



The Market For Ultra-Wideband Solutions

A Parks Associates White Paper

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Table of Contents

1.0	The FCC’s Big Gamble	1
2.0	UWB: A Revolution in Progress?	2
2.1	The Shift in the Regulatory Mindset Regarding Unlicensed Wireless Communications	2
2.2	Rethinking Past Notions about Wireless Networks and Multimedia Connectivity	2
2.3	Rethinking the Market Landscape: UWB as a Unifying Technology?	4
3.0	Where Is the UWB Market Likely to Find Early Success?	6
3.1	The Peripheral Interconnect Market	7
3.2	Digital Imaging and Mobile CE.....	7
3.3	Fixed Consumer Electronics.....	7

List of Figures

Figure 1 Characteristics of Ultra-wideband.....	3
Figure 2 Features of UWB.....	4
Figure 3 UWB’s Potential Market: PC, CE, and Mobile Devices.....	5
Figure 4 Products with Digital Interfaces.....	8
Figure 5 Total Annual Addressable Market for UWB Nodes.....	10
Figure 7 UWB Chipset Revenue Growth.....	11

1.0 The FCC's Big Gamble

“I believe that ultra-wideband technologies are destined to play a significant role across America’s communications landscape.”

- FCC Commissioner Michael J. Copps, February 14, 2002¹

“I am excited that ultra-wideband technology, which operates at powers [thousands of] times lower than PCS handsets, will allow us to take sharing to new levels, and help avoid such waste. These sophisticated applications can potentially co-exist with spectrum users in any frequency, while promising a host of exciting military, public safety, medical and consumer uses.”

- FCC Commissioner Kevin J. Martin, February 14, 2002²
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On February 14 2002, the Federal Communications Commission (FCC) issued a much-anticipated ruling that allows for the limited commercial deployment of ultra-wideband (UWB) wireless communications systems in the United States. In opening up an unprecedented amount of unlicensed wireless spectrum in which UWB to operate, the FCC acceded to the requests of a vast number of supporters which literally represent the ecosystem for digital home technology (and specifically home networking). From personal computing powers Intel Corp. and Microsoft Corp. to consumer electronics giants Philips Electronics N.V. and Samsung Electronics³ UWB is being positioned as the ideal connectivity solution across a vast range of products, including computer peripherals to digital imaging devices, home theater components, consumer electronics equipment, and mobile phones.

The commercialization of ultra-wideband solutions is an experiment of grand proportions on the part of U.S. regulators. In acceding to the requests of some of the most influential companies in the consumer electronics (CE) and personal computing (PC) markets, the FCC has opened an unprecedented amount of bandwidth for commercial use. In this action, the FCC is betting that a solution such as UWB – which by its nature is a non-

¹ *Separate Statement of Commissioner Michael J. Copps*, an addendum to the FCC’s *First Report and Order* issued on February 14, 2002.

² *Separate Statement of Commissioner Kevin J. Martin*, an addendum to the FCC’s *First Report and Order* issued on February 14, 2002.

³ Of course, the number of companies pursuing UWB development reaches far beyond these four examples. Parks Associates acknowledges that the success of UWB eventually will rest with companies both large and small, and this list is not meant to be exhaustive; merely illustrative.

interfering technology – will spur new communications development that will drive the wireless industry and overall economic development.

2.0 UWB: A Revolution in Progress?

Parks Associates argues that the “revolutionary” moniker is probably one that gets overused in technology business. After all, we’ve witnessed enough of the “hype-to-crash” syndrome in the past few years to be jaded to the constant clamor that often accompanies yet another “groundbreaking” technology that was 1) ahead of its time; 2) a wonderful piece of engineering but a nightmare to market; and/or 3) simply not a good idea. UWB has certainly received enough attention as the “revolutionary” technology solution for 2003 (and beyond). Jaded as we are, we agree that this solution may be fundamentally groundbreaking for three reasons, as covered below.

2.1 The Shift in the Regulatory Mindset Regarding Unlicensed Wireless Communications

The commercialization of ultra-wideband solutions – as allowed by recent Federal Communications Commission (FCC) rulings is an experiment of grand proportions on the part of U.S. regulators. In acceding to the requests of some of the most influential companies in the consumer electronics (CE) and personal computing (PC) markets, the FCC has opened an unprecedented amount of bandwidth for commercial use. In this action, the FCC is betting that a solution such as UWB – which by its nature is a non-interfering technology – will spur new communications development that will drive the wireless industry and overall economic development.

2.2 Rethinking Past Notions about Wireless Networks and Multimedia Connectivity

When it comes to skepticism toward the future implementation of wireless technology (particularly for multimedia applications), Parks Associates is not alone. Despite the success of wireless connectivity solutions in penetrating the mass-market for data networks at, there have existed doubts that wireless networks can provide ample throughput and quality-of-service measures to become the solution of choice for the

purposes of audio and video streaming. Of chief concern to many players in the CE world (set-top manufacturers serving the cable and satellite television industries, for example), is that, particularly when it comes to the high-throughput requirements for high-definition television (HDTV) streams in the home, the wireless solutions – as they exist in their present form—simply don’t have the overhead – or the throughput capacity – to provide for quality in-home broadcasts. Finally, there exists the argument about the need for a multimedia network that requires the longer-distance transport (say, more than 10 meters, or 30 feet) of video files. Is a whole-house solution really needed?

In specifically addressing the short-range and high-throughput connectivity of any number of devices in the home, UWB’s key attributes become quite attractive. In short, and as **Figure 1** and **Figure 2** highlight, UWB provides a new spin on wireless networks in that it:

1. Provides for incredibly high data rates at very short distances (matching the short-distance rate of some wired solution!), positioning it quite advantageously as a cable replacement solution for both the CE and PC industries;
2. Uses and emits a mere fraction of the power of existing wireless solutions, positioning it as a solution that fulfills the connectivity challenges of a company developing a great many products in different categories, including mobile and/or handheld devices, in which power consumption is a critical constraint; and
3. It was designed from the ground up to provide for quality-of-service, which should aid supporters in convincing a skeptical CE industry that this is the right solution for wireless video distribution.

Characteristics of Ultra-wideband	
Range	30 feet – 12 feet (10 meters and 4 meters)
Throughput	110 and 200 Mbps
Power Consumption	100mW and 250mW
Interference Capability	Robust to IEEE systems (i.e., Wi-Fi®)
Co-existence Capability	Reduced interference to IEEE systems
<i>Source:</i> IEEE 802.15.3a summary requirements from Staccato Communications (formerly known as Discrete Time Communications)	

Figure 1 Characteristics of Ultra-wideband

Features of UWB
<ul style="list-style-type: none"> • UWB RF energy is spread over a broad spectrum (7.1 GHz). • Energy is spread over a broad range and at such low power as to appear as harmless noise to other devices. • Lower power consumption makes it an attractive solution across a wide spectrum of products, including handhelds, consumer electronics, computers, and peripherals. • Its throughput is many times that of any narrowband solution; 500 Mbps and greater data rates are possible. • Can coexists with Wi-Fi and Bluetooth solutions. • Quality-of-service is built into the specifications. • Flexibility in transmission techniques (MBOA proposal) is key to developing a solution that meets international regulatory requirements.
<p>Source: Parks Associates' research © 2005 Parks Associates</p>

Figure 2 Features of UWB

2.3 Rethinking the Market Landscape: UWB as a Unifying Technology?

To the questions and concerns positioned in the previous section comes UWB. This is a technology designed and positioned not as a “backbone” solution (a longer-distance networking solution), but as one aimed at a very specific market need – cable replacement between and among such devices as high-end consumer electronics platforms (flat panel televisions and receivers, for example), PC peripherals (external storage devices, scanners, etc.) and mobile CE and communications devices (digital cameras, camcorders, music players, etc.).

As **Figure 3** illustrates, the cable replacement usage model for UWB opens its potential market across a potentially staggering array of products and platforms. This could be truly revolutionary technology in that it provides a unified wireless interconnectivity standard for the three platform sectors – PC, CE, and mobile – driving home networking today and well into the future.

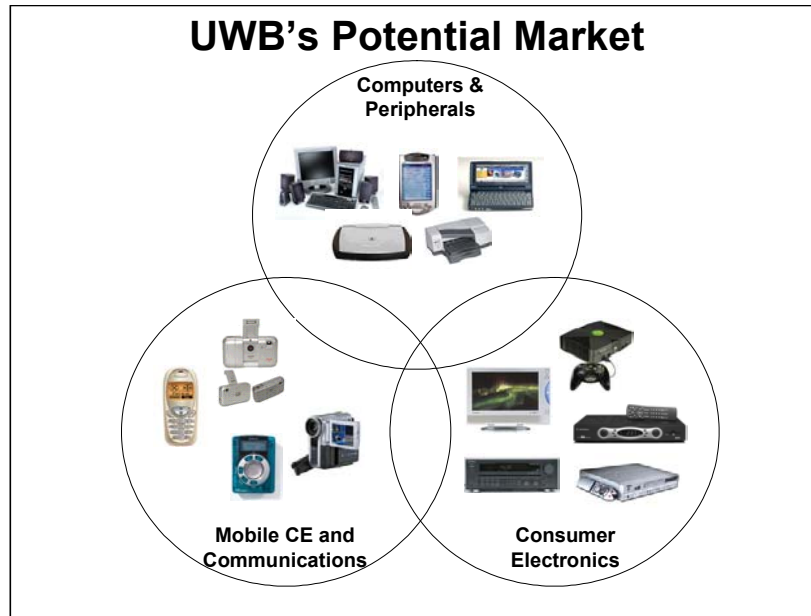


Figure 3 UWB's Potential Market: PC, CE, and Mobile Devices

Furthermore, UWB may prove to be unifying in terms of its promise of providing a global solution, meeting the regulatory restrictions of the “Big Three” markets – the U.S., Western Europe, and APAC (Asia-Pacific). Supporters of a proposal in front of the standards Task Group of the IEEE aver that it provides for “spectrum agility,” in that it can respond to certain portions of the spectrum that may be deemed “off-limits” to unlicensed wireless technologies by automatically adjusting its transmission characteristics. By providing for one solution meeting the requirements of a potentially huge global market, UWB supporters anticipate that development timelines can be pushed forward (as companies are not forced to create a new standard to meet their particular country or region’s regulatory standards), products brought to market quicker, volumes increased more rapidly, chipset costs fall, and a mass-market realized sooner. This would indeed be revolutionary!

3.0 Where Is the UWB Market Likely to Find Early Success?

For a solution so adept at providing precision location services – within very minute distances – we find it somewhat ironic that positioning UWB’s market fit has resulted in some rather vague (and perhaps overly-optimistic) forecasts. Granted, forecasting in the technology space is always difficult – the best we can offer are educated guesses based on such factors as consumer demand, industry development, history, and (sometimes) logic. Furthermore, positioning UWB on the “market spectrum” – identifying the key platforms and applications for which UWB is likely to be used – is extremely difficult, given its characteristics and the industry support behind it. As the figure below indicates, UWB is a potential market fit across a broad spectrum of products and applications.

We readily acknowledge the challenges inherent in forecasting a networking solution as broadly-positioned as UWB. However, we simultaneously would caution against the over-hype that has been associated with previous “revolutionary” technologies. The clearest example of this type of rose-colored forecasting is Bluetooth. UWB insiders are quite outspoken in their contention that this networking solution cannot experience the “over-hype/under-deliver” syndrome that has become synonymous with Bluetooth’s history. Therefore, building forecasts built on pragmatic deployment scenarios are critical in meshing UWB’s reality to its much-touted prospects.

Although we are pragmatic, we are by no means pessimistic about UWB’s future prospects as a short-range cable replacement technology. We do believe, however, that real UWB deployment is likely not to occur until the many players involved from the mobile, CE, and PC markets coalesce on a “standard” solution. Although a Task Group from the IEEE (802.15.3a) attempted to finalize an industry standard in 2003, a philosophic split prevented action. The delay in the standards development is likely to keep major players – primarily in the consumer electronics space – from deploying the solution as quickly as previously thought. However, companies have already begun to coalesce around alternative standardization methods (the *de facto* route), and we’ll see industry-wide support of a UWB chipset solution in time for late 2005 product shipments.

The market from 2005 through 2008 will shift from a heavy emphasis on PCs and peripheral connectivity to include more consumer electronics platforms. Because main players in the PC space have been the earliest and most-enthusiastic supporters of UWB, we anticipate that the wireless solution could be a standard on PC motherboards sometime in the near future. Once that occurs, we'll see increased interest and uptake in this wireless connectivity among PC peripheral partners.

3.1 The Peripheral Interconnect Market

We believe that UWB provides the PC players an optimized solution to finally replace cable connections (via Wireless USB). Developments such as the new PCI Express™ interconnection for desktops and servers will mean that PC and peripheral manufacturers will seek networking solutions that provide for robust connectivity between PCs and such peripherals as printers, scanners, and external memory and drives.

3.2 Digital Imaging and Mobile CE

Once the PC manufacturers have adopted UWB as a short-range cable replacement solution, manufacturers of digital cameras, camcorders, and mobile CE devices such as MP3 players will follow suit as Wireless USB becomes more commonplace. Wireless USB is ideally positioned as a cable-free and very high-speed connection between the PC and such devices.

3.3 Fixed Consumer Electronics

The fixed consumer electronics space – including such platforms as digital and HDTV receivers, A/V receivers, speakers, home theater projectors, set-top boxes, and the like – will be the last segment to experience high penetration of UWB for several reasons. First, because the early target for “network-capable” CE platforms are high-end and custom installed solutions, skepticism about using wireless solutions for connectivity between nodes will need to be addressed. It will take some time to convince manufacturers and custom installers that wireless connections can provide the same reliability and quality as wired solutions. Furthermore, IEEE 1394 (“FireWire®”),

Digital Visual Interface (DVI), and High-Definition Multimedia Interface (HDMI) connections will become more commonplace in coming years, and manufacturers may tend to lean toward these wired interfaces first, and wireless second. The set-top box market may provide a clear indication of the market for high-bandwidth digital interfaces, as recent agreements between the cable industry and the Consumer Electronics Association (CEA) will improve the odds of seeing more FireWire connections on set-top boxes. HDMI is also being pursued as a high-bandwidth and secure interface for digital products, including set-tops, receivers, and digital televisions. UWB solutions should be very well positioned as a next-generation high-bandwidth and robust wireless upgrade to each of these solutions.

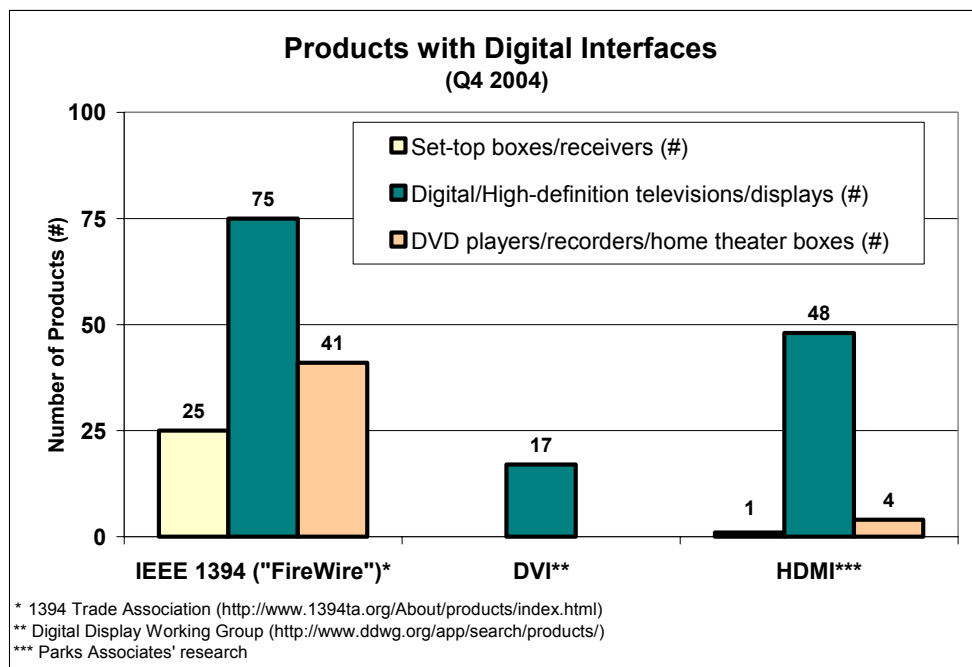


Figure 4 Products with Digital Interfaces

Finally, we are already witnessing the trend for point-to-point delivery of audio and video content using Wi-Fi® and other existing wireless solutions. Granted, earlier generations of Wi-Fi itself were not optimized to support high-quality HDTV streams, but dual advancement of both video compression techniques and radio design (“MIMO,” beam forming, and antenna diversity are among consideration for next-generation Wi-Fi standards) means that PC-to-CE point-to-point configurations for video distribution will become a growing reality. A growing number of manufacturers will adopt Wi-Fi as

perhaps an intermediate solution for their point-to-point networking endeavors. As a cable replacement solution, UWB will certainly fill a valued role in creating multimedia “clusters” that are easier to configure and eliminate the “rat’s nest” of cabling associated with the home entertainment ecosystem today.

Parks Associates’ forecast for UWB chipset deployment begins with an examination of the total addressable market (TAM) across the three major categories: PCs & Peripherals, Mobile CE, and Fixed CE. These estimates point to the *market potential* for UWB chipset shipments; these are not *chipset forecasts* in and of themselves. They are instead a useful guide to the size of the potential market for high-speed and short-range cable replacement solutions, such as UWB.

In sum, Parks Associates sees the TAM growing from more than 50 million product shipments at the end of this year (2003), to nearly 150 million products at the end of 2008 (Figure 4). The market for actual UWB-equipped solutions across the three product ecosystems – PCs and peripherals, Mobile CE, and Fixed CE – is expected to grow significantly after late 2005, when the first end-user products with short-range and high-speed UWB connectivity emerge (Figure 5). After being dominated early by PC-centric solutions in 2005, UWB shipments across the three categories will be fairly even by 2008. Annual UWB chipset revenues will exceed \$1 billion by the end of 2009 (Figure 6).

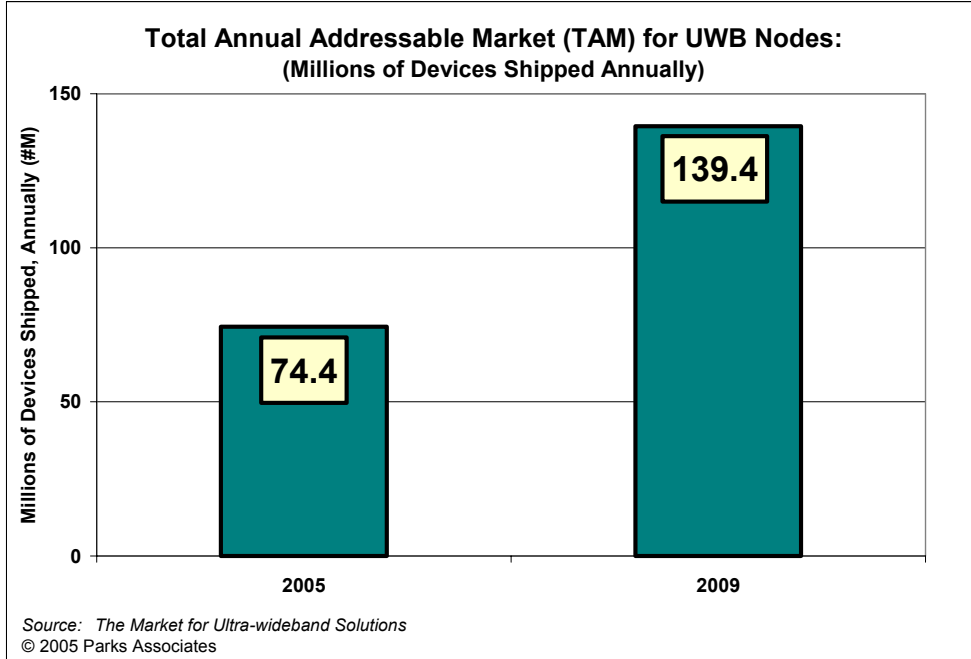


Figure 5 Total Annual Addressable Market for UWB Nodes

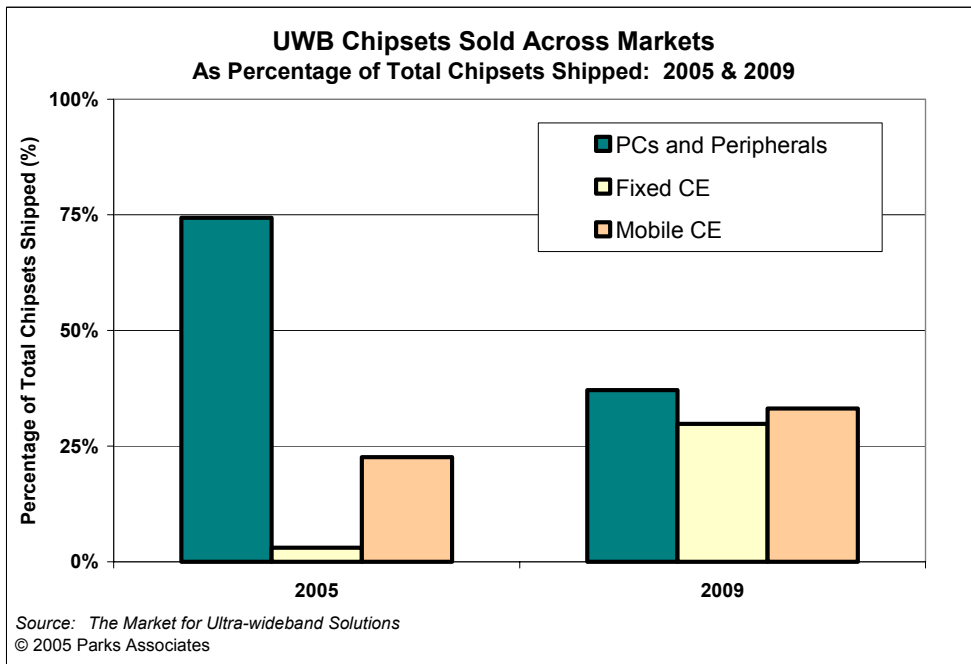


Figure 6 UWB Chipset Shipments Across Categories

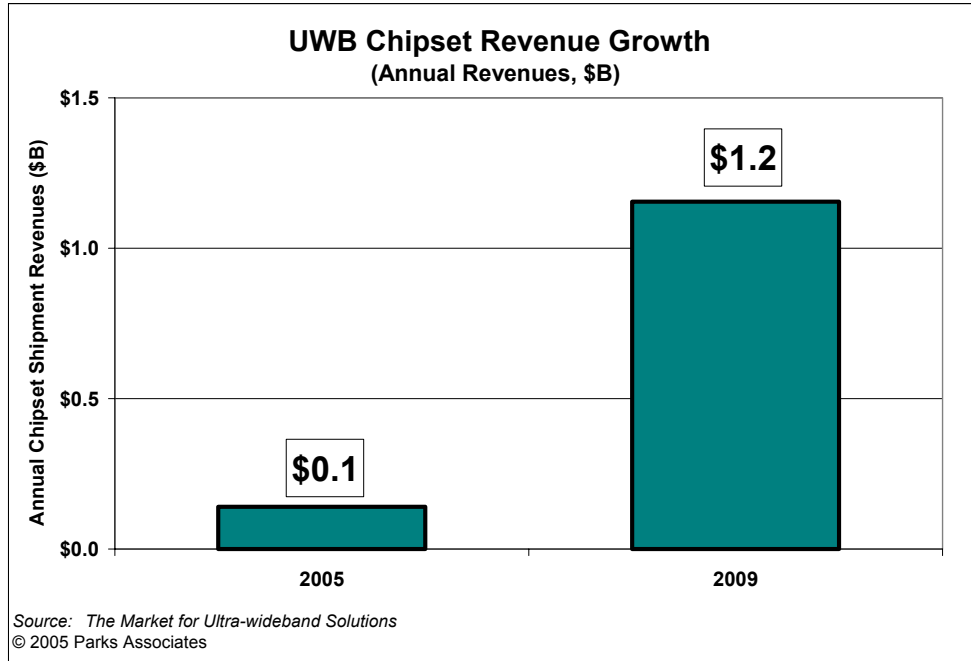


Figure 7 UWB Chipset Revenue Growth

About the Author: Kurt Scherf is vice president of research 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 *Personal Area Networking Solutions: The Next Generation*, an overview and analysis of market for ultra-wideband solutions.

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.