BlueCat Linux Board Support Guide

BlueCat Linux Release 5.0

DOC-0598-00

for IBM PowerPC 440GX Boards

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Preface

For More Information

For more information on the features of BlueCat Linux, refer to the following printed and online documentation.

- *BlueCat Linux User's Guide*

  This document contains information about installing, configuring and using BlueCat Linux.

- Online information

  The complete BlueCat Linux documentation set is available on the BlueCat Linux Documentation CD-ROM. Books are provided in both HTML and PDF formats.

  Updates to these documents are available online at the LynuxWorks Website: `http://www.lynuxworks.com`.

  Additional information about commands and utilities is provided online with the `man` command. For example, to find information about the GNU GCC compiler, use the following syntax:

  ```
  man gcc
  ```

Typographical Conventions

The typefaces used in this manual, summarized below, emphasize important concepts. All references to file names and commands are case sensitive and should be typed accurately.

Kind of Text	Examples
Body text; *italicized* for emphasis, new terms, and book titles	Refer to the *BlueCat Linux User's Guide.*

Environment variables, file names, functions, methods, options, parameter names, path names, commands, and computer data	`ls`
	`-l`
	`myprog.c`
	`/dev/null`

Commands that need to be highlighted within body text, or commands that must be typed as is by the user are **`bolded`**.	`login:` **`myname`** `#` **`cd /usr/home`**
Text that represents a variable, such as a file name or a value that must be entered by the user	`cat <`*`filename`*`>` `mv <`*`file1`*`> <`*`file2`*`>`

Blocks of text that appear on the display screen after entering instructions or commands	`Linux version 2.4.10-1 (bin@build1) (gcc version 2.95.3 20010315 (release)) #5 Tue Dec 18 13:33:08 MSK 2001`
	`Processor: Intel StrongARM-IXP1200 revision 3`
	`Architecture: Intel IXP1200`
	`On node 0 totalpages: 32768`
	`zone(0): 32768 pages.`
	`zone(1): 0 pages.`
	`zone(2): 0 pages.`

Keyboard options, button names, and menu sequences	**`Enter`**, **`Ctrl-C`**

Special Notes

The following notations highlight any key points and cautionary notes that may appear in this manual.

NOTE: These callouts note important or useful points in the text.

CAUTION! Used for situations that present minor hazards that may interfere with or threaten equipment/performance.

Technical Support

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How to Submit a Support Request

When you are ready to submit a support request, please include *all* the following information:

- First name
- Last name
- Your job title
- Phone number
- Fax number
- E-mail address
- Company name
- Address
- City, state, ZIP

- Country
- LynxOS or BlueCat Linux version you are using
- Target platform (for example, PowerPC or x86)
- Board Support Package (BSP)
- Current patch revision level
- Development host OS version
- Description of problem you are experiencing

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Web-based Support:

Log in at `http://www.lynuxworks.com/support/custhelp.php3` for all support subscribers, including Europe.

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Support, worldwide except Europe	`support@lnxw.com`
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Support, Europe (from our Paris, France office)	+33 1 30 85 93 96
Support, worldwide except Europe and Japan (from our San José, CA, USA headquarters)	+1 800-327-5969 or +1 408-979-3940
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CHAPTER 1 *Overview*

The *BlueCat Linux Board Support Guide for IBM PowerPC 440GX Boards* provides information about the BlueCat Linux Board Support Package (BSP) for IBM PowerPC 440GX Boards.

Throughout this Board Support Guide (BSG), the BSP is referred to as the "ppc440gx."

Features Overview

The following sections describe the new features of this release.

Kernel Version

BlueCat Linux release 5.0 is based on the Linux kernel version 2.6.0 available from `www.kernel.org`.

BlueCat Linux Cross-Development Tools

BlueCat Linux release 5.0 supports the following versions of GNU toolchain:

- `gcc` version 3.2.2
- `binutils` version 2.13.1

Supported Hardware

Table 1-1 describes the hardware supported with this release. For available BlueCat Linux drivers, please see Chapter 5, “Supported Device Drivers.”

Table 1-1: Hardware Supported

Model	Description
IBM PowerPC 440GX Board	PowerPC 440GX @533 MHz embedded microprocessor, Big Endianness (in toolchain and BSP), 128M of SDRAM, 256 KB on-chip SRAM, 32 KB I- and D-on-chip caches, built-in universal interrupt controller, built-in PCI-X bus and interface, two built-in UART 16750-compatible serial ports, two built-in 10/100/1000 Mb Ethernet controllers with TCP/IP Acceleration Hardware, two built-in 10/100Mb Ethernet controllers, Dallas Semiconductor Clock module on peripheral bus.

Supported Cross-Development Hosts

The BlueCat Linux development environment requires an installed, functional cross-development host with an Intel 386 or higher CPU. This host needs to be running one of the following development environments:

- Windows 2000/Pro with SP1 or later
- Windows XP
- PC running Red Hat Linux 8.0
- PC running Red Hat Linux 9.0

CHAPTER 2 *Downloading and Booting BlueCat Linux on the Target*

This chapter provides instructions for downloading a BlueCat Linux demo system from a cross-development host onto the target and then booting the demo system on the target board.

Prerequisites

This document is a guide to downloading and booting BlueCat Linux systems onto the user's target platform. Scenarios that use demo systems included in the BlueCat Linux distribution are presented. A basic familiarity with the target platform hardware and operation is required. The user must also have an understanding of system administration for the particular cross-development host on which the BlueCat Linux Core and the BSP are installed. It is assumed that the user has the manufacturer's documentation for the target board as well as system administration reference material for the cross-development host.

Before downloading and booting BlueCat Linux on the target board, it is assumed that the default BlueCat Linux PowerPC 440GX configuration and the ppc440gx BSP have been installed on the development host. This means that the user must:

1. Install the BlueCat Linux PowerPC Core onto the cross-development host as described in the "Installing the Default Configuration" section in Chapter 1, "Introduction and Installation" in the *BlueCat Linux User's Guide*.
2. Install the ppc440gx BSP onto the cross-development host as detailed in the "Installing Target Board Support" section of Chapter 1, "Introduction and Installation" in the *BlueCat Linux User's Guide*.
3. Activate support for the ppc440gx BSP as detailed in the "Activating Support for a Target Board" section of Chapter 1, "Introduction and Installation" in the *BlueCat Linux User's Guide*.

Downloading and Booting Overview

The procedure for downloading and booting a BlueCat Linux system onto a PowerPC 440GX target consists of the following main steps:

- Setting up hardware
- Booting a BlueCat Linux embedded system over a network

Downloading and booting a BlueCat Linux system from a network can be performed using either of the two OS boot loaders:

- PowerPC Initialization and Boot Software (PIBS) firmware (ROM Monitor firmware)
- BlueCat Linux OS loader

Please refer to Chapter 3, “Downloading and Booting BlueCat Linux” in the *BlueCat Linux User's Guide* for a discussion of the BlueCat Linux OS loader.

Setting up Hardware

Connecting the Target Board Serial Port to the Host

The target board has two serial ports. The first port is used both by the ROM Monitor firmware and the BlueCat Linux system console.

Before using the board, at least the first serial port needs to be connected to the development host. It is recommended that the user connect the target serial connector to COM1 on the host. The serial port settings on the host must be as follows:

- The serial port connected to the first target serial port has a baud rate of 115200
- The serial port connected to the second target serial port can have any baud rate

Throughout this chapter, the terminal window connected to the first serial connector is referred to as the “ROM Monitor console” or the “BlueCat Linux console,” depending on the context.

Setting up the PIBS Firmware

To set up the ROM Monitor firmware options for BlueCat Linux, perform the following steps:

1. Reset the target board. The ROM Monitor firmware boots up, and the prompt (`PIBS $`) appears on the ROM Monitor console:

```
DIMM slot 1: Not populated
DIMM slot 0: DDR SDRAM detected
--------------------------------------------------
COPYRIGHT   I B M    CORPORATION 2001, 2003
LICENSED MATERIAL  -  PROGRAM PROPERTY OF I B M
PowerPC Initialization and
Boot Software (PIBS)
Version 1.73 NOV/10/2003
--------------------------------------------------
            XX    XXX                          XXXX
              XX                             XX  XX
XX XXX     XXX     XX      XXXXXXX               XX
 XX  XX    XX    XXXXX   XX                XX
 XX  XX    XX    XX  XX  XXXXXXX           XX
 XXXXX     XX    XX  XX      XX          XX   X
 XX       XXXX   XXXXXX   XXXXXXX   XXXXX   XXXXXXX
XXXX
--------------------------------------------------
board config data version: 1.0
processor name          : 440GX
processor PVR value     : 0x51b21851
total SDRAM memory      : 268435456
system clk period (ps)   : 30000
system clk frequency (Hz): 33333333
VCO frequency           : 1066666666
CPU frequency           : 533333333
CPU frequency ind. method: 532802048
PLB frequency           : 152380952
OPB frequency           : 76190476
EBC frequency           : 76190476
MAL frequency           : 152380952
PCI frequency           : 133333333
TMR frequency           : 25000000
uart 0 clk frequency    : 11059200
uart 1 clk frequency    : 11059200
PCI arbiter            : Internal
enetgroup              : 4
emac2 gigabit mode      : RGMII.
emac3 gigabit mode      : RGMII.
-------------------------------------
Very simple shell for PIBS
type "help" for help
PIBS $
```

2. Configure Ethernet 0 (EMAC0) as follows:

   a. Set up the hardware address:

   ```
   PIBS $ set hwdaddr0=0004ACE327FC
   status: writing PIBS variable value to FLASH
   ```

   b. Set up the IP address of the target board:

   ```
   PIBS $ set ifconfigcmd0=ent0 172.17.1.12
   status: writing PIBS variable value to FLASH
   ```

3. Set up the IP address of the TFTP host and the name of the KDI image file on the host. For example:

   ```
   PIBS $ set ipdstaddr0=172.17.0.1
   status: writing PIBS variable value to FLASH
   PIBS $ set bootfilename=ibm440gx.kdi
   status: writing PIBS variable value to FLASH
   ```

4. Set up the fourth Ethernet group and then reset the board for the changes to take effect:

   ```
   PIBS $ enetgroup prom1 4 rgmii rgmii
   PIBS $ reset sys
   ```

Booting a BlueCat Linux System from a Network

A BlueCat Linux demo system can be booted from a network using either IBM PIBS firmware or the BlueCat Linux OS loader.

Booting a BlueCat Linux System from a Network using IBM PIBS Firmware

The IBM ROM Monitor Firmware uses the TFTP network protocol to load images over a network. To boot the `osloader` demo system over a network using the ROM Monitor firmware, perform the following steps:

1. Copy the `osloader.kdi` file from the `$BLUECAT_PREFIX/demo/osloader` directory to the `/tftpboot` directory on the cross-development host and rename it according to the PIBS firmware configuration. In this example, because the `ibm440gx.kdi` name has been specified in the PIBS variable `bootfilename`, the `osloader.kdi` file must be copied to the `/tftpboot` directory under the name `ibm440gx.kdi`.

```
BlueCat:$ cp $BLUECAT_PREFIX/demo/osloader/ \
osloader.kdi /tftpboot/ibm440gx.kdi
```

2. Reset the target board.
3. Type **`bootfile eth`** at the PIBS prompt to download and run the demo system.

```
PIBS $ bootfile eth
status: ready for TFTP binary file transfer
status: requesting file SDK
status: from 192.168.4.121
status: block=00001
loaded at:     01000000 0111EA00
zimage at:     0100589C 010C7113
initrd at:     010CC000 0111EA00
avail ram:     00400000 00800000

Linux/PPC load: hda=bswap hdb=bswap hdc=bswap hdd=bswap root=101
Uncompressing Linux...done.
Now booting the kernel
Linux version 2.6.0 (root@WINBUILD2) (gcc version 3.2.2) #2 Thu May 6
14:35:15 4
IBM Ocotea port (MontaVista Software, Inc. <source@mvista.com>)
On node 0 totalpages: 65536
  DMA zone: 65536 pages, LIFO batch:16
  Normal zone: 0 pages, LIFO batch:1
  HighMem zone: 0 pages, LIFO batch:1
Building zonelist for node : 0
Kernel command line: hda=bswap hdb=bswap hdc=bswap hdd=bswap root=101
PID hash table entries: 2048 (order 11: 16384 bytes)
Memory: 256320k available (1380k kernel code, 484k data, 80k init, 0k
highmem)
Calibrating delay loop... 796.67 BogoMIPS
Dentry cache hash table entries: 32768 (order: 5, 131072 bytes)
Inode-cache hash table entries: 16384 (order: 4, 65536 bytes)
Mount-cache hash table entries: 512 (order: 0, 4096 bytes)
POSIX conformance testing by UNIFIX
NET: Registered protocol family 16
PCI: Probing PCI hardware
PCI: bridge rsrc 0..ffff (100), parent c017fcf0
PCI: bridge rsrc 80000000..ffffefff (200), parent c017fd0c
pty: 256 Unix98 ptys configured
Serial: 8250/16550 driver $Revision: 1.90 $ 6 ports, IRQ sharing
disabled
ttyS0 at MMIO 0x0 (irq = 0) is a 16550A
ttyS1 at MMIO 0x0 (irq = 1) is a 16550A
RAMDISK driver initialized: 16 RAM disks of 8192K size 1024 blocksize
IBM ZMII: SMII mode
IBM EMAC: eth0: Phy @ 0x1, type Am79c875 (0x00137887)
IBM EMAC: eth0: MAC 00:00:00:00:00:00
IBM ZMII: SMII mode
IBM EMAC: eth1: Phy @ 0x2, type Am79c875 (0x00137887)
IBM EMAC: eth1: MAC 00:00:00:00:00:00
IBM RGMII: RGMII mode
IBM EMAC: eth2: Phy @ 0x10, type CIS8201 (0x000fc413)
IBM EMAC: eth2: MAC 00:00:00:00:00:00
IBM RGMII: RGMII mode
IBM EMAC: eth3: Phy @ 0x18, type CIS8201 (0x000fc413)
IBM EMAC: eth3: MAC 00:00:00:00:00:00
NET: Registered protocol family 2
```

```
IP: routing cache hash table of 2048 buckets, 16Kbytes
TCP: Hash tables configured (established 16384 bind 32768)
NET: Registered protocol family 17
RAMDISK: Compressed image found at block 17200
Freeing BlueCat RFS memory: 330k freed
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 80k init
BlueCat Loader Shell
>
```

Booting a BlueCat Linux System from a Network using the OS Loader

To boot the `showcase` demo system over a network using the BlueCat Linux OS loader, perform the following steps:

1. Copy the `showcase.kernel` and `showcase.rfs` files from the `$BLUECAT_PREFIX/demo/showcase` directory to the `/tftpboot` directory on the cross-development host.
2. Boot the OS loader as described in “Booting a BlueCat Linux System from a Network using IBM PIBS Firmware” on page 6.
3. At the BlueCat Linux OS loader prompt, enter the following commands:

   ```
   > set IF eth0
   > set IP <target_board_IP>
   > set HOST <development_host_IP>
   > set KERNEL tftp showcase.kernel
   > set RFS tftp showcase.rfs
   > set CMD ramdisk_size=28472
   > boot
   ```

   where *<target_board_IP>* is an IP address of the target and *<development_host_IP>* is an IP address of the development host.

   These commands load the `showcase` demo system from a network onto the target board and then automatically start it:

   ```
   eth0: driver changed get_stats after register
   IBM EMAC: eth0: link up, 100 Mbps HDX, auto-negotiation complete.

   getting showcase.kernel
   ..................................................................
   ...........
   Received 735703
   getting showcase.rfs
   ..................................................................
   ..........loaded at:   01000000 013BA250
   zimage at:    0100589C 010B1513
   initrd at:    010B6000 013BA24F
   avail ram:    00400000 00800000

   Linux/PPC load: ramdisk_size=28472 hda=bswap hdb=bswap hdc=bswap
   hdd=bswap rootm
   ```

```
Uncompressing Linux...done.
Now booting the kernel
Linux version 2.6.0 (root@WINBUILD2) (gcc version 3.2.2) #4 Thu May 6
14:38:27 4
IBM Ocotea port (MontaVista Software, Inc. <source@mvista.com>)
On node 0 totalpages: 65536
  DMA zone: 65536 pages, LIFO batch:16
  Normal zone: 0 pages, LIFO batch:1
  HighMem zone: 0 pages, LIFO batch:1
Building zonelist for node : 0
Kernel command line: ramdisk_size=28472 hda=bswap hdb=bswap hdc=bswap
hdd=bswapm
PID hash table entries: 2048 (order 11: 16384 bytes)
Memory: 253824k available (1200k kernel code, 448k data, 80k init, 0k
highmem)
Calibrating delay loop... 796.67 BogoMIPS
Dentry cache hash table entries: 32768 (order: 5, 131072 bytes)
Inode-cache hash table entries: 16384 (order: 4, 65536 bytes)
Mount-cache hash table entries: 512 (order: 0, 4096 bytes)
POSIX conformance testing by UNIFIX
NET: Registered protocol family 16
PCI: Probing PCI hardware
PCI: bridge rsrc 0..ffff (100), parent c014fce0
PCI: bridge rsrc 80000000..ffffefff (200), parent c014fcfc
pty: 256 Unix98 ptys configured
Serial: 8250/16550 driver $Revision: 1.90 $ 6 ports, IRQ sharing
disabled
ttyS0 at MMIO 0x0 (irq = 0) is a 16550A
ttyS1 at MMIO 0x0 (irq = 1) is a 16550A
RAMDISK driver initialized: 16 RAM disks of 28472K size 1024 blocksize
IBM ZMII: SMII mode
IBM EMAC: eth0: Phy @ 0x1, type Am79c875 (0x00137887)
IBM EMAC: eth0: MAC 00:00:00:00:00:00
IBM ZMII: SMII mode
IBM EMAC: eth1: Phy @ 0x2, type Am79c875 (0x00137887)
IBM EMAC: eth1: MAC 00:00:00:00:00:00
IBM RGMII: RGMII mode
IBM EMAC: eth2: Phy @ 0x10, type CIS8201 (0x000fc413)
IBM EMAC: eth2: MAC 00:00:00:00:00:00
IBM RGMII: RGMII mode
IBM EMAC: eth3: Phy @ 0x18, type CIS8201 (0x000fc413)
IBM EMAC: eth3: MAC 00:00:00:00:00:00
NET: Registered protocol family 2
IP: routing cache hash table of 2048 buckets, 16Kbytes
TCP: Hash tables configured (established 16384 bind 32768)
NET: Registered protocol family 1
NET: Registered protocol family 17
RAMDISK: Compressed image found at block 17112
Freeing BlueCat RFS memory: 3088k freed
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 80k init
INIT: version 2.84 booting
INIT: Entering runlevel: 1
Network is confieth0: driver changed get_stats after register
IBM EMAC: eth0: link up, 100 Mbps HDX, auto-negotiation complete.
gured as follows:

Target  IP address: 172.17.1.12
Gateway IP address: 172.17.0.1

Starting Apache server...
bash-2.05b#
```

CHAPTER 3 *Kernel Configuration Options*

The ppc440gx BSP comes with a default BlueCat Linux kernel. This kernel has a number of configuration options. This chapter details these options in the tables listed in Table 3-1: “BlueCat Linux Default Configuration for the ppc440gx BSP Distribution” below. Boldfaced entries in the tables represent subordinate menus. Italicized entries represent comments.

Table 3-1: BlueCat Linux Default Configuration for the ppc440gx BSP Distribution

Table Number and Configuration Parameter
Table 3-2: “Code Maturity Level Options”
Table 3-3: “General Setup”
Table 3-4: “Loadable Module Support”
Table 3-5: “Processor”
Table 3-6: “Platform Options”
Table 3-7: “Bus Options”
Table 3-8: “Advanced Setup”
Table 3-9: “Memory Technology Devices (MTD)”
Table 3-10: “Plug and Play Support”
Table 3-11: “Block Devices”
Table 3-12: “Multidevice Support (RAID and LVM)”
Table 3-13: “ATA/ATAPI/MFM/RLL Support”
Table 3-14: “SCSI Device Support”
Table 3-15: “IEEE 1394 (FireWire) Support (Experimental)”
Table 3-16: “I2O Device Support”

Table 3-1: BlueCat Linux Default Configuration for the ppc440gx BSP Distribution (Continued)

Table Number and Configuration Parameter
Table 3-17: “Networking Support”
Table 3-18: “ISDN Subsystem”
Table 3-19: “Graphics Support”
Table 3-20: “Input Device Support”
Table 3-21: “Character Devices”
Table 3-22: “Multimedia Devices”
Table 3-23: “File Systems”
Table 3-24: “Sound”
Table 3-25: “USB Support”
Table 3-26: “Library Routines”
Table 3-27: “Kernel Hacking”
Table 3-28: “Security Options”
Table 3-29: “Cryptographic Options”

Table 3-2: Code Maturity Level Options

Description	Setting
Prompt for development and/or incomplete code/drivers	Y
Select only drivers expected to compile cleanly	Y
Select only drivers that don't need compile-time external firmware	Y

Table 3-3: General Setup

Description	Setting
Support for paging of anonymous memory	Y
System V IPC	is not set

Table 3-3: General Setup (Continued)

Description	Setting
BlueCat Linux OS loader support	is not set
BlueCat Linux ignore printk	is not set
Memory sizing benchmarks	is not set
BSD Process Accounting	is not set
Sysctl support	Y
Kernel log buffer size (16 => 64KB, 17 => 128KB)	17
Kernel `.config` support	is not set
Remove Kernel Features (for Embedded Systems)	
Load all symbols for debugging/kksymoops	Y
Enable futex support	Y
Enable eventpoll support	Y
No-op I/O scheduler	Y
Anticipatory I/O scheduler	Y
Deadline I/O scheduler	Y
CODETEST device driver configuration	is not set

Table 3-4: Loadable Module Support

Description	Setting
Enable loadable module support	Y
Module unloading	Y
Forced module unloading	is not set
Module versioning support (Experimental)	is not set
Automatic kernel module loading	is not set

Table 3-5: Processor

Description	Setting
Processor Type (44x)	
6xx/7xx/74xx/8260	is not set
40x	is not set
44x	Y
POWER3	is not set
POWER4 and 970 (G5)	is not set
8xx	is not set
Math emulation	Y
CPU Frequency scaling	is not set
IBM 4xx Options	
Machine Type (Ocotea)	
Ebony	is not set
Ocotea	Y
Power Management support (Experimental)	is not set

Table 3-6: Platform Options

Description	Setting
PC PS/2 style keyboard	is not set
Symmetric multiprocessing support	is not set
Preemptible Kernel	Y
High memory support	is not set
Kernel support for ELF binaries	Y
Kernel support for MISC binaries	is not set
Default boot loader kernel arguments	is not set

Table 3-7: Bus Options

Description	Setting
Legacy `/proc/pci` interface	is not set
PCI device name database	is not set
Support for hot-pluggable devices	is not set
Parallel Port Support	
Parallel port support	is not set

Table 3-8: Advanced Setup

Description	Setting
Prompt for advanced kernel configuration options	is not set
--- Default settings for advanced configuration options are used	

Table 3-9: Memory Technology Devices (MTD)

Description	Settings
Memory Technology Device (MTD) support	is not set

Table 3-10: Plug and Play Support

Description	Settings
Plug and Play support	is not set

Table 3-11: Block Devices

Description	Settings
Normal floppy disk support	is not set
Compaq SMART2 support	is not set
Compaq Smart Array 5xxx support	is not set
Mylex DAC960/DAC1100 PCI RAID Controller support	is not set
Micro Memory MM5415 Battery Backed RAM support (Experimental)	is not set
Loopback device support	is not set
Network block device support	is not set
RAM disk support	Y
Default RAM disk size	8192
Initial RAM disk (`initrd`) support	is not set
BlueCat Linux RFS support	Y
Support for Large Block Devices	is not set

Table 3-12: Multidevice Support (RAID and LVM)

Description	Settings
Multiple devices driver support (RAID and LVM)	is not set

Table 3-13: ATA/ATAPI/MFM/RLL Support

Description	Settings
ATA/ATAPI/MFM/RLL support	is not set

Table 3-14: SCSI Device Support

Description	Settings
SCSI device support	is not set

Table 3-15: IEEE 1394 (FireWire) Support (Experimental)

Description	Settings
IEEE 1394 (FireWire) support (Experimental)	is not set

Table 3-16: I2O Device Support

Description	Settings
I2O support	is not set

Table 3-17: Networking Support

Description	Settings
Networking support	Y
Networking options	Y
Packet socket	Y
Packet socket: mmapped I/O	is not set
Netlink device emulation	is not set
UNIX domain sockets	Y
PF_KEY sockets	is not set
TCP/IP networking	Y
IP: multicasting	is not set
IP: advanced router	is not set

Table 3-17: Networking Support (Continued)

Description	Settings
IP: kernel level autoconfiguration	is not set
IP: tunneling	is not set
IP: GRE tunnels over IP	is not set
IP: ARP daemon support (Experimental)	is not set
IP: TCP Explicit Congestion Notification support	is not set
IP: TCP syncookie support (disabled per default)	is not set
IP: AH transformation	is not set
IP: ESP transformation	is not set
IP: IPComp transformation	is not set
The IPv6 protocol (Experimental)	is not set
DECnet support	is not set
802.1d Ethernet Bridging	is not set
Network packet filtering (replaces ipchains)	is not set
SCTP Configuration (Experimental)	
The SCTP protocol (Experimental)	is not set
Asynchronous Transfer Mode (ATM)	is not set
802.1Q VLAN support	is not set
ANSI/IEEE 802.2 LLC type 2 support	is not set
The IPX protocol	is not set
Appletalk protocol support	is not set
CCITT X.25 Packet Layer (Experimental)	is not set
LAPB Data Link Driver (Experimental)	is not set
Frame Diverter (Experimental)	is not set
Acorn Econet/AUN protocols (Experimental)	is not set
WAN router	is not set
Fast switching (read help!)	is not set
Forwarding between high speed interfaces	is not set

Table 3-17: Networking Support (Continued)

Description	Settings
QoS and/or fair queueing	
QoS and/or fair queueing	is not set
Network testing	
Packet Generator (USE WITH CAUTION)	is not set
Network device support	Y
ARCnet devices	
ARCnet support	is not set
Dummy net driver support	is not set
Bonding driver support	is not set
EQL (serial line load balancing) support	is not set
Universal TUN/TAP device driver support	is not set
Ethernet (10 or 100Mbit)	
Ethernet (10 or 100Mbit)	Y
Generic Media Independent Interface device support	is not set
National DP83902AV (Oak Ethernet) support	is not set
Sun Happy Meal 10/100baseT support	is not set
Sun GEM support	Y
3COM cards	is not set
Tulip family network device support	
“Tulip” family network device support	is not set
HP 10/100VG PCLAN (ISA, EISA, PCI) support	is not set
IBM PPC4xx EMAC driver support	Y
Verbose error messages	is not set
Number of receive buffers	128
Number of transmit buffers	128
Frame gap	8

Table 3-17: Networking Support (Continued)

Description	Settings
Skb reserve amount	0
EISA, VLB, PCI, and on board controllers	is not set
Ethernet (1000 Mbit)	
Alteon AceNIC/3Com 3C985/NetGear GA620 Gigabit support	is not set
D-Link DL2000-based Gigabit Ethernet support	is not set
Intel® PRO/1000 Gigabit Ethernet support	is not set
National Semiconductor DP83820 support	is not set
Packet Engines Hamachi GNIC-II support	is not set
Packet Engines Yellowfin Gigabit-NIC support (Experimental)	is not set
Realtek 8169 Gigabit Ethernet support	is not set
SiS190 Gigabit Ethernet support (Experimental)	is not set
Marvell Yukon Chipset/SysKonnect SK-98xx support	is not set
Broadcom Tigon3 support	is not set
Ethernet (10000 Mbit)	
Intel® PRO/10GbE support	is not set
Fiber Distributed Data Interface (FDDI) driver support	is not set
High Performance Parallel Interface (HIPPI) driver support (Experimental)	is not set
Point-to-Point Protocol (PPP) support	is not set
Serial Line Internet Protocol (SLIP) support	is not set
Wireless LAN (Non-Ham Radio)	
Wireless LAN drivers (non-ham radio) and wireless extensions	is not set
Token Ring devices	
Token Ring driver support	is not set
Red Creek Hardware VPN (Experimental)	is not set
Traffic Shaper (Experimental)	is not set

Table 3-17: Networking Support (Continued)

Description	Settings
WAN interfaces	
WAN interfaces support	is not set
Amateur Radio support	
Amateur radio support	is not set
IrDA (infrared) support	
IrDA subsystem support	is not set
Bluetooth support	
Bluetooth subsystem support	is not set

Table 3-18: ISDN Subsystem

Description	Settings
ISDN support	is not set

Table 3-19: Graphics Support

Description	Settings
Support for frame buffer devices	is not set

Table 3-20: Input Device Support

Description	Settings
Input devices (needed for keyboard, mouse, …)	Y
---Userland interfaces	
Mouse interface	is not set
Joystick interface	is not set

Table 3-20: Input Device Support (Continued)

Description	Settings
Touchscreen interface	is not set
Event interface	Y
Event debugging	is not set
--- *Input I/O drivers*	
Gameport support	is not set
Serial I/O support (needed for keyboard and mouse)	Y
i8042 PC keyboard controller	is not set
Serial port line discipline	is not set
ct82c710 Aux port controller	is not set
PCI PS/2 keyboard and PS/2 mouse controller	is not set
--- *Input Device Drivers*	
Keyboards	Y
AT keyboard support	is not set
Sun Type 4 and Type 5 keyboard support	is not set
XT keyboard support	is not set
Newton keyboard	is not set
Mice	is not set
Joysticks	is not set
Touchscreens	is not set
Misc	is not set

Table 3-21: Character Devices

Description	Settings
Virtual terminal	is not set
Nonstandard serial port support	is not set
Serial drivers	

Table 3-21: Character Devices (Continued)

Description	Settings
8250/16550 and compatible serial support	Y
Console on 8250/16550 and compatible serial port	Y
Maximum number of nonlegacy 8250/16550 serial ports	4
Extended 8250/16550 serial driver options	is not set
--- *Non-8250 serial port support*	
Unix98 PTY support	Y
Maximum number of Unix98 PTYs in use (0-2048)	256
I2C support	
I2C support	is not set
I2C Algorithms	is not set
I2C Hardware Bus support	is not set
I2C Hardware Sensors Chip support	is not set
Mice	
Bus mouse support	is not set
QIC-02 tape support	is not set
IPMI	
IPMI top-level message handler	is not set
Watchdog Cards	
Watchdog Timer support	Y
Disable watchdog shutdown on close	is not set
Software watchdog	is not set
WDT Watchdog Timer	is not set
WDT PCI Watchdog Timer	is not set
Berkshire Products PC Watchdog	is not set
Acquire SBC Watchdog Timer	is not set

Table 3-21: Character Devices (Continued)

Description	Settings
Advantech SBC Watchdog Timer	is not set
Eurotech CPU-1220/1410 Watchdog Timer	is not set
IB700 SBC Watchdog Timer	is not set
Intel i8xx TCO Timer/Watchdog	is not set
Mixcom Watchdog	is not set
National Semiconductor SCx200 Watchdog	is not set
SBC-60XX Watchdog Timer	is not set
W83877F (EMACS) Watchdog Timer	is not set
ZF MachZ Watchdog	is not set
AMD Elan SC520 processor Watchdog	is not set
AMD 766/768 TCO Timer/Watchdog	is not set
ALi M7101 PMU Computer Watchdog	is not set
ALi M1535 PMU Watchdog Timer	is not set
National Semiconductor PC87307/PC97307 (ala SC1200) Watchdog	is not set
ICP Wafer 5823 Single Board Computer Watchdog	is not set
SMA CPU5 Watchdog	is not set
`/dev/nvram` support	is not set
Generic `/dev/rtc` emulation	is not set
Extended RTC operation	is not set
Double Talk PC internal speech card support	is not set
Siemens R3964 line discipline	is not set
Applicom intelligent fieldbus card support	is not set
Ftape, the floppy tape device driver	
Ftape (QIC-80/Travan) support	is not set
`/dev/agpgart` (AGP support)	is not set

Table 3-21: Character Devices (Continued)

Description	Settings
Direct Rendering Manager (XFree86 4.1.0 and higher DRI support)	is not set
RAW driver (`/dev/raw/rawN`)	is not set

Table 3-22: Multimedia Devices

Description	Settings
Video for Linux	is not set
Digital Video Broadcasting Devices	
DVB for Linux	is not set

Table 3-23: File Systems

Description	Setting
Second extended file system support	Y
Ext2 extended attributes	Y
Ext2 POSIX access control lists	is not set
Ext2 security labels	is not set
Ext3 journalling file system support	is not set
Reiserfs support	is not set
JFS file system support	is not set
XFS file system support	is not set
Minix file system support	is not set
ROM file system support	is not set
Quota support	is not set
Kernel automounter support	is not set
Kernel automounter version 4 support (also supports v3)	is not set

Table 3-23: File Systems (Continued)

Description	Setting
CD-ROM/DVD File Systems	
ISO 9660 CD-ROM file system support	is not set
UDF file system support	is not set
DOS/FAT/NT File Systems	
DOS FAT file system support	is not set
NTFS file system support	is not set
Pseudo File Systems	
`/proc` file system support	Y
`/dev` file system support (Obsolete)	is not set
`/dev/pts` file system for Unix98 PTYs	Y
`/dev/pts` Extended Attributes	is not set
Virtual memory file system support (former shm file system)	is not set
Miscellaneous File Systems	
ADFS file system support (Experimental)	is not set
Amiga FFS file system support (Experimental)	is not set
Apple Macintosh file system support (Experimental)	is not set
BeOS file systemv(BeFS) support (read-only) (Experimental)	is not set
BFS file system support (Experimental)	is not set
EFS file system support (read-only) (Experimental)	is not set
Compressed ROM file system support	is not set
FreeVxFS file system support (VERITAS VxFS™-compatible)	is not set
OS/2 HPFS file system support	is not set
QNX4 file system support (read-only)	is not set
System V/Xenix/V7/Coherent file system support	is not set
UFS file system support (read-only)	is not set
Network File Systems	

Table 3-23: File Systems (Continued)

Description	Setting
NFS file system support	is not set
NFS server support	is not set
SMB file system support (to mount Windows shares, etc.)	is not set
CIFS support (advanced network file system for Samba, Windows, and other CIFS-compliant servers)	is not set
NCP file system support (to mount NetWare volumes)	is not set
Coda file system support (advanced network file system)	is not set
InterMezzo file system support (replicating file system) (Experimental)	is not set
Andrew File System support (AFS) (Experimental)	is not set
Partition Types	
Advanced partition selection	is not set

Table 3-24: Sound

Description	Setting
Sound card support	is not set

Table 3-25: USB Support

Description	Setting
Support for USB	is not set
Support for USB Gadgets	is not set

Table 3-26: Library Routines

Description	Setting
CRC32 functions	Y

Table 3-27: Kernel Hacking

Description	Setting
Kernel debugging	Y
Debug memory allocations	is not set
Magic SysRq key	is not set
Spinlock debugging	is not set
Sleep-inside-spinlock checking	is not set
Include kgdb kernel debugger	is not set
BlueCat Linux kernel debugger	is not set
Sleep-inside-spinlock checking	is not set
Include xmon kernel debugger	is not set
Include BDI-2000 user context switcher	is not set
Compile the kernel with debug info	is not set
Support for early boot texts over serial port	is not set

Table 3-28: Security Options

Description	Setting
Enable different security models	is not set

Table 3-29: Cryptographic Options

Description	Setting
Cryptographic API	is not set

CHAPTER 4 *Supported Demo Systems*

This chapter provides information about BlueCat Linux demo systems supported by the ppc440gx BSP.

Demo Systems

Table 4-1 lists the demo systems supported in the ppc440gx BSP distribution, the boot devices supported by each demo system, and their respective RAM and ROM requirements.

Table 4-1: Demo Systems Supported by the ppc440gx BSP

Demo	Boot Devices Supported by Default	ROM Requirements	RAM Requirements
`developer`	Network (using the IBM PIBS firmware)	5250 KB	28459 KB
`osloader`	Network (using the IBM PIBS firmware)	1170 KB	10102 KB
`showcase`	Network (using the IBM PIBS firmware)	3885 KB	20420 KB

developer Demo System

The `developer` demo system is a package consisting of the functionalities of the `shell`, `ftp`, `ping`, `gdb`, and `vl_demo` systems. For descriptions of `developer` and its components, refer to Chapter 4, “BlueCat Linux Demo Systems” in the *BlueCat Linux User’s Guide*.

osloader Demo System

`osloader` is the BlueCat Linux OS loader used to boot a BlueCat Linux system on the target board. Refer to Chapter 4, “BlueCat Linux Demo Systems” in the *BlueCat Linux User’s Guide* for details.

showcase Demo System

The `showcase` demo system starts and configures the Apache HTTP daemon, turning the target board into a web server. Refer to Chapter 4, “BlueCat Linux Demo Systems” in the *BlueCat Linux User’s Guide* for details.

CHAPTER 5 *Supported Device Drivers*

Table 5-1 lists the device drivers supported by the ppc440gx BSP and provides important information about them.

Table 5-1: Device Drivers Supported by the ppc440gx BSP

Hardware Device	Device Drivers	Location in Source Tree	Kernel Configuration Options	Notes
UART Two built-in 16750-compatible serial ports	`8250.c`	`drivers/serial`	`CONFIG_SERIAL_8250` `CONFIG_SERIAL_CONSOLE`	
Ethernet Two built-in 10/100Mb Ethernet controllers	`ibm_emac*.c`	`drivers/net/ibm_emac`	`CONFIG_IBM_EMAC`	
Ethernet Two built-in 10/100/1000Mb Ethernet controllers	`ibm_emac*.c`	`drivers/net/ibm_emac`	`CONFIG_IBM_EMAC`	The driver is extended to support the RGMII bridge
RTC Dallas Semiconductor Clock module on Peripheral Bus	`genrtc.c`	`drivers/char/`	`CONFIG_GEN_RTC`	

CHAPTER 6 *Known Problems and Limitations*

This chapter describes known problems and limitations of this release.

PowerPC 440GX Target Board Problems and Limitations

The following are known problems and limitations of this release:

- Modification of the file system stored in a RAM disk does not persist across umounting/mounting in BlueCat Linux 5.0. This limitation is due to a defect in the Linux kernel 2.6.0, described by official kernel maintainer Andrew Morton (`www.lkml.org`):

  "The kernel considers the ramdisk as being 'memory backed' it doesn't do writeback into the blockdev pagecache. If you remove the memory-backed flag, ramdisk contributes to dirty memory in undesirable ways. That memory-backed flag is too overloaded and needs to be split up. It's something I need to fix, but nobody seemed to be hurting from it up to now so I figured it could wait until after 2.6.0."

- The Gigabit Ethernet controllers (`eth2` and `eth3`) of revision 2.0 of the PPC440GX silicon have a hardware defect that may cause the controllers to stop transmitting data when configured in half-duplex modes (for any of the 10Mb, 100Mb, or 1000Mb rates). The defect is described on page 13 of the *PPC440GX Rev 2.0 Errata Version 5* document. As a workaround for this issue, use full duplex modes for these controllers.

User Documentation Updates

- Chapter 4, "BlueCat Linux Demo Systems" in the *BlueCat Linux User's Guide* provides incorrect values for the Storage and RAM requirements

for the `developer` demo system. The correct requirements for `developer` are:

- Storage: Medium
- RAM: Large

- The information in the *BlueCat Linux User's Guide* that states that `make xconfig` is supported on Linux hosts only is out of date.

  `make xconfig` is now also supported on Windows hosts.

  Ensure that Microsoft Visual Studio 6.0 or higher is installed on the cross-development host and that the Visual Studio environment tools have been set up to allow invocation of the Microsoft Visual Studio tools in command line mode.

  Then, to install the Qt library on the Windows host, go to `www.trolltech.com` and download the Qt software for Microsoft Visual Studio C++ Windows users. To install the Qt library, follow the instructions provided with the Qt software.

  `$BLUECAT_PREFIX/usr/src/linux/scripts/kconfig/Makefile` (the `Makefile` for the Windows host) uses the `QTLIBS` environment variable to list the Qt libraries that are needed to link with the `qconf` executable used to implement `make xconfig` on the Windows host. The following default definition is used:

  ```
  QTLIBS = qt-mteval323.lib qtmain.lib
  ```

  This definition specifies that libraries from the Qt 3.2.3 evaluation version for Windows are needed to link with the `qconf` executable.

  If the Qt version installed on the host differs from the Qt 3.2.3 evaluation version, the `QTLIBS` definition must be changed to specify the correct list of libraries. This can be done either by manually editing `$BLUECAT_PREFIX/usr/src/linux/scripts/kconfig/Makefile` to modify the `QTLIBS` definition or by defining the `QTLIBS` environment variable using the **Properties->Advanced->Environment Variables** wizard in the context menu of the **My Computer** icon on the Windows desktop. The second approach allows the user to avoid changing the `Makefile` every time BlueCat Linux is reinstalled.