

# Home Networking – Integrating Information Appliances with Personal Computers

While most “information appliances” perform a single function very well, the personal computer will remain the backbone and the gateway of the home network.

by Amit Dhir  
 Manager, Strategic Solutions  
 amit.dhir@xilinx.com

Krishna Rangasayee  
 Senior Manager, Strategic Solutions  
 krishna@xilinx.com

A plethora of new consumer devices – known as information appliances (IAs) – are invading the consumer market today, with a lot more to come. IAs like MP3 players, PDAs, digital cameras, set-top boxes, gaming consoles, cellular phones, and digital VCRs are gaining popularity and acceptance among consumers. The market research firm Dataquest predicts that the worldwide unit production of IAs will explode from 1.8 million in 1999 to 391 million in 2003. Another research firm, IDC, predicts that in 2001, 18.5 million IA units will ship compared to 15.7 million personal computers (PCs). Despite the growth in the shipments of IAs, PCs will continue to penetrate more households for several years to come.

Dataquest reports PC penetration now exceeds 50% of US households – of the 102 million US households, 52 million own a PC. Dataquest also forecasts that multi-PC households will grow from 15 million in 1998 to more than 26 million in 2003.

In this article, we explore the underlying market dynamics and technological hurdles

that face consumers and IA manufacturers in crossing the PC-centric home-networking threshold.

## The Invasion of Information Appliances

The rapid growth in multi-PC households is creating the need for sharing broadband Internet access, files/data, peripherals (such as printers and scanners), and IAs among the multiple PCs in different rooms of a house. This need has given birth to the fast-emerging home-networking market.

The PC is the most important and widely used device for computing, Internet access, online gaming, chatting, e-mail, data storage, and is hence, the residential gateway to network the home. With worldwide PC shipments totaling 134.7 million units in 2000 and predicted to exceed 200 million in year 2004, the PC remains in healthy demand. This is due to the ever-improving price per performance ratio and the position of the PC as a productivity tool. However, PCs have several weaknesses – such as being complex, buggy, and confusing.

On the other hand, IAs are a promising category of consumer digital electronics that provide users with low-cost, easy-to-use,

instant-on devices that are lightweight, reliable, and offer special-purpose features and benefits. Some of these IAs include digital cameras, digital displays (PDP, LCD), digital TV, Internet audio (CD, MP3) players, DVD players and recorders, set-top boxes, gaming consoles, Internet screen phones, Web pads, security units, energy management units (automated meter reading), VoIP phones, smart handheld devices like PDAs and handheld PCs, Web terminals, e-mail terminals, mobile phones, automobile PCs, and “white goods” (dish washers, dryers, washing machines).

Smarter chips with increased functionality are being embedded into everyday consumer products and IAs. While these devices are quite useful as standalone units, they can provide consumers with even more value and convenience when they are networked with each other.

In the year 2001, unit shipments of IAs will exceed unit shipments for PCs in the US. Parks Associates predicts that in the US, there will be 22 million home IAs sold in 2001 (excluding Internet-enabled mobile phones and telematics systems) compared to 18 million home PCs.



The factors driving IAs are aggressive vendor marketing, consumer demands for Internet connectivity, advancing bandwidth capacity, and lower product costs. IAs are targeting three specific areas:

- Replacing PCs with robust Web browsing, e-mail and interactive devices
- Supplementing PCs with coexisting peripherals like PDAs, printers, and scanners
- Sidestepping PCs with set-top boxes and cellular phones.

**The PC Still Rules**

Despite the IA invasion, the home PC is not going away soon, because PCs offer:

- **Compatibility** – Interoperability between documents for business, education, and government is essential. IAs often support only proprietary, non-PC supportive media standards.
- **Flexibility in the PC platform** – Video editing, music recording, Web authoring and hosting, gaming, e-mail, word-processing, financial analysis, and database management can all be done in one PC. Comparatively, most IAs are dedicated to only one or two functions.
- **Investment** – The massive corporate investment in the PC industry is simply too large to abandon – and there is no good reason to abandon it.
- **Momentum** – More than 50% of consumer homes in the US have PCs – and the number is growing. Worldwide, PCs have a huge installed base that makes the World Wide Web not only possible, but necessary, to modern society.
- **Pace of improvement** – Faster processors, bigger hard drives, better communication protocols, and other quantum leaps in the power of the PC, guarantee that it will remain the centerpiece of the Information Age for some time to come.

Also, as the price of PCs drop while their computing power skyrockets, the lines are becoming blurred between some PCs and IAs. In the under \$500 price range, the handheld PC is eclipsing the PDA, for instance.

The higher intelligence and multifunctionality of the PC makes it the ideal platform for being the residential gateway for home networking. PCs are already being shipped with onboard devices designed for broadband Internet access and with ports to support home networking of multiple information appliances.

Figure 1 shows a generic PC configured for home networking. In addition to the standard processor, memory, hard-disk drive, and operating system, this PC provides a platform that is ideal for multiple functions such as wired Ethernet and wireless Bluetooth™ home networking. Future generation PCs will provide even greater home-networking capabilities to interconnect multiple PCs, PC peripherals, and a host of information appliances.

There are applications that information appliances perform well. A Web pad provides the capabilities of scheduling, ordering groceries, sending and receiving e-mail with portability. While very convenient within the home, a Web pad requires an access point and a gateway to a high-speed Internet connection. The PC can provide all the above functions and more, such as

video editing, gaming, and word-processing. Hence, PCs will maintain a stronghold on consumer homes.

**Conclusion**

The growing ubiquity of the Internet, and the convergence of digital voice, data, and video are bringing interesting applications to the home. Lower PC prices have brought multiple PCs into the home. However, newer information appliances are arriving in the market that use the Internet to provide particular functions independent of a PC. The big question, then, is whether the information appliance will replace the PC in its entirety. We believe this is not likely. The information appliance provides a dedicated functionality, whereas the PC provides a platform to provide networking capabilities to a host of information appliances, PC peripherals, and other PCs. Hence, while information appliances will continue to penetrate homes - and some IAs will access the convenience of the Internet without the assistance of a PC – they will not replace PCs. Ultimately, to achieve their highest functionality, information appliances and the PC must be integrated.

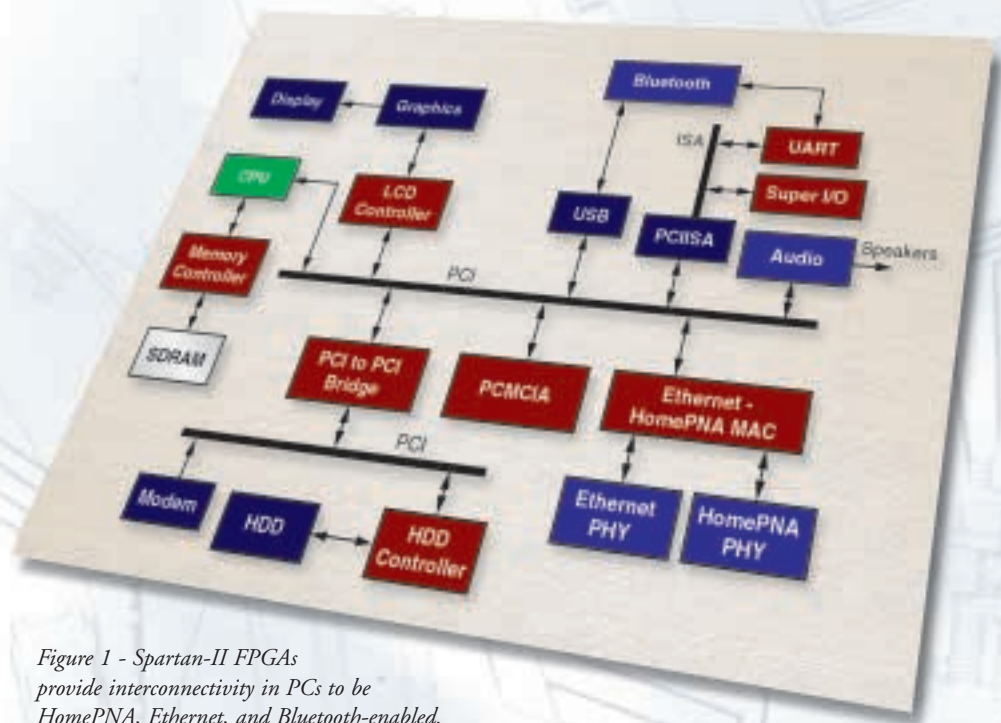


Figure 1 - Spartan-II FPGAs provide interconnectivity in PCs to be HomePNA, Ethernet, and Bluetooth-enabled.