte* music downloads (compared to 10% of all Internet households) ▪ 11% are likely to subscribe to Internet music service (compared to 6% of all Internet households)
Media Center PC	▪ 11% are likely to purchase Media Center PC (compared to 6% of all Internet households)
Digital Music Adapter	▪ 15% are likely to purchase digital music adapter at a price between $151 and $200 (compared to 8% of all Internet households)
Source: *Consumers & Emerging Multimedia Platforms*, a survey of 4,000 U.S. Internet households © 2004 Parks Associates	

Figure 12 Characteristics of Portable MP3 Player Owners

PC-Music Ecosystem solutions will center on a suite of products and services that will enhance consumers' ability to enjoy music not only on the computer, but in many locations in and outside of the home. Ideal solutions will provide consumers with integration between the music services and the products at which the audio content will be enjoyed.

PC-Music Ecosystem Solutions	
The Need	**The Solutions**
Content	• Internet music-on-demand services • Satellite radio services for the home • Personalized content: ripped CDs
The PC	• "Media-PC" platforms
Music Creation/Organization	• CD ripping and content aggregation software
Listening Experience	• Higher-quality speaker systems; surround sound
Back-up/Peripheral Storage	• Direct- or network-attached storage devices
Portability	• Portable MP3 players • Portable multimedia players • Ensuring that personalized music content can be enjoyed outside of the home environment
Connecting	• Satellite radio receivers • Digital Media Receivers • Digital Music Media Adapters • Middleware and other solutions that tie the PC/content services to clients in the home
User Interfaces/ Content Access	• "Media PC" Remote Controllers • Smart Displays/Web Tablets
The PC as a Multimedia Platform © 2004 Parks Associates	

Figure 13 PC-Music Ecosystem Solutions

2.1.2 The PC-Photography Experience

2.1.2.1 An Overview of the PC-Photography Ecosystem

The home computer is the only interface and storage platform for digital images among currently available products and solutions. Given that digital camera penetration currently stands at approximately one-third of U.S. households, the PC industry is seeking solutions – software and hardware-based – that will increase consumers' use of the home computer as an integral platform from which to store, edit, share, and print their photos. In addition, PC manufacturers and retailers can benefit from higher sales of high-end printers and Digital Media Receivers to share the photos within the home networking environment.

To better understand the current consumer mindset toward digital photography and the PC's role in this application, the industry needs to better understand the following questions:

- How do users currently edit digital photographs, and do they see a need for easier or perhaps more comprehensive editing packages?
- How creative do digital camera users want to get in the creation and sharing of their digital images? Are they, for example, using or desiring solutions that enable them to more creatively display and share digital photos with friends and family?
- A common concept shown at technology trade shows is the sharing of digital photos from the PC to another display device, such as the television in another part of the home. This application could be used for photo slideshows. Do desire this capability?

For the most part, U.S. consumers engage in basic photography-related applications – basic editing (cropping and reduction of red-eye, for example) and either e-mailing or printing their photographs. Based on Parks Associates' research in the use of digital cameras, consumers have difficulty envisioning and communicating any new digital photography editing needs. If the digital camera, software, and PC industries want to sell these new applications, they'll have to *show the consumer* exactly the benefits that can be derived from such solutions. Demonstration kiosks at the retail level and well-versed sales associates will be critical information gatekeepers for the end user.

2.1.2.2 The PC-Photography Ecosystem: Key Drivers and Conclusions

Consumers who are active in digital photography applications are likely candidates for purchasing additional software and hardware solutions that relate to home networking and the sharing of their content with friends and family. Figure 14 provides a glimpse at "Digital Photo-philes," defined by at least weekly use of the home computer for editing digital photos and creating photo slideshows and at least weekly use of the Internet for sharing/receiving photos.

Characteristics of "Digital Photo-philes"	
Segment Size	▪ Approximately 4% of the Internet population
Media Center PC	▪ 35% are likely to purchase a Media Center PC (compared to 19% of all Internet households)
Digital Media Receiver	▪ 22% are likely to purchase digital media receiver for sharing video/pictures between PC and TV at a price between $151 and $200 (compared to 6% of all Internet households)

Source: *Consumers & Emerging Multimedia Platforms*, a survey of 4,000 U.S. Internet households

Figure 14 Characteristics of "Digital Photo-philes"

The PC-Digital Photography Ecosystem solution set is pictured in Figure 15. Bundling of digital cameras with "media-PCs" equipped with new photo editing and sharing software will resonate among certain consumers who desire improved and unique ways in which to edit and share their digital photographs with friends and family. As prices for photo-quality printers continue to fall, a growing number of consumers will purchase these solutions. After all, Grandma still likes to frame the photos of the grandkids!

PC-Photography Ecosystem Solutions	
The Need	**The Solutions**
Media Capture	• Digital cameras • Mobile phones with integrated digital cameras
The PC	• "Media-PC" platforms
Photo Organization	• Photo organization software
Photo Editing	• Photo-editing software that provides consumers with fun and easy-to-use pre-selected macros (for example, "Happy Birthday" or "Holiday Fun" themes. • Creative sharing tools ("create-a-card," for example).
Printing	• Direct-to-camera connections to printer • Wireless solutions – camera to printer
Back-up/Peripheral Storage	• Direct- or network-attached storage devices
Sharing	• Easier links to Web hosting options • Portable multimedia players • In home: Digital Media Receivers
The PC as a Multimedia Platform © 2004 Parks Associates	

Figure 15 PC-Photography Ecosystem Solutions

2.1.3 The PC-Television Experience

2.1.3.1 An Overview of the PC-Television Ecosystem

Television viewing and the capture and storage of television content via TV tuners and personal video recording (PVR) software solutions is currently extremely limited by 1) the dearth of television tuners and their use at the home PC; and 2) the complexity in connecting the PC to television feeds – cable, satellite, or broadcast. Furthermore, the PC as a video viewing platform is extremely limited in light of small monitors and the location of PCs (they typically are tucked into back bedrooms or home offices and are not located in areas near the central entertainment space in the home). For the PC to evolve as a television platform, the PC industry must continue to aggressively market and sell larger LCD and plasma monitors and displays. They must also solve the challenge of connecting the PC to the incoming television feed. The advent of more robust wireless solutions (next-generation Wi-Fi® and/or ultra-wideband) will bring to market a growing number of "dongles" for connectivity. These will be key bridges between wired television connections and content platforms, such as home computers.

2.1.3.2 The PC-Television Ecosystem: Key Drivers and Conclusions

In the short-term the home computer is not a **primary** TV-centric platform for a great many U.S. households, given the constraints listed above. Certainly, there will be households that acquire the "living room media-PC," which has a form and functionality specifically suited to the home entertainment environment. With that being said, solutions such as USB-based tuners and PVR software suites will make their way into growing numbers of households for which the purchase of a stand-alone devices (think TiVo) or the subscription to a cable or satellite-based PVR service is unappealing.

PC-Television Ecosystem Solutions	
The Need	**The Solutions**
Video Capture	• Easy-to-use and low-cost TV tuners (notably USB-based external tuners) • Easy-to-use hardware and software-based PC-PVR solutions (sold in bundles)
The PC	• "Media-PC" platforms
Video Content Organization	• Video aggregation and organization software, including intuitive graphic user interfaces (GUIs)
Larger Monitors/Displays Networking to Existing TVs	• LCD monitors/plasma displays sold as bundles with "Media-PCs" • Digital Media Receivers
Back-up/Peripheral Storage	• Direct- or network-attached storage devices
Sound System Upgrades	• Surround-sound speakers • Home theater-in-a-box solutions sold as bundles
User Interfaces/ Content Access	• "Media PC" Remote Controllers • Smart Displays/Web Tablets
The PC as a Multimedia Platform © 2004 Parks Associates	

Figure 16 PC-Television Ecosystem Solutions

2.1.4 The PC-Video Experience

As home computers evolve to include such features as larger and better-quality viewing monitors, TV tuners, and personal video recording (PVR) software, the next phase of consumer adoption (perhaps in a very limited sense, at least initially) will be the acceptance of the home computer as a video player, storage platform, editing tool, and sharing mechanism.

2.1.4.1 An Overview of the PC-Movie Ecosystem

Although the market landscape for PC movies is currently limited to "road warriors" who watch movies on their laptop PCs while traveling or curious customers who occasionally download a movie from CinemaNow or Movielink by a curious customer, the propensity of mainstream consumers to use their home computers in the context of movie storage and viewing will change in the next five years.

Internet-Based VOD Providers

Company/Service	Deployment and Notes	Packages/Pricing
Starz on Real Movies	Launched in mid-2004 Partnered with Real Networks	Unlimited viewing of 100 movies (revolving selection) for $12.95/month
Movielink Downloadable Movies are Here	Joint-venture of MGM, Sony, Paramount, WB, and Universal 1,500 movies available	$2.99-$4.99 per movie
CinemaNow Watch Movies Here	1,500 movies Offers unlimited viewing subscriptions, *a la carte* rental, and permanent downloads Subscription service only includes select titles, typically independent productions	Premium Pass $9.99 per month Premium Pass+ $29.99 per month *A la carte* $2.99-$3.99 per month Download to own $14.99 per movie
Real	Offers a collection of content from CNN, BBC, NASCAR, NBA, ABC, and others	$9.95 per month unlimited use

Figure 17 Internet-Based VOD Providers

Although paid users of Internet-based movies-on-demand services will constitute a small minority of the broadband population in 2004 and 2005, these services will find a growing customer base in the years ahead. DSL providers – who for years have been seeking cost-effective ways to break into the video delivery business – have recently launched video bundles, thanks to recent agreements with satellite television providers DIRECTV and DISH Network. Furthermore, compression technologies allow high-

quality video to be delivered over standard ADSL connections, allowing DSL vendors to provide their customers with compelling on-demand video from Internet connections without having to upgrade their networks. The support of and adoption by ISPs of these services as key solutions differentiators will provide a boost to their growth (and to the operators' bottom line).

2.1.4.2 The PC-Movie Ecosystem: Key Drivers and Conclusions

The PC-Movie Ecosystem will consist of the solutions that will assist the end user in accessing and playing movies from the "media-PC" platform. Paid users of online movie services will grow at a compound annual growth rate (CAGR) of 173% from the end of 2003 to year-end 2008 (Figure 18). Content management software solutions (be they from Microsoft or another of the many players beginning to offer "media-PC" software packages) will help create a user experience in which stored video can be more easily accessed and played. Larger LCD and plasma monitors and displays as well as higher-quality surround-sound speaker solutions and home theater-in-a-box solutions sold as bundles with "media-PC" solutions will increase the likelihood that the home computer evolves into a movie-viewing platform. Finally, Digital Media Receiver solutions will ensure that movie content (either stored on the PC or delivered directly through a broadband Internet connection) can be accessed and streamed to viewing platforms around the home.

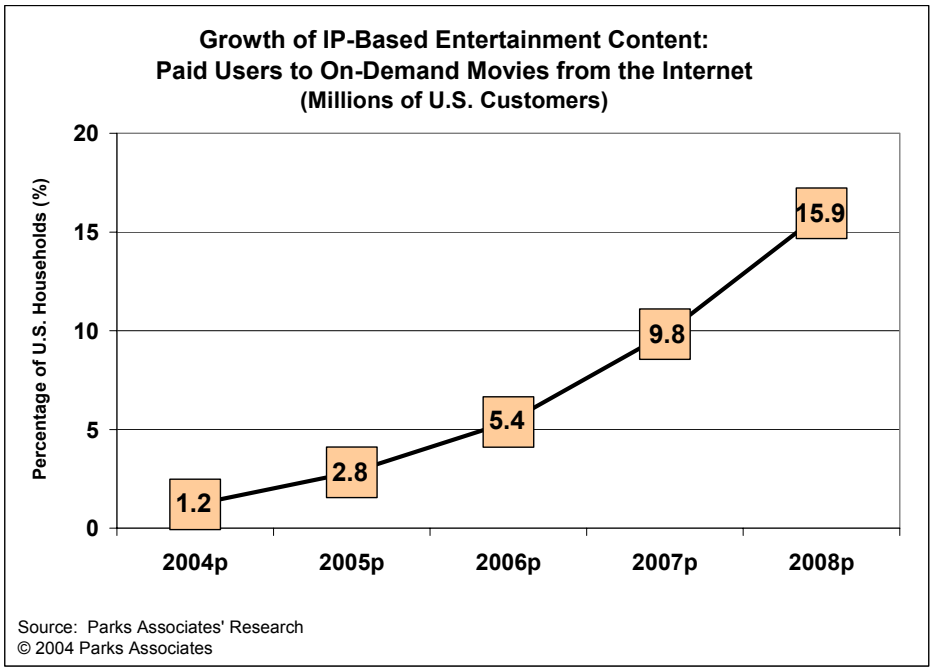

Figure 18 Growth of Paid Users to Internet-Based Movie Services

PC-Movie Ecosystem Solutions	
The Need	**The Solutions**
Transactional Solutions	• Software solutions that link the Internet-based on-demand movie offerings to the PC and peripheral platforms • Remote controllers that provide transactional functionality
The PC	• "Media-PC" platforms
Video Content Organization	• Video aggregation and organization software, including graphic user interfaces (GUIs) that provide an easy-to-use interface for stored movie content
Larger Monitors/Displays **Networking to Existing TVs**	• LCD monitors/plasma displays sold as bundles with "Media-PCs" • Digital Media Receivers
Back-up/Peripheral Storage	• Direct- or network-attached storage devices
Sound System Upgrades	• Surround-sound speakers • Home theater-in-a-box solutions sold as bundles
User Interfaces/ **Content Access**	• "Media PC" Remote Controllers • Smart Displays/Web Tablets
Portability/Sharing	• Portable multimedia players • Digital Media Receivers
The PC as a Multimedia Platform © 2004 Parks Associates	

Figure 19 PC-Movie Ecosystem Solutions

2.1.4.3 An Overview of the PC-Video Ecosystem

As the use of digital video cameras grows (Figure 20), the home computer will evolve to embrace features such as more user-friendly and creative video editing tools (software), viewing (larger monitors and displays), and sharing (via Digital Media Receivers) tools. Given the relatively low percentages of consumers who find such applications compelling, however, this is not currently a "must-have" application for most PC households. After all, consumers are constrained by time and their own patience when it comes to their home videos.

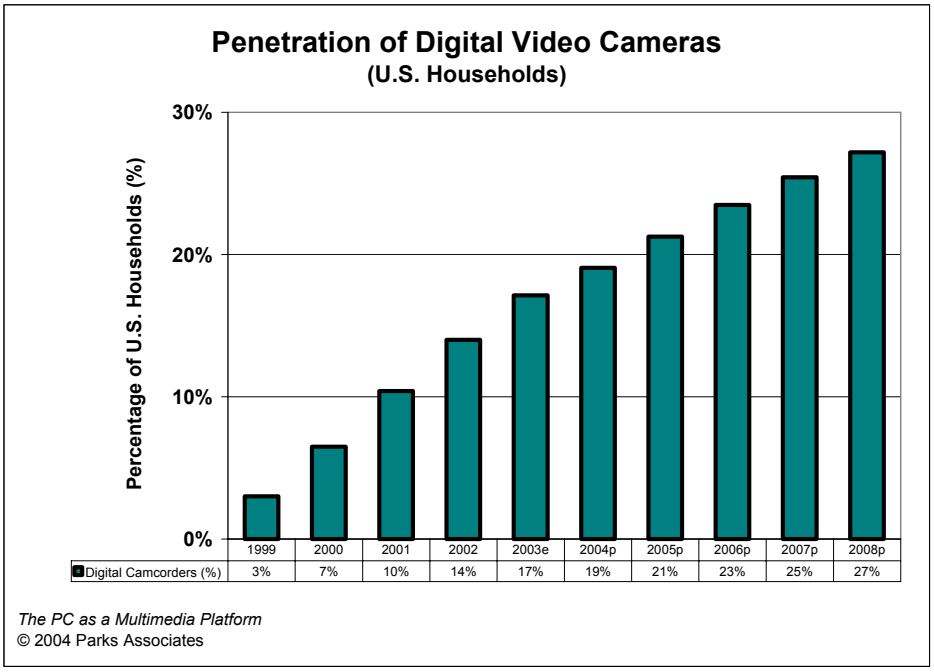

Figure 20 Penetration of Digital Video Cameras

2.1.4.4 The PC-Video Ecosystem: Key Drivers and Conclusions

Clearly, software solutions that provide for easier video editing – including splicing, adding music, and giving the content a cleaner and more professional look – are likely to grow in popularity. Ultra-wideband applications for short-range and high-throughput cable-replacement applications to increase the convenience of synching the digital video camera with the home computer will also boost the sales and use of the digital video camera as a key "content peripheral." This will speed up the process of downloading video to the PC for storage and/or editing and make consumers' lives just a tad easier.

PC-Video Ecosystem Solutions	
The Need	**The Solutions**
Creation	• Digital camcorders
The PC	• "Media-PC" platforms
Video Aggregation and Organization	• Video organization software
Video Editing	• Video editing software that provides for intuitive editing, scene selection/insertion, etc. • Editing packages that include simple macros for fun uses (inserting music, still photos, themes, etc.)
Larger Monitors/Displays **Networking to Existing TVs**	• LCD monitors/plasma displays sold as bundles with "Media-PCs" • Digital Media Receivers
Back-up/Peripheral Storage	• Direct- or network-attached storage devices
Sharing	• Portable multimedia players • In home: Digital Media Receivers
The PC as a Multimedia Platform © 2004 Parks Associates	

Figure 21 PC-Video Ecosystem Solutions

2.2 The "Media-PC" as an Entertainment Hub

The development of PC-centric multimedia networking will center first on the deployment of robust home computers that feature larger hard drives, integrated television tuners and special PVR (personal video recorder) software, and software that aids consumers in integrating, aggregating, and storing their personal media, including both commercial content (including ripped music CDs and downloaded video and audio content) and personalized and self-created content (including digital photos and home videos). Microsoft Corp. is obviously one of many interested parties in providing software solutions to power these home computers, and an overview of its Windows® XP Media Center Edition software is provided below.

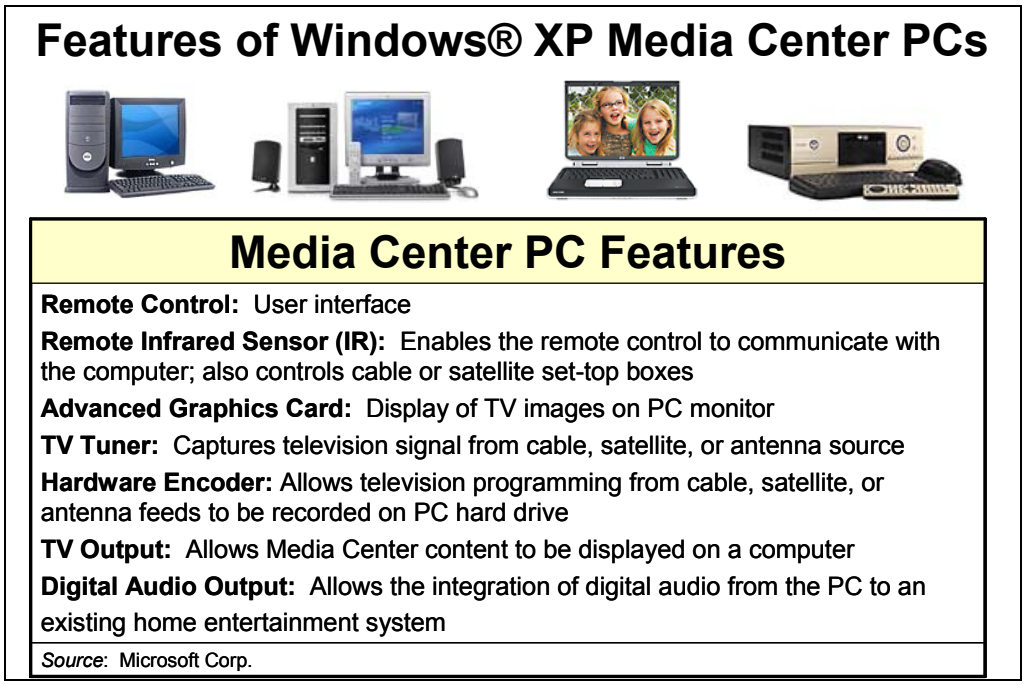

Figure 22 Features of Windows® XP Media Center PCs

To date, interest in purchasing Media Center Edition home computers has been limited to a distinct minority of consumers (Figure 21), given largely to a general lack of awareness about these systems. However, consumers who demonstrate regular use of their current home computers for such applications as TV viewing and recording, video editing, and photo applications are among those more likely to seek such a solution. As consumers grow more accustomed to using their home computers for media interaction, demand will grow accordingly.

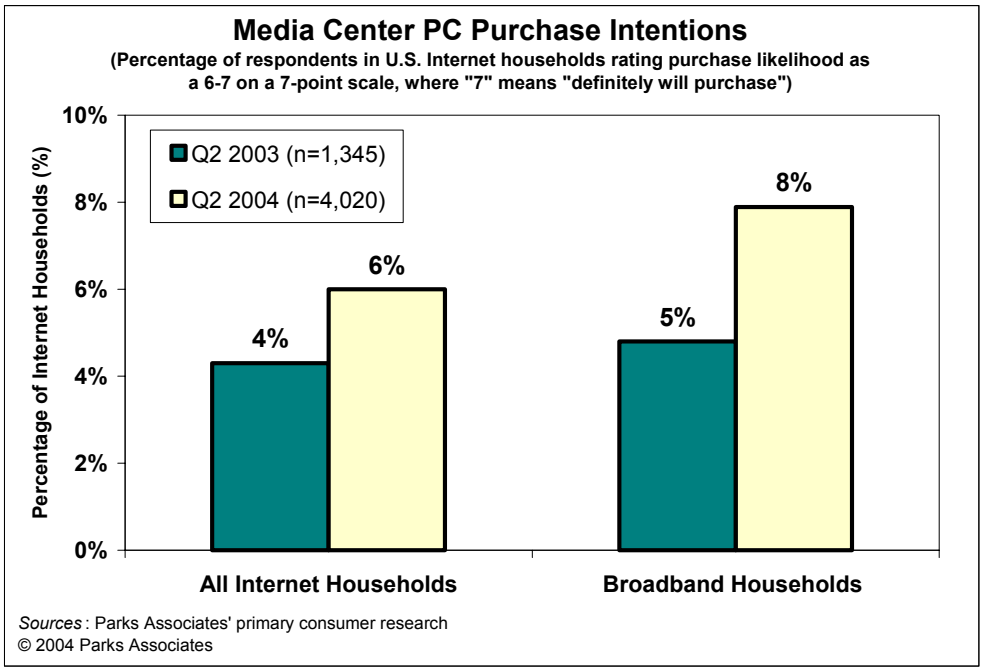

Figure 23 Media Center PC Purchase Intentions

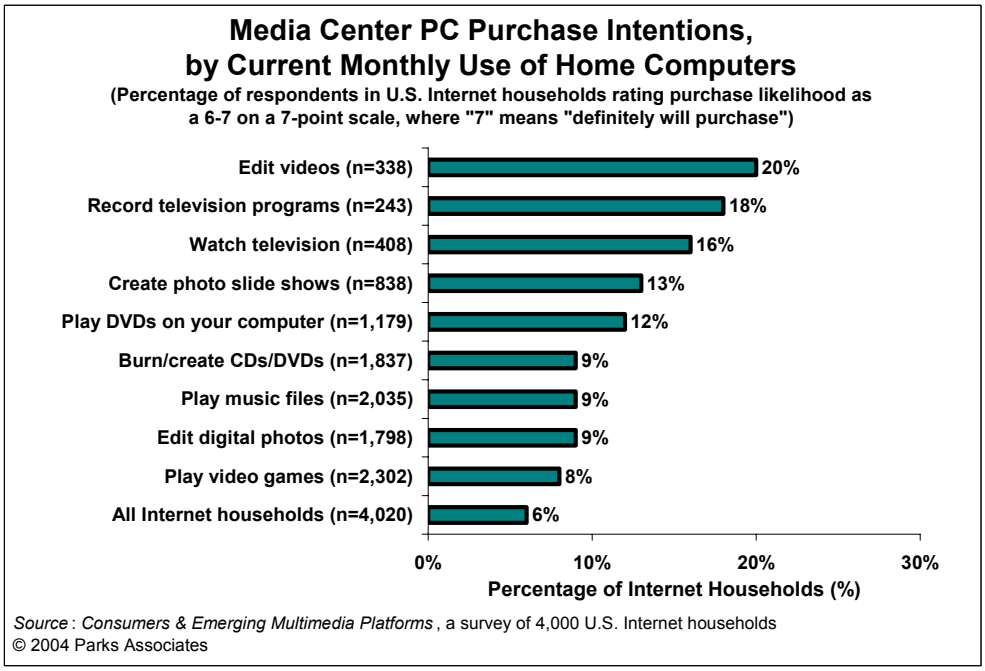

Figure 24 Media Center PC Purchase Intentions, by Current Monthly Use of Home Computers

Is the Media Center PC viewed by consumers as a replacement for their existing entertainment equipment? Overwhelmingly, likely purchasers indicate that the Media Center PC should be an adjunct to their existing equipment, allowing them to enhance their entertainment experience without having to spend a great deal of capital on a wholesale replacement of what they already own.

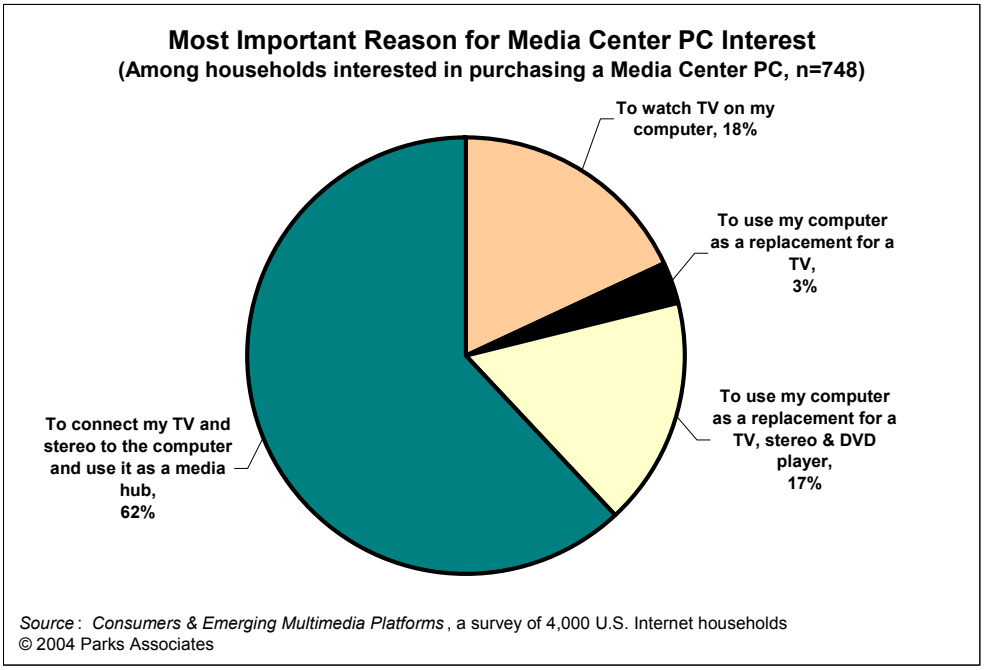

Figure 25 Most Important Reason for Media Center PC Interest

2.3 Digital Media Receivers/Music Adapters as Critical Networking Components

Once consumers have a critical mass of content stored on their home computers, survey data reveals that many are interested in the ability to link their PCs to consumer electronics platforms such as stereos and televisions in order to enjoy that content in areas of the home (the living room, for example) where a home computer may not necessarily need to be located. As Figure 24 indicates, the early market for so-called "media receiver/music adapter" products (home networking solutions that allow home computers to stream content to legacy consumer electronics products) will be for music applications. As the home computer evolves in popularity as a content hub for an array of content, including photos and video, expect to see a growing number of media receivers emerge to

support the networking of this content between home computers and display devices such as televisions, monitors, and even handheld viewing devices.

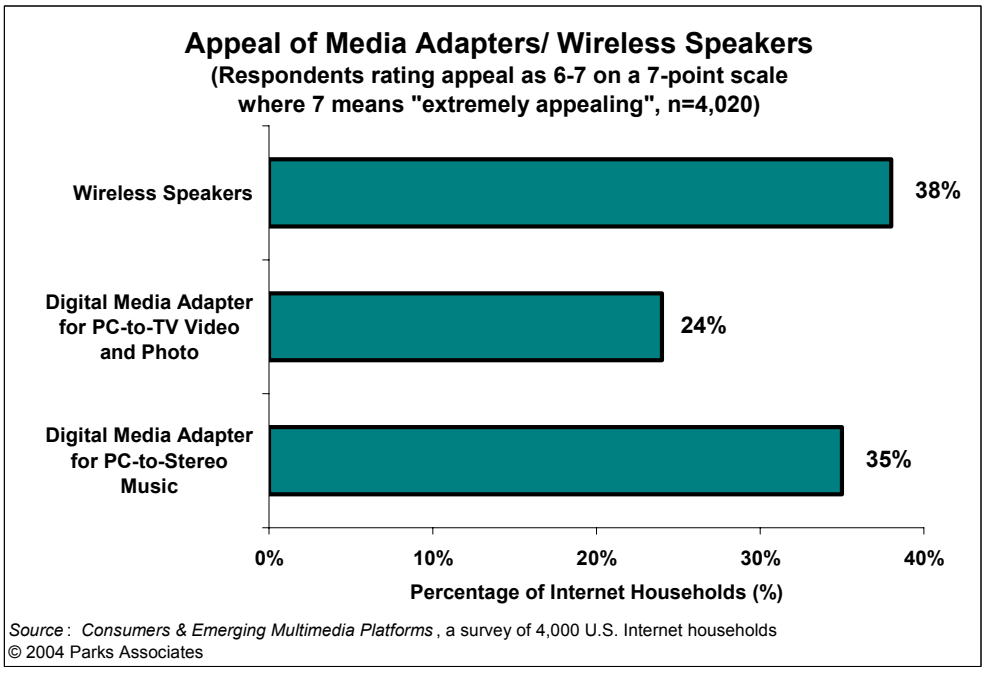

Figure 26 Appeal of Media Adapters/Wireless Speakers

- **Digital Media Receivers (DMRs)** will allow the television to serve as a primary interface for PC-stored content, particularly digital photos and videos. Certain versions will also include hard-disk drive (HDD) storage so they can digitally record television programming and provide for personal video recording (PVR) functionality. Figure 25 provides examples of digital media receivers.
- **Digital Music Adapters (DMAs)** will mainly be used in households that already use a wireless network. They will enable televisions, stereos, and game consoles to connect to the wireless network to stream content and/or network devices (such as game consoles) to a broadband service for online gaming. Figure 26 provides examples of digital music adapters.

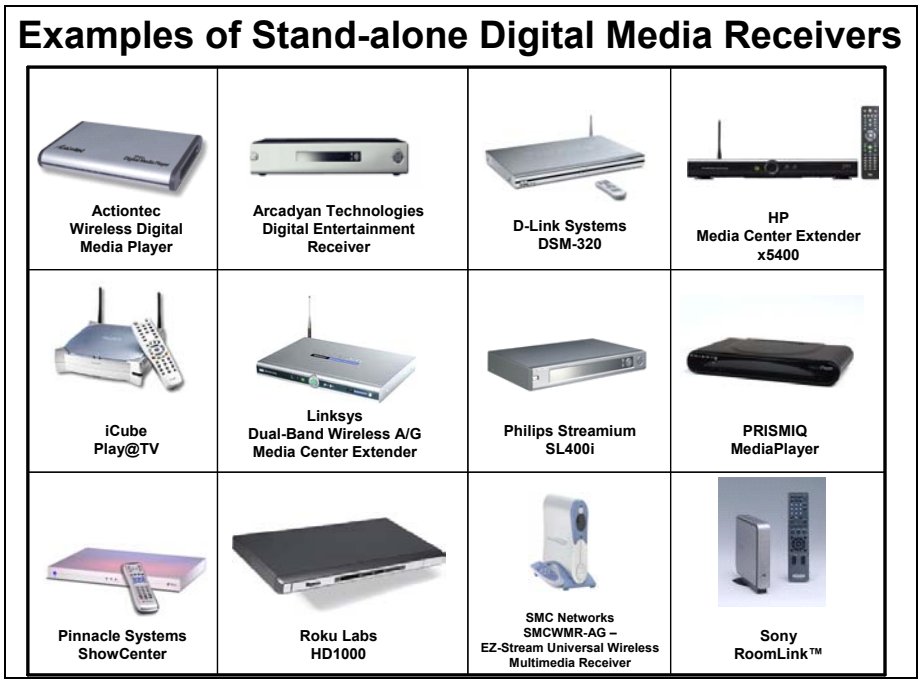

Figure 27 Examples of Stand-alone Digital Media Receivers

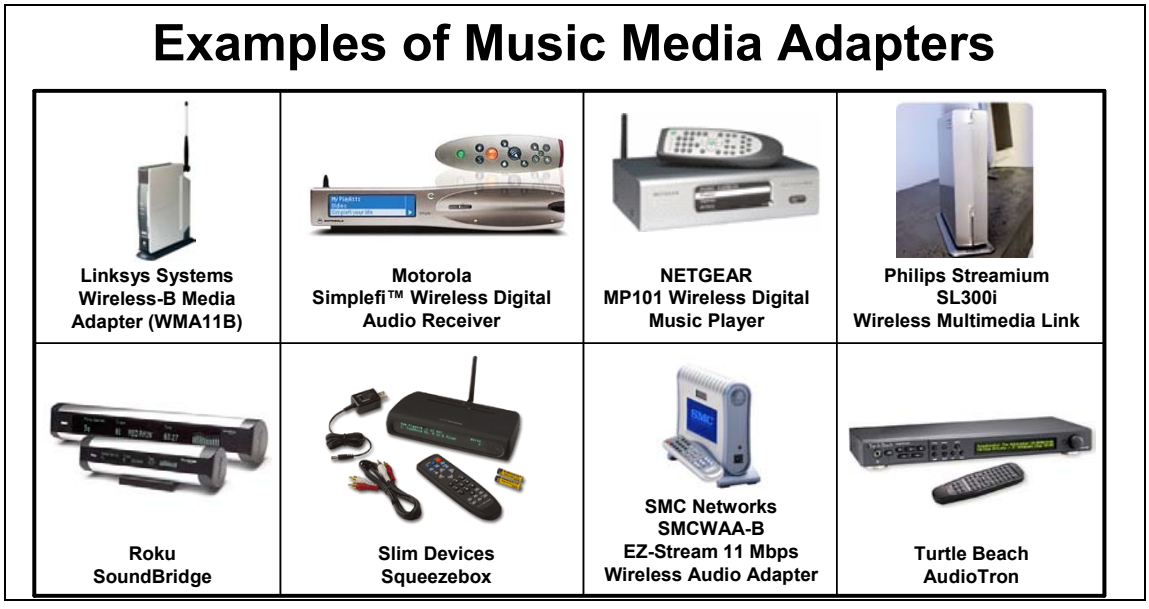

Figure 28 Examples of Music Media Adapters

2.4 Market Forecasts

The market for both PC hubs ("Media-PC" platforms) and multimedia networking equipment (digital media receivers/music adapters) is expected to grow significantly over a five-year period, as Figure 29 indicates. Unit sales of "Media-PCs" (platforms that include the features of the Media Center PC that come with software from Microsoft Corp. or a host of other vendors) are expected to reach seven million desktop units by the end of 2008. Networking nodes in the form of digital media receivers and music adapters will exceed 15 million solution shipments by this same time frame.

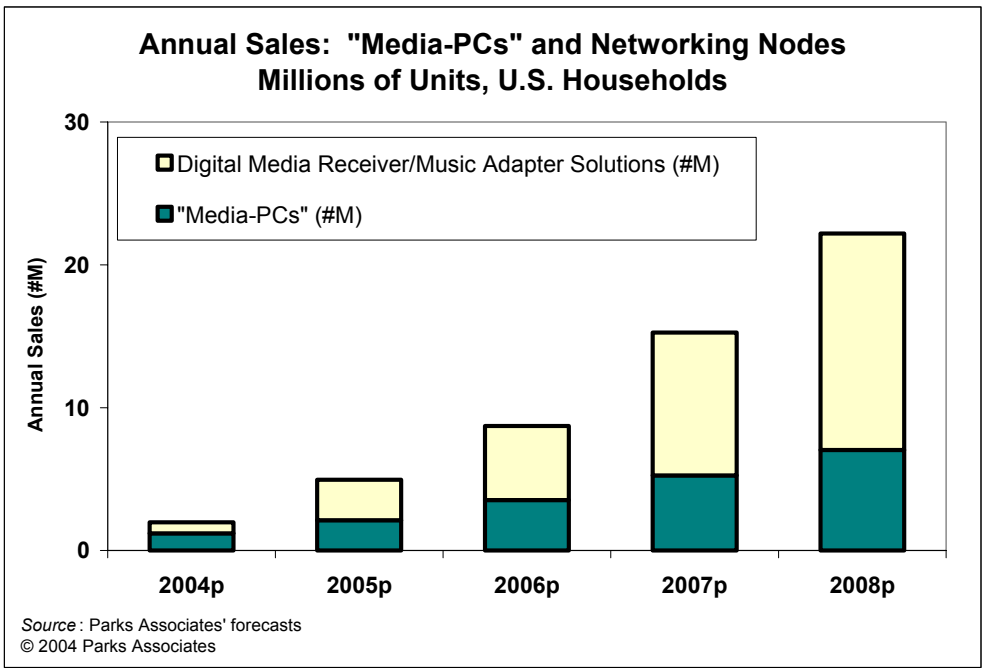

Figure 29 Annual Sales: "Media-PCs" and Networking Nodes