

BlueCat Linux Target Support Guide

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for Toshiba Pallas 3912 Boards

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This *BlueCat Linux Target Support Guide (TSG) for Toshiba Pallas 3912 Boards* provides information about the BlueCat Linux Target Support Package (TSP) for Toshiba Pallas 3912 boards supporting Toshiba TMPR3912U, 9817EAI CPUs.

Throughout this Target Support Guide (TSG), the TSP is referred to as the “tx3912” and the board as the “Pallas 3912” or simply as the “target board.”

The chapters of this TSG provide the information listed below:

- **Chapter 1** is an overview of this TSG’s individual chapters.
- **Chapter 2** describes BlueCat Linux download and boot procedures for Pallas 3912 target boards, using the BlueCat Linux `showcase` demo system as an example.
- **Chapter 3** provides information about the configuration of the default BlueCat Linux kernel contained in the tx3912 TSP. It also provides information about kernel reconfiguration parameters and options.
- **Chapter 4** summarizes the BlueCat Linux demo systems supported by the tx3912 TSP.
- **Chapter 5** provides a list of tx3912 TSP-supported device drivers with important information about each of them.

Downloading and Booting BlueCat Linux on the Target

This chapter provides instructions for downloading a BlueCat Linux KDI (Kernel Downloadable Image) from a cross development host into the Pallas 3912 flash memory over a network, and then booting the KDI on the target board. The BlueCat Linux `showcase` demo system is used as an example KDI to demonstrate these procedures.

NOTE: *While this chapter uses the `showcase` demo system to exemplify downloading a BlueCat Linux KDI, any other supported demo system or custom application can be downloaded and booted on a target board using these same procedures.*

Prerequisites

This document is intended as a guide for downloading and booting BlueCat Linux KDIs on Pallas 3912 target boards. Scenarios using the `showcase` demo system are presented.

A basic familiarity with the hardware and operation is required before using this guide. Users must also have an understanding of system administration for the particular cross development host on which BlueCat Linux and the Target Support Package (TSP) are installed.

It is also assumed that users are familiar with 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, the default BlueCat Linux MIPS core configuration and the tx3912 TSP must be installed on the cross development host.

1. Install the BlueCat Linux MIPS core configuration onto the cross development host, as described in the “Installing the Default BlueCat Linux Configuration” section in Chapter 1, “Installation” of the *BlueCat Linux User’s Guide*
2. Install the tx3912 TSP on the cross development host as detailed in the “Installing Support for Target Boards” section in Chapter 1, “Installation” of the *BlueCat Linux User’s Guide*.
3. Activate support for the tx3912 TSP as detailed in the “Activating Support for a Target Board” section of Chapter 1, “Installation” in the *BlueCat Linux User’s Guide*. Run the setup script provided to enable the BlueCat Linux environment:

```
$ . SETUP.sh tx3912
```

Downloading and Booting Overview

NOTE: *This section provides general information about downloading and booting BlueCat Linux KDIs on Pallas 3912 target boards. Read all of it before reading any specific section below, or attempting to download or boot BlueCat Linux on a target board.*

The standard procedure for downloading and booting a BlueCat Linux KDI on a Pallas 3912 target board consists of the following main steps:

- Physically setting up the hardware
- Installing a copy of the Toshiba bootloader into the target board’s flash memory via a serial line
- Downloading a copy of the BlueCat OS loader, `i_osloader`, from the cross development host into the target board RAM via a network (RARP) connection using Toshiba bootloader
- Copying `i_osloader` from the target RAM into its flash memory
- Using `i_osloader` to download a BlueCat Linux KDI (in this document, the `showcase` demo system) from the cross development host into the target flash memory via a network connection

- Using the Toshiba bootloader installed in the target flash memory to boot the BlueCat Linux KDI downloaded into the target flash memory (in this case, the `showcase` demo system)

Hardware Setup

The supported configuration is a cross development host with terminal emulation.

NOTE: The baud rate and parity settings for the serial connection using a terminal emulator (for both the PJ4 and the PJ8 ports) should be set as 38,400 bps, 8 bit - No parity - 1 stop bit, and no hardware flow control.

Figure 2-1 shows the hardware configuration.

This configuration reflects that during the BlueCat Linux download and boot processes, two terminal emulators need to be run simultaneously from the cross development host's user interface—one connected to the target board PJ4 port, and the other to the target board's PJ8 port. Either the COM1 or COM2 ports on the host can be connected to both the PJ4 or the PJ8 serial ports on the target board.

When running a BlueCat Linux session, the PJ4 terminal emulator displays the Toshiba Bootloader (MON>) prompt, while PJ8 displays the BlueCat Linux Loader Shell (BLOSH) (>)prompt.

The PJ3 port on the target board is used to set up a touch screen for the functionalities of the `showcase` demo system. The PJ2 port on the target board serves as the ethernet connector. Power supply connects to the PJ12 port. The power switch is S8. To reset the board, the user must first press the S6, and then the S5 button.

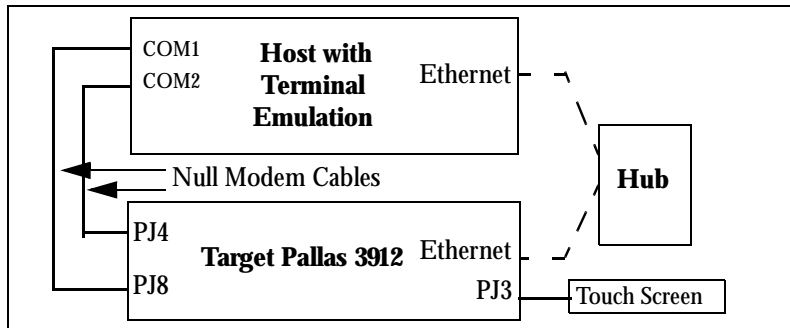


Figure 2-1: Host-Target Configuration

Downloading the Target Board Setup Utility

Definitions

Toshiba Bootloader

The Toshiba bootloader is a utility used to download Linux kernel images from a RARP server into RAM or flash memory. The Toshiba bootloader utility and the instructions for loading it are provided on the “Linux for Toshiba Pallas TX 3912/22” CD-ROM that comes with the Pallas 3912 board.

Downloading Toshiba Bootloader

To download Toshiba bootloader into the target flash memory, perform the following steps:

1. Download Toshiba bootloader into the Pallas 3912 board flash via a serial line using the instructions provided on the “Linux for Toshiba TX 3912/22” CD-ROM.

2. Configure a RARP server. Follow the steps detailed in the `Readme.txt` file located on the Toshiba Pallas 3912/22 CD-ROM.
3. Reset the target board by pressing the S6 button, and then the S5 button on the Pallas 3912 board. As a result, the `MON>` prompt appears on the `PJ4` terminal emulator.

Using i_osloader to Download a Demo System

Using the `showcase` demo system as an example, this section and its subsections provide step-by-step instructions for downloading any supported demo or custom BlueCat Linux system into the target flash memory via a network connection using `i_osloader`.

Definitions

i_osloader

`i_osloader` is a special version of the BlueCat Linux OS loader. It is used to download the desired BlueCat Linux custom or demo system (in this case, the `showcase` demo system) into the target flash memory. To install `i_osloader` into target flash memory, the user must use the Toshiba Monitor `MON>` prompt that appears on the `PJ4` terminal emulator.

`i_osloader` is located in the `$BLUECAT_PREFIX/demo.tx3912/\osloader` directory as a part of the standard BlueCat Linux distribution.

Downloading i_osloader

To download `i_osloader` into the target board, follow the steps below:

NOTE: *For those working from a Linux cross development host, these steps provide general information for many of the available versions of Linux. Some users may need to consult their Linux user documentation to determine any differences.*

1. From the host console, create a `/tftboot` directory under the root directory on the cross development host:

```
BlueCat:# mkdir /tftpboot
```

2. From the host console, copy the `i_osloader.kdi` file from the `$BLUECAT_PREFIX/demo.tx3912/osloader` directory into the `/tftpboot` directory on the cross development host.
3. Configure a TFTP server on the host by changing directory to `/etc` and editing the `inetd.conf` file.

Uncomment the following line:

```
tftp dgram udp wait root /usr/sbin/tcpd \  
in.tftpd /tftpboot
```

4. Set up the cross development host as a RARP server using the following command:

```
# rarp -s target_IP_address target_MAC_address
```

5. Download the `i_osloader.kdi` file from the `/tftpboot` directory on the cross development host into the target board RAM. Enter the following command on the PJ4 terminal emulator:

```
MON> br - i_osloader.kdi
```

The following screen output is displayed on the PJ4 terminal emulator as a result of using a RARP server:

```
Booting...: Using Reverse ARP.  
Ethernet address 00:06:50:00:70:2E  
IP address 216.100.252.199 = D864FCC7  
Booting TFTP server from 216.100.252.129 = D864FC81  
kernel file : i_osloader.kdi ...  
Downloaded 1374208 ( 14f800) bytes at a0080000 from  
TFTP server.  
MON>
```

Note the size of the image downloaded (14f800 in hexadecimal value). This value is used in the following command.

6. From the PJ4 terminal emulator, install the copy of `i_osloader` from the target RAM into the target flash memory by entering the following command:

```
MON> fc image_start_in_RAM \  
address_in_flash size_of_image
```

The variables above must be replaced by hexadecimal values where, for example:

```
- image_start_in_RAM      a0080000
- address_in_flash        be000000
- size_of_image           14f800
```

Using the values above, the following command is derived:

```
MON> fc a0080000 be000000 14f800
```

Upon entering the command above, the following screen output is displayed:

```
Completed.
MON>
```

NOTE: *By default, the Toshiba Linux Bootloader downloads images into the 0xa0080000 address in RAM.*

7. Typing the following command on the PJ4 terminal emulator will uncompress the i_osloader kernel:

```
MON> g address_in_flash
```

where *address_in_flash* is be000000 as explained above.

The following output is displayed on the PJ4 terminal emulator:

```
--- Jump ---
Compressed kernel : A01A71B4-A020D18F
RFS : A1F1A000-A1FFE800
Heap : A02295CC-A02395CC
Command line : root=101
Uncompressing Linux... done.
Now booting the kernel
-----
```

The following output is displayed on the PJ8 terminal emulator before the BLOSH prompt (>) is displayed:

```
Loading R[23]00 MMU routines.
CPU revision is: 00002210
config reg = 00000030
Instruction cache 4kb, linesize 16byte
Data cache 1kb, linesize 4byte
Linux version 2.2.12-1 (bin@build1) (gcc version egcs-
2.91.66 19990314/Linux
(eg
cs-1.1.2 release)) #3 Tue Jan 16 20:35:10 MSK 2001
Toshiba Reference System Setup
```

```
TX3912 75Mhz
tx39_initialize: cflags set to 77
Calibrating delay loop... 73.32 BogoMIPS
Memory: 29736k/32764k available (1048k kernel code,
548k data)
DENTRY hash table entries: 1048576 (order: 11, 8388608
bytes)
Buffer-cache hash table entries: 32768 (order: 5,
131072 bytes)
Page-cache hash table entries: 8192 (order: 3, 32768
bytes)
Checking for 'wait' instruction... unavailable.
POSIX conformance testing by UNIFIX
Linux NET4.0 for Linux 2.2
Based upon Swansea University Computer Society
NET3.039
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
TCP: Hash tables configured (ehash 32768 bhash 32768)
Starting kswapd v 1.5
TX39 UART driver version 0.04
Serial driver version 4.27 with no serial options
enabled
ttyS02 at 0x101303f8 (irq = 0) is a 16550A
tpanel: INITIALIZING INTERRUPTS FOR SIB AND TC35143F
Starting sib_init 2 in sib.c
Finished sib_init 2 in sib.c
tpanel: FINISHED INITIALIZING INTERRUPTS FOR SIB AND
TC35143F
RAM disk driver initialized: 16 RAM disks of 4096K size
smc9194.c:v0.12 03/06/96 by Erik Stahlman
(erik@vt.edu)
SMC9194: SMC91C94(r:1) at 0x10120000 IRQ:2 INTF:TP
MEM:4608b ADDR:
00:06:50:00:7
0:2e
RAMDISK: Compressed image found at block 31848
Flash mapping for Pallas board initialized starting at
address 0xbe000000
number of CFI chips: 1
Pallas Flash MTD driver: Configuration of partitions
is :
Pallas Flash MTD driver: Configured 0 partitions
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 36k freed
BlueCat Loader Shell
>
```

Downloading a Demo System into Target Flash Memory

To download a BlueCat Linux demo system (in this example, the showcase demo system) into the target flash memory, follow the steps below:

NOTE: *These instructions can also be used to load any demo system or custom application by replacing the filename, `showcase.kdi`, with the name of the demo system or custom application.*

1. Create a single partition into which a BlueCat Linux image can be downloaded.

```
> exec flash_fdisk /dev/mtdchar0 0-28
```

NOTE: *The Toshiba Pallas 3912 board has 32 MB of flash memory composed of 128 sectors of 256 KB each. As such, the following command would create a single partition in which a BlueCat Linux image of up to 7.25 MB could be downloaded:*

```
> exec flash_fdisk /dev/mtdchar0 0-28
```

Each demo system varies in size; see Chapter 4, “Demo Systems,” on page 29. Ensure that the sector range values in the line above are set appropriately.

2. From the PJ8 terminal emulator, select the ethernet interface and define the IP address for both the cross development host and target board by entering the following commands:

```
> set IP 216.100.252.144
> set HOST host_IP_address
> set IF eth0
```

Note that the host and target IP addresses above are on the same subnet. The target board's IP address (216.100.252.144) is the default address hardcoded into the `showcase.kdi` file in the tx3912 TSP. This address is used to connect to the Apache server via the user's web browser. If the user wishes to change the address, it is necessary to rebuild `showcase.kdi`.

3. On the host, copy the `showcase.kdi` files from the `$(BLUECAT_PREFIX)/demo.tx3912/showcase` directory into the `/tftpboot` directory so that it can be downloaded from there onto the target board:

4. Enter the following commands on the PJ8 terminal emulator to configure the cross development host for downloading `showcase.kdi` into the target flash memory:

```
> set FILE tftp /tftpboot/showcase.kdi
```

The following screen output validates that the first partition in the range of 0-28 in the target flash memory has been reserved for `showcase.kdi`:

```
Pallas Flash MTD driver: Configuration of partitions
is 0-28
Pallas Flash MTD driver: Configured 1 partitions
```

5. From the PJ8 terminal emulator, enter the following command to erase any data in the flash memory's first partition and burn the `showcase.kdi` image into that partition:

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

The screen output below appears, validating that the target flash memory's first partition has been erased and that `showcase.kdi` has been downloaded to that partition, by listing its file size in number of bytes (in this example, 1942528):

```
Device has 1 regions with sectors of the same size.
Total size of the device is 0x700000 bytes.
Erasing..... done.
getting /tftpboot/showcase.kdi
.....
.....
Received 1942528
>
```

This completes the download of the `showcase` demo system to the target flash memory.

This process can also be used to download a custom BlueCat Linux demo system or application into a target's flash memory.

Boot Options

Booting from Flash Memory

At this point, it is assumed that the `showcase` demo system has been successfully downloaded into the target flash memory. To boot the demo system in the target board's flash memory, follow these steps:

1. From the `PJ8` terminal emulator, enter this command at the `BLOSH (>)` prompt:

```
> reset
```

The screen on the `PJ4` terminal emulator scrolls down, displaying the following output followed by the `MON>` prompt:

```
Toshiba Bootloader for TX RISC Reference Kit Ver 000.10
Copyright (c) 1999, 2000 TOSHIBA Corporation
Pallas TX3912 Rev (ff) CPU Clk 75Mhz, BUS Clk 75Mhz
Slot [0] : MEM Base = 0x80040000, MEM Size = 0x01fc0000
FlashROM BE000000 - BFFFFFFF
smc driver is probed. base address (0xb0120000)
MON>
```

2. From the `PJ4` terminal emulator, go to the beginning of the `showcase` demo image by entering the following command:

```
MON> g be000000
```

This command activates the target to uncompress the kernel and to load the `showcase` demo system.

The following screen output displays on the `PJ4` terminal emulator:

```
Toshiba Bootloader for TX RISC Reference Kit Ver 000.10
Copyright (c) 1999, 2000 TOSHIBA Corporation
Pallas TX3912 Rev (ff) CPU Clk 75Mhz, BUS Clk 75Mhz
Slot [0] : MEM Base = 0x80040000, MEM Size = 0x01fc0000
FlashROM BE000000 - BFFFFFFF
smc driver is probed. base address (0xb0120000)
MON> g be000000
--- Jump ---
Compressed kernel : A01AB1B4-A021521D
RFS                : A1E54000-A1FFE800
Heap               : A023165C-A024165C
Command line       : ramdisk_size=32000 root=101
Uncompressing Linux... done.
Now booting the kernel
```

3. After the showcase demo system has booted up, bring up an internet browser window on any networked machine, and enter the Apache web server address in the Go To field.

This can be done by typing `http://216.100.252.144`. Note that this is the default address for the Apache web server and can be changed by modifying the `.bashrc.mips` file located in the `$BLUECAT_PREFIX/demo/showcase` directory.



Figure 2-2: Pallas 3912 Apache Web Server Page

4. BlueCat Linux support for MicroWindows is also displayed on the MicroWindows touch screen connected to PJ3. The user will first notice scrolling text, and in about 90 seconds, a picture of a mountain. Dragging a stylus over the surface of the screen changes the landscape displayed.

Booting a Demo System over a Network

To boot a demo system or a custom system from a cross development host over a network using `i_osloader`, use the following procedure:

1. Download the Toshiba bootloader and `i_osloader` into the target flash memory, as described in “Downloading Toshiba Bootloader” on page 6 and “Downloading `i_osloader`” on page 7.
2. Boot the BlueCat Linux demo system of choice on the cross development host via a network connection using `i_osloader` as detailed in the “Booting BlueCat Linux over Network or Parallel Port” section in Chapter 3, Booting BlueCat Linux, of the *BlueCat Linux User's Guide*

Kernel Configuration Options

The tx3912 Target Support Packet (TSP) comes with a default BlueCat Linux kernel. This kernel has a number of configuration options. These options are detailed in the tables listed in Table 3-1 below:

Table 3-1: tx3921 TSP Kernel Configuration Options

| Parameters | Table Number and Page |
|-----------------------------|-----------------------|
| Code Maturity Level Options | Table 3-2 on page 18 |
| Machine Selection | Table 3-3 on page 18 |
| CPU Selection | Table 3-4 on page 19 |
| General Setup | Table 3-5 on page 19 |
| Loadable Module Support | Table 3-6 on page 20 |
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| QoS and/or Fair Queuing | Table 3-9 on page 22 |
| SCSI Support | Table 3-10 on page 22 |
| Network Device Support | Table 3-11 on page 22 |
| ARCnet Drivers | Table 3-12 on page 23 |
| Ethernet (10 or 100 Mbit) | Table 3-13 on page 23 |
| Token Ring Devices | Table 3-14 on page 24 |
| WAN Interfaces | Table 3-15 on page 24 |
| ISDN Subsystem | Table 3-16 on page 24 |
| Character Devices | Table 3-17 on page 25 |
| Video for Linux | Table 3-18 on page 25 |

Table 3-1: tx3921 TSP Kernel Configuration Options (Continued)

| Parameters | Table Number and Page |
|--------------------------------------|-----------------------|
| Joystick Support | Table 3-19 on page 25 |
| Ftape, the Floppy Tape Device Driver | Table 3-20 on page 25 |
| Filesystems | Table 3-21 on page 26 |
| Network Filesystems | Table 3-22 on page 26 |
| Partition Types | Table 3-23 on page 27 |
| Sound | Table 3-24 on page 27 |
| Kernel Hacking | Table 3-25 on page 27 |
| LynuxWorks Messenger Support | Table 3-26 on page 28 |
| Modular Advanced Power Management | Table 3-27 on page 28 |

Table 3-2: Code Maturity Level Options

| Option | Value | Description |
|---------------------|-------|---|
| CONFIG_EXPERIMENTAL | Y | Prompt for development and/or incomplete code/drivers |

Table 3-3: Machine Selection

| Option | Value | Description |
|-------------------------|-------|----------------------------------|
| CONFIG_ACER_PICA_61 | N | Support for Acer PICA 1 chipset |
| CONFIG_ALGOR_P4032 | N | Support for Algorithmics P4032 |
| CONFIG_BAGET_MIPS | N | Support for MIPS series |
| CONFIG_DECSTATION | N | Support for DEG station |
| CONFIG_MIPS_MAGNUM_4000 | N | Support for MIPS Magnum 4000 |
| CONFIG_OLIVETTY_M700 | N | Support for Olivetti M7000-10 |
| CONFIG_SGI | N | Support for SGI workstation |
| CONFIG_SNI_RM200_PCI | N | Support SNI RM2000 PCI |
| CONFIG_TSBREF | Y | Support for Toshiba TX reference |

Table 3-3: Machine Selection (Continued)

| Option | Value | Description |
|-------------------------|-------|--------------------------|
| CONFIG_TSBREFUART | Y | CPU UART support |
| CONFIG_DBG_CONSOLE | N | Debug console support |
| CONFIG_TX39UART_CONSOLE | Y | TX39 CPU UART console |
| CONFIG_TSBREF_TC35143F | N | TXanalog devices support |

Table 3-4: CPU Selection

| Option | Value | Description |
|------------------|-------|----------------------|
| CONFIG_CPU_R3000 | Y | R3000 compatible CPU |

Table 3-5: General Setup

| Option | Value | Description |
|--------------------------------|-------|---|
| CONFIG_CPU_LITTLE_ENDIAN | Y | Generate little endian code |
| CONFIG_BLUECAT_LOADER | N | BlueCat Linux OS loader support |
| CONFIG_BLUECAT_IGNORE_PRINTK | N | BlueCat Linux ignore printk |
| CONFIG_BLUECAT_SMALL_FOOTPRINT | N | BlueCat Linux small memory footprint |
| CONFIG_BLUECAT_MEMSIZE | N | Memory usage statistics |
| CONFIG_BINFMT_MISC | N | Kernel support for MISC binaries |
| CONFIG_BINFMT_JAVA | N | Kernel support for JAVA binaries (Obsolete) |
| CONFIG_NET | Y | Networking support |
| CONFIG_SYSVIPC | Y | System V IPC |
| CONFIG_BSD_PROCESS_ACCT | N | BSD Process Accounting |
| CONFIG_SYSCTL | Y | Sysctl support |
| CONFIG_PARPORT | N | Parallel port support |

Table 3-6: Loadable Module Support

| Option | Value | Description |
|--------------------|-------|--|
| CONFIG_MODULES | Y | Enable loadable module support |
| CONFIG_MODVERSIONS | Y | Set version information on all symbols for modules |
| CONFIG_KMOD | Y | Kernel module loader support |
| CONFIG_FB | N | Support for frame buffer devices (Experimental) |

Table 3-7: Block Devices

| Option | Value | Description |
|----------------------------------|-------|--|
| CONFIG_BLK_DEV_FD | N | Normal PC floppy disk support |
| CONFIG_BLK_DEV_IDE | N | Enhanced IDE/MFM/RLL disk/ CD-ROM/tape/floppy support |
| CONFIG_BLK_DEV_HD_ONLY | N | Old hard disk (MFM/RLL/IDE) driver |
| CONFIG_BLK_DEV_LOOP | N | Loopback device support |
| CONFIG_BLK_DEV_NBD | N | Network block device support |
| CONFIG_BLK_DEV_MD | N | Multiple device driver support |
| CONFIG_BLK_DEV_RAM | Y | RAM disk support |
| CONFIG_BLK_DEV_INITRD | N | Initial RAM disk (<i>initrd</i>) support |
| CONFIG_BLUECAT_RFS | Y | BlueCat Linux RFS support |
| CONFIG_BLK_DEV_GENERIC_FLASH_DOC | N | M-Systems DiskOnChip |
| CONFIG_BLK_DEV_XD | N | XT hard disk support |
| CONFIG_PARIDE_PARPORT | N | Parallel port IDE device support |
| CONFIG_BLK_CPQ_DA | N | Compaq SMART2 support |

Table 3-8: Networking Options

| Option | Value | Description |
|---------------------------|-------|---|
| CONFIG_PACKET | Y | Packet socket |
| CONFIG_NETLINK | Y | Kernel/User netlink socket |
| CONFIG_RTNETLINK | Y | Routing messages |
| CONFIG_NETLINK_DEV | Y | Netlink device emulation |
| CONFIG_FIREWALL | N | Network firewalls |
| CONFIG_FILTER | Y | Socket filtering |
| CONFIG_UNIX | Y | UNIX domain sockets |
| CONFIG_INET | Y | TCP/IP networking |
| CONFIG_IP_MULTICAST | Y | IP: Multicasting |
| CONFIG_IP_ADVANCED_ROUTER | N | IP: Advanced router |
| CONFIG_IP_PNP | N | IP: Kernel level autoconfiguration |
| CONFIG_IP_ROUTER | N | IP: Optimize as router not host |
| CONFIG_NET_IPIP | N | IP: Tunneling |
| CONFIG_NET_IPGRE | N | IP: GRE tunnels over IP |
| CONFIG_IP_MROUTE | N | IP: Multicast routing |
| CONFIG_IP_ALIAS | N | IP: Aliasing support |
| CONFIG_ARPD | N | IP: ARP daemon support (Experimental) |
| CONFIG_SYN_COOKIES | N | IP: TCP syncookie support (Not enabled per default) |
| CONFIG_INET_RARP | N | IP: Reverse ARP |
| CONFIG_SKB_LARGE | N | IP: Allow large windows (not recommended if <16 MB of memory) |
| CONFIG_IPV6 | N | The IPv6 protocol (Experimental) |
| CONFIG_IPX | N | The IPX protocol |
| CONFIG_ATALK | N | Appletalk DDP |
| CONFIG_X25 | N | CCITT X.25 Packet Laser (Experimental) |

Table 3-8: Networking Options (Continued)

| Option | Value | Description |
|---------------------------|-------|---|
| CONFIG_LAPB | N | LAPB Data Link Driver (exp) |
| CONFIG_BRIDGE | N | Bridging (Experimental) |
| CONFIG_LLC | N | 802.2 LLC (Experimental) |
| CONFIG_ECONET | N | Acorn Econet/AUN protocols (Experimental) |
| CONFIG_WAN_ROUTER | N | WAN router |
| CONFIG_NET_FASTROUTE | N | Fast switching (Real help!) |
| CONFIG_NET_HW_FLOWCONTROL | N | Forwarding between high speed interfaces |
| CONFIG_CPU_IS_SLOW | N | CPU is too slow to handle full bandwidth |

Table 3-9: QoS and/or Fair Queueing

| Option | Value | Description |
|------------------|-------|--------------------------|
| CONFIG_NET_SCHED | N | QoS and/or fair queueing |

Table 3-10: SCSI Support

| Option | Value | Description |
|-------------|-------|--------------|
| CONFIG_SCSI | N | SCSI support |

Table 3-11: Network Device Support

| Option | Value | Description |
|-------------------|-------|--|
| CONFIG_NETDEVICES | Y | Network device support |
| CONFIG_DUMMY | N | Dummy net driver support |
| CONFIG_EQUALIZER | N | EQL (serial line load balancing) support |
| CONFIG_ETHERTAP | N | Ethertap network tap |
| CONFIG_NET_SB1000 | N | General Instruments Surfboard 1000 |

Table 3-11: Network Device Support (Continued)

| Option | Value | Description |
|------------------|-------|--|
| CONFIG_FDDI | N | FDDI driver support |
| CONFIG_HIPPI | N | High Performance Parallel Interface support (Experimental) |
| CONFIG_PPP | N | PPP (point-to-point) support |
| CONGIG_SLIP | N | SLIP (serial line) support |
| CONFIG_NET_RADIO | N | Wireless LAN (non-ham radio) |
| CONFIG_NET_FC | N | Fibre Channel driver support |
| CONFIG_REPCI | N | Red Creek Hardware VPN (Experimental) |
| CONFIG_SHAPER | N | Traffic Shaper (Experimental) |
| CONFIG_SBNI | N | SBNI12 Shaper support |

Table 3-12: ARCnet Drivers

| Option | Value | Description |
|---------------|-------|----------------|
| CONFIG_ARCNET | N | ARCnet support |

Table 3-13: Ethernet (10 or 100 Mbit)

| Option | Value | Description |
|------------------------|-------|---|
| CONFIG_NET_ETHERNET | Y | Ethernet (10 or 100 Mbit) |
| CONFIG_NET_VENDOR_3COM | N | 3COM cards |
| CONFIG_LANCE | N | AMD LANCE and PCnet(AT 1500 and NE2100) support |
| CONFIG_NET_VENDOR_SMC | Y | Western Digital/SMC cards |
| CONFIG_WD80X3 | N | WD80x3 support |
| CONFIG_ULTRA | N | SMC Ultra support |
| CONFIG_ULTRA32 | N | SMC Ultra32 support |
| CONFIG_SMC9194 | Y | SMC 9194 support |

Table 3-13: Ethernet (10 or 100 Mbit) (Continued)

| Option | Value | Description |
|-------------------------|-------|--|
| CONFIG_NET_VENDOR_RACAL | N | Racal-Interlan (micom) NI cards |
| CONFIG_RTL8139 | N | RealTek 8129/8139 (not 8019/8029!) support |
| CONFIG_SIS900 | N | Sis 900 PCI Fast Ethernet Adapter support |
| CONFIG_YELLOWFIN | N | Packet Engines Yellowfin Gigabit-NIC support |
| CONFIG_NET_ISA | N | Other ISA cards |
| CONFIG_NET_EISA | N | EISA, VLB, PCI and on-board controllers |
| CONFIG_NET_POCKET | N | Pocket and portable adaptors |

Table 3-14: Token Ring Devices

| Option | Value | Description |
|-----------|-------|---------------------------|
| CONFIG_TR | N | Token Ring driver support |

Table 3-15: WAN Interfaces

| Option | Value | Description |
|----------------------|-------|-------------------------------------|
| CONFIG_HOSTESS_SV11 | N | Control Hostess SV-11 support |
| CONFIG_COSA | N | COSA/SRP sync serial boards support |
| CONFIG_SEALEVEL_4021 | N | Sealevel Systems 4021 support |
| CONFIG_DLCI | N | Frame relay DLCI support |

Table 3-16: ISDN Subsystem

| Option | Value | Description |
|-------------|-------|--------------|
| CONFIG_ISDN | N | ISDN support |

Table 3-17: Character Devices

| Option | Value | Description |
|---------------------------|-------|---|
| CONFIG_VT | N | Virtual terminal |
| CONFIG_SERIAL | Y | Standard/generic (dumb) serial support |
| CONFIG_SERIAL_CONSOLE | Y | Support for console on serial port |
| CONFIG_SERIAL_EXTENDED | N | Extended dumb serial driver options |
| CONFIG_SERIAL_NONSTANDARD | N | Non-standard serial port support |
| CONFIG_UNIX98_PTYS | N | UNIX98 PTY support |
| CONFIG_MOUSE | N | Mouse support (not serial mice) |
| CONFIG_QIC02_TAPE | N | QIC-02 tape support |
| CONFIG_WATCHDOG | N | Watchdog Timer support |
| CONFIG_NVRAM | N | /dev/nvram support |
| CONFIG_RTC | N | Enhanced Real Time Clock Support |
| CONFIG_DTLK | N | Double Talk PC internal speech card support |

Table 3-18: Video for Linux

| Option | Value | Description |
|------------------|-------|-----------------|
| CONFIG_VIDEO_DEV | N | Video for Linux |

Table 3-19: Joystick Support

| Option | Value | Description |
|-----------------|-------|------------------|
| CONFIG_JOYSTICK | N | Joystick support |

Table 3-20: Ftape, the Floppy Tape Device Driver

| Option | Value | Description |
|--------------|-------|-------------------------------|
| CONFIG_FTAPE | N | Ftape (QIC-80/Travan) support |

Table 3-21: Filesystems

| Option | Value | Description |
|--------------------|-------|---|
| CONFIG_QUOTA | N | Quota support |
| CONFIG_AUTOFS_FS | N | Kernel automounter support |
| CONFIG_ADFS_FS | N | ADFS filesystem support (Read-only) (Experimental) |
| CONFIG_AFFS_FS | N | Amiga FFS filesystem support |
| CONFIG_HFS_FS | N | Apple Macintosh filesystem support (Experimental) |
| CONFIG_FAT_FS | N | DOS FAT filesystem support |
| CONFIG_ISO9660_FS | N | ISO 9660 CD-ROM filesystem support |
| CONFIG_MINIX_FS | Y | Minix filesystem support |
| CONFIG_NTFS_FS | N | NTFS filesystem support (Read-only) |
| CONFIG_HPFS_FS | N | OS/2 HPFS filesystem support (Read-only) |
| CONFIG_PROC_FS | Y | /proc filesystem support |
| CONFIG_QNX4FS_FS | N | QNX filesystem support (Experimental) |
| CONFIG_ROMFS_FS | N | ROM filesystem support |
| CONFIG_EXT2_FS | Y | Second extended filesystem support |
| CONFIG_SYSV_FS | N | System V and Coherent filesystem support |
| CONFIG_UFS_FS | N | UFS filesystem support |
| CONFIG_BLUECAT_FFS | N | BlueCat Linux Flash File System support |
| CONFIG_EFS_FS | N | SGI EFS filesystem support (Read-only) (Experimental) |

Table 3-22: Network Filesystems

| Option | Value | Description |
|----------------|-------|---|
| CONFIG_CODA_FS | N | Coda filesystem support (advanced network filesystem) |
| CONFIG_NFS_FS | N | NFS filesystem support |
| CONFIG_NFSD | N | NFS server support |

Table 3-22: Network Filesystems (Continued)

| Option | Value | Description |
|---------------|-------|--|
| CONFIG_SMB_FS | N | SMB file system support (to mount WfWshares, etc.) |
| CONFIG_NCP_FS | N | NCP filesystem support (to mount NetWare volumes) |

Table 3-23: Partition Types

| Option | Value | Description |
|------------------------------|-------|--|
| CONFIG_BSD_DISKLABEL | N | BSD disklabel (BSD partition tables) support |
| CONFIG_MAC_PARTITION | N | Macintosh partition map support |
| CONFIG_SMD_DISKLABEL | N | SMD disklabel (Sun partition tables) support |
| CONFIG_SOLARIS_X86_PARTITION | N | Solaris (x86) partition table support |
| CONFIG_UNIXWARE_DISKLABEL | N | Unixware slices support (Experimental) |

Table 3-24: Sound

| Option | Value | Description |
|--------------|-------|--------------------|
| CONFIG_SOUND | N | Sound card support |

Table 3-25: Kernel Hacking

| Option | Value | Description |
|------------------------|-------|-----------------------------------|
| CONFIG_CROSSCOMPILE | Y | Is a crosscompiler being used |
| CONFIG_MIPS_FPE_MODULE | N | Build fp exception handler module |
| CONFIG_REMOTE_DEBUG | N | Remote GDB kernel debugging |
| CONFIG_MAGIC_SYSRQ | N | Magic System Request Key support |
| CONFIG_BLUECAT_KDBG | N | BlueCat Linux kdbg support |

Table 3-26: LynuxWorks Messenger Support

| Option | Value | Description |
|-----------------------|-------|----------------------------------|
| CONFIG_BLUECAT_IOPMAN | N | Enable Lynux IOP Manager support |
| CONFIG_BLUECAT_MSNG | N | Messenger support |

Table 3-27: Modular Advanced Power Management

| Option | Value | Description |
|--------------------|-------|---------------------------|
| CONFIG_BLUECAT_APM | N | BlueCat Linux APM support |

This chapter provides information all Blue Cat Linux demo systems supported by the tx3912 Target Support Package (TSP).

Supported Demo Systems

The following table lists the demo systems supported in the tx3912 TSP standard distribution, boot devices supported by each demo system, and their RAM and ROM requirements:

Table 4-1: Demo Systems Supported by the tx3912 TSP

| Demo | Default Boot Devices Supported | ROM Requirements | RAM Requirements |
|-----------|--|------------------|------------------|
| developer | Flash Network using the OS loader | 2761 KB | 10760 KB |
| osloader | Flash Network using the OS loader | 1399 KB | 8710 KB |
| showcase | Flash Network using the OS loader | 1900 KB | 9278 KB |

developer Demo System

The `developer` demo system includes functionality of the `shell`, `ftp`, `ping`, and `gdb` demo systems. Refer to Chapter 4 of the *BlueCat Linux User's Guide* for a description of `developer` and its constituent demo systems.

osloader Demo System

`osloader` is the BlueCat Linux OS loader used to boot a BlueCat Linux embedded system on the target board. Refer to Chapter 4 of the *BlueCat Linux User's Guide* for details.

showcase Demo System

This section provides information on the `showcase` demo system. The `showcase` demo system consists of MicroWindows support, and configures an Apache web server on the target board. A generic description can be found in Chapter 4 of the *BlueCat Linux User's Guide*. Board-specific features are described below.

DEMO

Configures an Apache web server
Simple MicroWindows demonstration

SYNOPSIS

This demo system starts and configures the Apache HTTP daemon turning the target board into a Web server. At the same time, a simple MicroWindows application is started.

REQUIREMENTS

| | |
|---------------|---|
| Storage | Medium |
| RAM | Medium |
| Network | Yes |
| Disk | None |
| Kernel Option | The choice of <i>kernel options</i> for this demo system depends on the root filesystem used: |

- If the root filesystem is an FFS image programmed into target flash memory, then the following two kernel options must be specified:

```
pallas_part_conf="\4-35\" root=1f01
```

- If the root filesystem is an RFS image, then the `ramdisk_size=32768` option must be specified.

DESCRIPTION

The system boots up in single-user mode. `init` starts `bash` without a login prompt. `bash` automatically executes the `./bashrc` script file, which contains commands to bring up the network interface and set up the kernel routing table.

The network configuration is displayed on the LCD display. `./bashrc` starts the `httpd` daemon and a MicroWindows demo application.

The MicroWindows application opens a window with a picture on the screen. Pressing the touch panel on the picture flips the picture to a different screen.

After the demo is booted the Apache server is accessible from any networked machine using the IP address displayed on the LCD panel during the boot process.

This demo system provides automatic network configuration using values specified at build time. The only interaction available to the user is via the touch panel, the console on LCD, and the Apache server.

The prebuilt network configuration is as follows:

Table 4-2: Prebuilt Network Configuration

| | |
|-------------------|-----------------|
| Target IP address | 216.100.252.144 |
| No default route | none |

To change these values, modify the `./bashrc.mips` file in the `$BLUECAT_PREFIX/demo/showcase/local/etc` directory and rebuild the root filesystem image.

The top lines of the `./bashrc.mips` file read as follows:

```
# This is a bash profile
#
TARGET_IP=216.100.252.144
GATE_IP=
```

The only modifications needed are in the values of the `TARGET_IP` and `GATE_IP` variables, which should correspond to the desired target and default gateway IP addresses respectively. If the value of `GATE_IP` is left empty, then no default route will be added. The root filesystem images are rebuilt by the following sequence of commands, which must be issued while in the `$BLUECAT_PREFIX/demo/showcase` directory.

```
BlueCat:$ touch showcase.spec

BlueCat:$ make rootfs

BlueCat:$ make kdi
```

This demo system can be installed into target flash memory either as a BlueCat Linux image composed of a kernel image and a compressed root filesystem image, or as two images: a BlueCat Linux image containing only a kernel image and an FFS root filesystem image. In the latter case, the FFS image will be mounted as a root filesystem.

To install this demo system into flash memory as a BlueCat Linux image composed of a kernel image and a compressed root file system image using the OS loader, use the following procedure:

1. Boot `i_osloader` on the target.
2. Create a single partition located at the beginning of flash memory, for instance, as in the following example:

```
> exec flash_fdisk /dev/mtdchar0 0-28
```

This command creates a partition of size 7.25 MB at the beginning of flash memory; see the “Flash Partitioning” section of Chapter 7, Flash Support and FFS Architecture of the *BlueCat Linux User’s Guide* for further information.

3. Set the environment variables to properly configure the network access, as in the following example:

```
> set IP 172.17.3.5
> set HOST 172.17.0.1
> set IF eth0
```

4. Set the `FILE` environment variable so that it points to the `showcase` BlueCat Linux image, as in the following example:

```
> set FILE tftp /tftpboot/showcase.kdi
```

5. Burn the image into flash memory, by entering the following command:

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

6. Reset the target, by entering the following command:

```
> reset
```

To install this demo system into flash memory with the FFS image mounted as a root file system using the OS loader, follow these steps:

1. Run the setup utility to enable the BlueCat Linux environment:

```
# . SETUP.sh tx3912
```

2. Rebuild the `showcase` BlueCat Linux image so that it does not include a compressed root file system image. Also, the kernel command line in the BlueCat Linux image must include the `pallas_part_conf` and `root` options. The flash partition configuration string must be in accordance with the argument supplied to `flash_fdisk` below.

The following command issued in the `demo/showcase` directory rebuilds the BlueCat Linux image and sets the appropriate kernel command line:

```
BlueCat:$ echo "pallas_part_conf=\\
"4-35\\" root=1f01"| mkboot -m -k \
showcase.kernel -c stdin showcase.kdi
```

3. Copy the `showcase.jffs` and `showcase.kdi` files to the `/tftpboot` directory on the host system.
4. Boot `i_osloader` on the target.

5. Partition flash memory. Create two partitions, one for the kernel image and the other for the root filesystem image. For instance:

```
> exec flash_fdisk /dev/mtdchar0 0-3:4-35
```

This command creates the first partition of 1 MB in size for the kernel at the beginning of flash memory, and right after the first partition, the second partition of 8 MB for the root filesystem image.

6. Set the environment variables to properly configure the network access, for example, as follows:

```
> set IP 172.17.3.5
```

```
> set HOST 172.17.0.1
```

```
> set IF eth0
```

7. Set the FILE environment variable so that it points to the `showcase` root filesystem FFS image, as in the following example:

```
> set FILE tftp /tftpboot/showcase.jffs
```

8. Burn the FFS image into flash memory by entering the following command:

```
> flash /dev/mtdchar2 erase
```

9. Set the FILE environment variable so that it points to the `showcase` BlueCat Linux image, as in the following example:

```
> set FILE tftp /tftpboot/showcase.kdi
```

10. Burn the BlueCat Linux image to flash memory by entering the following command:

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

11. Reset the target by entering the following command:

```
> reset
```

NOTE: *Mounting the showcase FFS image as a root filesystem takes about 100 seconds during the kernel bootstrap process.*

Supported Device Drivers

This chapter provides information about device drivers supported for use with the tx3912 Target Support Package (TSP) for the Pallas 3912 board.

Table 5-1 shows the device drivers supported by the tx3912 TSP for the Pallas 3912 board:

Table 5-1: Device Drivers Supported by the tx3912 TSP

| Hardware Device | Device Drivers | Location in Source Tree | Kernel Configuration Options | Notes |
|--|-----------------------|----------------------------|---|--|
| NOR Flash 32 MB on board | 28F016S.c pallas.c | drivers/mtd drivers/mtd | CONFIG_MODULES CONFIG_BLUECAT_FFS CONFIG_MTD_CFI CONFIG_MTD_28F016S CONFIG_MTD_PALLAS | Supported via BlueCat Linux FFS and Flash Management |
| Serial Port UART on main board | tx39uart.c | drivers/char | CONFIG_TSBREFUART | |
| Keyboard PS/2 interface on board | pc_keyb.c | drivers/char | CONFIG_VT | |
| Touch Screen On board | tpanel.c | arch/mips/tsbref | | |
| Audio On board | afc_sound.c | drivers/sound/tsbref | CONFIG_TSBREF_TC35143F CONFIG_SOUND_TSBREF | |
| Ethernet SMC91C94 on board | smc9194.c | drivers/net | CONFIG_NET CONFIG_NETDEVICES CONFIG_NET_ETHERNET CONFIG_NET_VENDOR_SMC CONFIG_SMC9194 | |

Table 5-1: Device Drivers Supported by the tx3912 TSP (Continued)

| Hardware Device | Device Drivers | Location in Source Tree | Kernel Configuration Options | Notes |
|------------------------------------|----------------|-------------------------|--|-------|
| APM Power module on chip | apm.c | arch/mips | CONFIG_BLUECAT_APM CONFIG_BLUECAT_APM_MIPS_CPU | |
| LCD LCD on chip | tx3912video.c | drivers/video | CONFIG_VT CONFIG_FB CONFIG_FB_TX3912VIDEO CONFIG_FBCON_ADVANCED CONFIG_FBCON_CFB8 CONFIG_FBCON FONTS CONFIG_FONT_8x8 CONFIG_FONT_8x16 | |