

# BlueCat Linux Board Support Guide

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BlueCat Linux Release 5.1

DOC-0649-00

*for the AMCC PowerPC 440EP and 440GR Boards*

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# Preface

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## 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 filenames 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, filenames, 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 filename or a value that must be entered by the user, is *italicized*.

```
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.

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

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

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## Technical Support

LynuxWorks Support handles support requests from current support subscribers.

For questions regarding LynuxWorks products or evaluation CDs, or to become a support subscriber, our knowledgeable sales staff will be pleased to help you (<http://www.lynuxworks.com/corporate/contact/sales.php3>).

### 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

## Where to Submit a Support Request

### By E-mail:

Support, Europe	tech_europe@lnxw.com
Support, worldwide except Europe	support@lnxw.com
Training and courses	USA: training-usa@lnxw.com Europe: training-europe@lnxw.com

### By Phone:

Training and courses	USA: +1 408-979-4353 Europe: +33 1 30 85 06 00
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
Support, Japan	+81 33 449 3131

**By Fax:**

Support, Europe (from our Paris, France office)	+33 1 30 85 06 06
Support, worldwide except Europe and Japan (from our San José, CA, USA headquarters)	+1 408-979-3945
Support, Japan	+81 22 449 3803



The *BlueCat Linux Board Support Guide for AMCC PowerPC 440EP and 440GR Boards* provides information about the BlueCat Linux Board Support Package (BSP) for AMCC PowerPC (formerly IBM PowerPC) 440EP and 440GR target boards.

Throughout this Board Support Guide (BSG), the BSP is referred to as “ppc440ep” and the target board is referred to as the “PowerPC 440EP board” or simply as the “target board.”<sup>1</sup>

---

## Features Overview

The following sections describe the new features of this release.

### Kernel Version

BlueCat Linux release 5.1 is based on the Linux kernel version 2.6.7 available from [www.kernel.org](http://www.kernel.org).

### BlueCat Linux Cross-Development Tools

BlueCat Linux release 5.1 supports the following versions of GNU toolchain:

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

---

1. Note that the ppc440ep BSP supports both AMCC PowerPC 440EP and 440GR boards. For ease of reference, however, both boards are referred to as the “PowerPC 440EP board” throughout this BSG. Refer to Table 1-1 to a description of supported hardware for both boards.

## 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
AMCC PowerPC 440EP and 440GR boards	<ul style="list-style-type: none"><li>• PowerPC 440EP up to 533MHz embedded microprocessor with FPU or 440GR up to 667MHz without FPU</li><li>• Big Endianness (in toolchain and BSP)</li><li>• 256 MB of DDR SDRAM; 266 MHz data rate, x32</li><li>• 32 MB Flash</li><li>• 32 KB I- and D-on-chip caches</li><li>• Built-in universal interrupt controller</li><li>• Built-in DMA controller</li><li>• Built-in PCI interface (33 MHz or 66 MHz per PCI Local Bus 2.2 host only)</li><li>• Two built-in 10/100 Ethernet controllers</li><li>• Two built-in UART 16750-compatible serial ports</li></ul>

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## Available BlueCat Linux Development Tools

Table 1-2 indicates the availability of BlueCat Linux development tools on the cross-development platforms listed for use with the ppc440ep BSP.

**Table 1-2: BlueCat Linux Tools Availability**

Tool	Windows	Linux
CodeWarrior	N/A	N/A
SpyKer	N/A	N/A
VisualLynux	✓	N/A

---

## 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



# *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.

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## **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 440EP configuration and the ppc440ep 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 ppc440ep 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 ppc440ep 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*.

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## Downloading and Booting Overview

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

- Setting up hardware
- Downloading and booting a BlueCat Linux system from target Flash memory or a network

Downloading and booting a BlueCat Linux system from a network can be performed using either:

- The factory-default U-Boot firmware
- or
- 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.

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## Setting up Hardware

### Connecting the Target Board Serial Port to the Host

The target board has two serial ports. Serial port 0 (UART0) is P2, and serial port 1 (UART1) is P3. They are DB-9 Molex 87204-6043 headers.

The first port (UART0, P2) is used by both the factory-default U-Boot 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 9600.
- 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 “U-Boot console” or the “BlueCat Linux console,” depending on the context.

## Connecting the Target Board Ethernet Card to the Host

The PowerPC 440EP board provides 10BaseT/100BaseTX Ethernet connections via Category 5 Unshielded Twisted Pair cable using the on-board RJ-45 connector.

The Ethernet port on the target board is used to provide a standard network connection for the board and, in particular, to load BlueCat Linux embedded systems onto the board over a network. The Ethernet port on the PowerPC 440EP board is used to connect to a LAN.

It is also required that the user set up networking on the host system. In particular, the user must choose a unique IP address for the development host as well as for the target board. These addresses are referred to as `<development_host_IP>` and `<target_board_IP>`, respectively. For more information on how to set up networking on the host, please refer to system administration reference material.

TFTP must be enabled on the host. For more information, refer to “Setting Up a TFTP Server” in Chapter 3, “Downloading and Booting BlueCat Linux” in the *BlueCat Linux User’s Guide*.

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## Downloading a BlueCat Linux System into Flash

This section provides instructions on how a BlueCat Linux embedded system can be downloaded into the target Flash memory using the U-Boot firmware (via the BlueCat Linux OS loader). Refer also to the *BlueCat Linux User’s Guide* for additional details about the BlueCat Linux OS loader.

### Downloading a BlueCat Linux System into Flash using the U-Boot Firmware

To download the `osloader` demo system into the target board, perform the steps below. This section uses the `osloader` demo system as an example, but these instructions are applicable to any of the demo systems.

1. Copy the `i_osloader.kdi` file from the `BLUECAT_PREFIX/demo/osloader` directory to the `/tftpboot` directory on the development host.



```
> flash /dev/mtdchar1 erase
> reset
```

where *<target\_board\_IP>* is the IP address of the target and  
*<development\_host\_IP>* is the IP address of the development host.

---

**NOTE:** The size of partition configured using the `flash_fdisk` command depends on the BlueCat Linux system size and should be large enough to hold a BlueCat Linux demo KDI. For more information on the sizing of BlueCat Linux demo systems, refer to Chapter 4, “Supported Demo Systems.”

---

After these commands have been performed, the `osloader` demo is programmed into Flash and can be booted as described in the “Booting a BlueCat Linux System from Flash” section below.

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## Booting a BlueCat Linux System from Flash

### Booting a BlueCat Linux System from Flash using the U-Boot Firmware

To boot the `osloader` demo installed into the Flash memory, perform the following steps:

1. Reset the target board.
2. At the U-Boot console, type the following:

```
=> go 0xfe007000
```

This command starts the `osloader` demo system programmed into Flash.

The PowerPC 440EP board can be configured to start a demo system programmed into Flash automatically at the board power-up. To prepare the PowerPC 440EP board to boot BlueCat Linux from Flash automatically, enter the following commands:

```
=> setenv bootcmd go 0xfe007000
=> setenv bootdelay 3
=> saveenv
```

As a result, the demo system programmed into Flash is started by the PPCBoot monitor automatically on board power-up.

## Booting a BlueCat Linux System from a Network

A BlueCat Linux demo system can be booted from a network using either the U-Boot firmware or the BlueCat Linux OS loader.

### Booting a BlueCat Linux System from a Network using the U-Boot Firmware

The factory-default U-Boot firmware uses the TFTP network protocol to load images over a network. This section provides instructions on how to boot a BlueCat Linux demo system over a network.

To boot the `developer` demo system over a network using the U-Boot firmware, perform the steps below. This section uses the `developer` demo system as an example, but these instructions are applicable to any of the demo systems.

1. Reset the target board.

The U-Boot firmware boots up, and the prompt (`=>`) appears on the console.

2. Set up the environment variables to specify the IP address of the TFTP host, the IP address of the TFTP server, and the name of the KDI image file on the host. For example:

```
=> setenv ipaddr 192.168.4.4
=> setenv serverip 192.168.4.104
=> setenv bootfile developer.kdi
=> saveenv
```

3. Download the BlueCat Linux image using the `tftp` command:

```
=> tftp
Waiting for PHY auto negotiation to complete.. done
Using ppc_440x_eth0 device
TFTP from server 192.168.4.104; our IP address is 192.168.4.4
Filename 'developer.kdi'.
Load address: 0x100000
Loading: #####
#####
#####
done
Bytes transferred = 5575680 (551400 hex)
```

Note the image load address (`<image_load_address>`). In the example above the load address is `0x100000`.

- To boot the BlueCat Linux image, issue the `go` command. Note that the address in the `go` command is calculated as

```
<image_load_address>+0x7000.
```

```
=> go 0x107000
```

```
## Starting application at 0x00107000 ...
loaded at:    01000000 0154C400
zimage at:    01005988 010FC183
initrd at:    01101000 0154C400
avail ram:    00400000 00800000
```

```
Linux/PPC load: ramdisk_size=28472 hda=bswap hdb=bswap hdc=bswap
hdd=bswap root1
```

```
Uncompressing Linux...done.
```

```
Now booting the kernel
```

```
Linux version 2.6.7 (root@obelix.lynx.com) (gcc version 3.2.2) #72 Fri
Jun 10 05
```

## 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:

- Copy the `showcase.kernel` and `showcase.rfs` files from the `$BLUECAT_PREFIX/demo/showcase` directory to the `/tftpboot` directory on the cross-development host.
- Boot the OS loader as described in “Booting a BlueCat Linux System from a Network using the U-Boot Firmware” on page 10.
- 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 the IP address of the target and

`<development_host_IP>` is the 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
eth0: Transmit request threshold: 256
```

```
getting showcase.kernel
```

```
.....eth0:
Link is up
eth0: Speed: 100, Full duplex.
eth0: Transmit request threshold: 256
.....
.....
Received 936680
getting showcase.rfs
.....
.....
Received 3190298
command liSwitching to new kernel...
loaded at:    01000000 013F1E1C
zimage at:   01005978 010E2BD0
initrd at:   010E7000 013F1E1A
avail ram:   00400000 00800000

Linux/PPC load: ramdisk_size=28472 hda=bswap hdb=bswap hdc=bswap hdd=bswap
room
Uncompressing Linux...done.
Now booting the kernel
Linux version 2.6.7 (root@WINBUILD2) (gcc version 3.2.2) #2 Thu Aug 4
22:38:175
IBM Bamboo/Yosemite port (BlueCat))
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
Built 1 zonelists
Kernel command line: ramdisk_size=28472 hda=bswap hdb=bswap hdc=bswap
hdd=bswap
PID hash table entries: 2048 (order 11: 16384 bytes)
Warning: real time clock seems stuck!
Memory: 254464k available (1420k kernel code, 400k data, 264k init, 0k
highmem)
Calibrating delay loop... 398.33 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)
NET: Registered protocol family 16
PCI: Probing PCI hardware
JFFS version 1.0, (C) 1999, 2000 Axis Communications AB
JFFS2 version 2.2. (C) 2001-2003 Red Hat, Inc.
Serial: 8250/16550 driver $Revision: 1.90 $ 8 ports, IRQ sharing disabled
ttyS0 at MMIO 0x0 (irq = 0) is a 16550A
ttyS1 at MMIO 0x0 (irq = 1) is a 16550A
ttyS2 at MMIO 0x0 (irq = 3) is a 16550A
ttyS3 at MMIO 0x0 (irq = 4) is a 16550A
RAMDISK driver initialized: 16 RAM disks of 28472K size 1024 blocksize
mal0: Initialized, 4 tx channels, 2 rx channels
emac: IBM EMAC Ethernet driver, version 2.0
Maintained by Benjamin Herrenschmidt <benh@kernel.crashing.org>
zmii0: input 0 in RMII mode
eth0: IBM emac, MAC 00:ba:dc:00:12:34
eth0: Found Generic MII PHY (0x01)
zmii0: input 1 in RMII mode
eth1: IBM emac, MAC 00:ba:dc:00:12:35
eth1: Found Generic MII PHY (0x03)
physmap flash device: 2000000 at fe000000
  Amd/Fujitsu Extended Query Table v1.3 at 0x0040
number of CFI chips: 1
cfi_cmdset_0002: Disabling fast programming due to code brokenness.
Using anticipatory io scheduler
```

```
physmap flash device: configuration of partitions is :
physmap flash device: configured 0 partitions
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 17308
Freeing BlueCat RFS memory: 3115k freed
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 264k init
INIT: version 2.84 booting
INIT: Entering runlevel: 1
Network is confieth0: Transmit request threshold: 256
gured as follows:

Target IP address: 172.17.1.12
Gateway IP address: 172.17.0.1

Starting Apache server..eth0: Link is Up
eth0: Speed: 100, Full duplex.
eth0: Transmit request threshold: 256
.
bash-2.05b#
```



# Kernel Configuration Options

The ppc440ep 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 ppc440ep BSP Distribution” below. Boldfaced entries in the tables represent subordinate menus. Italicized entries represent comments.

**Table 3-1: BlueCat Linux Default Configuration for the ppc440ep BSP Distribution**

Table Number and Configuration Parameter
Table 3-2: “Code Maturity Level Options”
Table 3-3: “General Setup”
Table 3-4: “Loadable Module”
Table 3-5: “Processor”
Table 3-6: “Platform Options”
Table 3-7: “Bus Options”
Table 3-8: “Advanced Setup”
Table 3-9: “Device Drivers”
Table 3-10: “File Systems”
Table 3-11: “Library Routines”
Table 3-12: “Kernel Hacking”
Table 3-13: “Security Options”
Table 3-14: “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	Y
POSIX message queues	is not set
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
Auditing support	is not set
Support for hot-pluggable devices	Y
Kernel .config support	is not set
<b>Configure standard kernel features (for small systems)</b>	Y
<i>--- Configure standard kernel features (for small systems).</i>	
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

**Table 3-3: General Setup (Continued)**

Description	Setting
Deadline I/O scheduler	Y
CFQ I/O scheduler	Y
<b>CODETEST device driver configuration</b>	is not set
Optimize for size	is not set

**Table 3-4: Loadable Module**

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

**Table 3-5: Processor**

Description	Setting
<b>Processor Type (44x)</b>	
6xx/7xx/74xx/52xx/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

**Table 3-5: Processor (Continued)**

Description	Setting
CPU Frequency scaling	is not set
<b>IBM 4xx options</b>	
<b>Machine Type (Bamboo)</b>	
Ebony	is not set
Ocotea	is not set
Bamboo	Y
Yosemite	Y
Enable 440EP FPU	is not set
Power Management support (Experimental)	is not set
IRQ to user delivery	is not set

**Table 3-6: Platform Options**

Description	Setting
PC PS/2-style keyboard	is not set
High resolution timer support	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 bootloader kernel arguments	is not set

**Table 3-7: Bus Options**

Description	Setting
Legacy /proc/pci interface	Y
PCI device name database	Y
<b>PCMCIA/CardBus support</b>	
PCMCIA/CardBus support	is not set

**Table 3-8: Advanced Setup**

Description	Setting
Prompt for advanced kernel configuration options	is not set
--- <i>Default settings for advanced configuration options are used.</i>	

**Table 3-9: Device Drivers**

Description	Setting
<b>Generic Driver Options</b>	
Hotplug firmware loading support	is not set
<b>Memory Technology Devices</b>	
Memory Technology Device (MTD) support	Y
Debugging	is not set
MTD partitioning support	Y
MTD concatenating support	Y
RedBoot partition table parsing	is not set
Command line partition table parsing	is not set
--- <i>User Modules And Translation Layers</i>	

**Table 3-9: Device Drivers (Continued)**

Description	Setting
Direct char device access to MTD devices	Y
Caching block device access to MTD devices	Y
Flash Translation Layer (FTL) support	is not set
NAND Flash Translation Layer (NFTL) support	is not set
Inverse NAND Flash Translation Layer (INFTL) support	is not set
<b>RAM/ROM/Flash chip drivers</b>	
Detect Flash chips by Common Flash Interface (CFI) probe	Y
Detect non-CFI AMD/JEDEC-compatible Flash chips	is not set
Flash chip driver advanced configuration options	is not set
Support for Intel/Sharp Flash chips	is not set
Support for AMD/Fujitsu Flash chips	Y
Support for ST (Advanced Architecture) Flash chips	is not set
Support for RAM chips in bus mapping	is not set
Support for ROM chips in bus mapping	is not set
Support for absent chips in bus mapping	is not set
Older (theoretically obsoleted now) drivers for non-CFI chips	is not set
<b>Mapping drivers for chip access</b>	
Support nonlinear mappings of Flash chips	is not set
CFI Flash device in physical memory map	Y
Physical start address of Flash mapping	0xfe000000
Physical length of Flash mapping	0x2000000
Bus width in octets	2
<b>Self-contained MTD device drivers</b>	
Ramix PMC551 PCI Mezzanine RAM card support	is not set
Uncached system RAM	is not set
Test driver using RAM	is not set

**Table 3-9: Device Drivers (Continued)**

Description	Setting
MTD emulation using block device	is not set
<i>--- Disk-On-Chip Device Drivers</i>	
M-Systems Disk-On-Chip 2000 and Millennium	is not set
M-Systems Disk-On-Chip Millennium-only alternative driver (see help)	is not set
M-Systems Disk-On-Chip Millennium Plus	is not set
<b>NAND Flash Device Drivers</b>	
NAND device support	is not set
<b>Parallel port support</b>	
Parallel port support	is not set
<b>Plug and Play support</b>	
<b>Block devices</b>	
Normal floppy disk support	is not set
Compaq SMART-2 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
Promise SATA SX8 (carmel) support	is not set
RAM disk support	Y
Default RAM disk size (Kbytes)	8192
Initial RAM disk ( <i>initrd</i> ) support	is not set
BlueCat Linux RFS support	Y
Support for Large Block Devices	is not set
<b>ATA/ATAPI/MFM/RLL support</b>	

**Table 3-9: Device Drivers (Continued)**

Description	Setting
ATA/ATAPI/MFM/RLL support	is not set
<b>SCSI device support</b>	
SCSI device support	is not set
<b>Multiple device support (RAID and LVM)</b>	
Multiple devices driver support (RAID and LVM)	is not set
<b>Fusion MPT device support</b>	is not set
<b>IEEE 1394 (FireWire) support</b>	
IEEE 1394 (FireWire) support	is not set
<b>I2O device support</b>	
I2O device support	is not set
<b>Macintosh device drivers</b>	is not set
<b>CAN support</b>	
Controller Area Network (CAN) support	is not set
<b>Networking support</b>	
Networking support	Y
<b>Networking options</b>	
Packet socket	Y
Packet socket: mmapped IO	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
IP: kernel level autoconfiguration	is not set

**Table 3-9: Device Drivers (Continued)**

<b>Description</b>	<b>Setting</b>
IP: tunneling	is not set
IP: GRE tunnels over IP	is not set
IP: ARP daemon support (Experimental)	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
<b>Network packet filtering (replaces ipchains)</b>	is not set
<b>SCTP Configuration (Experimental)</b>	
The SCTP Protocol (Experimental)	is not set
Asynchronous Transfer Mode (ATM) (Experimental)	is not set
802.1d Ethernet Bridging	is not set
802.1Q VLAN support	is not set
DECnet 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
<b>QoS and/or fair queuing</b>	

**Table 3-9: Device Drivers (Continued)**

Description	Setting
QoS and/or fair queueing	is not set
<b>Network testing</b>	
Packet Generator (Use with Caution)	is not set
<b>Amateur Radio support</b>	is not set
<b>IrDA (infrared) subsystem support</b>	is not set
<b>Bluetooth subsystem support</b>	is not set
Network device 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
<b>ARCnet devices</b>	
ARCnet devices	is not set
<b>IBM On-chip net device</b>	
IBM On-chip net device	is not set
<b>Ethernet (10 or 100Mbit)</b>	
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	is not set
3Com cards	is not set
<b>Tulip family network device support</b>	
“Tulip” family network device support	is not set
HP 10/100VG PCLAN (ISA, EISA, PCI) support	is not set

**Table 3-9: Device Drivers (Continued)**

<b>Description</b>	<b>Setting</b>
IBM PPC4xx EMAC driver support	
Verbose error messages	is not set
Number of receive buffers	128
Number of transmit buffers	128
Frame gap	8
Skb reserve amount	0
EISA, VLB, PCI, and on-board controllers	is not set
<b>Ethernet (1000 Mbit)</b>	
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
Marvell Yukon Chipset/SysKonnect SK-98xx support	is not set
Broadcom Tigon3 support	is not set
<b>Ethernet (10000 Mbit)</b>	
Intel PRO/10GbE support	is not set
S2IO 10GbE XFrame NIC	is not set
<b>Token Ring devices</b>	
Token Ring driver support	is not set
<b>Wireless LAN (non-ham radio)</b>	
Wireless LAN drivers (non-ham radio) and wireless extensions	is not set
<b>WAN interfaces</b>	
WAN interfaces support	is not set

**Table 3-9: Device Drivers (Continued)**

Description	Setting
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
Traffic Shaper (Experimental)	is not set
Network console logging support (Experimental)	is not set
<b>ISDN subsystem</b>	
ISDN support	is not set
<b>Telephony Support</b>	
Linux telephony support	is not set
<b>Input device support</b>	
Input devices (needed for keyboard, mouse, ...)	Y
<i>---Userland interfaces</i>	
Mouse interface	is not set
Joystick interface	is not set
Touchscreen interface	is not set
Event interface	Y
Event debugging	is not set
<i>--- Input I/O drivers</i>	
Gameport support	is not set
Serial I/O support	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
<i>--- Input Device Drivers</i>	

**Table 3-9: Device Drivers (Continued)**

Description	Setting
Keyboards	Y
AT keyboard support	is not set
Sun Type 4 and Type 5 keyboard support	is not set
DECstation/VAXstation LK201/LK401 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
<b>Character devices</b>	
Virtual terminal	is not set
Nonstandard serial port support	is not set
<b>Serial drivers</b>	
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
<i>--- Non-8250 serial port support</i>	
Unix98 PTY support	Y
Legacy (BSD) PTY support	Y
Maximum number of legacy PTY in use	256
QIC-02 tape support	is not set
<b>IPMI</b>	
IPMI top-level message handler	is not set
<b>Watchdog Cards</b>	

**Table 3-9: Device Drivers (Continued)**

Description	Setting
Watchdog Timer support	is not set
/dev/nvram support	is not set
Generic /dev/rtc emulation	is not set
Extended RTC operation	is not set
DoubleTalk PC internal speech card support	is not set
Siemens R3964 line discipline	is not set
Applicom intelligent fieldbus card support	is not set
<b>Ftape, the floppy tape device driver</b>	
Ftape (QIC-80/Travan) support	is not set
/dev/agpgart (AGP support)	is not set
Direct Rendering Manager (XFree86 4.1.0 and higher DRI support)	is not set
RAW driver (/dev/raw/rawN) (Obsolete)	is not set
<b>I2C support</b>	
I2C support	is not set
<b>Misc devices</b>	
<b>Multimedia devices</b>	
Video for Linux	is not set
<b>Digital Video Broadcasting Devices</b>	
DVB for Linux	is not set
<b>Graphics support</b>	
Support for frame buffer devices	is not set
<b>Sound</b>	
Sound card support	is not set
<b>USB support</b>	
Support for host-side USB	is not set

**Table 3-9: Device Drivers (Continued)**

Description	Setting
<b>USB Gadget Support</b>	
Support for USB Gadgets	is not set

**Table 3-10: 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
<b>CD-ROM/DVD File System</b>	
ISO 9660 CD-ROM file system support	is not set
UDF file system support	is not set
<b>DOS/FAT/NT File Systems</b>	
DOS FAT file system support	is not set
NTFS file system support	is not set
<b>Pseudo File Systems</b>	

**Table 3-10: File Systems (Continued)**

Description	Setting
/proc file system support	Y
sysfs file system support	Y
/dev file system support (Obsolete)	is not set
/dev/pts Extended Attributes	is not set
Virtual memory file system support (former shm file system)	is not set
<b>Miscellaneous File Systems</b>	
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 system (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
Journalling Flash File System (JFFS) support	Y
JFFS debugging verbosity (0 = quiet, 3 = noisy)	0
Journalling Flash File System v2 (JFFS2) support	Y
JFFS2 debugging verbosity (0 = quiet, 2 = noisy)	0
JFFS2 support for NAND Flash (Experimental)	is not set
Compressed ROM file system support	is not set
FreeVxFS file system support (VERITAS VxFS™-compatible)	is not set
OS/2 High-Performance File System (HPFS) 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
<b>Network File Systems</b>	
NFS file system support	Y
Provide NFSv3 client support	is not set
Provide NFSv4 client support (Experimental)	is not set

**Table 3-10: File Systems (Continued)**

<b>Description</b>	<b>Setting</b>
Allow direct I/O on NFS files (Experimental)	is not set
NFS server support	Y
x[*] Provide NFSv3 server support	Y
Provide NFSv4 server support (Experimental)	is not set
Provide NFS server over TCP support (Experimental)	is not set
Secure RPC: Kerberos V mechanism (Experimental)	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
Andrew File System (AFS) support (Experimental)	is not set
<b>Partition Types</b>	
Advanced partition selection	is not set
<b>Native Language Support</b>	
Base native language support	is not set

**Table 3-11: Library Routines**

<b>Description</b>	<b>Setting</b>
<i>--- CRC32 functions</i>	
CRC32c (Castagnoli et al.) Cyclic Redundancy-Check	is not set

**Table 3-12: Kernel Hacking**

Description	Setting
Kernel debugging	is not set
BlueCat Linux kernel debugger	is not set
Support for early boot texts over serial port	is not set

**Table 3-13: Security Options**

Description	Setting
Enable different security models	is not set

**Table 3-14: Cryptographic Options**

Description	Setting
Cryptographic API	is not set

This chapter provides information about BlueCat Linux demo systems supported by the ppc440ep BSP.

## Demo Systems

Table 4-1 lists the demo systems supported in the ppc440ep 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 ppc440ep BSP**

Demo	Boot Devices Supported by Default	ROM Requirements	RAM Requirements
developer	Network (using U-boot firmware) Network (using BlueCat Linux OS loader) Flash (using U-boot firmware) Flash (using BlueCat Linux OS loader)	5254.5 KB	27732 KB
osloader	Network (using U-boot firmware) Flash (using U-boot firmware)	1246.5 KB	9426 KB
showcase	Network (using U-boot firmware) Network (using BlueCat Linux OS loader) Flash (using U-boot firmware) Flash (using BlueCat Linux OS loader)	4103 KB	20153 KB

### developer Demo System

The `developer` demo system is a package consisting of the functionalities of the `shell`, `ftp`, `ping`, and `gdb` 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 system 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.

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## CHAPTER 5 *Supported Device Drivers*

Table 5-1 lists the device drivers supported by the ppc440ep BSP and provides important information about them.

**Table 5-1: Device Drivers Supported by the ppc440ep BSP**

Hardware Device	Device Drivers	Location in Source Tree	Kernel Configuration Options
UART  Two built-in 16750-compatible serial ports	8250.c	drivers/serial	CONFIG_SERIAL_8250 CONFIG_SERIAL_CONSOLE
Ethernet  Two built-in 10/100 Mb Ethernet controllers	ibm_emac*.c	drivers/net/ibm_emac	CONFIG_IBM_EMAC
Flash memory	physmap.c	drivers/mtd/maps	CONFIG_MTD CONFIG_MTD_PARTITIONS CONFIG_MTD_CHAR CONFIG_MTD_BLOCK CONFIG_MTD_CFI CONFIG_MTD_GEN_PROBE CONFIG_MTD_CFI_ADV_OPTIONS CONFIG_MTD_CFI_NOSWAP CONFIG_MTD_CFI_AMDSTD CONFIG_MTD_PHYSMAP CONFIG_MTD_START CONFIG_MTD_LEN CONFIG_MTD_BUSWIDTH
PCI	bamboo.c	arch/ppc/platforms/4xx	CONFIG_PCI



This chapter describes known problems and limitations of this release.

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## PowerPC 440EP 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 unmounting/mounting in BlueCat Linux 5.1. This limitation is due to a defect in the Linux kernel 2.6, described by official kernel maintainer Andrew Morton ([www.lkml.org](http://www.lkml.org)):

*“Because 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.”*

- By default, software FPU emulation is enabled in the BlueCat Linux kernel configuration for the demo systems.

For the PowerPC 440EP target it is possible to use hardware FPU instead of software FPU emulation. To enable the hardware FPU feature, make the following changes in the kernel configuration:

- Disable the **Processor** -> **Math emulation** option
- Enable the **Processor** -> **IBM 4xx options** -> **Enable 440EP FPU** option

## 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