



*NET+Works with Green Hills
Getting Started Guide*

Making
DEVICE NETWORKING
easy™

NET+Works with Green Hills Getting Started Guide

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Using this guide

Review this section for basic information about this guide, as well as for general support contact information.

About this guide

This guide describes NET+OS with Green Hills and how to use it as part of your development cycle. Part of the NET+Works integrated product family, NET+OS is a network software suite optimized for the NET+ARM.

Software release

This guide supports NET+OS 6.3. By default, this software is installed in the `C:\netos63_ghs` directory. The instructions in this guide are based on the assumption that NET+Works is installed in the default installation directory.

Who should read this guide

This guide is for software engineers and others who use NET+Works for NET+OS.

To complete the tasks described in this guide, you must:

- Be familiar with installing and configuring software.
- Have sufficient user privileges to do these tasks.
- Be familiar with network software and development board systems.

Conventions used in this guide

This table describes the typographic conventions used in this guide:

This convention	Is used for
<i>italic type</i>	Emphasis, new terms, variables, and document titles.
bold, sans serif type	Menu commands, dialog box components, and other items on the screen.
menu name → option	Menu commands. The first word is the menu name; the words that follow are menu selections.
monospaced type	Filenames, pathnames, and code examples.

Related documentation

- The *Hardware Installation Guide* describes how set up the hardware.
- *NET+Works with Green Hills BSP Porting Guide* describes how to port the board support package (BSP) to a new hardware application using Green Hills.
Digi strongly recommends that you go to the porting guide after you complete the tasks in this guide to learn about using the central build system.
- *NET+Works with Green Hills Programmer's Guide* describes how to use NET+OS to develop programs for your application and hardware.
- NET+Works online help describes the application programmer interfaces (APIs) that are provided with NET+OS. The online help is located in `C:\netos63_ghs\Documentation`.

For information about third-party products and other components, review the documentation CD-ROM that came with your development kit.

For information about the processor you are using, see your NET+Works hardware documentation.

Documentation updates

Digi occasionally provides documentation updates on the Web site.

Be aware that if you see differences between the documentation you received in your NET+Works package and the documentation on the Web site, the Web site content is the latest version.

Customer support

To get help with a question or technical problem with this product, or to make comments and recommendations about our products or documentation, use the contact information listed here:

- United States telephone: 1 877 912-3444
- International telephone: 1 952 912-3444
- email: digi.info@digi.com
- Web site: <http://digi.com>

Introduction

This document provides a series of tasks in which you will:

- Install NET+Works with Green Hills.
- Request and install a license for the Green Hills software.
- Configure the IP address for your development board.
- (MAJIC only) Configure the address for your MAJIC probe and configure the MAJIC probe.
- Complete a brief exercise that demonstrates how to use the tool set, including:
 - Building the board support package (BSP), libraries, and template applications
 - Running and debugging the sample application

You must do the all the tasks in this guide, in the order in which they are presented.



Note Plan to spend approximately two hours completing the tasks in this document. The exact time depends on the speed of your PC and how long it takes to get a license key from Green Hills.

MAJIC upgrades

If you have a previous version of the MAJIC firmware, you *must* upgrade it. See the Appendix.

What's next?

Go on to the next task, where you'll install NET+Works.

Task 2: Installing the NET+Works software

In this task, you will install the NET+Works software on your system. The software installation uses a wizard to guide you through the process.

About the installation

During the installation, if you register NET+Works, you are prompted for a serial number. Use the serial number that's located on your development board. If the development board is not available, use Vnnnnnnnn.

The NET+Works software uses a wizard to install the software. The major components are installed in this order:

- 1 Green Hills software
- 2 NET+OS

After the Green Hills software is loaded, you see a prompt about whether to restart your PC. You *must* click **Yes, I want to restart my computer now**. After you restart your system, continue to follow the wizard instructions.

► To begin the NET+Works installation:

Place the installation CD in your CD drive, and follow the wizard prompts.

What's next?

Go to the next task to complete the Green Hills installation.

Task 4: Requesting a Green Hills software license key

In this task, you will request a license key for your Green Hills software.

If you are upgrading from a prior NET+OS/Green Hills installation, you do not need to request and install a Green Hills license. Skip to Task 7, “Configuring the IP address of the development board.”

About the Green Hills license keys

Before you can use the Green Hills MULTI software, you must request and install a software license key. You can request:

- An evaluation (temporary) key, which gives you access to the Green Hills MULTI software for 30 days
- A permanent key

Digi strongly recommends that you request both license types at the same time. With an evaluation license key, you can start using the software immediately, while getting a permanent license key can take up to 15 business days.

You use the MULTI Licensing Wizard to create a license request that you can either e-mail, fax, or mail to Green Hills. The wizard prompts you for information such as:

- The number of licenses you want
- Whether the license is computer-locked or dongle-locked
- The type of computer on which you will use the software
- Whether the license key is an evaluation (temporary) or permanent license

The license key is sent to your e-mail address.

About license types

If you request a computer-locked license, you must use it on the PC from which you request the license.

If you request a dongle-locked license, you must attach the dongle to your PC before you begin the license request procedure.

Requesting a license

To request a license:

- 1 Click the MULTI icon on your desktop.

The MULTI Launcher opens:



Because you don't yet have a license, a warning pop-up window also opens:



2 To continue, click OK in the pop-up window.

The MULTI Licensing Wizard opens:

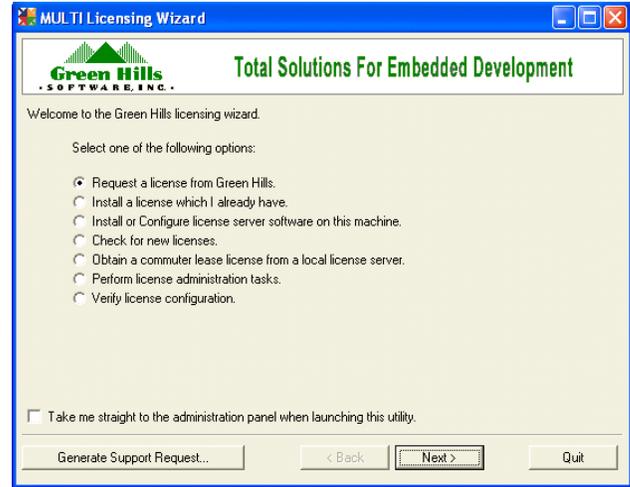


In addition, a warning pop-up window from the MULTI License Administrator opens:

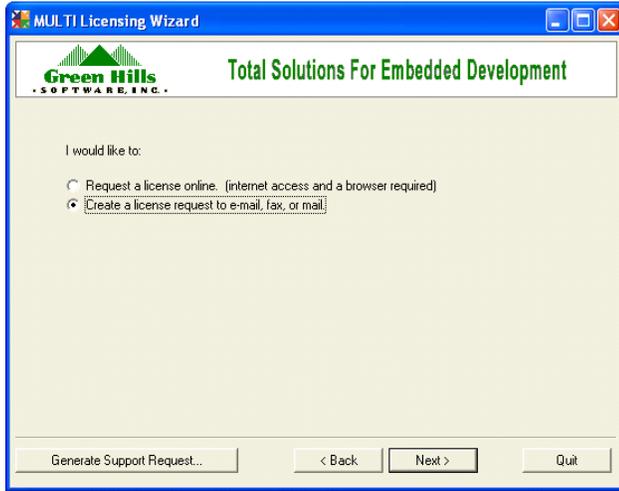


3 To continue, click OK in the pop-up window.

4 In the MULTI Licensing Wizard, click Request a license from Green Hills. Then click Next.



This window opens:

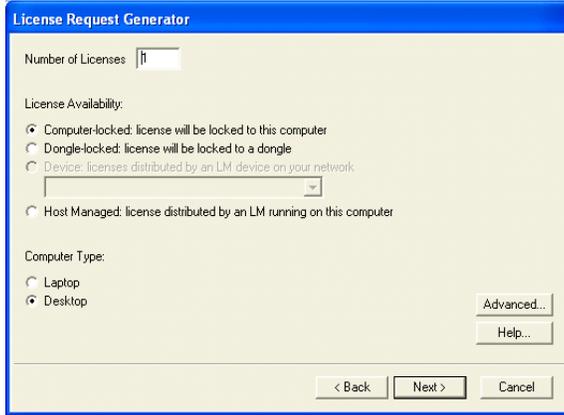


- 5 Click **Create a license request to e-mail, fax, or mail**, and then click **Next**.

The License Request Generator opens with this form:

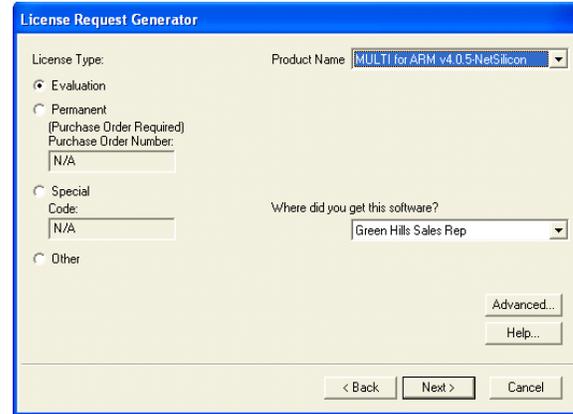
- 6 Fill in the form, leaving the **GHS User ID (if known)** field blank, and then click **Next**.

The License Request Generator window opens:



Then click Next.

This window opens:



7 Do these steps:

- Enter the number of licenses you want to request.
- Under **License Availability**, click the type of license you want.
Do not click Host Managed: license distributed by an LM running on this computer.
- Click your computer type.

- 8** Under **License Type**, click **Evaluation**, and then click **Next**.
The Green Hills Software 30-day license agreement opens.
- 9** Review the license agreement, and then click **Yes**.
The **License Request Generator** window opens.

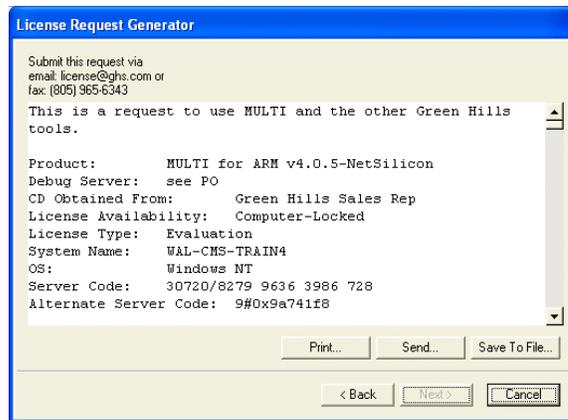
If the License Request Generator window doesn't open, you see this dialog box:



This message indicates that you did not connect the dongle.

Connect the dongle and click **Retry** in the **Dongle Not Found** dialog box.

If the License Request Generator does not return a copy of your license request (shown next), stop and call Technical Support.



- 10 Review the information in the license request to make sure it is correct. Then, do either of these steps:
 - If the PC from which you are making the request has e-mail, click **Send**.
 - If the PC from which you are making the request does not have e-mail, click **Save to File**. Then go to a system that has e-mail, and send your request as an attachment to `license@ghs.com`.
- 11 In the **License Request Generator**, click **Finish**.
- 12 In the **MULTI Licensing Wizard**, click **Quit**.
- 13 Exit from the **MULTI Launcher**.
- 14 To request your permanent license, repeat this task – but at step 8, click **Permanent** for the license type.

What's next?

Within an hour, you receive an e-mail message that either:

- Includes the license key file and installation instructions
- Indicates that manual processing is required. Call Technical Support.

Go on to the next task, where you'll save your license key to your PC.

Task 6: Installing the Green Hills license key

In this task, you will install the evaluation license key you received by e-mail from Green Hills.

When you receive your permanent license, follow the directions provided by Green Hills with your license. To launch the MULTI Licensing Wizard from the MULTI Launcher, select **Utilities** → **License Administrator**.

► To install the evaluation license key:

- 1 Double-click the MULTI icon on your desktop.

The MULTI Launcher opens:



Because you don't yet have a license, this pop-up window opens:



- 2 To continue, click **OK** in the pop-up window.

The **MULTI Licensing Wizard** opens, and a pop-up window from the **MULTI License Administrator** opens:



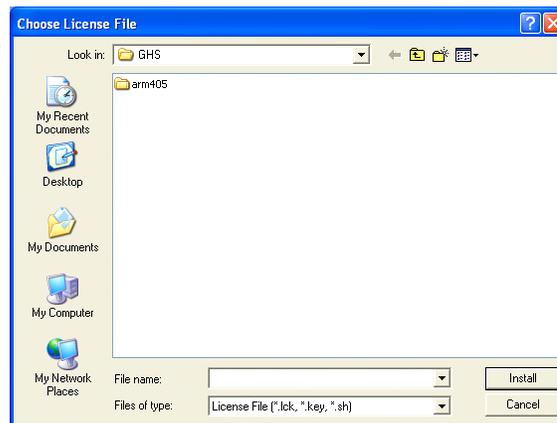
- 3 To continue, click **OK** in the pop-up window.
- 4 In the **MULTI Launcher** window, select **File** → **Close Launcher**.

The **MULTI Licensing Wizard** remains open.

- 5 In the **MULTI Licensing** window, click **Install a license which I already have**, and then click **Next**.

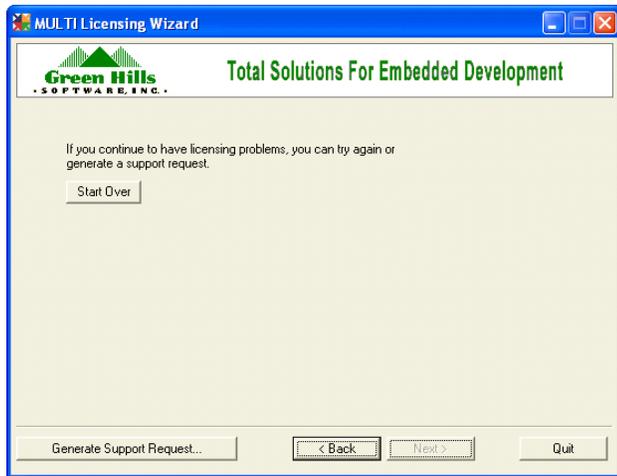
If you did not close the **MULTI Launcher** window, the **MULTI Licensing** window prompts you to close all **MULTI** windows. Close the other **MULTI** windows, and click **Next** in the **MULTI Licensing Wizard**.

The **Choose License File** dialog box opens:



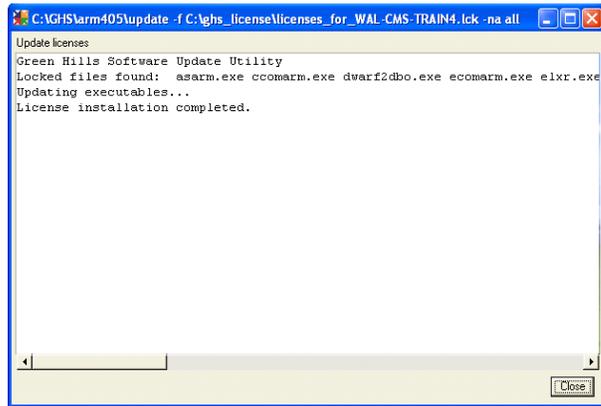
- 6 Browse to your license file, select it, and click Install.

This window opens:



The installation takes a few minutes. This window, which doesn't require any response from you, remains open during the installation process

Then the Update Licenses window opens:

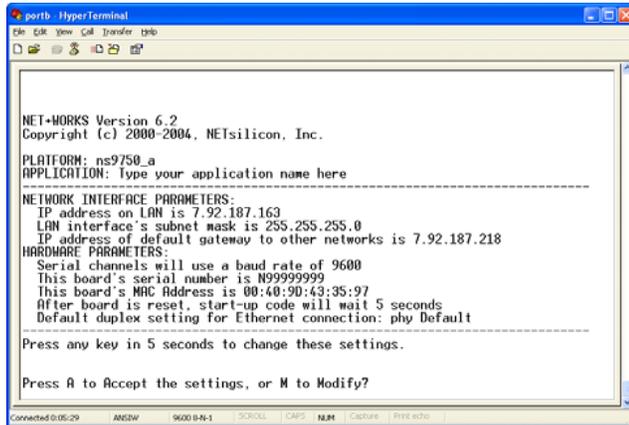


- 7 If you see any error messages in the Update Licenses window, contact Technical Support. Otherwise, click Close.
- 8 In the MULTI Licensing Wizard, click Quit.

What's next?

Go on to the next task to configure your board's IP address.

You see this information in the HyperTerminal window:



```
portb - HyperTerminal
File Edit View Call Transfer Data

NET-WORKS Version 6.2
Copyright (c) 2000-2004, NETsilicon, Inc.

PLATFORM: ns9750_a
APPLICATION: Type your application name here
-----
NETWORK INTERFACE PARAMETERS:
IP address on LAN is 7.92.187.163
LAN interface's subnet mask is 255.255.255.0
IP address of default gateway to other networks is 7.92.187.218
HARDWARE PARAMETERS:
Serial channels will use a baud rate of 9600
This board's serial number is N99999999
This board's MAC Address is 00:40:9D:43:35:97
After board is reset, start-up code will wait 5 seconds
Default duplex setting for Ethernet connection: phy Default
-----
Press any key in 5 seconds to change these settings.

Press A to accept the settings, or M to Modify?

Connected 0:05:29  ANZDW  9600 B-A-1  SCROLL  CAPS  NUM  Capture  Print echo
```

- 3 Press any key.
You have only five seconds to press a key.
- 4 To change the configuration, press M, and then press Enter.

You are prompted for a root password.

- 5 Enter the default root password — Netsilicon — and press Enter.

The first of a series of configuration prompts appears.

- 6 At each prompt, do one of these steps:
 - To accept the current value, press Enter.
 - To change a setting, enter a value and press Enter.

As you scroll through the settings, a prompt indicates that you must press a key within five seconds if you want to change additional settings.

What's next?

If you are using a MAJIC probe, go on to the next section, where you'll set up the MAJIC's IP address.

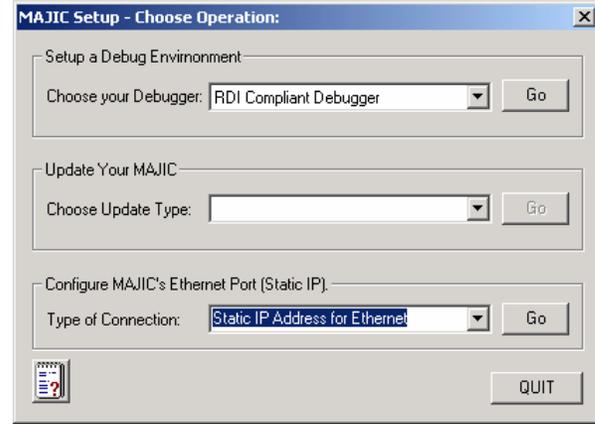
If you are using a Raven debugger, you're ready to build the software. Skip to Task 10, "Building the BSP, libraries, and sample applications."

The EPI MAJIC Setup Wizard Introduction window opens:



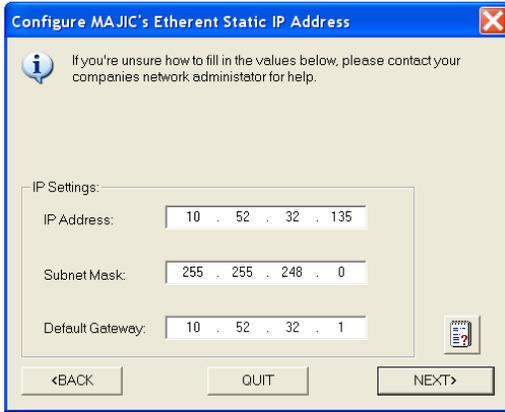
3 Click NEXT.

The Choose Operations window opens:



4 From the Type of Connection pulldown menu, select Static IP Address for Ethernet, and then click Go.

The Configure MAJIC's Ethernet Static IP Address window opens:

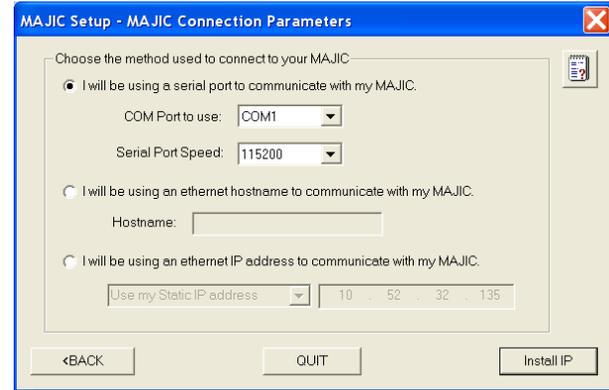


5 Enter the information you got from your network administrator:

- IP Address
- Subnet Mask
- Default Gateway

and then click NEXT.

The MAJIC Connection Parameters window opens:



6 Do these steps:

- a Click I will be using a serial port to communicate with my MAJIC.
- b From the COM port to use pulldown menu, select the serial port number.

Make sure no other programs are using the COM port you select.

- c Click **Install IP**.

The **Install Static IP** dialog box opens:



- 7 Connect the MAJIC serial cable between the MAJIC probe's serial port and the COM port you selected in the **MAJIC Connection Parameters** window (in step 6 of this task), and then click **OK**.

A dialog box and a DOS window open.

- 8 In the **Check Your Installation Result** dialog box, confirm that the IP address information in the DOS window is correct by clicking **OK**.

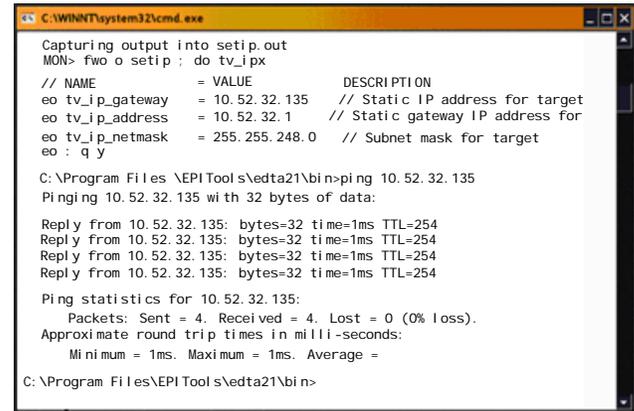
If there is a problem, correct it and go back to step 1 of this task.

- 9 Connect an Ethernet cable from your MAJIC probe to your LAN hub or switch.
- 10 After the MAJIC probe turns off, power-cycle the MAJIC.
- 11 In the DOS window, ping the IP address by entering:

```
ping IP_ADDR
```

where *IP_ADDR* is the IP address of the MAJIC.

This is what you should see in the DOS window:



(Note that the colors of the text and background are reversed in this screen for easier reading.)

If the `ping` succeeds, the IP address is installed.

If you don't see this response, do these steps:

- Check the Ethernet connection to the MAJIC
- Confirm that the IP parameters are legal
- Verify that you power-cycled your MAJIC

Otherwise, repeat this task.

12 Close the DOS window.

In the **Check Your Install Results** dialog box, click **OK**.

What's next?

Go on to the next task for instructions about configuring the MAJIC probe.

Task 9: Configuring the MAJIC probe

In this task, you will set up the MAJIC probe by making software configuration settings. The EPI MAJIC Setup Wizard leads you through the process in which you'll make selections and provide information.

► To configure the MAJIC probe:

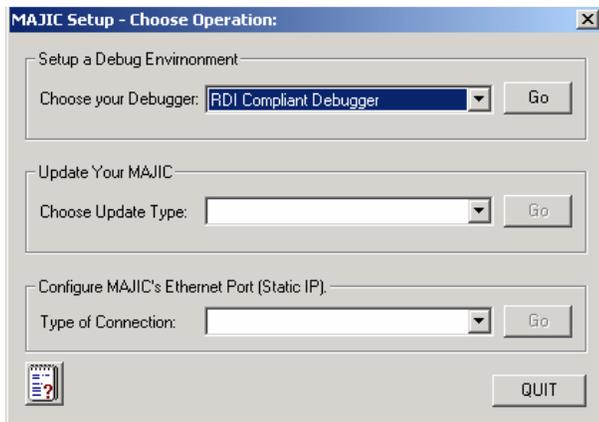
- 1 Start the MAJIC Setup Wizard by doing one of these steps:
 - **Windows XP systems.** Select Start → All Programs → EPI Tools-EDTA 2.2a → MAJIC Setup Wizard.
 - **Windows 2000 systems.** Select Start → Programs → EPI Tools-EDTA 2.2a → MAJIC Setup Wizard.

The EPI MAJIC Setup Wizard Introduction window opens:



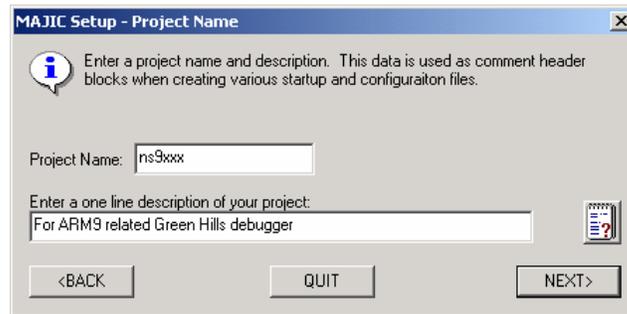
- 2 After you review the introduction, click NEXT.

The Choose Operation window opens:



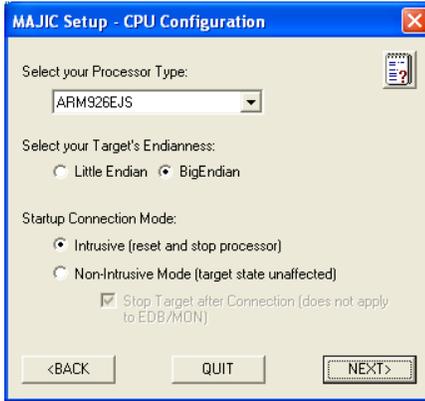
- 3 From the Choose Your Debugger pulldown menu, select RDI Compliant Debugger, and click Go.

The Project Name window opens:



- 4 Create a new project by entering a project name and a brief description. Then click NEXT.

The CPU Configuration window opens:

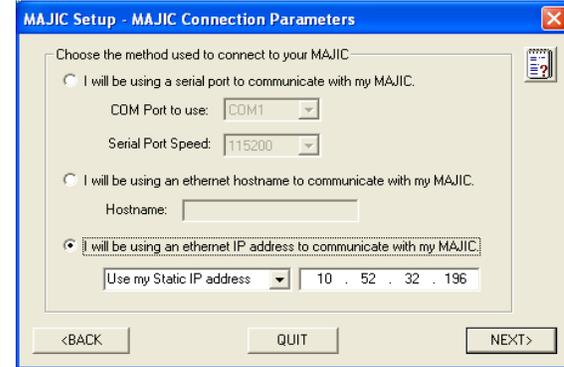


5 Do these steps:

- a From the **Select Your Processor Type** pulldown menu, select **ARM926EJS**.
- b Under **Select your Target's Endianness**, click **BigEndian**. Under **Startup Connection Mode**, click **Intrusive Mode (reset and stop processor)**.

Then click **NEXT**.

The MAJIC Connection Parameters window opens:

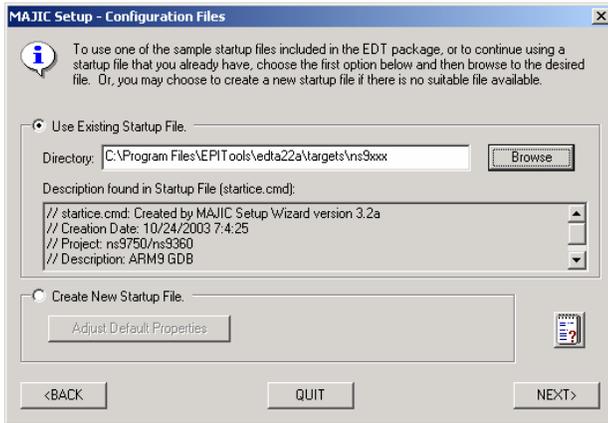


6 Do these steps:

- a Click **I will be using an Ethernet IP address to communicate with my MAJIC**.
- b Enter the IP address for the MAJIC. Use the IP address you provided in Task 8, step 6.
- c Make sure **Use My Static IP address** is selected.

Then click **NEXT**.

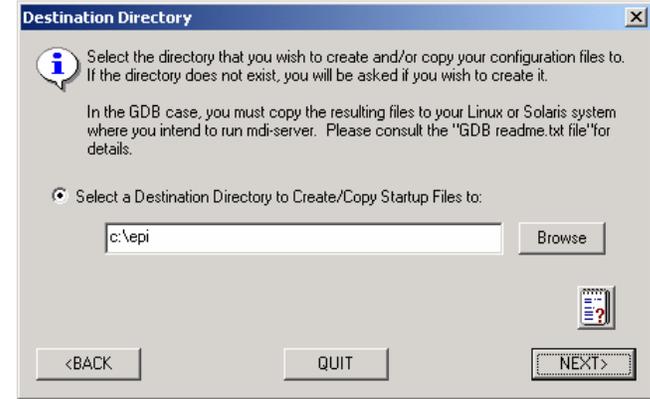
The Configuration Files window opens:



- 7 Click **Use Existing Startup File**, and do these steps:
 - a Click **Browse**.
 - b Navigate to the **Program Files** → **EPI Tools** → **edta22a** → **Targets** → **ns9xxx** directory, select the **startice.cmd** file, and click **Open**.

Click **NEXT**.

The Destination Directory window opens:



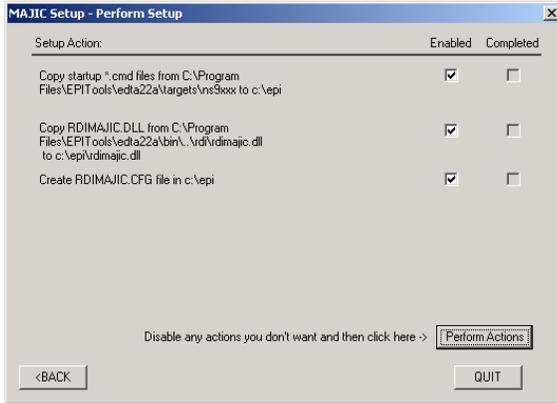
- 8 Click **Select a Destination Directory to Create/Copy Startup Files to**.

Then browse to the directory you want to use for files that are created or copied during the MAJIC setup.

Make sure that each name in the path is eight characters or fewer and doesn't use any spaces.

Click **NEXT**.

The **Perform Setup** window opens with a summary of your selections:



9 Check **Enabled** for each item, then click **Perform Actions**.

This step creates MAJIC setup files in the directory you specified in step 8.

If the directory doesn't exist, the MAJIC Setup Wizard prompts you with a pop-up warning to create one. Click **Yes** to create the directory.

10 To exit from the wizard, click **Done**.

What's next?

You're ready to build the software. Go on to the next task, in which you'll build the BSP, libraries, and sample applications.

Building the entire system

This section uses the NS9360 as an example.

► To build the entire system:

- 1 Open Green Hills MULTI v4.0.5 by double-clicking the MULTI icon on your desktop.

The MULTI launcher opens:



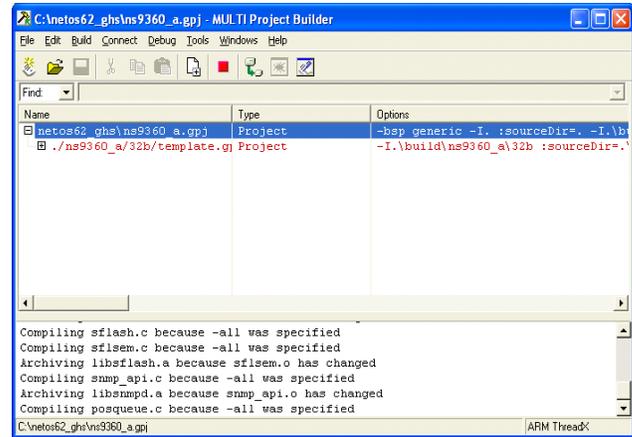
- 2 Select File → Open Project Builder.
- 3 Browse to \netos63_ghs, and select your platform.

For example, to build the NS9360 development board, select ns9360_a.gpj.

The MULTI Project Builder window opens.

- 4 In the MULTI Project Builder window, select Build → Rebuild ns9360_a.gpj.

You see the build take place, as shown here:

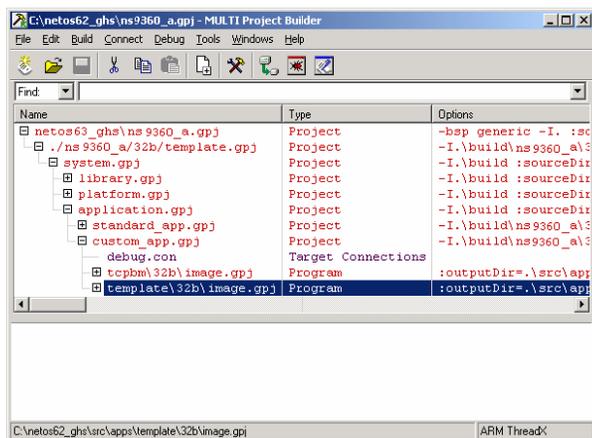


When the build completes, you will have built the BSP, libraries, and all the sample applications.

Building an individual application

You can rebuild an individual application by selecting the application and selecting Build, as shown in this example.

- 1 Navigate to the template application for the ns9360_a platform, as shown here:



- 2 Select Build → Rebuild image.

You see the build take place in the window.

What's next

You're ready to run and debug the template application. Go on to the next task.

Task 11: Running and debugging the template application

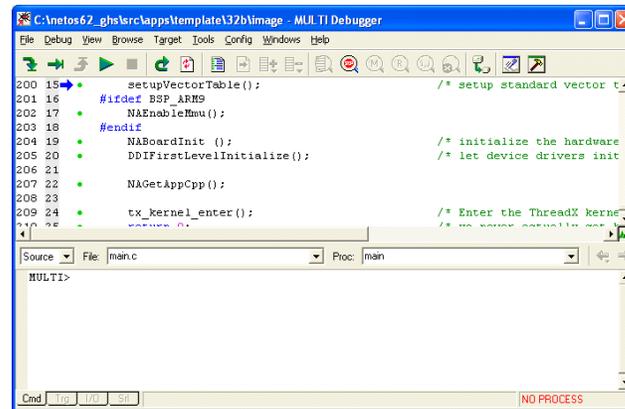
You run and debug the application in the builder window. This section describes how to debug the application using both the MAJIC probe and the Raven debugger.

Running the application with the MAJIC

▶ To run the template application using the MAJIC probe:

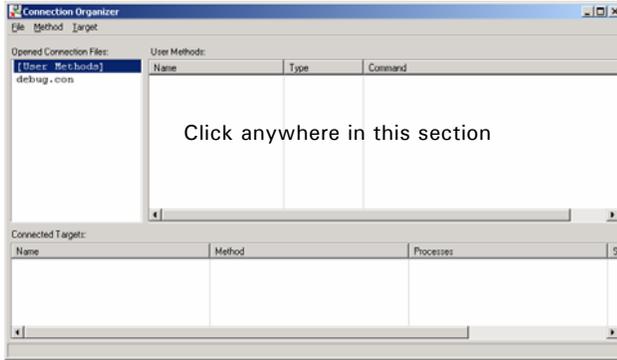
- 1 In the MULTI Project Builder window, select **Debug** → **Debug image**.

You see this in the window:



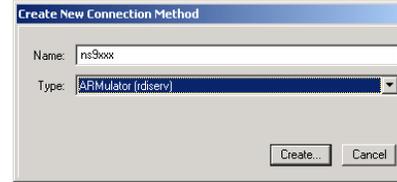
2 Select Target → Show Connection Organizer.

The Connection Organizer window opens:



3 In the User Methods section of the window, right-click as noted in the illustration, and select New.

The Create New Connection Method dialog box opens:

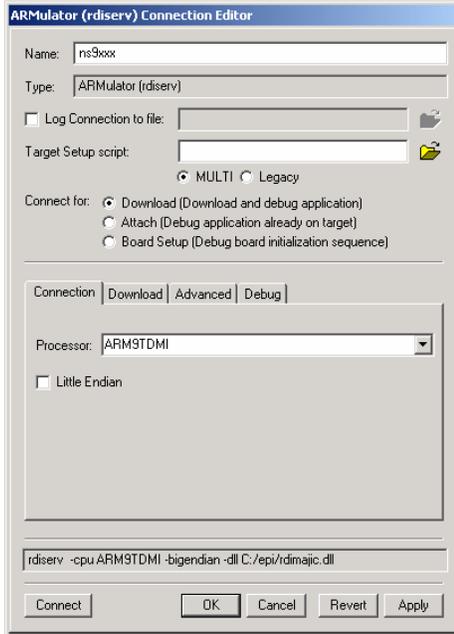


4 Do these steps:

- a In the Name input box, enter ns9xxx (for either the ns9360_a or ns9750_a platform).
- b From the Type pull-down menu, select ARMulator (rdiserv) for ARM.

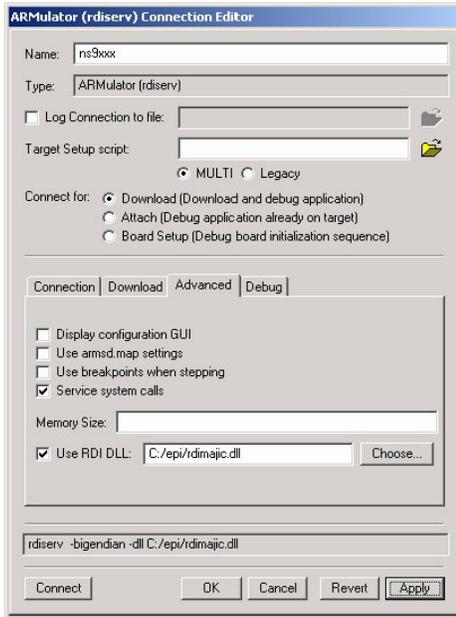
Then click Create.

The ARMulator (rdiserv) Connection Editor opens:



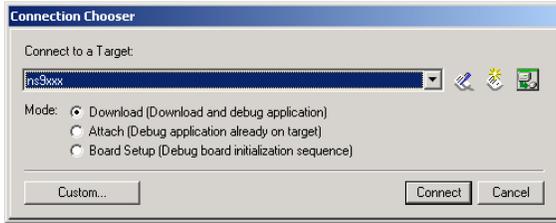
- 5 In the Connection portion of the Armulator window, do these steps:
 - a From the Processor pulldown menu, select **ARM9TDMI**. (This option is compatible with the Net+Silicon ARM926EJS-based processors.)
 - b Uncheck **Little Endian**.
 - c Click the **Advanced** tab.

You see this information in the center of the window:



- 6 Do these steps:
 - a Check RDI DLL.
 - b If the input text box next to the **RDI DLL** check box contains text, delete it.
 - c Click **Choose**, navigate to the folder you selected as the destination for the EPI files (in Task 9, step 8), and select `rdimajic.dll`.
 - d *In the Use RDI DLL text box, replace the back slashes (\) with forward slashes (/).*
- 7 Click **Apply**.
- 8 Close the **ARMulator (rdiserv) Connection Editor** by clicking **OK**, and then close the **Connection Organizer** window.
- 9 If a **HyperTerminal** window is not open, open one as you did in Task 7, step 1.
- 10 In the **MULTI Debugger** window, select **Target** → **Connect**.

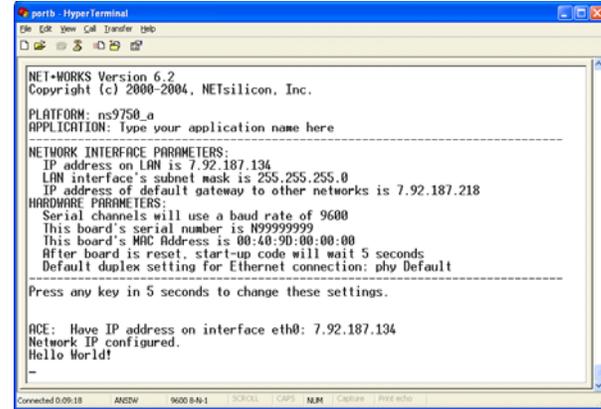
The Connection Chooser dialog box opens:



- 11 Check that the target name matches the name you entered in step 4a.
- 12 In the Connection Chooser dialog box, click **Connect**.
- 13 To start running the application, in the **MULTI Debugger** window, select **Debug** → **Go**.

If you have difficulty connecting, you may need to select **Target** → **Disconnect from Target**, and then go back to step 10 and continue.

When the application is loaded and starts running, the application dialog appears in the HyperTerminal window, as shown here:



Note that **Hel1o Wor1d** appears in the last line of the window.

14 Select **Debug** → **Halt**.

At the **MULTI**> prompt at the bottom of the **MULTI Debugger** window, set a breakpoint at the **main** function by typing:

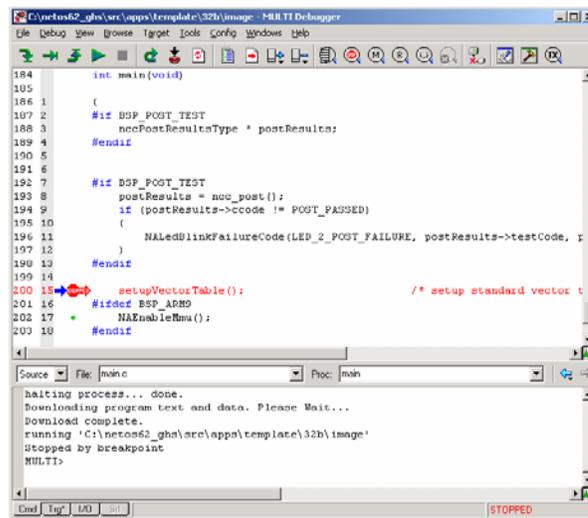
b main

and press **Enter**.

15 Select **Target** → **Disconnect from Target**.

16 Repeat steps 10 through 13 of this task.

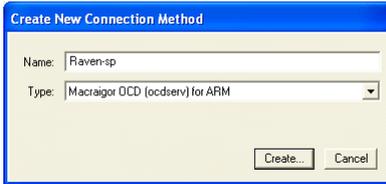
When you reach the breakpoint, you see this:



17 To continue execution, select **Debug** → **Go**.

You have now completed all the tasks in this guide.

The Create New Connection Method dialog box opens:

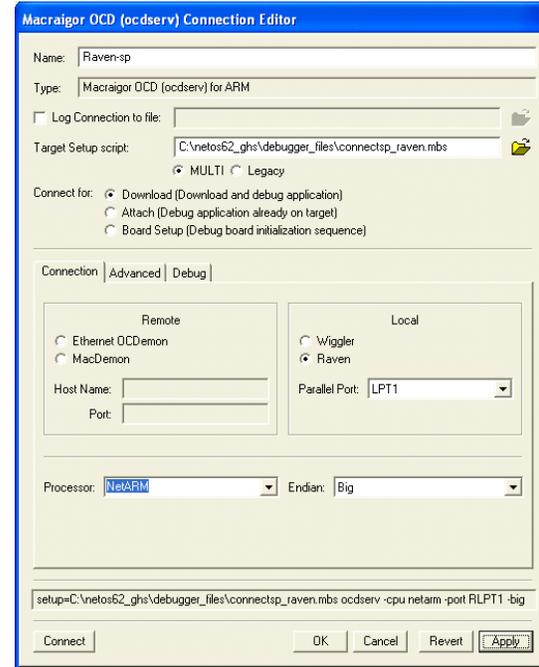


4 Do these steps:

- a In the Name input box, enter a descriptive name for your platform.
- b From the Type pull-down menu, select **Macraigor OCD (ocdserv) for ARM**.

Then click **Create**.

The Macraigor OCD (ocdserv) Connection Editor opens:



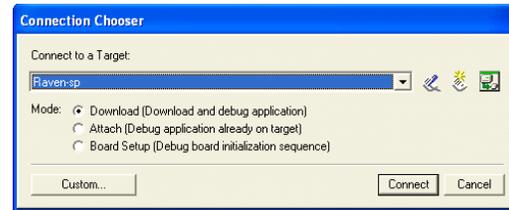
- 5 In the **Macraigor OCD (ocdserv) Connection Editor**, do these steps:
 - a In the input box next to **Target Setup** script, navigate to the `netos63_ghs\debugger_files\` directory, and select the script for your platform. The scripts have a `.mbs` extension.
 - b In the **Local** section of the window, click **Raven**. Then, from the **Parallel Port** pulldown menu, select your parallel port for the local connection
 - c In the **Processor** section of the window, from the **Processor** pulldown menu, select **NetARM**. Then, from the **Endian** pulldown menu, select **Big**.

Click **Apply**.

- 6 Close the **Macraigor OCD (ocdserv) Connection Editor** by clicking **OK**, and then close the **Connection Organizer** window.

- 7 In the **MULTI Debugger**, select **Target** → **Connect**.

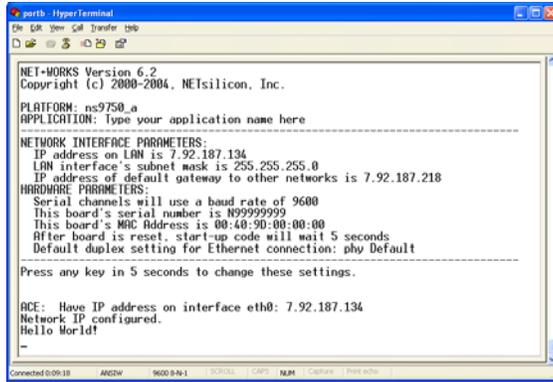
The **Connection Chooser** dialog box opens:



- 8 Check that the target name matches the name you entered in step 4a.
- 9 In the **Connection Chooser** dialog box, click **Connect**.
- 10 In the **MULTI Debugger** window, select **Debug** → **Go** to start running the program.

If you have difficulty connecting, you may need to select **Target** → **Disconnect**, and then go back to step 7.

When the program is loaded and starts running, the sample application dialog appears in the HyperTerminal window, as shown here:



Note that Hello World appears in the last line of the window.

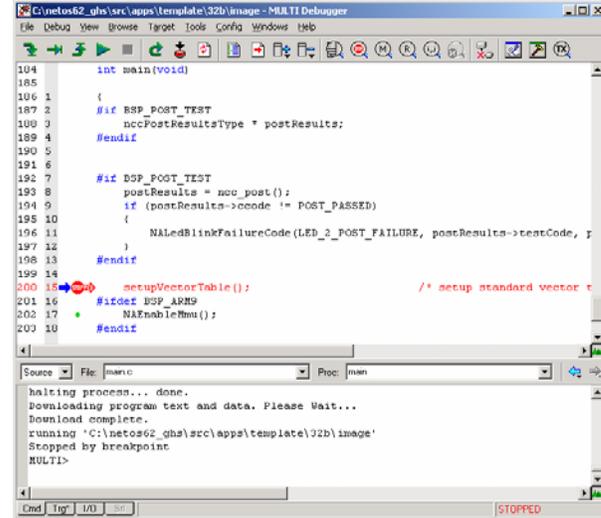
11 Select Debug → Halt.

At the MULTI> prompt at the bottom of the MULTI Debugger window, set a breakpoint at the main function by entering:

```
b main
```

12 Select Target → Disconnect from Target, and repeat steps 7 through 10.

When you reach the breakpoint, you see this:



13 To continue execution, select Debug → Go.

You have now completed all the tasks in this guide.

Tips and suggestions

Now that you've completed the exercise, here are some tips for when you start using NET+Works with Green Hills with your own projects.

Where should I put my code, and why?

Add your code as a subdirectory in the `netos63_ghs/src/examples` directory. The software calls the `applicationStart` function in the `root.c` file. Start by duplicating some other example and modifying the `Makefiles`.

A good choice is `naftpapp`, the FTP server example. Add your application to this example, which allows you to reload new code after it's running in flash. Without the FTP server in your application, you can't re-flash the system.

To load your specific settings, edit the `root.c` file. To make your board settings, edit the `appconf.h` file.

For information about modifying `Makefiles`, see the *NET+Works with Green Hills BSP Porting Guide*.

What should my next step be?

The next step is running your application from flash. The flash code is broken up into two parts:

- The bootloader (`rom.bin`), which is located in:
`netos63_ghs/src/bsp/platforms/your_platform`.
- Your application (`image.bin`), which is located in
`netos63_ghs/src/examples/your_example/32b`.

What do I need to know?

You need to become familiar with the central build system. Digi strongly recommends that you go to the *NET+Works with Green Hills BSP Porting Guide* to learn how to use the central build.

Appendix: Updating the MAJIC probe's firmware

This appendix describes how to update the firmware for your MAJIC probe using the MAJIC Setup Wizard.

You must do this procedure if you have a previous version of the MAJIC firmware.

If you need to set up the IP address of the MAJIC probe, see Task 8.

► To update the MAJIC's firmware:

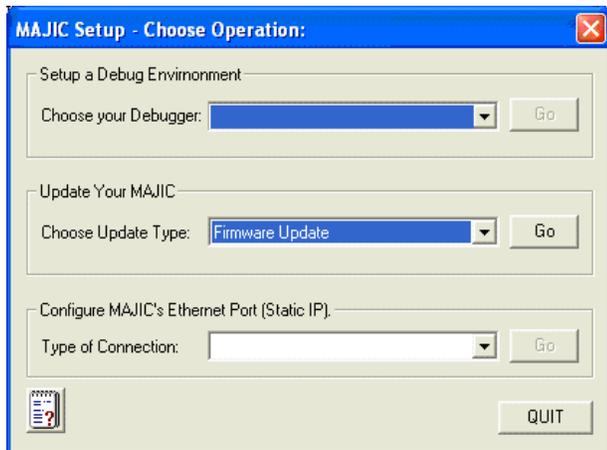
- 1 Start the MAJIC Setup Wizard by doing one of these steps:
 - **Windows XP systems.** Select Start → All Programs → EPI Tools-EDTA 2.2a → MAJIC Setup Wizard.
 - **Windows 2000 systems.** Select Start → Programs → EPI Tools-EDTA 2.2a → MAJIC Setup Wizard.

The EPI MAJIC Setup Wizard Introduction window opens:



2 After you review the introduction, click NEXT.

The Choose Operation window opens:

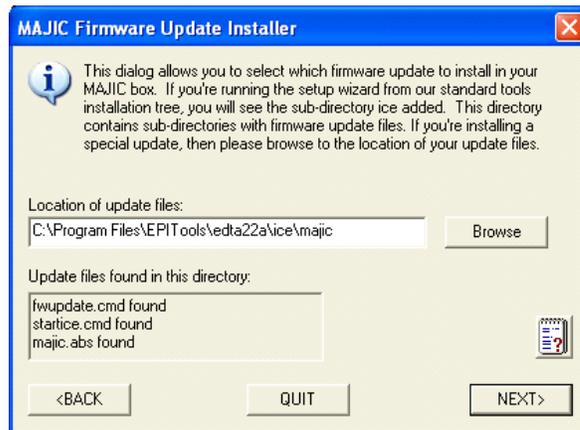


3 From the Choose Update Type pulldown menu, select **Firmware update**.

Then click **Go**.

The MAJIC Connection Parameters dialog box opens:

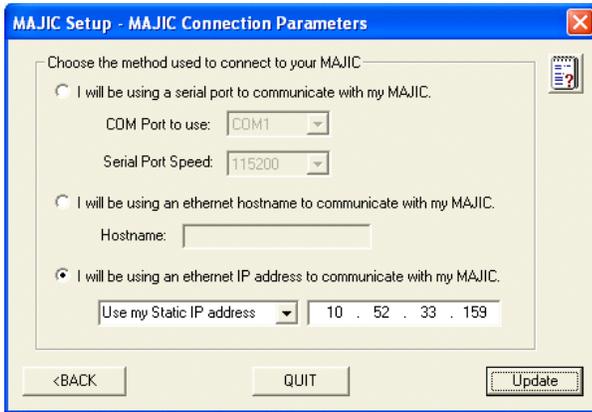
The MAJIC Firmware Update Installer dialog box opens:



4 If the directory name is not already in the **Location of update files** input box, browse to this directory:

C:\ProgramFiles\EPITools\edta22A\ice\majic

and click **NEXT**.

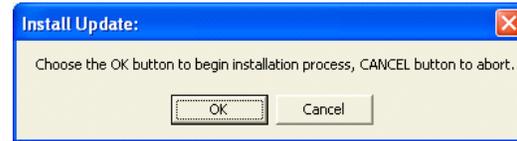


5 Do these steps:

- a Click I will be using an Ethernet IP address to communicate with my MAJIC.
- b Enter the IP address for the MAJIC.
- c Make sure Use My Static IP address is selected.

Then click Update.

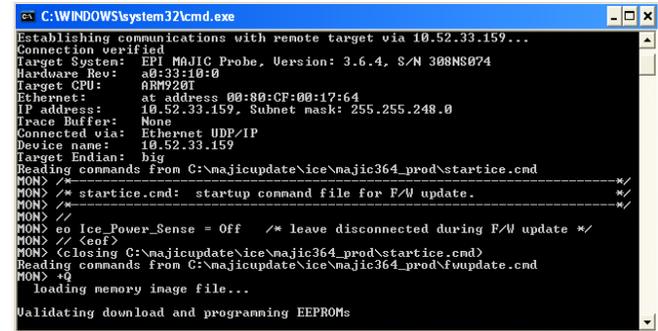
The Install Update dialog box opens:



6 To begin the update, click OK.

A DOS window and the Check Your Installation Result dialog box open.

The firmware download takes place in the DOS window:



- 7 When the download finishes, do one of these steps:
- If the download was successful, click **OK** in the **Check Your Installation Result** dialog box.
 - If the download was not successful, click **Cancel** in the **Check Your Installation Result** dialog box, and repeat this procedure.



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