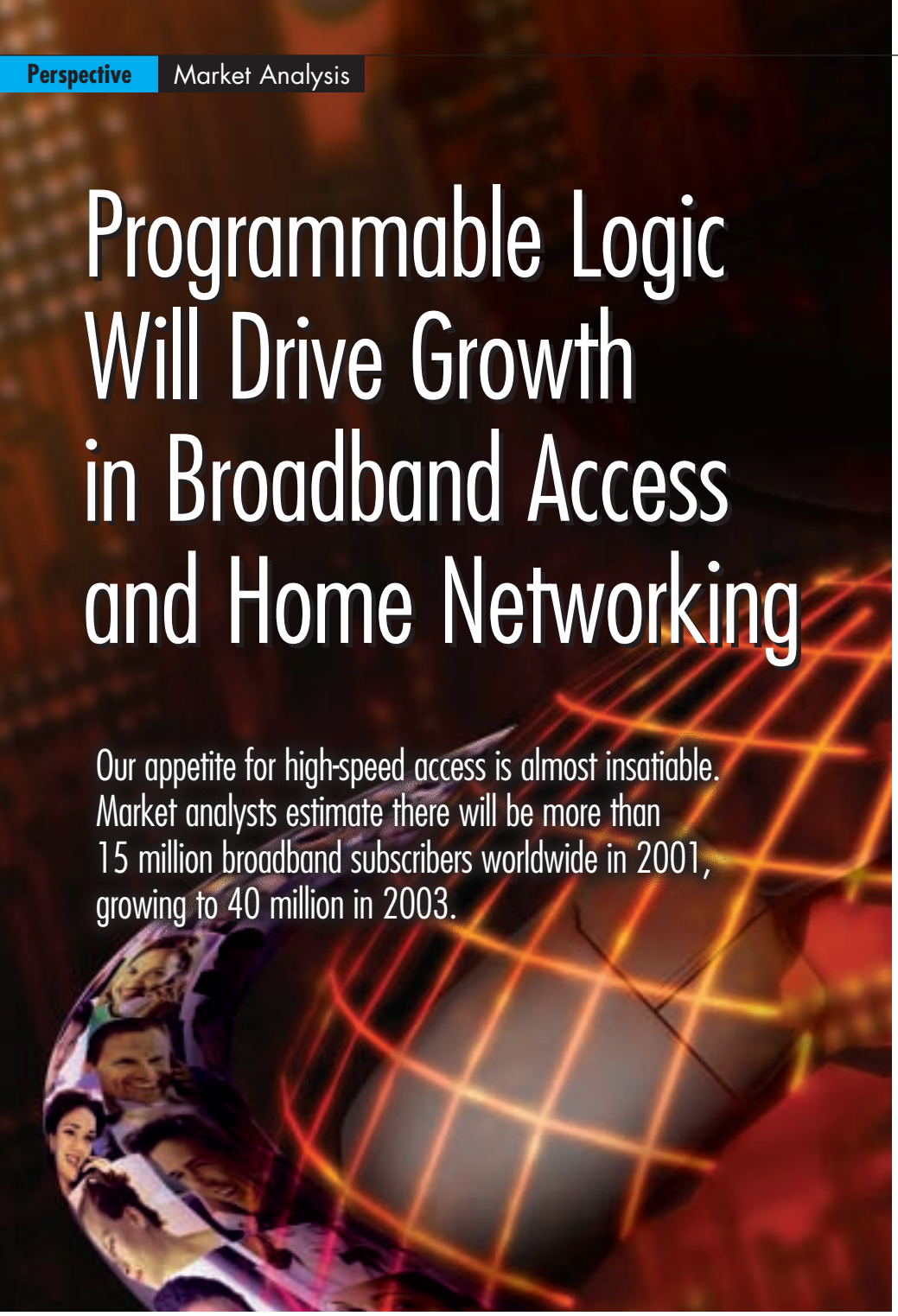
Programmable Logic Will Drive Growth in Broadband Access and Home Networking



Our appetite for high-speed access is almost insatiable. Market analysts estimate there will be more than 15 million broadband subscribers worldwide in 2001, growing to 40 million in 2003.

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The Internet has become an integral tool and resource for an ever-growing population of corporate users. As this population continues to expand to include remote corporate users – such as telecommuters, field engineers, and "road warriors" – their need for speeds equivalent to corporate LANs has increased, because access speed directly impacts worker productivity.

Likewise, reliance on the Internet and the need for greater bandwidth is driving consumers away from traditional analog-based modem technology in favor of higher speed broadband access technologies. Broadband not only delivers faster Internet access to the home, but it also serves as the catalyst for the expansion of the new home networking market.

We predict programmable logic will play an essential role in accelerating the growth and deployment of both broadband access and many of the new home networking applications and technologies.

Demand for Broadband

Broadband access describes a high-bandwidth digital communications link that provides access speeds typically greater than 128 Kbps. Broadband access not only provides significantly faster access times than older analog technologies (more than 100 times as fast), but it is also a conduit better suited for some of the newer, high-bandwidth Internet applications. These applications include streaming video, online shopping, MP3 music, VoIP (Voice over Internet Protocol), viewing of high-resolution images, and online gaming.

Broadband service is delivered to the home using a variety of different technologies, including cable, DSL, satellite, wireless, powerline, and ISDN. While each technology has its own set of benefits and drawbacks, in most cases, the existing home wiring infrastructure and the availability of the service itself usually plays the biggest role in determining the consumer's choice of broadband technology.

Traditionally, cost constraints have dictated the use of custom logic circuits, such as gate arrays, to implement additional logic circuits for products like digital modems, which have large annual unit volume shipments. While gate arrays may have proved to be cost effective in the past, the long development cycles can have a negative impact on a product manufacturer's time to revenue, and hence, success in the market.

In the past five years, advances in semiconductor technologies have dramatically affected the ability to create low-cost programmable logic families, such as Xilinx® Spartan®-II field programmable gate arrays (FPGAs). As costs are now beginning to reach parity with traditional gate arrays, low-cost FPGAs are rapidly becoming the technology of choice. They are used throughout a wide range of broadband access equipment because of their inherent flexibility and ability to accelerate the time to market delivery of new products. These benefits have not only accelerated the

growth and availability of broadband services, but the broadband services themselves are now spawning new markets, such as home networking.

Networking Comes Home

Although economics professors may cringe, supply can create its own demand. This phenomenon, called a "virtuous cycle," is perhaps best illustrated by the personal computer market, where faster microprocessors continue to drive more demanding software applications, which in turn drive the need for faster processors. In the case of home networking, more bandwidth, in the form of broadband access, is driving new applications such as MP3 audio players, online gaming, streaming video, and other amenities that in turn are driving the need for greater bandwidth that will eventually lead to more new applications.

This virtuous cycle, compounded by a voracious consumer desire to be entertained and to share information, leads market analysts to estimate the home networking market will swell to $6 billion dollars by the year 2004. First, however, several barriers must be overcome for this market to realize its full potential. While lack of consumer ease-of-use is one of the more problematic impediments to market growth, perhaps the most important issue today is the fragmentation of the home networking technologies themselves.

With over 22 disparate technologies – including phonelines, powerlines, IEEE 1394 (FireWire), Ethernet, USB 2.0, HomeRF, Bluetooth™, DECT, IEEE 802.11, and HiperLAN2 – it is unclear, which, if any technology, will be the winner. Each technology has its own pros and cons. Many of these technologies conflict with each other and are not interoperable. Furthermore, some of these technologies continue to be revised as problems are discovered after they are deployed.

Disparate Technologies, Programmable Solutions

With so much confusion and chaos surrounding home networking technologies, manufacturers are forced to overcome a difficult learning curve before developing products. Moreover, stiff competition and time-to-market pressures almost mandate a "ready, fire, aim" development model. Manufacturers attempt to design products for the longest life cycles, but they are up against the challenges of getting those products to market as fast as possible. Quite often, this dichotomy can lead to the development of products that become obsolete shortly after introduction.

Additionally, because of the sheer number of different home networking standards, leading manufacturers are driven to develop a large number of distinctly different products in order to garner an appreciable share of the market. Developing such a large number of products using traditional technologies, such as gate arrays, can prove to be both technically impractical and cost prohibitive. As we've seen in the digital modem markets, at this relatively early stage, highly integrated ASSP solutions are generally not available or feasible. The low unit volumes of these fragmented broadband technologies rarely justify the required engineering and financial investments.

And, as we have seen in the broadband access markets, the multiple standards and rapidly evolving features of home networking make programmable logic a natural fit for this new and changing marketplace. Home networking demands high performance, scalability, interoperability, upgradability, security, and a low cost of ownership. Low cost FPGAs, such as the Xilinx Spartan-II FPGA family, readily address these requirements and will serve to accelerate the growth and success of home networking.

Additionally, Xilinx is currently backing a new initiative that simplifies the task of designing products that can be remotely upgraded, modified, or fixed once they have been deployed in the field. Called Xilinx Online, this initiative uses Xilinx Internet Reconfigurable Logic (IRL™) to take advantage of the inherent reprogrammability of FPGAs to "future proof" products against premature obsolescence.

The ability to remotely upgrade a product will not only serve to accelerate the time-to-market of home networking applications, but it will also extend the useful life of existing systems – and significantly reduce production, maintenance, and support costs. Clearly, the benefits of the Xilinx Online initiative and IRL will prove to be a tremendous value to the new and emerging home networking applications.

Conclusion

It's clear the consumer desire for faster Internet access is the major catalyst fueling the demand for broadband access to the home. As broadband access technologies gain momentum and leaders emerge, they are already responsible for spawning a wide range of new home networking applications. We expect this trend will continue well into the future.

Where low cost programmable logic has played a key role in accelerating the growth and deployment of digital broadband access technologies, it will play an even greater role in bringing new home networking technologies to life.

For more information on the challenges and opportunities of home networking, visit *www.xilinx.com/esp/.*