



The Future of the Home Network: Why the Hybrid?

A Parks Associates Position Paper

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1.0 Home Networks Rise to Prominence

In the mid-to-late 1990s, the promise of technology to and in the home created some very high expectations about what form and function the “home network of the future” would take. And it’s safe to say that there existed some fairly heady expectations that the influx of broadband Internet and other services into the home would spur a renaissance in development of a wide variety of connected solutions inside the home. Spanning home computers and entertainment devices, in addition to white goods and home systems, the home network was going to bring Metcalfe’s Law into clear focus for the average consumer. The value of data and content coming into the home would be magnified as more devices, platforms, and home and mobile systems could access it.

In many respects, the exuberance and promise of the late 1990s, along with a great many unfulfilled forecasts, was emblematic of technology development outpacing consumers’ awareness of and interest in home networking solutions. Through many research studies – both quantitative and qualitative – we’ve found that many of the connectivity applications so widely touted on any number of PowerPoint presentations at industry conferences simply have not yet resonated to any strong degree among many consumers. This, however, is beginning to change.

The hypothesis that broadband connectivity is a key driver for why consumers seek data networking solutions to allow multiple computers in the home has certainly been validated. As **Figure 1** indicates, the significant uptake of residential broadband Internet service, which began after 1999, has driven the sale of home networking equipment, a market that began in earnest after 2001. By the end of this year (2004), Parks Associates is forecasting 32 million U.S. residential broadband customers and more than 17 million households with a home data network.

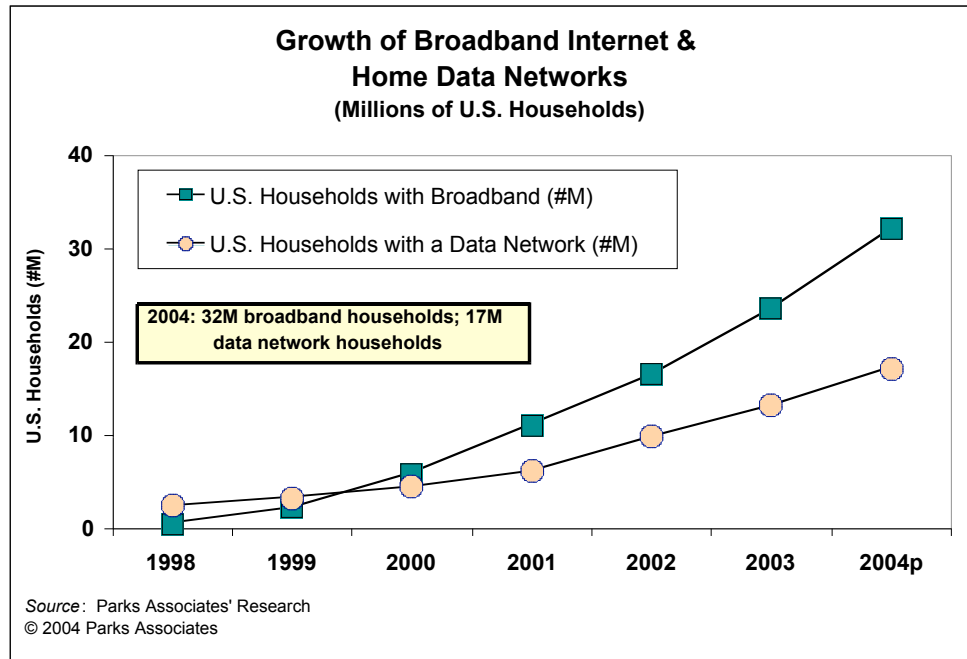


Figure 1 Growth of Broadband Internet & Home Data Networks

1.1 Service Providers Become Key Channel for Home Networking Product Distribution

Traditional brick-and-mortar retailers have been the dominant distribution channel through which consumers have purchased home networking solutions. In multiple surveys, approximately 60% of consumers with data networks indicate that they purchased these devices from a store or via the Internet. In just the past year, however, broadband service providers have become much more aggressive in selling routers and wireless access points to their new and existing subscribers. From recent data (June 2004), Parks Associates estimates that at least one million U.S. households are using home networking equipment provided by their broadband service provider (**Figure 2**).

There exists anecdotal evidence that customers who purchase a home networking solution remain more loyal to their broadband provider (indicating less churn in studies such as *Broadband Networked Households*, a survey of 3,370 U.S. broadband households that Parks Associates conducted in Q4 2003).

Beyond the attraction of new customers and the retention of their existing customer base, broadband ISPs are investing significant research and development dollars to determine

how connectivity inside the home can be leveraged for other services beyond data connectivity. The move from fairly simple (though by no means full-proof!) data networking solutions is leading the service provider community to consider the requirements for next-generation home networking solutions, based on some key applications.

ISPs are investigating connectivity for *entertainment applications* (which we specifically identify as streamed video from a set-top box to multiple televisions inside the home) and *multimedia applications*, which involves streamed content (audio, video, images, etc.) between among home computers and consumer electronics platforms (PC-to-stereo for distributed music; PC-to-TV for displaying digital photographs, videos, and other content). Finally, voice services, including voice-over-IP (VoIP) and the integration of mobile telephony into the service mix are likely to dictate the types of customer premise equipment (CPE) and home networking solutions that are employed. For example, service providers must consider if/how they will integrate voice applications with home networking equipment. Furthermore, they will have to consider the requirements for home networking solutions that include such factors as throughput, quality-of-service, and coverage. In other words, will the solutions in place today provide for a user experience that is as close to headache-free as possible?

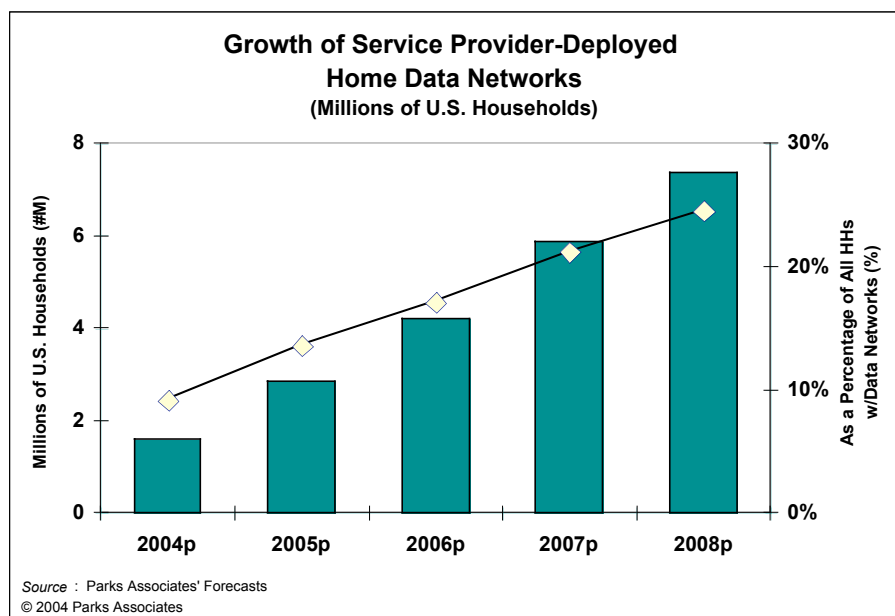


Figure 2 Growth of Service Provider-Deployed Home Data Networks

1.2 Cutting the Cord: Why Wi-Fi® Has Driven Home Networking Growth

In much the same way as “Kleenex®¹” has become synonymous with any facial tissue, Wi-Fi® has in many respects come to symbolize home networking to a great many consumers (upwards of five million U.S. households by mid-2004, as shown in **Figure 3**). Standardization of a protocol for wireless networking (and isn’t Wi-Fi less cumbersome to say than “eye-triple-ee-eight-oh-two-dot-eleven-bee” anyway?) created an level playing field that has allowed multiple chipset vendors to enter the market, develop chipsets in large volumes, and allow their OEM partners to create lower-cost products such as access points, NICs, and adapters. The rapidly-falling end-user prices for Wi-Fi equipment has been a significant driver to allowing more consumers (including the later adopters, who tend to be more cost-conscious) to embrace wireless connections and give them greater flexibility in where home computers are used in the home.

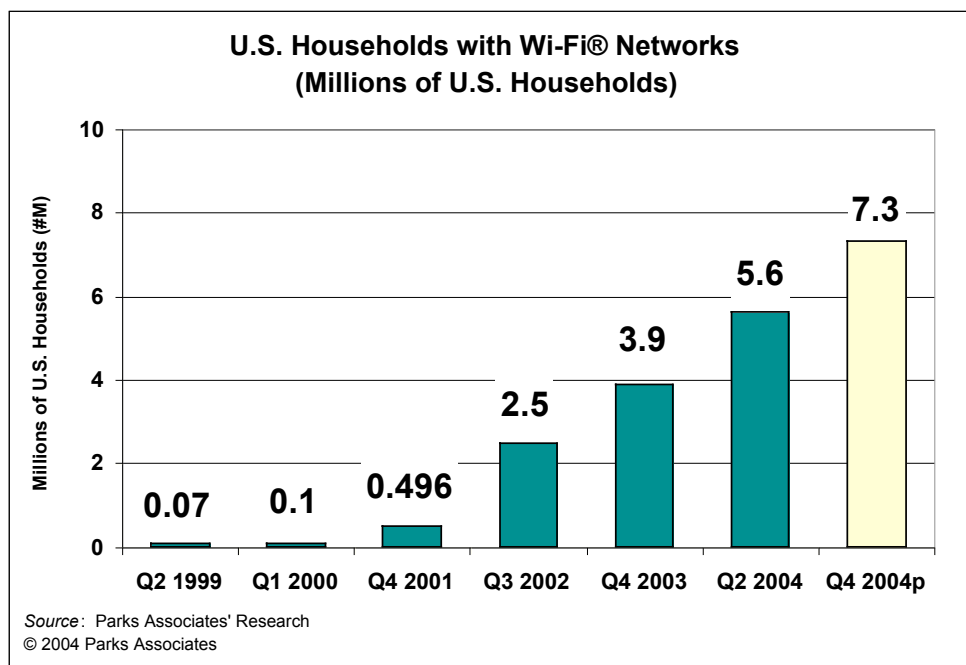


Figure 3 U.S. Households with Wi-Fi® Networks

The flexibility of where home computers can be used is a key driver for the purchase of wireless networks. In many homes, wireless connectivity offers consumers the

¹ Kleenex is a registered trademark of Kimberly-Clark Corp.

opportunity to use computers to access the Internet from a great many locations. This is becoming increasingly important for households that are using multiple PCs, both desktops and laptops (**Figure 4**) in many areas of the home. And, home computers, especially in multiple-PC households, are being positioned in many different rooms around the house. Children's bedrooms are key locations in multiple-PC households.

Consumers & Emerging Multimedia Platforms 2004	
Q2 2004, U.S. Internet Households, n=4,420	
Multiple-PC Household Configuration	% of All MPC HHs
2+ Desktops and 0 Laptops	39%
1 Desktop and 1 Laptop	25%
2+ Desktops and 1 Laptop	23%
2+ Desktops and 2+ Laptops	8%
1 Desktop and 2+ Laptops	3%
0 Desktops and 2+ Laptops	1%
TOTAL	100%

Figure 4 Multiple-PC Household Configuration

1.3 Consistent Coverage as a Challenge to Wireless Networks

The advantages that wireless networks bring in terms of the flexibility that they give users in accessing broadband Internet connections from multiple locations in the home can often be offset by the fact that many users do not receive consistent and reliable coverage in all parts of their home. With a single access point that is perhaps located back in a home office or another location, consistent coverage of the data signal can be an issue, especially given such variables as larger home sizes and construction techniques.

Industry and consumer data may support the notion that wireless networking solutions provide less-than perfect coverage and consistent speed. For example, nearly 20% of consumers using a wireless data network surveyed in late 2003 (*Broadband Networked Households*) indicate that they are likely to upgrade to a *faster* wireless networking solution. We wonder if the issue really isn't really a lack of *consistent coverage*, and consumers equate *faster speed* as a means to offset lack of ubiquitous coverage.

Furthermore, although pinning retailers on the return rates for their home networking products is difficult, interviews with a number of industry players reveals that the return

rate for wireless home networking solutions can be in the range of 10-20%. This evidence from the retailers provides some evidence to the notion that not all wireless home networking users are consistently satisfied with the performance of their products, either returning them or purchasing additional equipment – such as repeaters – to provide for a more consistent experience.

Wi-Fi solutions have continued to evolve, and 802.11g and 802.11a solutions offer increased throughput and coverage. In developing new wireless technologies, such augmentations as antenna diversity and multiple input/output (MIMO) features will continue to strengthen the wireless proposition, not only for home data networks, but for additional connectivity applications. However, this isn't to say that wireless *alone* will be the solution of choice. We'll get into this rationale in the next few sections.

2.0 The Evolution of Advanced Services in the Home

2.1 Multimedia and Entertainment Networks

Beyond sharing a broadband connection between and among home computers, technological development and consumers' appetite for new ways to enjoy a wide variety of content and applications – including music, video, photos, and voice – are converging under a class of solutions called entertainment and multimedia – networks. The development and sale of these solutions is being spurred by the needs of players in home computing, consumer electronics, and services industries. The work by these companies will spur new growth in home networks, as products specifically aimed at multimedia sharing will soon account for a significant share of the total market (**Figure 5**).

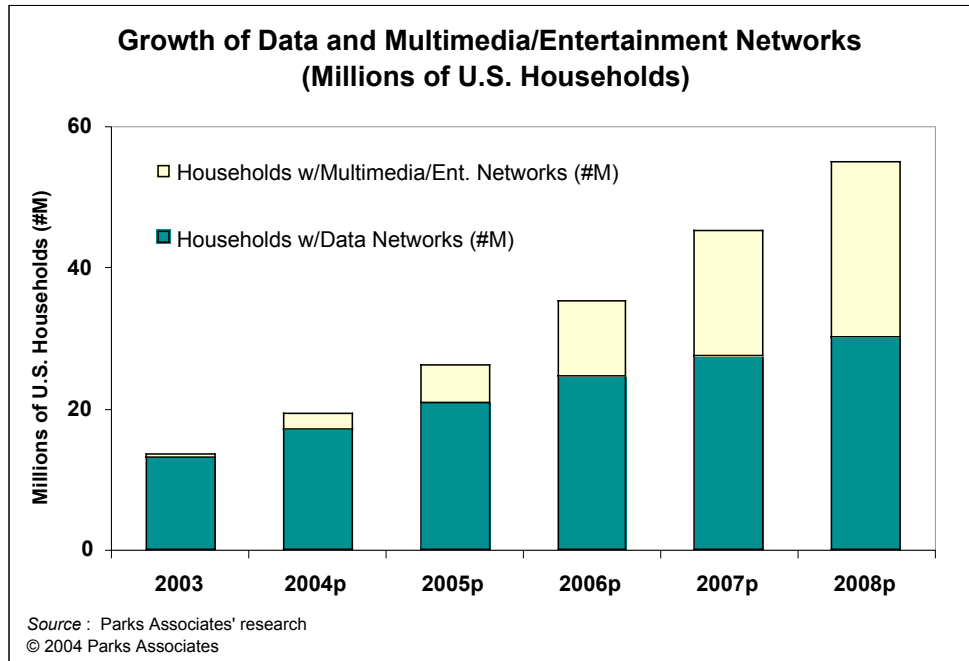


Figure 5 Growth of Data and Multimedia/Entertainment Networks

2.2 Voice Applications

As much as the delivery of multimedia content in the form of video and other types of content is going to be a key differentiator between one service provider and another, voice applications will remain an essential offering. Service providers are now casting a keen eye to the marriage of the home network and voice applications, where voice-over-IP (VoIP) signals can be carried to multiple platforms everywhere in the home. Certainly, voice-over-Wi-Fi has been receiving a great deal of attention recently. However, given the need by service providers to offer advanced solutions with the same degree of quality and reliability as the plain-old-telephone-service (POTS) to which millions of customers have grown accustomed, they are looking with interest at not only wireless solutions, but reliable wired solutions (phoneline, coax, and powerline) that can provide for consistent and extended coverage to all of the areas of the home where the applications will be needed.

2.3 Requirements for Whole-House Consistent Coverage and Performance

The demands by service providers (including players in telephony, broadband, and television services) for networking solutions that can meet today's needs for data networks and their plans to provide a host of services to their customers are going to dictate a move to hybrid networking solutions that incorporate both wired *and* wireless components. Specifically, service providers are demanding that the home networking solutions they deploy meet the following parameters:

Consistent Throughput: Service providers are spending a great deal of time developing market requirement plans that will dictate their home networking plans. Some convey very specific needs for networking throughput, indicating that (consistent) speeds of at least 25 Mbps are an absolute necessity. Other service providers haven't yet provided specific definition to their throughput requirements, other than to indicate that a home networking solution should be able to handle multiple streams of data, voice, and video. Because service providers are still uncertain in what order their next-generation services will be deployed (at what point, for example, do ILECs deploy IP-based multi-channel video offerings?), the home networking solutions that they offer will have to be scaleable.

Consistent Coverage: Service providers want assurance that content can be accessed from multiple areas of the home. They are skeptical about relying entirely on a wireless solution that may not provide this consistency of coverage, and have indicated that hybrids of wireless and wired networks hold a great deal of attraction.

Quality-of-Service: Service providers do not want to be the primary point of contact for customers upset that video on the television is of poor quality or that voice transmissions are choppy. The home networking solution(s) that the service providers embrace will have to account for quality-of-service for many different kinds of content. Given the overhead that wired solutions provide in terms of throughput capabilities, they are seen as a necessary part of a home networking configuration.

2.4 The Advent of Hybrid Distribution Systems

No single home networking solution is going to prevail as computer manufacturers, consumer electronics players, and service providers deploy next-generation content applications and platforms. In interviews conducted with industry leaders in broadband and television services, chipset development, consumer electronics, and advanced customer premise equipment (CPE), Parks Associates finds that there a single-mindedness among industry leaders to adopt hybrid solutions – wireless *and* wired solutions combined together in a single system. As one major service provider put it quite succinctly, “Don’t box us in” by forcing him to choose only one networking solution.

The market to provide next-generation home networking solutions is currently wide open, and Parks Associates is evaluating the prospects of a number of different solutions that are vying for market share as backbone solutions. From coax (Entropic, Coaxsys, TMT) to phonenumber (HomePNA and Serconet) and powerline (HomePlug), all solutions are currently being evaluated.

Each of the three wired backbone contenders – coax, phonenumber, and powerline each have a significant opportunity to see success. For example, coaxial solutions are being positioned for multi-room video distribution solutions that take advantage of the influx of digital video recorder (DVR) set-top boxes that cable and satellite television service providers are using as key differentiators. With the advent of IP television services from telecommunications players around the world, we anticipate that video distribution in the home will become much more mainstream in just a few years. Telecommunications service providers have also shown a partiality toward twisted-pair phonenumber solutions in the home, because it is a medium with which they are familiar. Not only will phonenumber backbones be considered for such applications as distributed data and voice, but it is under serious consideration as a video networking backbone, also. Finally, powerline solutions have become far more reliable, and they will be touted for their performance and for ease-of-use.

The world of home networking will move toward hybrid solutions, as chipset prices drop and as OEM players heed the call of service providers to develop home networking platforms that provide customers with a great deal of flexibility and the service providers

with a good degree of reliability. As our forecast in **Figure 6** indicate, we anticipate that hybrid solutions will make up 60% or more of the home networking products – data, voice, and multimedia – that are shipped by the end of 2008.

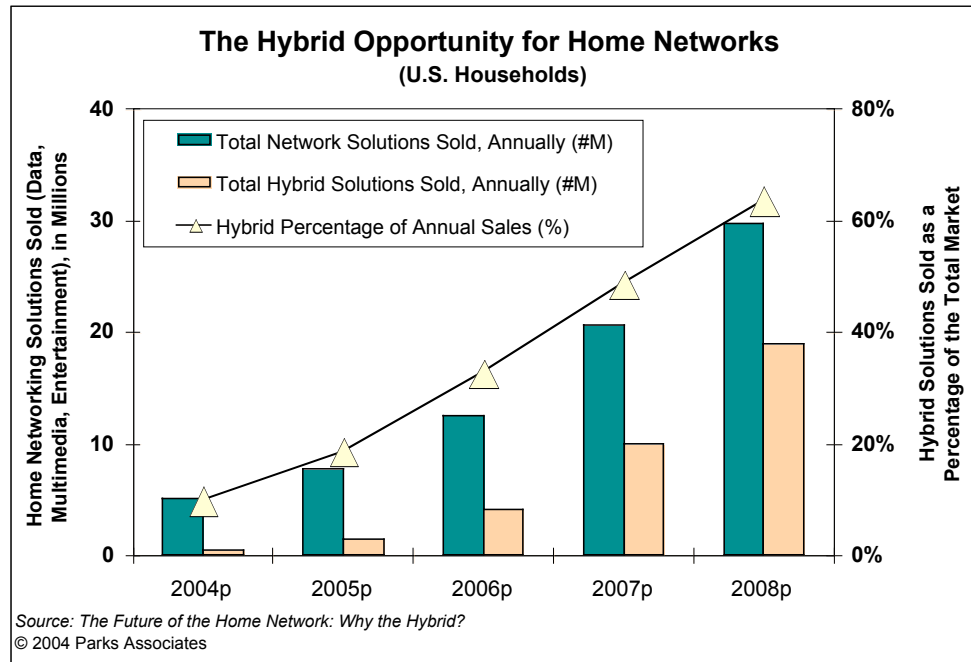


Figure 6 The Hybrid Opportunity for Home Networks

The Hybrid Opportunity for Home Networks: Going Inside the Numbers					
	2004p	2005p	2006p	2007p	2008p
Total Network Solutions Sold, Annually (#M)	5.1	7.8	12.5	20.6	29.7
Total Hybrid Solutions Sold, Annually (#M)	0.496	1.4	4.1	10.0	18.9
Hybrid % of Annual Sales (%)	10%	19%	33%	49%	64%

Source: *The Future of the Home Network: Why the Hybrid?*
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Figure 7 The Hybrid Opportunity for Home Networks: Going Inside the Numbers

The promise of hybrid networks are solutions that offer end-users a great deal of flexibility and performance, greatly enhancing their data, voice, multimedia, and entertainment applications. For service providers and OEM players, hybrids will deliver more reliability and fewer customer service calls, which have a significant impact on customer satisfaction and brand loyalty. The market opportunity for hybrid home

networking solutions is significant. As the home networking market – data, multimedia, and entertainment – grows eightfold between 2004 and the end of 2008 (**Figure 8**), hybrid solutions will capture a growing percentage of the home networking dollars.

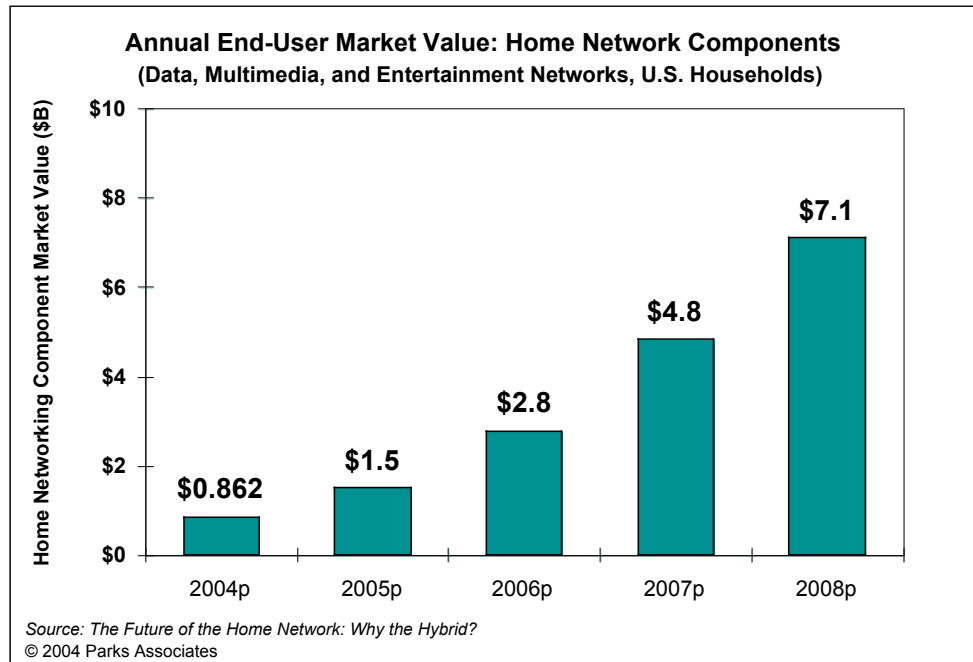


Figure 8 Annual End-User Market Value: Home Network Components

About the Author: Kurt Scherf is vice president and principal analyst for Parks Associates, and studies developments in home networks, residential gateways, digital entertainment, technology development in the housing market, and residential and building management and controls. Mr. Scherf is the sole author or contributing author/analyst to more than 30 research reports and studies produced by Parks Associates since 1998. His most recent work includes *The PC as a Multimedia Platform* and *Consumers & Emerging Multimedia Platforms*.

About Parks Associates: Parks Associates is a market research and consulting firm focused on all product and service segments that are “digital” or provide connectivity within the home. The company’s expertise includes home networks, digital entertainment, consumer electronics, broadband and Internet services, and home systems.

Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, multiclient studies, consumer research, workshops, and custom-tailored client solutions. Parks Associates also hosts two executive seminars, both part of the Fall Focus series, and co-hosts CONNECTIONS™ (in partnership with the Consumer Electronics Association) each year. www.parksassociates.com.