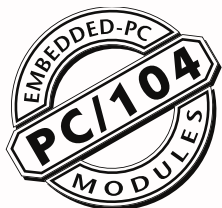


Remote Management of VersaLogic Processor/CPU Boards

This article answers common questions about managing VersaLogic's Jaguar, Bobcat and VSBC-8 processor/CPU boards, using Preboot Execution Environment (PXE) boot ROM firmware from Argon Technology.

PXE is a key component in centralizing booting of networked embedded devices.

The article also outlines the benefits of network booting (LAN booting) in managing and servicing these devices.



Argon Technology is an Executive
 Member of the PC/104 Consortium

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What is PXE?

PXE (pronounced "pixie") allows a system to boot from a LAN by turning a network adapter into a boot device. This opens up a vast array of management, diagnostic and support features.

PXE is an open industry standard developed and supported by a number of software and hardware vendors. Designed by Intel as part of the Wired for Management (WfM) specification to improve the manageability of desktop systems, PXE is equally suitable for embedded applications.

You can add PXE boot ROM code as a BIOS extension in your VersaLogic EBX, STD or PC/104 processor/CPU board as an option. It's also available on floppy disk (PXE on Disk™), CD and DiskOnChip.

PXE boots a system from the network by transferring a "boot image file" from a server. This file can be an operating system or a "pre-OS" agent (see the Pre-OS section in this paper) that can perform management, diagnostic, maintenance and service tasks. Because PXE is not operating system-specific, the image file can load any OS that allows remote booting.

Configuring CPU Boards for Network Boot

To install a PXE Boot Agent® on a VersaLogic CPU board, use the VersaLogic FBU utility to program the PXE Boot Agent into the BIOS extension flash sector. Other CPU boards may already have the PXE Boot Agent installed.

While a device may have a PXE Boot Agent installed, it is not always enabled by the BIOS. In a BBS-compliant BIOS, the PXE Boot Agent must be part of the BIOS boot order. Most BIOS products support the BIOS Boot Specification (BBS), or other methods that let you set the boot order from a BIOS setup screen. VersaLogic CPU boards do not implement BBS, so the PXE Boot Agent is enabled by turning on the BIOS Extension feature in the BIOS Custom Configuration screen.

To perform a network boot each time the system is powered on, select PXE by selecting the Network Adapter as the first boot device. With BBS products that support Network Service Boot (NSB), you can set PXE lower in the boot order and a message (e.g. "Press F12 to boot from network") will appear while the device boots. In this case, PXE is used only when the need arises.

Cont...

† Unless otherwise stated, in this article "device" refers to a product that includes an embedded microcomputer.

Acronyms and Abbreviations

BIOS

basic input/output system

boot ROM

A memory chip that allows a workstation to be booted from the server or other remote station

DHCP

Dynamic Host Configuration Protocol

DOS

disk operating system

FTP

File Transfer Protocol

IPX

Internet Packet Exchange

NCP

NetWare Core Protocol

NIC

network interface card

OS

operating system

POST

power-on self-test

PXE

Preboot Execution Environment

ROM

read-only memory

RWU

Remote Wake Up

TCO

total cost of ownership

TCP/IP

Transmission Control Protocol/Internet Protocol

TFTP

Trivial File Transfer Protocol

WfM

Wired for Management

If you can't change the boot order, there's usually a method within the PXE Boot Agent to switch between local and network booting. With a product such as Argon's PXE Boot Agent and Managed PC Boot Agent™(MBA) ROM, you can set the default boot method from the built-in configuration screen or by using a configuration utility.

Why Network Booting?

Network Booting isn't a new concept. In the past, however, it was largely limited to diskless devices such as thin clients and dedicated systems. Now PXE has standardized the process, so software and hardware vendors can all support the same architecture.

The advantages and uses for network booting include:

- Deploying software and OS for new embedded devices.
- Automating maintenance tasks such as backups.
- Automating device diagnostic & testing in manufacturing process
- Automating device checking such as virus scans.
- Ensuring guaranteed security when this is an issue.

One of the most common applications is installing an OS in a brand new device that has no operating system (or re-installing it when the operating system has failed or critical files have been corrupted).

This eliminates the need to visit each device on the network with a stack of installation CDs. Setting up a new device is as simple as connecting it to the network and powering it on. (A network can be a service technician's basic PC/notebook with diagnostic software and a switch.) You can even set up servers to detect new devices and install software automatically, further cutting administration and management time.

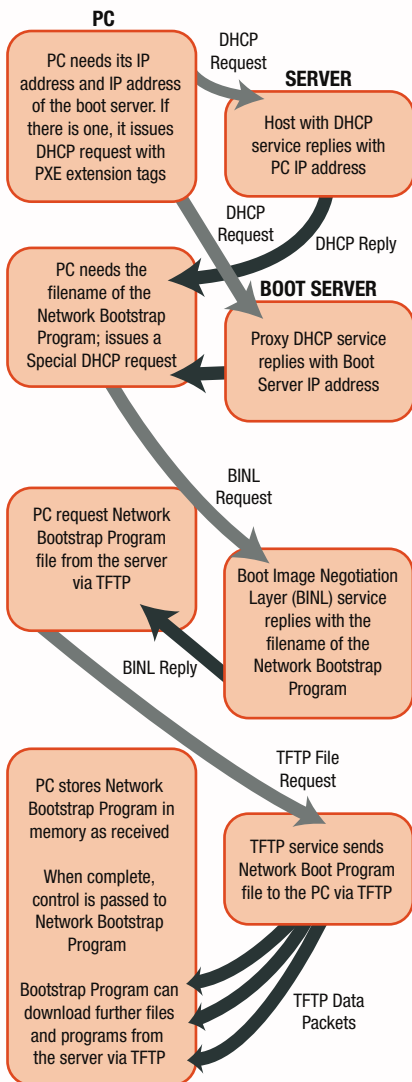
Managing "headless" devices is much simpler, since there is no need to connect a floppy drive, keyboard or monitor to the device to run your diagnostics software, or to trouble shoot. You can automate these procedures using the Network Adapter and PXE.

Should a device crash, a network boot can do a hardware diagnostic, and if it detects a software-related problem, it can re-install that software, or all of the device's software, from the server.

Booting from the network also guarantees a "clean" boot, with no boot-time viruses or user-modified files. The boot files are stored on the server, protected from infection. Alternately, a network boot can scan the local hard drive for viruses, ensuring that it's clean before booting from it. This is called a pre-OS boot.

There are many other advantages to using PXE-based network booting with embedded systems. For example, you can use PXE to load run-test and diagnostic applications before connecting any local media. Automating device setup and initialization from the network simplifies installing and configuring software.

In dirty or vibration prone environments, where problems can occur with the moving parts of local media like hard drives, network booting lets you eliminate local media entirely.



All major network controllers are supported including:

- AMD PCnet
- Broadcom
- Intel 82559er, 82551er, 82541er
- National Semiconductor DP83815, DP83816, DP83820, DP83821
- Realtek 8139 series
- SSMSc
- VIA

For a complete list of supported adapters visit: www.ArgonTechnology.com/embedded

How Does PXE Work?

As well as the PXE Boot Agent on the embedded device, some server side components are needed to support PXE devices. These include a PXE server and a TFTP (Trivial File Transfer Protocol) server. The PXE server is designed to work in conjunction with a Dynamic Host Configuration Protocol (DHCP) server. PXE can share the server with DHCP, or be installed on a different server. This makes it possible to add PXE to an existing network without affecting the DHCP server or configuration.

An image file editor is also required to create and maintain the boot image file for the PXE device.

Wired for Management includes other features for use with PXE. Remote Wake Up can power on, manage and shutdown a remote device, all from a remote location. This lets you schedule updates to occur overnight, while the network is idle, avoiding user interruptions during the day.

For a more detailed technical description of how PXE works, please visit <http://www.pxe.ca>.

Pre-OS

PXE can do more than just load the operating system or install a new system. It can also be used in a pre-OS environment. Pre-OS involves loading a small operating environment to perform a management task or diagnostic test before loading the device's final operating system from a local hard drive. A common example is running hardware diagnostic programs as part of the manufacturing testing and burn-in process. If all test pass, the operating system or application is then installed on the hard drive as required.

Another application is scanning the hard drive for viruses before the device boots. This guarantees that networked devices aren't infected before they start. For more information on pre-OS, see the Argon white paper: "The When, What, Why, and How of Pre-OS" at (<http://www.pre-os.com>)

Conclusion

PXE is a natural fit for VersaLogic processor boards when local storage might be limited or even absent. Depending on the application, it could prove to be more cost-effective to replace local storage devices such as Compact Flash and DOC modules with a product such as Argon's Managed PC Boot Agent.

It's also a great way to automate your diagnostic and burn-in testing process. For devices that have hard drives, it can automate remote deployment of the operating system or applications.

It's very easy to add Argon's PXE Boot Agent (supports PXE only) or Managed PC Boot Agent (support PXE, RPL, NetWare, DHCP and BOOTP) to a VersaLogic processor board so you can remotely and automatically manage devices, either during the manufacturing process or servicing.

Managed PC Boot Agent also provides distinct benefits to the end customer. It allows them to remotely manage their networked devices, which is especially valuable if they have hard drives.

White Paper

Remote Management of VersaLogic Processor/CPU Boards



Tested & Approved with Embedded BIOS 2000: PXE, RPL, BOOTP, DHCP, NetWare network boot protocols



PC/104-Plus processor module with Intel 82559er 10/100 Ethernet with PXE, RPL, BOOTP, DHCP and NetWare network booting support integrated into the General Software BIOS 2000

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For product information, to place an order, or to speak with a representative, please contact us.

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To learn more about the technology and benefits of network booting visit:

Wired for Management Baseline Specifications (including PXE):
<http://www.intel.com/labs/manage/wfm/wfmspecs.htm>

The Linux Terminal Server Project
<http://www.ltsp.org>

Argon Managed PC Boot Agent:
<http://www.ArgonTechnology.com/mba>

PXE Server Tools – Argon Client Management Services (CMS) software
<http://www.ArgonTechnology.com/cms>

White Paper, The When, What, Why, and How of Pre-OS:
<http://www.pre-os.com>



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Attention VersaLogic Customers Free Evaluation of PXE Boot Agent

Call us for a free evaluation copy of our PXE Boot Agent that you can test in your applications with VersaLogic boards. Our OEM Licensing department will be happy to explain all the details about this no-obligation test program.

Call +1.905.673.9978

About Argon Technology Corporation

Argon Technology is a world leader in network booting solutions. Founded by former employees of 3Com Corporation, Argon is licensed to build, support and develop the network booting technologies formerly provided by 3Com's Lanworks subsidiary.

The company's Boot ROM technology supports all leading manufactures of networking ASICs and add in cards, as well as desktop management applications that comply with the Wired for Management standard. Argon also provides consulting and training services that help its customers use network booting to lower Embedded device ownership cost.

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