MIPS

Malta™ Developer's Kit - Getting Started with Windows® CE .NET

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Contents

1 Overview

This document describes how to get started with Microsoft® Windows® Embedded CE version 6.0 operating system on the MIPS Malta™ development platform.

1.1 How to Get Started

New users of the Malta development platform are recommended to read and follow the guidelines in the document, "Malta Developers Kit Getting Started" (MD00051), delivered along with the Malta board, to understand the basic Malta hardware in operation and then continue with the guidelines in this document to proceed with setting up a Windows Embedded CE development environment on Malta.

1.2 Target Hardware

The basic Malta hardware, as delivered, consists of the Malta motherboard and its daughter board, carrying a suitable CPU (MIPS32-4Kc/4KEc/4KSc/24Kc/24Kf or MIPS64-5Kc/5Kf/20Kc/25Kf) and System Controller (Galileo GT64120, MIPS Bonito64, or MIPS SOCit™). The daughter board must be equipped with a minimum 32 MB PC100 SDRAM (64 MB is recommended).

In addition to the basic Malta hardware, you will need:

- Suitable standard ATX cabinet with power supply. For a power supply with standby capabilities, a minimum current of 720 mA is required (1A/1.5A peak recommended) for the 5V standby voltage.

- Windows Embedded CE compatible Video PCI card (the MIPS Malta BSP defaults to the ATI RageXL)

- Optional Windows Embedded CE compatible Audio PCI card (the MIPS Malta BSP defaults to the Ensoniq ES1371 PDD)

- Optional NE2000 compatible Ethernet PCI card, when booting Windows Embedded CE stand alone applications. (Nno KITL/VMINI transport)

- PS/2 Keyboard and Mouse

- VGA monitor

- Ethernet cables

- Parallel port cable for downloading Windows Embedded CE 6.0 boot loader

1.3 Host Development PC Requirements

Please see details on the Microsoft product, Windows Embedded CE 6.0, for the current list of requirements for the host PC. Recent requirements included:

- 600 MHz Pentium (1 GHz recommended) processor

- 192 MB RAM (256 MB recommended)

- Without MSDN, an aggragate of 3 GB, 3.8 or 4.8 GB with an MSDN installation

- CD-ROM or DVD-ROM drive is not required

- Graphics display of 800x600 at 256 colors; 1024x768 16-bit color recommended

- Microsoft Mouse or compatible pointing device

1.4 Required Software Tools

To start Windows Embedded CE development on Malta, you will need following software:

- Microsoft Windows Embedded CE version 6.0. This tool package contains Platform Builder 6.0, all the binary Windows Embedded CE 6.0 OS kernels and system libraries, and the Microsoft® Visual C++® 2005.

NOTE: To get more information and to submit an order for the package, you may go to Microsoft's website to Products and Related Technologies, to Develop Tools, to Windows Embedded.

- MIPS Malta Development Platform BSP (release 06.00.00 or higher) for the Windows Embedded CE 6.0 operating system

NOTE: Please send an email request to "support@mips.com" with subject "Request for MIPS Malta Windows Embedded CE 6.0 BSP".

- A terminal emulation program for communicating with the Target Malta board via its Debug Serial port. We do not recommend using HyperTerm, as it can be confusing when used in this system to determine the order of lines displayed from the target. Alternatives include Tera Term, which is a free terminal emulator (see The Tera Term Home Page) and Procomm Plus32, which can be purchased from Datastorm Technologies.

2 Target Hardware Setup

The diagram in Figure 1 shows the layout of the Malta board.

Figure 1 Location of Essential Features of Malta Board
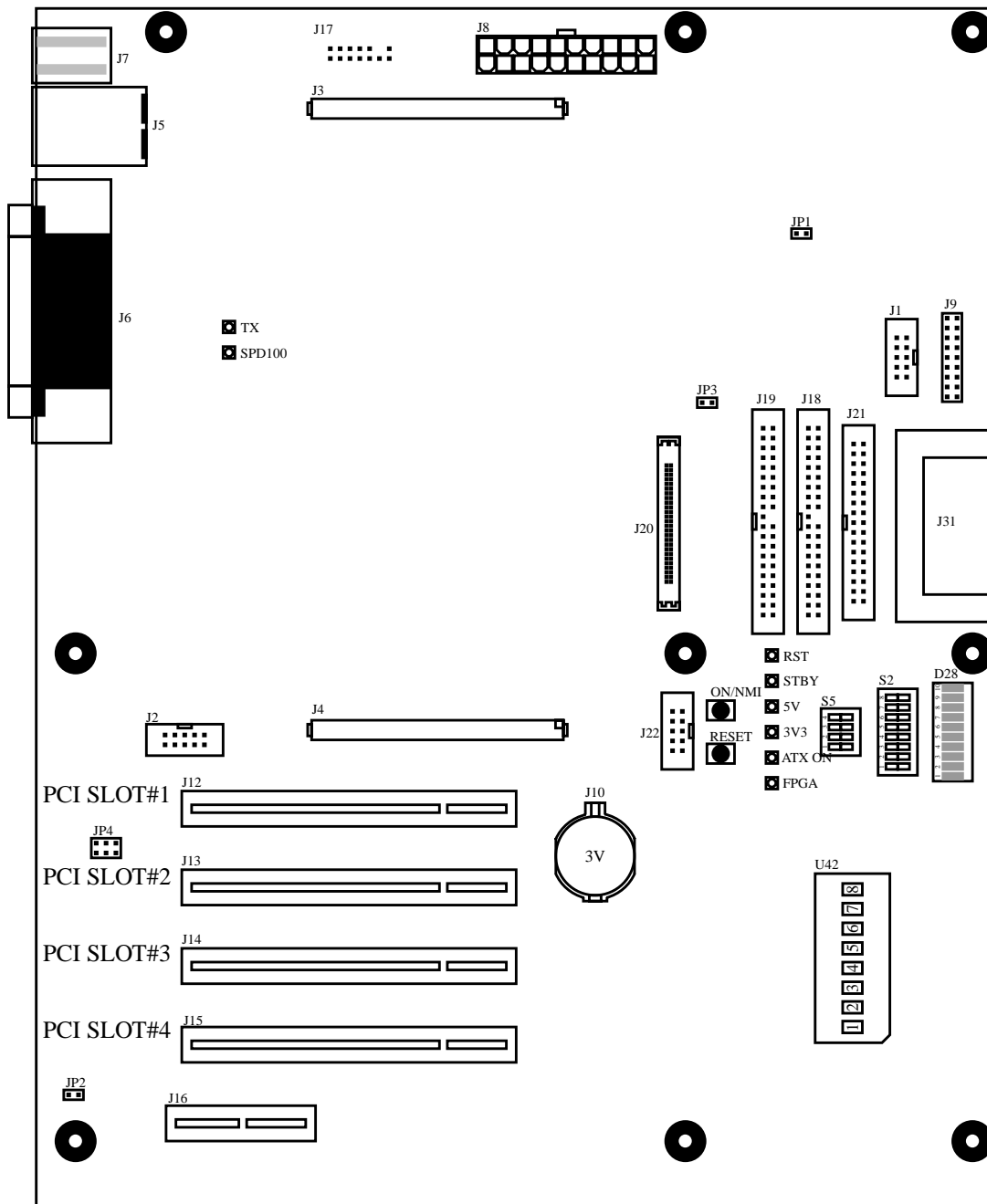
For Windows Embedded CE on Malta, following locations are important to notice:

- 'JP4' (left side): jumpers to control the PCI clock frequency

- 'S5-0' (right side): dip switch "PROG" controls programming of on-board flash via the parallel port

- 'S5-1' (right side): dip switch "BIGEND" controls endianness and must be set 'OFF' = 'little endian', as the Windows Embedded CE operating system is available (compiled) for 'little endian' only

- 'J12'-'J15': PCI slots 1-4

2.1 Jumper Settings

By default, no jumpers are fitted on the Malta board.

NOTE: When using a Malta daughter board with a core bus speed slower than the default PCI-clock of 33 MHz, the PCI-clock speed must be adjusted via jumper block JP4 to be the same or slower than the core bus speed. See "Malta User's Manual" (MD00048) Table 23 "Jumpers" for a list of available PCI-clock speeds and jumper combinations.

2.2 DIP Switch Settings

The dip switch, S5-1 BIGEND, must be set to OFF to set endianness = little. (The Windows Embedded CE operating system is always compiled for little endianness.)

2.3 Installing PCI Cards

PCI cards may be installed in any slot on the Target Malta board, but some slots share interrupt lines with other devices on the PCI bus. PCI card placement may affect interrupt priority and latency.

PCI devices map to the following interrupts:

- PCI slot 1 maps to PCI INTA which is steered to IRQ5 on the PIIX4E South Bridge Interrupt Controller

- PCI slot 2 and the on-board AMD Ethernet Controller (AM79C973) map to PCI INTB which is steered to IRQ10 on the PIIX4E South Bridge Interrupt Controller

- PCI slot 3 and the on-board Crystal Audio Controller (CS4281) map to PCI INTC which is steered to IRQ11 on the PIIX4E South Bridge Interrupt Controller

- PCI slot 4 and the on-board PIIX4E USB Host Controller map to PCI INTD which is steered to IRQ9 on the PIIX4E South Bridge Interrupt Controller

2.3.1 Network Cards

When using the Malta board with Platform Builder, the Malta on-board Ethernet Controller is supported by the shared Ethernet driver of the MIPS Malta BSP, providing download and debug network traffic and application network traffic as well. However, the shared Ethernet driver cannot be used for stand alone Windows Embedded CE applications, when booting Windows Embedded CE images in non-debug mode. Therefore, to obtain network access

for stand alone applications, an NE2000-compatible PCI Ethernet Controller may be installed in an available PCI slot. See the Windows Embedded CE documentation for a list of supported PCI Ethernet Controllers.

3   Host Development PC Setup

3.1 Installing the Windows Embedded CE Tools

Windows Embedded CE 6.0 is delivered in conjuction with Microsoft Visual Studio 2005. To install, you will first install the Microsoft Visual Studio Suite, and then install Windows Embedded CE 6.0. Follow the installation instructions for Microsoft Visual Studio 2005 first, which will lead you through two discs.

During installation configuration of Windows Embedded CE 6.0 , you will be asked to select which CPUs will be supported. Please select all of the following:

- MIPSII

- MIPSII_FP

- MIPSIV

- MIPSIV_FP

3.2 Installing the MIPS Malta BSP

You can download the MIPS Malta BSP from the MIPS Technologies web site: http://www.mips.com/products/soft-waretools/system_software/Windows_CE_BSP.php.

The download includes:

- This document (MD00141 – Malta™ Developer's Kit – Getting Started with Windows Embedded Embedded CE 6.0)

- Release Notes, in `readme.txt`

- Microsoft Installation package

The MIPS Malta BSP source, a Platform Builder CEC description file, and a readme.txt file detailing use of the BSP with the Malta development board, are located in the Microsoft Installation package.

Double-click on the MSI file to begin installing the MIPS Malta BSP and follow the Package Wizard instructions to complete the installation.

3.3 Verify the Windows Embedded CE Tool Installation

Now everything should be installed on the Host Development PC and the Windows Embedded CE development environment for MIPS Malta BSP should be ready. The installation should be verified by building a Windows

Embedded CE sample image. The following example describes how to build a sample image with the ready to use sample platform, "Internet Appliance", and built for a "MIPSII" kernel, which is compliant with all supported MIPS CPU cards on Malta.

Lauch Start-> All Programs-> Microsoft Visual Studio 2005-> Microsoft Visual Studio 2005, and execute the following steps:

1. Enter File -> New-> Project

2. Select "Platform Builder for CE 6.0" in the left pane, and "OS Design" in the right. Enter a name for your new design, and press OK.

3. Press Next.

4. Select "MIPS Malta: MIPSII", and press Next.

5. Select Industrial Device and press Next.

6. Select Internet Appliance and press Next.

7. Press Finish,

8. The pop-up "Catalog Item Notification" is a standard Microsoft security warning; press Acknowledge.

9. Select "Build Solution" from the Build pull-down menu to build the Windows Embedded CE sample image and await build completion. For those with prior experience with Microsoft CE products, avoid the "Advanced Build Commands" -> "Build and Sysgen" option; it rebuilds code for which libraries are shipped that you do not need to rebuild.

Verify that the image builds to completion with no errors.

You can change build options by selecting the Project -> Properties pull-down. In the pop-up window, select Configuration Properties -> Build Options. For example, if you are doing a release build, you may still want to enable the Debugger.

NOTE: For Step 9, a potential risk exists, especially when building big images like debug images, to get build errors like "Error: Too much data space used by DLLs in MODULES section....". The reason is that more static memory than the default (min. 32 MB device) is required and must be assigned by setting a predefined environment variable "IMGRAM64" to "1" (min. 64 MB device). This Build Option can be found on the same pop-up window as described in the previous paragraph – it is labeled "Run-time image can be larger than 32 MB (IMGRAM64=1)".

Once you have done a build, you can modify the build options, or the BSP code, and need not recompile the entire Windows Embedded CE space. You can rebuild just the BSP by going into the Solution Explorer, expand your solution name, and the top of the Windows Embedded CE tree, expand PLATFORM, and you will see "MIPS_MALTA". If you right-click on MIPS_MALTA, you can do a build (or re-build) just from there, for a great savings of time. Note this will not work if you have not already completed a build, or if you have changed anything outside the scope of the BSP.

4 Target Software Setup

4.1 Installing the Windows Embedded CE Boot loader

After the MIPS Malta BSP has been installed into Platform Builder, The Windows Embedded CE boot loader binary files and a readme.txt file detailing the installation of the boot loader, is located in the following directory:

```
%_WINCEROOT%\PLATFORM\MIPS_MALTA\bin
```

This directory contains the boot loader images for the Target Malta board in Motorola S-record format, Yamon BIN format and MIPS Malta 1284 Flash Download format. There are two types of BOOT images delivered with the MIPS Malta BSP. One supports at least 32 MB of RAM, and the other supports at least 64 MB of RAM. Please choose the appropriate image for your application.

The MIPS Malta boot loader for Windows Embedded CE 6.0 is not backwards-compatible with OS images built on an older version of Windows CE.

4.1.1 Binary installation: BOOT_xxx.fl

The MIPS Malta Flash Download binary file, BOOT_xxx.fl, may be downloaded via the Parallel port to the Target Malta board.

Before you begin, you must attach a Parallel port cable between the Target Malta board and the Host Development PC. You should also have a serial cable attached between the Debug Serial port (TTY0) on the Target Malta board and the Host Development PC, and your preferred terminal emulator connected directly to the COM port where the cable is connected on the Host Development PC.

Having attached all cables to the Target Malta board, you should now power up the Malta board and a YAMON prompt, like the example below, should be displayed in your terminal emulator.

```
YAMON ROM Monitor, Revision 02.13.
Copyright (c) 1999-2006 MIPS Technologies, Inc. - All Rights Reserved.

For a list of available commands, type 'help'.

Compilation time =             Dec 7 2006 19:22:35
Board type/revision =          0x02 (Malta) / 0x00
Core board type/revision =     0x0a (Core24K) / 0x00
System controller/revision =   MIPS SOC-it 101 OCP / 1.3 SDR-FW-2:1
FPGA revision =                0x0001
MAC address =                  00.d0.a0.00.01.4e
Board S/N =                    0000000086
PCI bus frequency =            33.33 MHz
Processor Company ID/options = 0x01 (MIPS Technologies, Inc.) / 0x00
Processor ID/revision =        0x93 (MIPS 24Kc) / 0x64
Endianness =                   Little
CPU/Bus frequency =            266 MHz / 133 MHz
Flash memory size =            4 MByte
SDRAM size =                   128 MByte
First free SDRAM address =     0x800b7360
```

```
YAMON>
```

Please verify from the prompt that Endianness = Little. If not, set Malta DIP-switch S5-2=OFF.

1. Enable Flash Download mode by setting DIP switch S5-0 (PROG) to ON. The Alpha display should read:

    ```
    Flash DL
    ```

2. On the Host Development PC side enter the BIN directory in the MIPS Malta BSP. From the command line, execute the following command:

    For the 32 Mbyte image:
    ```
    %_WINCEROOT%\PLATFORM\Mips_malta\Bin> ..\Scripts\go_32MB.bat
    ```

    For the 64 Mbyte image:
    ```
    %_WINCEROOT%\PLATFORM\Mips_malta\Bin> ..\Scripts\go_64MB.bat
    ```

3. When completed, the Alpha display should read:

    ```
    FINISHED
    ```

4. Disable Flash Download mode by setting DIP switch S5-0 (PROG) to 'OFF'. A YAMON prompt like the example below, should be displayed on the terminal emulator.

    ```
    YAMON ROM Monitor, Revision 02.13.
    Copyright (c) 1999-2003 MIPS Technologies, Inc. - All Rights Reserved.

    For a list of available commands, type 'help'.

    Compilation time =           Aug 12 2002  11:22:06
    Board type/revision =        0x02 (Malta) / 0x00
    Core board type/revision =   0x03 (Core20K) / 0x02
    System controller/revision = Bonito64 / 1-10f-e2 02/06/25/10:49
    FPGA revision =              0x0001
    MAC address =                00.d0.a0.00.00.91
    Board S/N =                  0000000024
    PCI bus frequency =          33.33 MHz
    Processor Company ID/options = 0x01 (MIPS Technologies, Inc.) / 0x04
    Processor ID/revision =      0x82 (MIPS 20Kc) / 0x60
    Endianness =                 Little
    CPU/Bus frequency =          500 MHz / 100 MHz
    Flash memory size =          4 MByte
    SDRAM size =                 64 MByte
    First free SDRAM address =   0x800adc80^

    YAMON>
    ```

5. Setup YAMON to execute the boot loader program after reset:

    ```
    YAMON> set start 'go be100000'
    ```

6. Now, reset the Target Malta board (either YAMON-cmd: 'reset' or press front reset button)

The boot loader will come up with the following display on the Debug Serial port:

```
    Microsoft Windows CE Ethernet Bootloader Common Library Version 6.0 Built
May 29 2007 at 13:21:28
    Microsoft Windows CE Ethernet Bootloader Version 6.0 for MIPS Malta Built
May 29 2007 at 15:38:47

    Processor Info: Company MIPS Technologies Inc., Implementation 20Kc.
    L1 ICache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
    L1 DCache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
    TLB Entries: 48.
    CPU Frequency: 267 MHz
    SDRAM Size: 64 MBytes

    System ready!
    Preparing for download...
    INFO: Predownload....
    INFO: No boot configuration found at 0x9e180000
    Hit space to enter configuration menu 5...
    Hit space to enter configuration menu 4...
    ...
```

You have now completed installation of the Windows Embedded CE boot loader.

4.1.2 Binary installation: BOOT_xxx.bin

The YAMON binary file, BOOT_xxx.bin, may be downloaded via the Ethernet port (TFTP download) to the Target
Malta board.

Before you begin, you must copy the Windows Embedded CE 6.0 boot loader image, BOOT_xxx.bin, to your TFTP
host's TFTP boot directory. Attach an Ethernet port cable to the Target Malta board so it resides on a network that
can access the TFTP host. You should also have a serial cable attached between the Debug Serial port (TTY0) on the
Target Malta board and the Host Development PC, and your preferred terminal emulator connected directly to the
COM port where the cable is connected on the Host Development PC.

Having attached all cables to the Target Malta board, you should now power up the Malta board and a YAMON
prompt like the example below should be displayed in your terminal emulator.


```
    YAMON ROM Monitor, Revision 02.13.
    Copyright (c) 1999-2003 MIPS Technologies, Inc. - All Rights Reserved.

    For a list of available commands, type 'help'.

    Compilation time =              Aug 12 2002  11:22:06
    Board type/revision =           0x02 (Malta) / 0x00
    Core board type/revision =      0x03 (Core20K) / 0x02
    System controller/revision =    Bonito64 / 1-10f-e2 02/06/25/10:49
    FPGA revision =                 0x0001
    MAC address =                   00.d0.a0.00.00.91
    Board S/N =                     0000000024
    PCI bus frequency =             33.33 MHz
    Processor Company ID/options =  0x01 (MIPS Technologies, Inc.) / 0x04
    Processor ID/revision =         0x82 (MIPS 20Kc) / 0x60
    Endianness =                    Little
    CPU/Bus frequency =             500 MHz / 100 MHz
```

```
Flash memory size =              4 MByte
SDRAM size =                     64 MByte
First free SDRAM address =       0x800adc80

YAMON>
```

Please verify from the prompt, that 'Endianness = Little'. If not, set Malta DIP-switch S5-2=OFF.

1. Get a reserved IP-address from your network administrator for YAMON's IP-stack.

   Setup YAMON IP-address:

   ```
   YAMON> set ipaddr 192.168.201.52
   ```

   Setup YAMON subnetmask:

   ```
   YAMON> set subnetmask 255.255.255.0
   ```

   When needed, setup YAMON IP-gateway (ask your network administrator):

   ```
   YAMON> set gateway 192.168.201.254
   ```

   Setup TFTP-hostserver:

   ```
   YAMON> set bootserver 192.168.201.197
   ```

   Now you have completed the YAMON network setup and are ready to start the download and install procedure
   of the Windows Embedded CE 6.0 boot loader image.

2. Initially, clear 128 KB of user FLASH area:

   ```
   YAMON> erase be100000 20000
   ```

3. Download the boot loader image via TFTP from the TFTP host into the Target Malta board RAM:

   ```
   YAMON> fread tftp://<tftphost>/BOOT_xxx.bin 80100000
           About to binary read tftp://<tftphost>/BOOT_xxx.bin
           Press Ctrl-C to break
           Start = 0x80100000, range = (0x80100000,0x80119FC0), format = BIN
   ```

4. Flush the downloaded image to memory:

   ```
   YAMON> flush
   ```

5. Copy the boot loader image from RAM to user FLASH:

   ```
   YAMON> copy 80100000 be100000 20000
   ```

6. Configure YAMON to execute the boot loader program after reset:

```
YAMON> set start 'go be100000'
```

7. Now, reset the Target Malta board (either YAMON-cmd: 'reset' or press front reset button)

The boot loader will come up with the following display on the Debug Serial port:

```
    Microsoft Windows CE Ethernet Bootloader Common Library Version 1.0 Built
May 29 2007 at 13:21:28
    Microsoft Windows CE Ethernet Bootloader Version 5.0 for MIPS Malta Built
May 29 2007 at 15:38:47

    Processor Info: Company MIPS Technologies Inc., Implementation 20Kc.
    L1 ICache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
    L1 DCache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
    TLB Entries: 48.
    CPU Frequency: 267 MHz
    SDRAM Size: 64 MBytes

    System ready!
    Preparing for download...
    INFO: Predownload....
    INFO: No boot configuration found at 0x9e180000
    Hit space to enter configuration menu 5...
    Hit space to enter configuration menu 4...
    ...
```

You have now completed installation of the Windows Embedded CE boot loader.

4.1.3 Binary installation: BOOT_xxx.sre

The Motorola S-record file, BOOT_xxx.sre, may be downloaded either via the Debug Serial port or Ethernet port (TFTP download) to the Target Malta board.

Before you begin, you must copy the Windows Embedded CE 6.0 boot loader image, BOOT_xxx.sre, to your terminal emulator's download directory or your TFTP host's TFTP boot directory, depending on your preferred download type. If you select TFTP download, attach an Ethernet port cable to the Target Malta board so it resides on a network that can access the TFTP host. You should also have a serial cable attached between the Debug Serial port (TTY0) on the Target Malta board and the Host Development PC, and your preferred terminal emulator connected directly to the COM port where the cable is connected on the Host Development PC.

Having attached all cables to the Target Malta board, you should now power up the Malta board and a YAMON prompt like the example below should be displayed in your terminal emulator.

```
    YAMON ROM Monitor, Revision 02.13.
    Copyright (c) 1999-2003 MIPS Technologies, Inc. - All Rights Reserved.

    For a list of available commands, type 'help'.

    Compilation time =              Aug 12 2002  11:22:06
    Board type/revision =           0x02 (Malta) / 0x00
    Core board type/revision =      0x03 (Core20K) / 0x02
    System controller/revision =    Bonito64 / 1-10f-e2 02/06/25/10:49
```

```
FPGA revision =             0x0001
MAC address =               00.d0.a0.00.00.91
Board S/N =                 0000000024
PCI bus frequency =         33.33 MHz
Processor Company ID/options = 0x01 (MIPS Technologies, Inc.) / 0x04
Processor ID/revision =     0x82 (MIPS 20Kc) / 0x60
Endianness =                Little
CPU/Bus frequency =         500 MHz / 100 MHz
Flash memory size =         4 MByte
SDRAM size =                64 MByte
First free SDRAM address =  0x800adc80

YAMON>
```

Please verify from the prompt, that Endianness = Little. In case not, set Malta DIP-switch S5-2=OFF.

1. If you are going to download via TFTP, get a reserved IP-address from your network administrator for YAMON's IP-stack.

    Setup YAMON IP-address:

    ```
    YAMON> set ipaddr 192.168.201.52
    ```

    Setup YAMON subnetmask:

    ```
    YAMON> set subnetmask 255.255.255.0
    ```

    When needed, setup YAMON IP-gateway (ask your network administrator):

    ```
    YAMON> set gateway 192.168.201.254
    ```

    Setup TFTP-hostserver:

    ```
    YAMON> set bootserver 192.168.201.197
    ```

    Now you have completed the YAMON network setup and are ready to start the download and install procedure of the Windows Embedded CE 6.0 boot loader image.

2. Initially, clear 128 KB of user FLASH area:

    ```
    YAMON> erase be100000 20000
    ```

3. Download the boot loader image via Serial/TFTP from the Host Development PC/TFTP host into the Target Malta board RAM:

    Serial download:

    ```
    YAMON> load asc://tty0
            About to load asc://tty0
            Press Ctrl-C to break
            Start dump from terminal program
    ```

    NOTE: Now download/dump the BOOT_xxx.sre file from your terminal emulator. If you are using TeraTerm, select the pulldown menu option File -> Send File..., and select the file to send. With Hyperterminal, you must

enter the menu Transfer-> SendTextFile

TFTP download:

```
YAMON> load tftp://<tftphost>/BOOT_xxx.sre
        About to load tftp://<tftphost>/BOOT_xxx.sre
        Press Ctrl-C to break
```

The load message for the 32 MB image:

```
Start = 0x81F80004, range = (0x81F80000,0x81F99FC0), format = SREC
```

The load message for the 64 MB image:

```
Start = 0x83F80004, range = (0x83F80000,0x83F99FC0), format = SREC
```

4. Flush the downloaded image to memory:

```
YAMON> flush
```

5. Copy the boot loader image from RAM to user FLASH:

The 32 MB image:

```
YAMON> copy 81F80000 be100000 20000
```

The 64 MB image:

```
YAMON> copy 83F80000 be100000 20000
```

6. Configure YAMON to execute the boot loader program after reset:

```
YAMON> set start 'go be100000'
```

7. Now, reset the Target Malta board (either YAMON-cmd: 'reset' or press front reset button)

The boot loader will come up with the following display on the Debug Serial port:

```
  Microsoft Windows CE Ethernet Bootloader Common Library Version 1.0 Built
May 29 2007 at 13:21:28
  Microsoft Windows CE Ethernet Bootloader Version 6.0 for MIPS Malta Built
May 29 2007 at 15:38:47

  Processor Info: Company MIPS Technologies Inc., Implementation 20Kc.
  L1 ICache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
  L1 DCache Info: SetsPerWay 256, NumWays 4, LineSize 32, Size 32768.
  TLB Entries: 48.
  CPU Frequency: 267 MHz
  SDRAM Size: 64 MBytes

  System ready!
```

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```
        Preparing for download...
        INFO: Predownload....
        INFO: No boot configuration found at 0x9e180000
        Hit space to enter configuration menu 5...
        Hit space to enter configuration menu 4...
        ...
```

You have now completed installation of the Windows Embedded CE boot loader.

4.2 Configuring the Windows Embedded CE Boot loader

After installation completion, the Windows Embedded CE 6.0 boot loader must be configured to communicate with the Host Development PC. During boot loader initialization, the following messages will be displayed on the terminal emulator:

```
  Hit space to enter configuration menu 5...
    Hit space to enter configuration menu 4...
    Hit space to enter configuration menu 3...
    Hit space to enter configuration menu 2...
    ...
```

Hit the spacebar within the terminal emulator window and navigate the boot loader menus to setup the Boot/Debug device and Network settings. The top level menu options are as follows:

```
    ----------------------------------------------------------
    Main Menu
    ----------------------------------------------------------

    [1] Show Current Settings
    [2] Set Device Id
    [3] Select Boot Device
    [4] Select Debug Device
    [5] Network Settings
    [6] Save Settings
    [0] Exit and Continue
```

When finished, save your settings and exit. The boot loader will continue with its initialization and attempt to connect with your Host Development PC. You should see something similar to the following output to your terminal emulator:

```
    Am79c973: Wait for link... Link detected
    INFO: Boot device uses MAC 00:d0:a0:00:03:1c
    INFO: *** Device Name MALTA796 ***
    InitDHCP():: Calling ProcessDHCP()
    ProcessDHCP()::DHCP_INIT
    Got Response from DHCP server, IP address: 172.20.4.2

    ProcessDHCP()::DHCP IP Address Resolved as 172.20.4.2, netmask: 255.255.255.224
    Lease time: 90060 seconds
    Got Response from DHCP server, IP address: 172.20.4.2
    No ARP response in 2 seconds, assuming ownership of 172.20.4.2
```

```
+EbootSendBootmeAndWaitForTftp
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
```

Take note of the Device Name, as you will need it later when connecting the Target Malta board to the Host Development PC.

After configuration has completed, the Malta development board provides standard Windows CE SDB development services, accessible from the Host Development PC via the Platform Builder tools.

5   Host/Target Connectivity

After the Host Development PC and Target Malta board have been set up and configured, Windows Embedded CE 6.0 images can be downloaded and debugged using the KITL transport and debug services in Platform Builder. To verify KITL is working, performing the following steps:

1. Check that the Target Malta Board is still sending "BOOTME" messages. If not, then reset the board and allow the Windows Embedded CE 6.0 boot loader to reinitialize.

2. On the Host Development PC side, start Microsoft Visual Studio 2005, and open the Sample Project that you made. Then enter the pull-down menu Target -> Connectivity Options …. Bring the Connectivity Options pop-up window the foreground.

3. Set Download and Transport both to Ethernet and press 'Settings' beside the 'Download' pane to enter the "Ethernet Download Settings" submenu to select the target device (the target device name should appear in the selection pane), while the target issues the 'BOOTME' messages.

4. Finally go to submenu Target->Attach Device to start the download.

5. You should now see the following debug messages on the terminal emulator:

```
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
Packet has the following data:
boot.bin[NULL]octet[NULL]
TFTP packet could have 1 name/value pairs
Locked Down Link 1
Src IP 192.168.1.4 Port 03D4 Dest IP 192.168.1.6 Port 0493
Default TFTP block size set to: 512 bytes
There were no options detected in the TFTP
EthDown::TFTPD_OPEN::boot.bin
-EbootSendBootmeAndWaitForTftp
BL_IMAGE_TYPE_BIN

TFTP: Desktop losing ACK, block number = 28628, Ack again
rom_offset=0x0.
ImageStart = 0x80002000, ImageLength = 0x18FE0CC, LaunchAddr = 0x80002004
Completed file(s):

----------------------------------------------------------------------------

[0]: Address=0x80002000 Length=0x18FE0CC Name="" Target=RAM
ROMHDR at Address 80002044h
INFO: Lauch Windows CE .NET by jumping to 0x80002004...
Windows CE Kernel for MIPS Built on May 14 2007 at 16:15:00
+OEMInit
+OALMIPSGetProcessorId()=0x1954C
Processor Info: Company MIPS Technologies Inc., Implementation Unknown.
L1 ICache Info: SetsPerWay 512, NumWays 4, LineSize 32, Size 65536.
```

```
L1 DCache Info: SetsPerWay 512, NumWays 4, LineSize 32, Size 65536.
TLB Entries: 32.
CPU frequency: 50 MHz
SDRAM size: 128 MBytes
DeviceId................. MALTA871
pArgs->flags............. 0xD
pArgs->devLoc.IfcType.... 5
pArgs->devLoc.LogicalLoc. 0xB00
pArgs->devLoc.PhysicalLoc 0x0
pArgs->devLoc.Pin........ 5
pArgs->ip4address........ 1
pDevice->Name............ s
pDevice->ifcType......... 5
pDevice->id.............. 0x20001022
pDevice->resource........ 1
pDevice->type............ 2
pDevice->pDriver......... 0x81908000
Am79c973: Wait for link...
Link detected
Am79c973: Enable Tx ... KITL: *** Device Name MALTA871 ***
KITL: using sysintr 0x10
-OALKitlEthInit: Getting DCHP address
KITL: DHCP get/renew device IP: 1
-OALKitlEthInit: Got DCHP address
VBridge:: built on [Sep 6 2006] time [19:28:01]
VBridgeInit()...TX = [16384] bytes -- Rx = [16384] bytes
Tx buffer [0xA193EEE0] to [0xA1942EE0].
Rx buffer [0xA1942F00] to [0xA1946F00].
VBridge:: NK add MAC: [0-D0-A0-0-3-67]
Connecting to Desktop
KITL: Connected host IP: 1 Port: 1169
KITL: Leaving polling mode... 0x8192EBC0
Closing Handle of Timer Thread
VBridge:: VB_INITIALIZED returns [1]
VBridge:: RESET_BUFFER received.
VBridge:: built on [Sep 6 2006] time [19:28:01]
VBridgeInit()...TX = [16384] bytes -- Rx = [16384] bytes
Tx buffer [0xA193EEE0] to [0xA1942EE0].
Rx buffer [0xA1942F00] to [0xA1946F00].
VBridge:: Current VMini packet filter = [0xB]
```

NOTE: Your example configuration has been built with the KITL support, selected before build in the submenu Platform-> Settings and 'Build Options' with click-select in the 'Enable KITL'.

6 Support

MIPS Technologies provides first line support for the Windows Embedded CE on Malta product, through the following channels:

- WWW documentation pages at `http://www.mips.com`. This should be your first call when looking for the answer to any problems or queries you may have. There may be updated versions of the documents available on the site.

- E-mail hotline. Send an E-mail with your name and company details, plus full details of the hardware and software you have (include revision numbers, serial numbers and as much other information as possible) to: `support@mips.com`. Remember to include all details of the problem you are seeing, such as status of LEDs, the ASCII LED display, what has been output on the Debug Serial port (TTY0), and what has been output on the Windows CE debug port etc.

7 Revision History

Revision	Date	Description
01.00	2001/06/25	Issued for internal review
01.01	2001/07/04	Comments added after internal review
02.01	2002/05/29	Updated for Windows CE .NET
02.02	2002/06/12	New title
02.03	2002/07/01	Updated after comments from Microsoft
02.04	2002/08/29	Updated for Windows CE .NET 4.10
02.05	2002/09/03	Change bars added and updated to SDT-template 01.07
02.06	2002/11/15	Updated for BSP release 01.04
02.07	2002/11/20	A note about IMGRAM64 env. variable added to par. 2.6
02.08	2003/02/15	Updated for BSP release 01.05
02.09	2003/04/28	Updated with new template
05.00	2004/05/05	Updated for Windows CE .NET 5.0 and MIPS Malta BSP release 05.00
06.00	2007/06/29	Updated for Windows Embedded CE 6.0 and MIPS Malta BSP release 06.00
06.02	2008/03/07	Increased hardware functionality and made bug fixes.