# BlueCat Linux Board Support Guide

BlueCat Linux Release 5.0

DOC-0599-00

*for Intel IQ80331 Boards*

Product names mentioned in the *BlueCat Linux Board Support Guide for Intel IQ80331 Boards* are trademarks of their respective manufacturers and are used here only for identification purposes.



Printed in the United States of America.

# Contents

# *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`<br>`-l`<br>`myprog.c`<br>`/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`**<br>`#` **`cd /usr/home`** |
| Text that represents a variable, such as a file name or a value that must be entered by the user, is *italicized*. | `cat <`*`filename`*`>`<br>`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`<br>`Processor: Intel StrongARM-IXP1200 revision 3`<br>`Architecture: Intel IXP1200`<br>`On node 0 totalpages: 32768`<br>`zone(0): 32768 pages.`<br>`zone(1): 0 pages.`<br>`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

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`<br>Europe: `training-europe@lnxw.com` |

### By Phone:

| | |
|---|---|
| Training and courses | USA: +1 408-979-4353<br>Europe: +33 1 30 85 06 00 |
| Support, Europe<br>(from our Paris, France office) | +33 1 30 85 93 96 |
| Support, worldwide except Europe and Japan<br>(from our San José, CA, USA headquarters) | +1 800-327-5969 or<br>+1 408-979-3940 |
| Support, Japan | +81 33 449 3131 |

### By Fax:

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

### Web-based Support:

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

# CHAPTER 1 *Overview*

The *BlueCat Linux Board Support Guide for Intel IQ80331 Boards* provides information about the BlueCat Linux Board Support Package (BSP) for the Intel IOP331 processor with Intel XScale microarchitecture.

Throughout this Board Support Guide (BSG), the BSP is referred to as the "iq80331" and the target board is referred to as the "IQ80331" or simply as the "target board."

## Features Overview

This 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 |
|---|---|
| IQ80331 platform for the Intel IOP331 processor | • Intel XScale core at a maximum of 800MHz<br>• Little-endian<br>• 256MB DDR SDRAM<br>• Level-1 32KB instruction cache and 32KB data cache<br>• Integrated interrupt controller with 13 external interrupt inputs<br>• Application Accelerator Unit<br>• DMA controller<br>• Performance Monitoring Unit,<br>• 8 MB Intel Strata Flash<br>• Two integrated serial UARTs<br>• Integrated PCI-X interface<br>• Intel 82545 Gigabit Ethernet<br>• Integrated 2 $I^2C$ controllers |

## 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 iq80331 BSP.

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

| Tools | 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

# 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 for downloading and booting BlueCat Linux systems onto the user's target board. Scenarios that use demo systems included in the BlueCat Linux distribution are presented. A basic familiarity with the target board hardware and operation is required. The user must also have an understanding of system administration for the particular cross-development host on which 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 ARM configuration and the iq80331 BSP have been installed on the cross-development host. This means that the user must:

1. Install the BlueCat Linux XScale 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 iq80331 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 iq80331 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 on the IQ80331 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 can be performed using either

- the RedBoot firmware

or:

- BlueCat Linux OS loader

The BlueCat Linux OS loader demo system includes the `i_osloader` and `osloader` Kernel Downloadable Images (KDIs). `osloader` is the image with the base functionality of the BlueCat Linux OS loader configured in. This includes the ability to download BlueCat Linux images from a TFTP host, execute them in RAM, and other important features. `i_osloader` is extended with support for the Journalling Flash File System (JFFS) and can thus be used to download a desired BlueCat Linux custom or demo system into the target board's Flash memory.

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

# Setting up Hardware

## Connecting the Target Board Serial Ports to the Host

The target board has two serial ports (J1E1 RJ11 dual serial port connector). The first port (the lower J1E2 connector) is used by the RedBoot firmware and the BlueCat Linux embedded system. The second port (the upper J1E2 connector) is used by the BlueCat Linux GDB debugger.

Before using the board, the lower port needs to be connected to the development host. It is recommended that the user connect the lower J1E2 connector to COM1

on the host. Use the serial cables shipped with the IQ80331 board to connect the port.

The serial port connected to the lower J1E2 port must be configured at a baud rate of 115200.

Throughout this chapter, the terminal window connected to the lower J1E2 connector is referred to as the “RedBoot console” or the “BlueCat Linux console,” depending on the context.

### Connecting the Target Board Ethernet Card to the Host

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 IQ80331 board is the J1D1 connector. The user must use this port to connect the IQ80331 to the LAN.

It 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 the host operating system documentation.

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*.

## Setting up the RedBoot Firmware

To set up the RedBoot firmware options for BlueCat Linux operations, perform the following steps:

1. Reset the target board.
2. At the RedBoot console, enter:

```
RedBoot> fconfig
Run script at boot: false
Use BOOTP for network configuration: false
Gateway IP address: Enter
Local IP address: <target_board_IP>
Local IP address mask: <target_board_IP_mask>
```

```
Default server IP address: <development_host_IP>
Console baud rate: 115200
DNS server IP address: Enter
GDB connection port: 9000
Force console for special debug messages: false
Network debug at boot time: false
Update RedBoot non-volatile configuration - continue (y/n)? y
... Unlock from 0xc07c0000-0xc07c1000: .
... Erase from 0xc07c0000-0xc07c1000: .
... Program from 0x07fd2000-0x07fd3000 at 0xc07c0000: .
... Lock from 0xc07c0000-0xc07c1000: .
RedBoot>
```

where <*target_board_IP*> is the IP address of the target, <*target board_IP_mask*> is the subnet IP mask, and <*development_host_IP*> is the IP address of the development host.

# 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 RedBoot 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 RedBoot

Specifically, these instructions are applicable to any of the demo systems. This chapter uses the `osloader` demo system as an example.

The following figure shows how the Flash memory on the IQ80331 board is partitioned for BlueCat Linux if the RedBoot monitor is used.

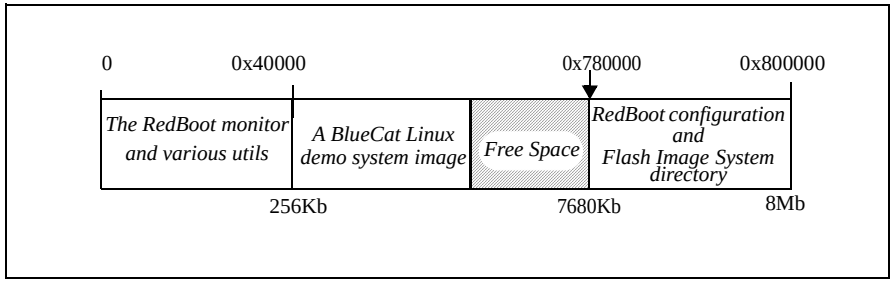


**Figure 2-1: Partitioning of the Flash Memory**

To download the `osloader` demo system into the target board, perform the following steps:

1. Copy the `i_osloader.kdi` file from the `$BLUECAT_PREFIX/demo/osloader` directory to the `/tftpboot` directory on the development host.
2. Copy the `osloader.kdi` file from the `$BLUECAT_PREFIX/demo/osloader` directory to the `/tftpboot` directory on the development host.
3. Reset the target board.
4. At the RedBoot console, enter the following commands:

   ```
   RedBoot> load -r -b 0x100000 i_osloader.kdi
   RedBoot> go 0x100000
   ```

   These commands load the `i_osloader` system to RAM and start it. As a result, the BlueCat Linux OS loader prompt appears in the BlueCat Linux console.
5. At the BlueCat Linux OS loader prompt, type the following commands:

   ```
   > set IF eth0
   > set IP <target_board_IP>
   > set HOST <development_host_IP>
   > set FILE tftp osloader.kdi
   > exec flash_fdisk /dev/mtdchar0 2-15
   > 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.

# Booting a BlueCat Linux System from Flash

## Booting a BlueCat Linux System from Flash using RedBoot

To boot the `osloader` demo installed into the Flash memory, perform the steps below. For detailed information on how to install the demo system to Flash, refer to the "Downloading a BlueCat Linux System into Flash using RedBoot" section.

1. Reset the target board.
2. At the RedBoot console, type the following:

   ```
   RedBoot> go 0xc0040000
   ```

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

The IQ80331 board can be configured to start a demo system programmed into Flash automatically at the board power-up. To prepare the IQ80331 board to boot BlueCat Linux from Flash automatically, enter the following commands:

```
RedBoot> fconfig
Run script at boot: true
Boot script:
.. channel 0
Enter script, terminate with empty line
>> go 0xc0040000
>> Enter
Boot script timeout (1000ms resolution): 2
Use BOOTP for network configuration: false
Gateway IP address: Enter
Local IP address: Enter
Local IP address mask: Enter
Default server IP address: Enter
Console baud rate: 115200
DNS server IP address: Enter
GDB connection port: 9000
Force console for special debug messages: false
Network debug at boot time: false
Update RedBoot non-volatile configuration - continue (y/n)? y
... Unlock from 0xc07c0000-0xc07c1000: .
... Erase from 0xc07c0000-0xc07c1000: .
... Program from 0x07fd2000-0x07fd3000 at 0xc07c0000: .
... Lock from 0xc07c0000-0xc07c1000: .
RedBoot>
```

As a result, the demo system programmed into Flash is started by the RedBoot 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 the RedBoot firmware.

## Booting a BlueCat Linux System from a Network using RedBoot

To boot the `showcase` demo system over a network using the RedBoot firmware, perform the following steps:

1. Copy the `showcase.kdi` file from the `$BLUECAT_PREFIX/demo/showcase` directory to the `/tftpboot` directory on the development host.
2. Reset the target board.
3. At the RedBoot console, enter the following commands:

```
RedBoot> load -r -b 0x100000 showcase.kdi
RedBoot> go 0x100000
```

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

# CHAPTER 3 *Kernel Configuration Options*

The iq80331BSP 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 iq80331 BSP Distribution” below. Boldfaced entries in the tables represent subordinate menus. Italicized entries represent comments.

**Table 3-1: BlueCat Linux Default Configuration for the iq80331 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: “System Type” |
| Table 3-6: “Architecture-dependent General Setup” |
| Table 3-7: “Parallel Port Support” |
| Table 3-8: “Memory Technology Devices” |
| Table 3-9: “Plug and Play Support” |
| Table 3-10: “Block Devices” |
| Table 3-11: “Multidevice Support (RAID and LVM)” |
| Table 3-12: “Networking Support” |
| Table 3-13: “ATA/ATAPI/MFM/RLL Support” |
| Table 3-14: “SCSI Device Support” |
| Table 3-15: “IEEE 1394 (FireWire) Support” |
| Table 3-16: “$I^2O$ Support” |

**Table 3-1: BlueCat Linux Default Configuration for the iq80331 BSP Distribution (Continued)**

| Table Number and Configuration Parameter |
|---|
| Table 3-17: “ISDN Support” |
| Table 3-18: “Input Device Support” |
| Table 3-19: “Character Devices” |
| Table 3-20: “Multimedia Devices” |
| Table 3-21: “File Systems” |
| Table 3-22: “Graphics Support” |
| Table 3-23: “Sound” |
| Table 3-24: “USB Support” |
| Table 3-25: “Kernel Hacking” |
| Table 3-26: “Security Options” |
| Table 3-27: “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 |
| BlueCat Linux OS loader support | is not set |
| BlueCat Linux ignore printk | is not set |

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

| Description | Setting |
|---|---|
| Memory sizing benchmarks | is not set |
| BSD Process Accounting | is not set |
| Sysctl support | is not set |
| 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) | Y |
| Automatic kernel module loading | Y |

**Table 3-5: System Type**

| Description | Setting |
|---|---|
| **ARM system type (IOP3xx-based)** | |
| ADIFCC-based | is not set |
| Anakin | is not set |
| Cirrus-CL-PS7500FE | is not set |
| Co-EBSA285 | is not set |
| PXA250/210-based | is not set |
| EBSA-110 | is not set |
| Epxa10db | is not set |
| FootBridge | is not set |
| Integrator | is not set |
| IOP3xx-based | Y |
| LinkUp-L7200 | is not set |
| RiscPC | is not set |
| SA1100-based | is not set |
| Shark | is not set |
| **CLPS711X/EP721X Implementations** | is not set |
| **Epxa10db** | is not set |
| **Footbridge Implementations** | is not set |
| **IOP3xx Implementation Options** | |
| --- *IOP3xx Platform Types* | |
| Enable support for IQ80310 | is not set |
| Enable support for IQ80321 | is not set |
| Enable support for IQ31244 | is not set |
| Enable support for IQ80331 | Y |
| --- *IOP3xx Chipset Features* | |

**Table 3-5: System Type (Continued)**

| Description | Setting |
|---|---|
| Support AAU for RAID5 hardware XOR engine | Y |
| Support DMA on IOP3xx | Y |
| Support DMA kernel `memcpy` on IOP3XX | Y |
| Support DMA `copy_to_user()` on IOP3XX | Y |
| Support DMA `copy_from_user()` on IOP3XX | Y |
| Support Intel IOP3xx Performance Monitor (Experimental) | Y |
| **Intel PXA250/210 Implementations** | is not set |
| **SA11x0 Implementations** | is not set |
| --- *Processor Type* | |
| --- *Processor Features* | |
| Support Thumb user binaries | is not set |
| Support for BDI2000 JTAG Debugger | is not set |
| Enable dcache write allocate on XScale | Y |

**Table 3-6: Architecture-dependent General Setup**

| Description | Setting |
|---|---|
| Compressed boot loader in ROM/Flash | is not set |
| Compressed ROM boot loader base address | 0x0 |
| Compressed ROM boot loader BSS address | 0x0 |
| Legacy `/proc/pci` interface | is not set |
| PCI device name database | is not set |
| Support for hot-pluggable devices | is not set |
| --- *At least one math emulation must be selected* | |
| NWFPE math emulation | Y |
| Support extended precision | is not set |

**Table 3-6: Architecture-dependent General Setup (Continued)**

| Description | Setting |
|---|---|
| FastFPE math emulation (Experimental) | is not set |
| Kernel support for ELF binaries | Y |
| Kernel support for a.out and ECOFF binaries | is not set |
| Kernel support for MISC binaries | is not set |
| **Generic Driver Options** | is not set |
| Power Management support | is not set |
| Preemptible Kernel (Experimental) | Y |
| RISC OS personality | is not set |
| Default kernel command string | is not set |

**Table 3-7: Parallel Port Support**

| Description | Settings |
|---|---|
| Parallel port support | is not set |

**Table 3-8: Memory Technology Devices**

| Description | Settings |
|---|---|
| Memory Technology Device (MTD) support | Y |
| Debugging | is not set |
| MTD partitioning support | Y |
| MTD concatenating support | is not set |
| RedBoot partition table parsing | is not set |
| Command line partition table parsing | is not set |
| ARM Firmware Suite partition parsing | is not set |
| --- *User Modules and Translation Layers* | |

**Table 3-8: Memory Technology Devices (Continued)**

| Description | Settings |
|---|---|
| Direct character 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 |
| **RAM/ROM/Flash chip drivers** | |
| 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 | Y |
| Support for AMD/Fujitsu Flash chips | is not set |
| 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 |
| **Mapping drivers for chip access** | |
| Support for nonlinear mappings of Flash chips | is not set |
| CFI Flash device in physical memory map | is not set |
| CFI Flash device mapped on ARM Integrator/P720T | is not set |
| CFI Flash device mapped on the XScale IOP3XX board | Y |
| CFI Flash device mapped on EDB7312 | is not set |
| **Self-contained MTD device drivers** | |
| Ramix PMC551 PCI Mezzanine RAM card support | is not set |
| Uncached system RAM | is not set |
| Test driver using RAM | is not set |

**Table 3-8: Memory Technology Devices (Continued)**

| Description | Settings |
|---|---|
| MTD emulation using block device | is not set |
| --- *Disk-On-Chip Device Drivers* | |
| 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 |
| **NAND Flash Device Drivers** | |
| NAND device support | is not set |

**Table 3-9: Plug and Play Support**

| Description | Settings |
|---|---|
| Plug and Play support | is not set |

**Table 3-10: 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 | 28472 |

**Table 3-10: Block Devices (Continued)**

| Description | Settings |
|---|---|
| Initial RAM disk (`initrd`) support | is not set |
| BlueCat Linux RFS support | Y |

**Table 3-11: Multidevice Support (RAID and LVM)**

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

**Table 3-12: Networking Support**

| Description | Settings |
|---|---|
| Networking support | Y |
| **Networking options** | |
| Packet socket | 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 |
| 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 |

**Table 3-12: Networking Support (Continued)**

| Description | Settings |
|---|---|
| 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) (Experimental) | 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 |
| **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 |

**Table 3-12: Networking Support (Continued)**

| Description | Settings |
|---|---|
| **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) | 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 | Y |
| Use Rx Polling (NAPI) | 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 |
| **IBM On-chip net device** | is not set |
| Fiber Distributed Data Interface (FDDI) driver support | is not set |
| High Performance Parallel Interface (HIPPI) driver support (Experimental) | is not set |

**Table 3-12: Networking Support (Continued)**

| Description | Settings |
|---|---|
| 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 |
| **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 3-13: 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**

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

**Table 3-16: $I^2O$ Support**

| Description | Settings |
|---|---|
| $I^2O$ support | is not set |

**Table 3-17: ISDN Support**

| Description | Settings |
|---|---|
| ISDN support | is not set |

**Table 3-18: Input Device Support**

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

**Table 3-18: Input Device Support (Continued)**

| Description | Settings |
|---|---|
| Event interface | is not set |
| Event debugging | is not set |
| --- *Input I/O drivers* | |
| Gameport support | is not set |
| Serial I/O support (needed for keyboard and mouse) | is not set |
| i8042 PC keyboard controller | is not set |
| --- *Input Device Drivers* | |
| Keyboards | is not set |
| Mice | is not set |
| Joysticks | is not set |
| Touchscreens | is not set |
| Misc | is not set |

**Table 3-19: Character Devices**

| Description | Settings |
|---|---|
| Virtual terminal | is not set |
| Nonstandard serial port support | is not set |
| **Serial drivers** | |
| 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 to 2048) | 32 |
| **$I^2C$ support** | |

**Table 3-19: Character Devices (Continued)**

| Description | Settings |
|---|---|
| $I^2C$ support | Y |
| $I^2C$ device interface | Y |
| **$I^2C$ Algorithms** | |
| $I^2C$ bit-banging interfaces | is not set |
| $I^2C$ PCF 8584 interfaces | is not set |
| **$I^2C$ Hardware Bus support** | |
| ALI 1535 | is not set |
| ALI 15x3 | is not set |
| AMD 756/766 | is not set |
| AMD 8111 | is not set |
| Intel 801 | is not set |
| Intel XScale IOP3xx on-chip $I^2C$ interface | Y |
| Nvidia Nforce2 | is not set |
| Intel PIIX4 | is not set |
| SiS 5595 | is not set |
| SiS 630/730 | is not set |
| SiS 96x | is not set |
| VIA 82C596/82C686/823x | is not set |
| **$I^2C$ Hardware Sensors Chip support** | |
| Analog Devices ADM1021 and compatibles | is not set |
| EEPROM (DIMM) reader | is not set |
| ITE IT87xx and compatibles | is not set |
| National Semiconductor LM75 and compatibles | is not set |
| National Semiconductor LM78 and compatibles | is not set |
| National Semiconductor LM85 and compatibles | is not set |
| VIA686A | is not set |

**Table 3-19: Character Devices (Continued)**

| Description | Settings |
|---|---|
| Winbond W83781D, W83782D, W83783S, W83627HF, Asus AS99127F | 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 | is not set |
| `/dev/nvram` support | is not set |
| Enhanced Real Time Clock support | is not set |
| Generic `/dev/rtc` emulation | 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 |
| Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) | is not set |
| RAW driver (`/dev/raw/rawN`) | is not set |

**Table 3-20: Multimedia Devices**

| Description | Settings |
|---|---|
| Video for Linux | is not set |

**Table 3-20: Multimedia Devices (Continued)**

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

**Table 3-21: File Systems**

| Description | Setting |
|---|---|
| Second extended file system support | Y |
| Ext2 extended attributes | 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 |
| **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 |

**Table 3-21: File Systems (Continued)**

| Description | Setting |
|---|---|
| `/dev/pts` file system for Unix98 PTYs | Y |
| `/dev/pts` Extended Attributes | is not set |
| Virtual memory file system support (former shm file system) | Y |
| **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 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 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** | |
| NFS file system support | Y |
| Provide NFSv3 client support | Y |
| Provide NFSv4 client support (Experimental) | Y |
| Allow direct I/O on NFS files (Experimental) | is not set |
| NFS server support | Y |

**Table 3-21: File Systems (Continued)**

| Description | Setting |
|---|---|
| Provide NFSv3 server support | Y |
| Provide NFSv4 server support (Experimental) | Y |
| Provide NFS server over TCP support (Experimental) | is not set |
| Provide `RPCSEC_GSS` authentication (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) (Experimental) | 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 | Y |
| Acorn partition support | is not set |
| Alpha OSF partition support | is not set |
| Amiga partition table support | is not set |
| Atari partition table support | is not set |
| Macintosh partition map support | is not set |
| PC BIOS (MS-DOS partition tables) support | is not set |
| Windows Logical Disk Manager (Dynamic Disk) support | is not set |
| NEC PC-9800 partition table support | is not set |
| SGI partition support | is not set |
| Ultrix partition table support | is not set |
| Sun partition tables support | is not set |
| EFI GUID Partition support | is not set |

**Table 3-22: Graphics Support**

| Description | Settings |
|---|---|
| Support for frame buffer devices | is not set |

**Table 3-23: Sound**

| Description | Setting |
|---|---|
| Sound card support | is not set |

**Table 3-24: USB Support**

| Description | Setting |
|---|---|
| Support for USB | is not set |
| **Support for USB Gadgets** | is not set |

**Table 3-25: Kernel Hacking**

| Description | Setting |
|---|---|
| Include Frame Pointer | Y |
| Verbose user fault messages | is not set |
| Include GDB debugging information in kernel binary | is not set |
| Kernel debugging | is not set |
| BlueCat Linux kernel debugger | is not set |

**Table 3-26: Security Options**

| Description | Setting |
|---|---|
| Enable different security models | is not set |

**Table 3-27: 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 iq80331 BSP.

## Demo Systems

Table 4-1 lists the demo systems supported in the iq80331 BSP distribution, the boot devices supported by each demo system, and their respective RAM and ROM requirements.

**Table 4-1: Demo Systems Supported by iq80331 BSP**

| Demo | Boot Devices Supported by Default | ROM Requirements | RAM Requirements |
|---|---|---|---|
| `developer` | Network (using RedBoot or OS loader) | 4809.5 KB | 23371 KB |
| `osloader` | Network (using RedBoot) | 1052 KB | 6176 KB |
| `showcase` | Network (using RedBoot or OS loader) | 3660.5 KB | 16593 KB |

### developer Demo System

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

# CHAPTER 5 *Supported Device Drivers*

Table 5-1 lists the device drivers supported by the iq80331 BSP and provides important information about them.

**Table 5-1: Device Drivers Supported by the iq80331 BSP**

| Hardware Device | Device Drivers | Location in Source Tree | Kernel Configuration Options |
|---|---|---|---|
| UART<br><br>2 integrated serial UARTs 16550 compatible | `8250.c` | `drivers/char` | `CONFIG_SERIAL`<br>`CONFIG_SERIAL_CONSOLE` |
| Ethernet<br><br>Intel 82544 Gigabit Ethernet | `e1000*.c` | `drivers/net/e1000` | `CONFIG_E1000` |
| $I^2C$<br><br>Integrated 2 $I^2C$ controllers | `busses/i2c-iop3xx.c` | `drivers/i2c` | `CONFIG_I2C_IOP3XX` |
| Flash<br><br>8 MB on Intel Strata Flash | `arm_flash*.c` | `drivers/mtd/maps` | `CONFIG_MTD_IOP3XX` |
| DMA Controller | `dma.c` | `arch/arm/mach-iop3xx` | `CONFIG_IOP3XX_DMA`<br>`CONFIG_IOP3xx_DMACOPY`<br>`CONFIG_IOP3xx_DMACOPYTOUSER`<br>`CONFIG_IOP3xx_DMA_COPYFROMUSER` |

**Table 5-1: Device Drivers Supported by the iq80331 BSP (Continued)**

| Hardware Device | Device Drivers | Location in Source Tree | Kernel Configuration Options |
|---|---|---|---|
| Application Accelerator Unit (AAU) | `aau.c` | `arch/arm/mach-iop3xx` | `CONFIG_IOP3XX_AAU` |
| Performance Monitoring Unit (PMU) | `pmon.c` | `arch/arm/mach-iop3xx` | `CONFIG_IOP3XX_PMON` |

# CHAPTER 6 *Known Problems and Limitations*

This chapter describes known problems and limitations of this release.

## IQ80331 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`):

  *"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."*

- Loading of a kernel module may fail with the following message:

  ```
  module.o: unable to fixup relocation: out of range
  ```

  To avoid this problem, either make sure that the `CONFIG_MODULE_UNLOAD` option is enabled or comment out `__exit keywords` in the kernel module source.

## 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.