

# BlueCat-ME Linux Board Support Guide

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BlueCat-ME Linux Release 5.4.1

DOC-0773-00

*for Xilinx Spartan-3E 1600 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 Release Notes*

This printed document contains late-breaking information about the current release of BlueCat Linux.

- *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
```

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## 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; <i>italicized</i> for emphasis, new terms, and book titles	Refer to the <i>BlueCat Linux User's Guide</i> .
Environment variables, filenames, functions, methods, options, parameter names, path names, commands, and computer data	<code>ls</code> <code>-l</code> <code>myprog.c</code> <code>/dev/null</code>
Commands that need to be highlighted within body text, or commands that must be typed as is by the user are <b>bolded</b> .	<code>login: <b>myname</b></code> <code># <b>cd /usr/home</b></code>
Text that represents a variable, such as a filename or a value that must be entered by the user, is <i>italicized</i> .	<code>cat &lt;filename&gt;</code> <code>mv &lt;file1&gt; &lt;file2&gt;</code>
Blocks of text that appear on the display screen after entering instructions or commands	<code>Linux version 2.4.10-1</code> <code>(bin@build1) (gcc version</code> <code>2.95.3 20010315 (release)) #5</code> <code>Tue Dec 18 13:33:08 MSK 2001</code> <code>Processor: Intel StrongARM-</code> <code>IXP1200 revision 3</code> <code>Architecture: Intel IXP1200</code> <code>On node 0 totalpages: 32768</code> <code>zone(0): 32768 pages.</code> <code>zone(1): 0 pages.</code> <code>zone(2): 0 pages.</code>
Keyboard options, button names, and menu sequences	<b>Enter</b> , <b>Ctrl-C</b>

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## 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



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The *BlueCat-ME Linux Board Support Guide for Xilinx Spartan-3E 1600E Boards* provides information about the BlueCat-ME Linux Board Support Package (BSP) for the Xilinx Spartan 3E-1600 (SP3E/1600) boards.

The Spartan 3E-1600 Development Board is powered by the XC3S1600E Spartan-3E FPGA device and is supported by industry-standard peripherals, connectors and interfaces. It offers a rich feature set that spans a wide range of applications, and provides a comprehensive environment for developing embedded designs based on the Spartan-3E FPGA.

Spartan-3E FPGA features a 1600 K gate array with the ability to implement the software 32-bit MicroBlaze RISC processor using the Xilinx Embedded Development Kit (EDK).

Throughout this Board Support Guide (BSG), the BSP is referred to as the “sp3e” and the target board is referred to as the “SP3E/1600” or simply as the “target board.”

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## Features Overview

This following sections describe the new features of this release.

### Kernel Version

BlueCat-ME Linux release 5.4.1 is based on the Linux kernel version 2.6.13 available from [www.kernel.org](http://www.kernel.org).

## Xilinx ISE/EDK Version

BlueCat-ME Linux release 5.4.1 was explicitly tested to operate in conjunction with Xilinx ISE version 9.1.03 and EDK version 9.1.01.

## BlueCat-ME Linux Cross-Development Tools

BlueCat-ME Linux release 5.4.1 utilizes the following versions of the GNU toolchain provided within the Xilinx EDK:

- gcc version 3.4.1
- binutils version 2.10.1

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## Supported Hardware

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

**Table 1-1: Hardware Supported**

Model	Description
Xilinx Spartan-3E 1600E board	<ul style="list-style-type: none"><li>• MicroBlaze soft processor core on the XC3S1600E Spartan-SE FPGA device</li><li>• Big-endian</li><li>• 32 MB DDR SDRAM</li><li>• One RS-232 serial port</li><li>• Ethernet controller interface—one 10/100 interface running in full- and half-duplex modes</li><li>• SPI interface</li><li>• GPIO</li><li>• 16 MB Flash</li></ul>

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## Supported Cross-Development Hosts

The BlueCat-ME 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:

- Microsoft Windows:
  - Windows XP Professional
- Linux workstations:
  - Red Hat Enterprise Linux 4



# *Downloading and Booting BlueCat-ME Linux on the Target*

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

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## **Prerequisites**

This document is a guide to downloading and booting BlueCat-ME Linux systems onto the user's target board. Scenarios that use demo systems included in the BlueCat-ME 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 the BlueCat-ME 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-ME Linux on the target board, it is assumed that the default BlueCat-ME Linux MicroBlaze configuration and the sp3e BSP have been installed on the development host. The user must:

1. Install the Xilinx EDK/ISE environment on the cross-development host.

---

**NOTE:** On Windows host, the additional steps are required to ensure the correct mounting of the Cygwin execution environment from the BlueCat Linux distribution for Windows host. Specifically, one of the following procedure should be performed:

1. Start EDK GUI using **Start -> Programs -> Xilinx Platform Studio 9.1i-> Xilinx Platform Studio.**
2. Start the EDK shell from the GUI main menu using **Project -> Launch EDK Shell.**
3. Remove the Cygwin environment mounting:

```
# umount -A
```

4. Close the EDK shell and exit the EDK GUI.
5. Install the Cygwin execution environment from the BlueCat 5.4.1 Core distribution. Please refer to the *BlueCat User's Guide* for the details.

or

Remove the following entries from the Windows registry:

```
HKEY_CURRENT_USER\Software\Cygnus Solutions
```

```
HKEY_LOCAL_MACHINE\SOFTWARE\Cygnus Solutions
```

---

2. Install the BlueCat-ME Linux MicroBlaze 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*.
3. Install the sp3e 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*.
4. Activate support for the sp3e 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*.
5. In the BlueCat Linux environment, activate Xilinx EDK/ISE support. On the Linux host, this can be done by sourcing the corresponding setup

scripts in the EDK/ISE installation. On the Windows host, the full path to the EDK/ISE tools should be added to the PATH environment variable:

```
BlueCat:$ export PATH=<path_to_EDK_installation>/\
gnu/microblaze/nt/bin:$PATH
```

---

**NOTE:** On Windows host, to activate the Cygwin bash window for working with the already installed BlueCat Linux environment, run the `cygnus.bat` script located in the BlueCat `cygwin32` directory. For instance, if the BlueCat 5.4 environment is installed on drive C, run the following command:

```
C:\cygwin32\cygnus.bat
```

This script will verify the correct mounting of the Cygwin execution environment from the BlueCat 5.4 Core distribution and start `bash`.

In case other Cygwin versions are installed on the Windows host along with the Cygwin from the BlueCat 5.4.1 distribution, it is recommended to remove the following entries from the Windows registry:

```
HKEY_CURRENT_USER\Software\Cygnus Solutions
HKEY_LOCAL_MACHINE\SOFTWARE\Cygnus Solutions
```

and then run `cygnus.bat`.

---

## Downloading and Booting Overview

The procedure for downloading and booting a BlueCat-ME Linux system on the target board consists of the following main steps:

- Setting up hardware
- Downloading and booting a BlueCat-ME Linux system

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

- Xilinx Microprocessor Debug (XMD) engine running on the development host
- BlueCat Linux OS loader

The BlueCat Linux OS loader demo system currently includes the `osloader` Kernel Downloadable Image (KDI). `osloader` is the image with the base functionality of the BlueCat Linux OS loader configured in.

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

### Configuring the Target Board

Make sure that the M1 jumper is installed and the M0 and M2 jumpers are removed from the J30 header on the board.

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

The serial port connected to the target DTE serial port has a baud rate of 9600.

Throughout this document, the terminal window connected to the serial connector is referred to as the “serial console.”

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

The USB port on the target board is used to provide the USB-based JTAG programming interface. This interface is used for downloading FPGA bitstreams and BlueCat-ME Linux KDI images to the target board.

The USB port on the target board should be connected to a USB 2.0 port on the development host.

### Connecting the Target Platform Ethernet Port 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-ME Linux embedded systems onto the board over a network. The Ethernet port on the target 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 `<host_IP_address>` and `<target_IP_address>`, 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*.

## Booting a BlueCat-ME Linux System via the USB-based JTAG Interface

A BlueCat-ME Linux demo system can be booted via the USB-based JTAG interface using the Xilinx XMD engine running on the development host.

To boot the `osloader` demo system via the USB-based JTAG interface using the Xilinx XMD engine, perform the following steps on the development host.

1. Change the home directory to the directory where the bitstream image is stored.

```
BlueCat:~$ cd $BLUECAT_PREFIX/boot
```

2. Start the Xilinx XMD engine.

```
BlueCat:~$ xmd
```

3. Download the FPGA bitstream.

```
XMD% impact -batch sp3e.cmd
```

4. Connect to the MicroBlaze target.

```
XMD% connect mb mdm
```

5. Download the `osloader.kdi` image to the target.

```
XMD% dow -data ../demo/osloader/osloader.kdi \  
0x24000000
```

---

**NOTE:** On Windows host, Xilinx XMD fails to follow the demo link. Use the following command to download the `osloader.kdi` image to the target:

```
XMD% dow -data ../demo.sp3e/osloader/osloader.kdi \  
0x24000000
```

---

6. Boot the `osloader` demo.

```
XMD% con 0x24000000
```

At this step, the following output shall appear on the serial console:

```
Linux version 2.6.13.4 (bin@build3) (gcc version 3.4.1 ( Xilinx EDK  
8.2.02 Build EDK_Im_Sp2.4 241006 )) #3 Tue Apr 3 09:23:30 EDT 2007  
setup_memory: max_mapnr: 0x25fff  
setup_memory: min_low_pfn: 0x24000  
setup_memory: max_low_pfn: 0x2000  
On node 0 totalpages: 8192  
DMA zone: 8192 pages, LIFO batch:3  
Normal zone: 0 pages, LIFO batch:1  
HighMem zone: 0 pages, LIFO batch:1
```

```
Built 1 zonelists
Kernel command line: xilinx_emac_mac=00:0E:B6:6E:6C:00 hda=bswap
hdb=bswap hdc=bswap hdd=bswap root=101
OPB INTC #0 at 0x41200000
PID hash table entries: 256 (order: 8, 4096 bytes)
Console: Xilinx OPB UART Lite
Dentry cache hash table entries: 8192 (order: 3, 32768 bytes)
Inode-cache hash table entries: 4096 (order: 2, 16384 bytes)
Memory: 31036k/32768k available
Calibrating delay loop... 32.76 BogoMIPS (lpj=163840)
Mount-cache hash table entries: 512
NET: Registered protocol family 16
ttyS0 at MMIO 0x40600000 (irq = 3) is a Xilinx OPB UART Lite
io scheduler noop registered
io scheduler anticipatory registered
io scheduler deadline registered
io scheduler cfq registered
RAMDISK driver initialized: 16 RAM disks of 8192K size 1024 blocksize
eth0: using fifo mode.
eth0: Xilinx EMAC #0 at 0x40C00000 mapped to 0x40C00000, irq=1
eth0: id 2.01; block id 11, type 1
NET: Registered protocol family 2
IP route cache hash table entries: 512 (order: -1, 2048 bytes)
TCP established hash table entries: 2048 (order: 2, 16384 bytes)
TCP bind hash table entries: 2048 (order: 1, 8192 bytes)
TCP: Hash tables configured (established 2048 bind 2048)
TCP reno registered
TCP bic registered
NET: Registered protocol family 1
RAMDISK: Compressed image found at block 591092
Freeing BlueCat RFS memory: 79k freed
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 68k freed
BlueCat Loader Shell
>
```

---

## Booting a BlueCat-ME Linux System from a Network

A BlueCat-ME Linux demo system can be booted from a network using the BlueCat Linux 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 `/tftboot` directory on the cross-development host.
2. Boot the OS loader as described in “Booting a BlueCat-ME Linux System via the USB-based JTAG Interface” on page 10.

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=10240
> 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.

---

## Downloading a BlueCat-ME Linux System into Flash

This section provides instructions on how a BlueCat-ME Linux embedded system can be downloaded into the target Flash memory using 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-ME Linux System into Flash Using the OS Loader

To download a BlueCat-ME Linux embedded system into the target Flash memory using the BlueCat Linux OS loader, 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 `osloader.kdi` file from the `$(BLUECAT_PREFIX)/demo/osloader` directory to the `/tftpboot` directory on the development host:

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

2. Boot the `i_osloader` demo as described in “Booting a BlueCat-ME Linux System via the USB-based JTAG Interface” on page 10.

The BlueCat Linux OS loader prompt (>) appears on the console.

3. 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 0-10
> 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.

The partition size specified in the `flash_fdisk` command depends on the size of the system and should be large enough to hold the BlueCat-ME Linux demo KDI. For the example above, the following calculation shows that a partition of size 0-10 is a correct parameter for the `osloader` demo system:

$$(10 - 0 + 1) * 128KB = 1408KB$$

where 128 KB is the size of the Flash sector. The calculated value 1408 KB is greater than the ROM requirement for the `osloader` demo (1303 KB). Refer to Chapter 4, “Supported Demo Systems” for details about the ROM requirements for all supported BlueCat-ME Linux demo systems. As the result, the `osloader` demo is programmed into the first 11 sectors of Flash.

To boot the `osloader` demo installed into the Flash memory, start XMD on the development host as described in “Booting a BlueCat-ME Linux System via the USB-based JTAG Interface” on page 10, steps 1-2, and type the following commands at the XMD prompt:

```
XMD% impact -batch sp3e.cmd
XMD% connect mb mdm
XMD% con <flash_base>
```

where *<flash\_base>* is the base address of the Flash memory region in the address space.

This address can be obtained from the console output when booting the `i_osloader` demo. For example, the following line in the console output:

```
Registering a 16MB OPB Flash at 0x21000000
```

indicates that the Flash memory region starts from 0x21000000.

## Updating the FPGA Bitstream

A preconfigured FPGA design project tree for the sp3e BSP is located in the `$BLUECAT_PREFIX/boot/project_sp3e` directory. It can be used as a starting point for updating the FPGA bitstream for the target board.

To update the bitstream, start the Xilinx Platform Studio (xps) specifying `$BLUECAT_PREFIX/boot/project_sp3e/sp3e.xmp` as the project file.

After the necessary modifications have been performed, the bitstream can be regenerated by selecting the **Device Configuration / Update Bitstream** menu option.

To update the BlueCat-ME Linux kernel source tree according to the updated FPGA bitstream, perform the following steps in the **Xilinx Platform Studio** window:

1. Select the **Software/Software Platform Settings** menu.

The **Software Platform Settings** window appears.

2. In the **Software Platform Settings** window, select the **Software Platform** option on the left. Then enter the core clock frequency in the `CORE_CLOCK_FREQ_HZ` field.

The core clock frequency value for the preconfigured bitstream must be 66666667. If the core clock frequency for the updated FPGA bitstream has changed, this value should be updated accordingly.

3. In the same window, select **linux\_bc54** in the **OS** field.
4. In the same window, select the **OS** and **Libraries** options on the left. Enter values in the following fields:

- `BLUECAT_PREFIX`: absolute path to the root directory of the kernel source tree;
- `KERNEL_CONFIG`: absolute path to the kernel configuration file.

For example, to update the kernel sources and the kernel configuration for the `developer demo` system,

`<BlueCat_Linux_installation_point>/usr/src/linux` should be entered in the `BLUECAT_PREFIX` field and

`<BlueCat_Linux_installation_point>/demo/developer/\  
developer.config` should be entered in the `KERNEL_CONFIG` field.

5. Close the **Platform Settings** window by pressing **OK**.
6. For updating the BlueCat-ME Linux kernel source tree, select the **Software/Generate Libraries and BSPs** menu option.

7. Rebuild the demo system(s) with the updated kernel. For the information on how to rebuild the demo systems, refer to Chapter 4, “BlueCat Linux Demo Systems” in the *BlueCat Linux User’s Guide*.

The updated system can be then downloaded and booted on the target board as described in this document.



The sp3e BSP comes with a default BlueCat-ME Linux kernel. This kernel has a number of configuration options. This chapter details these options in the tables listed in Table 3-1: “BlueCat-ME Linux Default Configuration for the sp3e BSP Distribution” below. Boldfaced entries in the tables represent subordinate menus. Italicized entries represent comments.

**Table 3-1: BlueCat-ME Linux Default Configuration for the sp3e BSP Distribution**

<b>Table Number and Configuration Parameter</b>
Table 3-2: “Code Maturity Level Options”
Table 3-3: “General Setup”
Table 3-4: “Loadable Module Support”
Table 3-5: “Processor Type and Features”
Table 3-6: “Executable File Formats”
Table 3-7: “Networking”
Table 3-8: “File Systems”
Table 3-9: “Kernel Hacking”
Table 3-10: “Security Options”
Table 3-11: “Cryptographic Options”
Table 3-12: “Library Routines”

**Table 3-2: Code Maturity Level Options**

<b>Description</b>	<b>Setting</b>
Prompt for development and/or incomplete code/drivers	is not set

**Table 3-3: General Setup**

<b>Description</b>	<b>Setting</b>
Local version—append to kernel release	is not set
BlueCat Linux OS Loader support	is not set
Memory sizing benchmarks	is not set
BSD Process Accounting	is not set
Sysctl support	is not set
Auditing support	is not set
Support for hot-pluggable devices	is not set
Kernel Userspace Events	Y
Kernel <code>.config</code> support	is not set
<b>Configure standard kernel features (for small systems)</b>	
<i>--- Configure standard kernel features (for small systems).</i>	
Load all symbols for debugging/ <code>kksymoops</code>	is not set
Enable support for <code>printk</code>	Y
BUG() support	is not set
Enable full-sized data structures for core	is not set
Enable futex support	is not set
Enable eventpoll support	is not set
<b>CODETEST device driver configuration</b>	is not set
Optimize for size	is not set
Function alignment	0
Label alignment	0

---

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

Description	Setting
Loop alignment	0
Jump alignment	0

**Table 3-4: Loadable Module Support**

Description	Setting
Enable loadable module support	is not set

**Table 3-5: Processor Type and Features**

Description	Setting
<b>Subarchitecture Type</b>	SP3E/1600
ML401	is not set
SP3E/1600	Y
Are you using uncached shadow for RAM?	Y
Allow allocating large blocks (> 1MB) of memory	Y

**Table 3-6: Executable File Formats**

Description	Setting
Kernel support for flat binaries	Y
Enable ZFLAT support	is not set
Enable shared FLAT support	is not set
Kernel support for MISC binaries	is not set

**Table 3-7: Networking**

<b>Description</b>	<b>Setting</b>
Networking support	Y
<b>Networking options</b>	
Packet socket	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: 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
IP: tunnel transformation	is not set
IP: TCP socket monitoring interface	is not set
TCP: advanced congestion control	is not set
The IPv6 protocol	is not set
<b>Network packet filtering (replaces ipchains)</b>	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

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
<b>QoS and/or fair queueing</b>	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
<b>Device Drivers</b>	
<b>Generic Driver Options</b>	
Prevent firmware from being built	Y
Hotplug firmware loading support	is not set
<b>Memory Technology Devices (MTD)</b>	
Memory Technology Device (MTD) support	Y
Debugging	is not set
MTD concatenating support	is not set
MTD partitioning support	Y
RedBoot partition table parsing	is not set
Command line partition table parsing	is not set
User Modules and Translation Layers	
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
<b>RAM/ROM/Flash chip drivers</b>	
Detect non-CFI AMD/JEDEC-compatible Flash chips	is not set

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
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
<b>Mapping drivers for chip access</b>	
Support nonlinear mappings of Flash chips	Y
CFI Flash device in physical memory map	is not set
OPB CFI Flash device mapped on Xilinx boards	Y
Generic uClinux RAM/ROM file system support	is not set
Map driver for platform device RAM (mtd-ram)	is not set
<b>Self-contained MTD device drivers</b>	
Uncached system RAM	is not set
Physical system RAM	is not set
Test driver using RAM	is not set
MTD emulation using block device	is not set
<i>--- Disk-On-Chip Device Drivers</i>	
M-Systems Disk-On-Chip 2000 and Millennium (Deprecated)	is not set
M-Systems Disk-On-Chip Millennium-only alternative driver	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

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
<b>Plug and Play support</b>	is not set
<b>Block devices</b>	
Normal floppy disk support	is not set
Loopback device support	is not set
Network block device support	is not set
RAM disk support	Y
Default number of RAM disks	16
Default RAM disk size (kbytes)	8192
Initial RAM disk ( <i>initrd</i> ) support	is not set
Initramfs source file(s)	is not set
BlueCat Linux RFS support	Y
Packet writing on CD-ROM/DVD-ROM media	is not set
<b>IO Schedulers</b>	
Anticipatory I/O scheduler	Y
Deadline I/O scheduler	Y
CFQ I/O scheduler	Y
ATA over Ethernet support	is not set
<b>ATA/ATAPI/MFM/RLL support</b>	
ATA/ATAPI/MFM/RLL support	is not set
<b>SCSI device support</b>	
SCSI device support	is not set
<b>Multidevice 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>	is not set

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
<b>I2O device support</b>	is not set
<b>Network device support</b>	
Network device support	Y
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>IBM On-chip net device</b>	is not set
<b>Ethernet (10 or 100Mbit)</b>	
Ethernet (10 or 100Mbit)	is not set
Xilinx 10/100 OPB EMAC support	Y
<b>Ethernet (1000 Mbit)</b>	is not set
<b>Ethernet (10000 Mbit)</b>	is not set
<b>Token Ring devices</b>	is not set
<b>Wireless LAN (non-hamradio)</b>	
Wireless LAN drivers (non-ham radio) and wireless extensions	is not set
<b>PCMCIA network device support</b>	
PCMCIA network device support	is not set
<b>WAN interfaces</b>	
WAN interfaces support	is not set
Point-to-Point Protocol (PPP) support	is not set
Serial Line Internet Protocol (SLIP) support	is not set
<b>ISDN subsystem</b>	
ISDN support	is not set

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
<b>Telephony Support</b>	
Linux telephony support	is not set
<b>Input device support</b>	
Generic input layer (needed for keyboard, mouse, ...)	is not set
<b>Hardware I/O ports</b>	
Serial I/O support	is not set
Gameport support	is not set
<b>Character devices</b>	
Virtual terminal	is not set
Nonstandard serial port support	is not set
<b>Serial drivers</b>	
<i>--- Non-8250 serial port support</i>	
Xilinx UART Lite driver	Y
Xilinx UART Lite Console support	Y
Unix98 PTY support	is not set
Legacy (BSD) PTY support	Y
Maximum number of legacy PTY in use	256
<b>IPMI</b>	
IPMI top-level message handler	is not set
<b>Watchdog Cards</b>	
Watchdog Timer support	is not set
Enhanced Real Time Clock support	is not set
Generic <code>/dev/rtc</code> emulation	is not set
Xilinx OPB GPIO support	Y
Double Talk PC internal speech card support	is not set

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
Siemens R3964 line discipline	is not set
<b>Ftape, the floppy tape device driver</b>	is not set
RAW driver (/dev/raw/rawN) (Obsolete)	
<b>TPM devices</b>	is not set
<b>I2C support</b>	
I2C support	is not set
<b>Dallas's 1-wire bus</b>	is not set
Dallas's 1-wire support	
<b>Hardware Monitoring support</b>	
Hardware Monitoring support	is not set
<b>Misc devices</b>	is not set
<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>	
<b>USB Gadget support</b>	
Support for USB Gadgets	is not set
<b>MMC/SD Card support</b>	
MMC support	is not set

**Table 3-7: Networking (Continued)**

<b>Description</b>	<b>Setting</b>
<b>InfiniBand support</b>	is not set
<b>SN Devices</b>	is not set
<b>CAN support</b>	
Controller Area Network (CAN) support	is not set

**Table 3-8: File Systems**

<b>Description</b>	<b>Setting</b>
Second extended file system support	Y
Ext2 extended attributes	is not set
Ext2 execute in place support	is not set
Ext3 journalling file system support	is not set
Reiserfs support	is not set
JFS file system support	is not set
<b>XFS support</b>	
XFS file system support	is not set
Minix file system support	is not set
ROM file system support	is not set
Inotify file change notification support	is not set
Quota support	is not set
Dnotify 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-ROM Filesystems</b>	
ISO 9660 CD-ROM file system support	is not set
UDF file system support	is not set

**Table 3-8: File Systems (Continued)**

Description	Setting
<b>DOS/FAT/NT File Systems</b>	
MS-DOS file systems support	is not set
VFAT (Windows 95) file system support	is not set
NTFS file system support	is not set
<b>Pseudo file systems</b>	
<code>/proc</code> file system support	Y
<code>sysfs</code> file system support	Y
<code>/dev/pts</code> Extended Attributes	Y
<code>/dev/pts</code> Security Labels	is not set
Virtual memory file system support (former <code>shm</code> file system)	Y
<code>tmpfs</code> Extended Attributes	is not set
<b>Miscellaneous file systems</b>	
Apple Extended HFS file system support	is not set
Journalling Flash File System (JFFS) support	Y
JFFS debugging verbosity (0 = quiet, 3 = noisy)	0
JFFS stats available in <code>/proc</code> file system	Y
Journalling Flash File System v2 (JFFS2) support	Y
JFFS2 debugging verbosity (0 = quiet, 2 = noisy)	0
JFFS2 write-buffering support	Y
Advanced compression options for JFFS2	is not set
Compressed ROM file system support ( <code>cramfs</code> )	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

**Table 3-8: File Systems (Continued)**

<b>Description</b>	<b>Setting</b>
<b>Network File Systems</b>	
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 filesystem 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
<b>Partition Types</b>	
Advanced partition selection	is not set
<b>Native Language Support</b>	
Base native language support	is not set

**Table 3-9: Kernel Hacking**

<b>Description</b>	<b>Setting</b>
Show timing information on <code>printks</code>	is not set
Kernel debugging	is not set
Physical address where UART Lite for early <code>printk</code> is mapped	0x40600000

**Table 3-10: Security Options**

<b>Description</b>	<b>Setting</b>
Enable access key retention support	is not set
Enable different security models	is not set

**Table 3-11: Cryptographic Options**

<b>Description</b>	<b>Setting</b>
Cryptographic API	is not set
<b>Hardware crypto devices</b>	is not set

**Table 3-12: Library Routines**

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

This chapter provides information about BlueCat-ME Linux demo systems supported by the sp3e BSP.

---

## Demo Systems

Table 4-1 lists the demo systems supported in the sp3e 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 sp3e BSP**

<b>Demo</b>	<b>Boot Devices Supported by Default</b>	<b>ROM Requirements</b>	<b>RAM Requirements</b>
developer	USB-JTAG (using Xilinx XMD) Network (using BlueCat Linux OS loader) ROM/Flash (using Xilinx XMD)	2806 KB	13336 KB
osloader	USB-JTAG (using Xilinx XMD) ROM/Flash (using Xilinx XMD)	1303 KB	5908 KB
showcase	USB-JTAG (using Xilinx XMD) Network (using BlueCat Linux OS loader) ROM/Flash (using Xilinx XMD)	1782 KB	7420 KB

## developer Demo System

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

---

**NOTE:** BlueCat Linux debugging is not supported in this release.

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## osloader Demo System

`osloader` is the BlueCat Linux OS loader used to boot a BlueCat-ME 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 `appWeb` 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.

# Supported Device Drivers and Peripherals

This chapter describes supported device drivers and hardware periphery supported by the sp3e BSP.

## Supported Device Drivers

Table 5-1 lists the device drivers supported by the sp3e BSP and provides important information about them.

**Table 5-1: Device Drivers Supported by the sp3e BSP**

Hardware Device	Device Drivers	Location in Source Tree	Kernel Configuration Options
UART serial port	uartlite.c	drivers/serial	CONFIG_SERIAL_XILINX_UARTLITE CONFIG_SERIAL_CONSOLE
Ethernet One built-in 10/100 Mb Ethernet controller	*.c	drivers/net/xilinx_emac	CONFIG_XILINX_EMAC
16550-compatible UART serial port	8250.c	drivers/serial	CONFIG_SERIAL_8250 CONFIG_SERIAL_8250_CONSOLE
Ethernet Lite One built-in 10/100 MB Ethernet controller	*.c	drivers/net/xilinx_emaclite	CONFIG_XILINX_EMACLITE

**Table 5-1: Device Drivers Supported by the sp3e BSP (Continued)**

Hardware Device	Device Drivers	Location in Source Tree	Kernel Configuration Options
16 MB Flash	xilinx_opb_flash.c	drivers/mtd/maps	CONFIG_MTD_XILINX_OPB
SPI controller	*.c	drivers/char/xilinx_spi	CONFIG_XILINX_SPI
GPIO controller	*.c	drivers/char/xilinx_gpio	CONFIG_XILINX_GPIO

The SP3/1600 boards do not have installed on-board chips.

## Supported Hardware Peripherals

The peripherals on the SP3/1600 boards are implemented by programming a corresponding IP core into the on-board FPGA using the Xilinx EDK tools.

Table 5-2 lists the supported IP cores.

**Table 5-2: Supported IP Cores**

IP Core	Driver
opb_uartlite_v1_00_b	drivers/serial/uartlite.c
opb_uart16550_v1_00_d	drivers/serial/8250.c
opb_ethernet_v1_04_a	drivers/net/xilinx_emac/*.c
opb_ethernetlite_v1_01_b	drivers/net/xilinx_emaclite/*.c
opb_emc_v2_00_a	drivers/mtd/maps/xilinx_opb_flash.c
opb_spi_v1_00_e	drivers/char/xilinx_spi/*.c
opb_gpio_v3_01_b	drivers/char/xilinx_gpio/*.c

This chapter describes known problems and limitations of this release.

---

## SP3E/1600 Target Board Problems and Limitations

- Since the Ethernet IP cores used for this board have no dedicated nonvolatile memory regions, it is necessary to specify the Ethernet MAC address every time the system starts. It can be done by performing the `ifconfig` command before bringing the interface up. For example:

```
# ifconfig eth0 hw ether 00:0E:B6:6E:6C:02
```

Alternatively, the `xilinx_emac` driver supports the `xilinx_emac_mac` parameter, which can be passed to the kernel for setting the MAC address.

The following example demonstrates how to set this parameter for `osloader.kdi`:

```
# echo xilinx_emac_mac=00:0E:B6:6E:6C:02 | \  
mkboot -m -k osloader.disk -f osloader.rfs \  
-c stdin osloader.kdi
```

- In order for networking to operate properly, the exception handling for unaligned data access must be enabled in the FPGA design. The software emulation of floating point operations does not work on MicroBlaze version 5.
- Since the Xilinx EDK does not allow enabling both SPI and Flash support in the FPGA bitstream simultaneously, this release also does not provide simultaneous support for these features. The pregenerated FPGA bitstream for the target board enables Flash support and disables SPI support.

- The MicroBlaze toolchain used in this release does not generate code for calling the C functions declared with the `constructor` and `destructor` attributes.

---

## Removing the VGA and PS/2 IP Cores from the FPGA Bitstream

To remove the VGA and PS/2 IP cores from the FPGA bitstream, perform the following steps:

1. Edit the `BLUECAT_PREFIX/boot/project_sp3e/sp3e.ucf` file and delete the following lines at the end of the file:

```
NET "SP3E_VGA_Red" ...
NET "SP3E_VGA_Green" ...
NET "SP3E_VGA_Blue" ...
NET "SP3E_VGA_HSYNCH_N" ...
NET "SP3E_VGA_VSYNCH_N" ...
NET "ps2_clk" ...
NET "ps2_data" ...
```

2. Start the Xilinx Platform Studio (xps) specifying `BLUECAT_PREFIX/boot/project_sp3e/sp3e.xmp` as the project file.
3. Delete the `fsl_ps2_0`, `opb_color_video_ctrl_0`, and `fsl_v20_1` IP instances and all their ports by right-clicking on these instances, selecting **Delete Instance...**, and pressing **OK**.
4. Regenerate the FPGA bitstream and update the BlueCat-ME Linux kernel source tree as described in “Updating the FPGA Bitstream” on page 14.