DG0472
Demo Guide
Running Webserver and TFTP Server on SmartFusion2 Devices Using lwIP and FreeRTOS

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1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the current publication.

1.1 Revision 9.0

The following is a summary of the changes made in this revision.

- Updated the document for Libero SoC v12.6.
- Removed the references to Libero version numbers.

1.2 Revision 8.0

The document was updated for Libero v11.8 SP2 software release.

1.3 Revision 7.0

The following is a summary of the changes in revision 7.0 of this document.

- Libero SoC, FlashPro, and SoftConsole design requirements were updated. For more information, see Design Requirements, page 4.
- Throughout the document, the names of SoftConsole projects used in the demo design (and the associated figures) were updated.

1.4 Revision 6.0

The document was updated for Libero v11.7 software release details (SAR 77020).

1.5 Revision 5.0

The document was updated for Libero v11.6 software release (SAR 53219).

1.6 Revision 4.0

The document was updated for Libero v11.5 software release (SAR 53219).

1.7 Revision 3.0

The following is a summary of the changes in revision 3.0 of this document.

- The document was updated for Libero v11.4 software release details (SAR 60795).
- The document was updated for SmartFusion2 Advanced Development Board details (SAR 60795).

1.8 Revision 2.0

The document was updated to include TFTP server (SAR 55038).

1.9 Revision 1.0

The document was updated for Libero v11.2 software release (SAR 53219).

1.10 Revision 0.0

Revision 0.0 was the first publication of this document.

2 Running Webserver and TFTP Server on SmartFusion2 Device

The demo design associated with this document shows the Tri-Speed Ethernet Medium Access Controller (TSEMAC) features of the SmartFusion®2 device. The design has a Webserver and a Trivial File Transfer Protocol (TFTP) server implemented on a SmartFusion2 Advanced Development Board. For more information about this board, refer to *UG0557: SmartFusion2 SoC FPGA Advanced Development Kit User Guide*.

The design demonstrates the following.

- Use of SmartFusion2 Ethernet MAC connected to a Serial Gigabit Media Independent Interface (SGMII) PHY.
- Integration of SmartFusion2 MAC driver with lwIP TCP/IP stack and FreeRTOS operating system.
- Implementation of Webserver on the SmartFusion2 Advanced Development Board.
- Implementation of TFTP server on the SmartFusion2 Advanced Development Board.
- Procedure to run Webserver and TFTP server designs on the SmartFusion2 Advanced Development Board.

The Microcontroller Subsystem (MSS) of the SmartFusion2 device has an instance of the TSEMAC peripheral, which can be configured between the host PC and the Ethernet network at 10/100/1000 Mbps data transfer rates (line speeds).

For more information about the TSEMAC interface for SmartFusion2 devices, refer to *UG0331: SmartFusion2 Microcontroller Subsystem User Guide*.

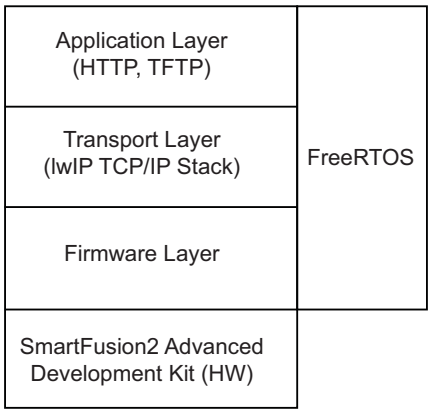
2.1 Webserver and TFTP Server Demo Design Layers

The Webserver and TFTP server demo designs have the following layers.

- Application layer
- Transport layer (lwIP TCP/IP stack)
- RTOS and firmware layer

The following figure is a block diagram of the three layers in the Webserver and TFTP server applications on the SmartFusion2 device.

Figure 1 • **Webserver and TFTP Server Applications on a SmartFusion2 FPGA**



2.1.1 Application Layer

The Webserver handles the HTTP request from the client (host PC) browser and transfers the static pages to the client in response to its request. When the IP address (for example, http://10.60.3.25) is typed in the address bar of the browser, an HTTP request is sent to the port associated with the Webserver. The Webserver then interprets the request and responds to the client with the requested page or resource.

The TFTP client (the host PC) transfers files to the SmartFusion2 device (the TFTP server) using the `TFTP PUT` command. Transferred files are stored in the SmartFusion2 Advanced Development Board external flash memory, which is connected to the SmartFusion2 SPI_0 interface. The File Allocation Table (FAT) file system on the SPI flash is used to display the files available in SPI flash memory.

2.1.2 Transport Layer (lwIP TCP/IP Stack)

The lwIP TCP/IP stack, developed by Adam Dunkels at the Swedish Institute of Computer Science (SICS), is suitable for embedded systems because of its low system resource usage. The lwIP stack can be used with or without an operating system. It consists of actual implementations of IP, ICMP, UDP, and TCP protocols, as well as the support functions such as buffer and memory management.

For more information about lwIP design and implementation, refer to *www.sics.se/~adam/lwip/doc/lwip.pdf*.

lwIP is available (under a BSD license) in C source-code format for download at *http://download.savannah.gnu.org/releases/lwip/*.

2.1.3 RTOS and Firmware Layer

FreeRTOS is an open-source, real-time operating system kernel. In this demo, FreeRTOS is used to prioritize and schedule tasks. For more information about FreeRTOS, including the latest source code, refer to *http://www.freertos.org*.

The firmware provides software drivers to configure and control the following MSS components.

- Ethernet MAC
- MMUART
- GPIO
- SPI
- RTC

2.2 Design Requirements

The following table lists the hardware and software requirements for running this demo design.

Table 1 • **Design Requirements**

Requirement	Version
Operating System	64 bit Windows 7 and 10
Hardware	
SmartFusion2 Advanced Development Kit with: • 12 V adapter • USB A to mini-B cable	Rev B or later
Ethernet cable	RJ45
Software	
FlashPro Express	Refer to the `readme.txt` file provided in the design files for the software versions used with this reference design.
Libero® System-on-Chip (SoC) for viewing the design files	
SoftConsole	
MSS Ethernet MAC drivers	
Host PC drivers	*USB to UART drivers*
A serial terminal emulation program	HyperTerminal, TeraTerm, or PuTTY
Browser	Mozilla Firefox or Internet Explorer

Note: Libero SmartDesign and configuration screen shots shown in this guide are for illustration purpose only. Open the Libero design to see the latest updates.

2.3 Prerequisites

Before you begin:

Download and install Libero SoC (as indicated in the website for this design) on the host PC from the following location.

https://www.microsemi.com/product-directory/design-resources/1750-libero-soc

2.4 Demo Design

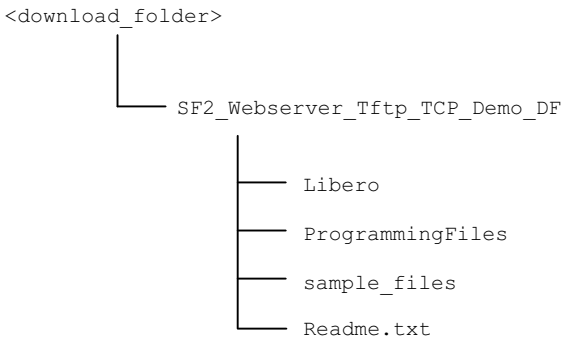
The demo design files are available for download at *http://soc.microsemi.com/download/rsc/?f=m2s_dg0472_df*

The demo design files include:

- A Libero SoC hardware project with the corresponding SoftConsole firmware project
- Sample files to be transferred to the SmartFusion2 device using the TFTP server
- Programming files
- `A Readme.txt` file

The following figure shows the top-level structure of the demo design files. For more information, refer to the `Readme.txt` file.

Figure 2 • **Demo Design Files Top-Level Structure**



2.4.1 Demo Design Features

- Webserver: Displays options for the following:
  - RTC and Ethernet interface data display
  - LED blinking
  - HyperTerminal display
  - SmartFusion2 Google Search
- TFTP server: Transfers files from the host PC to the SmartFusion2 Advanced Development Board

2.4.2 Demo Design Description

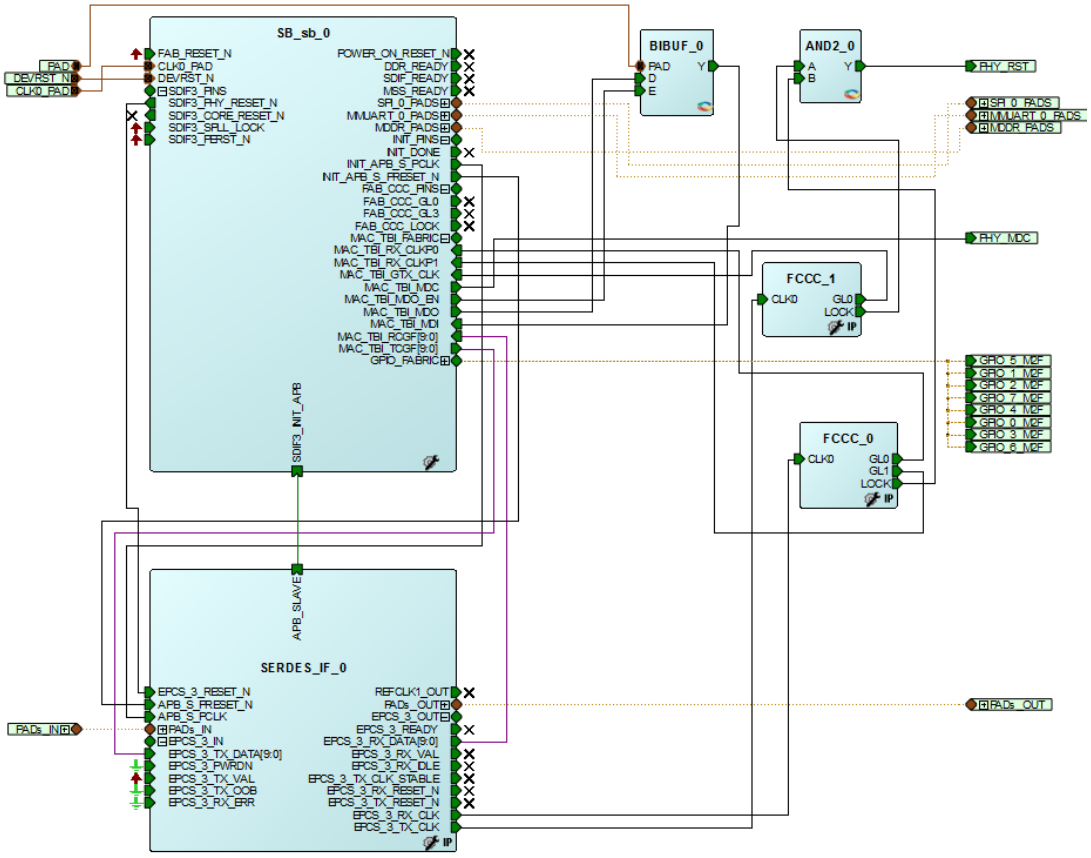
The demo design is implemented using an SGMII PHY interface, by configuring the TSEMAC for ten-bit interface (TBI) operation. For more information about the TSEMAC TBI interface, refer to *UG0331: SmartFusion2 Microcontroller Subsystem User Guide*.

This section provides detailed information about the Libero SoC hardware project and SoftConsole firmware project associated with the demo design.

2.4.2.1 Libero SoC Hardware Project

The following figure shows the Libero SoC top-level hardware design implementation for the demo design.

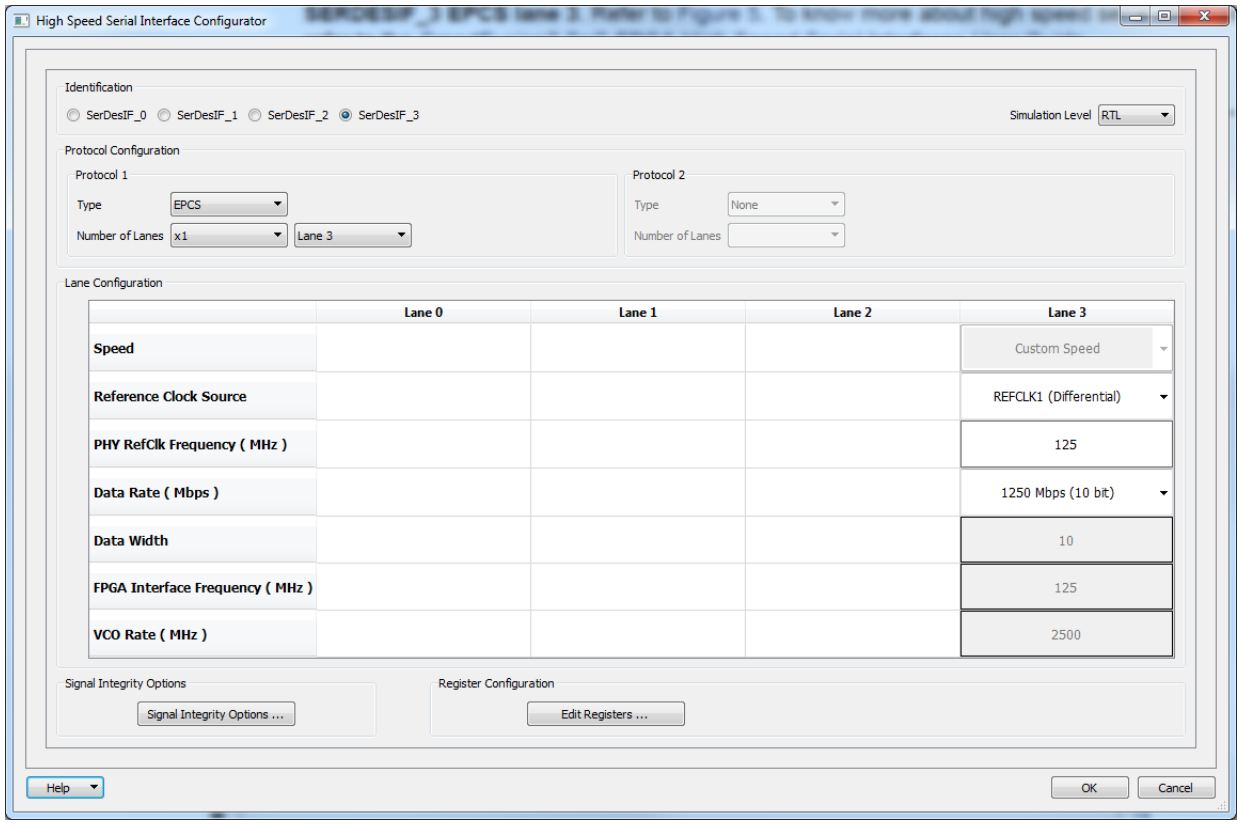
Figure 3 • **Libero SoC Top-Level Hardware Design**



The Libero SoC hardware project uses the following SmartFusion2 MSS resources and IP.

- TSEMAC TBI interface for supporting Ethernet functionality on the SmartFusion2 device
- MMUART_0 interface for RS-232 communications on the SmartFusion2 Advanced Development Kit
- SPI_0 interface for accessing external flash memory
- General Purpose Input and Output (GPIO) for connecting to the LEDs on the board
- Dedicated input pad 0 as the clock source
- SERDES_IF IP high-speed serial interface configured for SerDesIF_3 EPCS Lane 3 (as shown in the following figure)

Figure 4 • **High-Speed Serial Interface Configuration**



For more information about high-speed serial interfaces, refer to *UG0447: IGLOO2 and SmartFusion2 High Speed Serial Interfaces User Guide*.

2.4.2.1.1 Package Pin Assignment

Each LED and PHY interface signal on the SmartFusion2 board has a package pin assigned to it. The following table lists the LED port names and corresponding package pins.

Table 2 • **LED to Package Pin Assignment**

Port Name	Package Pin
LED_1	D26
LED_2	F26
LED_3	A27
LED_4	C26
LED_5	C28
LED_6	B27
LED_7	C27
LED_8	E26

The following table lists the PHY interface signals and corresponding package pins

Table 3 • **PHY Interface Signal to Package Pin Assignment**

Port Name	Direction	Package Pin
PHY_MDC	Output	F3
PHY_MDIO	Input	K7
PHY_RST	Output	F2

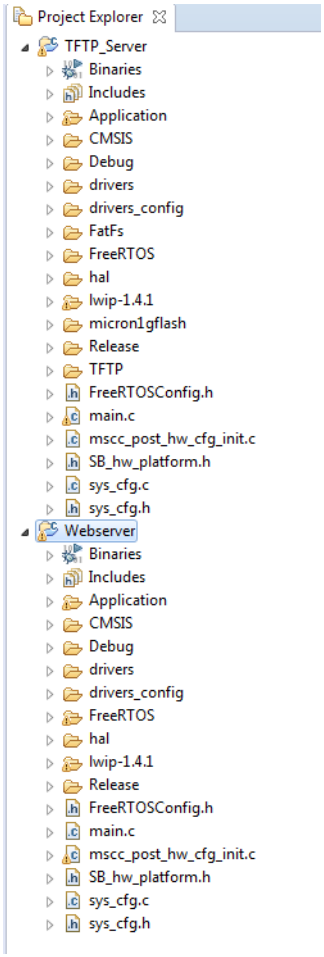
2.4.2.2 SoftConsole Firmware Project

The following stacks available in the SoftConsole Project Explorer are used in this demo design.

- lwIP TCP/IP stack v1.4.1
- FreeRTOS

The following figure shows the directory structure of the demo design in SoftConsole.

Figure 5 • **Demo Design Directory Structure in SoftConsole Project**



The SoftConsole workspace consists of the following projects.

- TFTP_Server: contains the TFTP server application (which uses LWIP, FreeRTOS, and FatFs) and all the firmware and hardware abstraction layers that correspond to the hardware design.
- Webserver: contains the Webserver application (which uses LWIP and FreeRTOS) and all the firmware and hardware abstraction layers that correspond to the hardware design.

The following figure shows the driver versions used for the demo.

Figure 6 • **Demo Design Driver Versions**

	Generate		Instance Name	Core Type	Version	Compatible Hardware Instance
1	☑		SmartFusion2_CMSIS_0	SmartFusion2_CMSIS	2.3.105	SB_sb_MSS
2	☑		SmartFusion2_MSS_Ethernet_MAC_Driver_0	SmartFusion2_MSS_Ethernet_MAC_Driver	3.1.100	SB_sb_MSS:MAC
3	☑		SmartFusion2_MSS_GPIO_Driver_0	SmartFusion2_MSS_GPIO_Driver	2.1.102	SB_sb_MSS:GPIO
4	☐		SmartFusion2_MSS_HPDMA_Driver_0	SmartFusion2_MSS_HPDMA_Driver	2.2.100	SB_sb_MSS
5	☑		SmartFusion2_MSS_MMUART_Driver_0	SmartFusion2_MSS_MMUART_Driver	2.1.100	SB_sb_MSS:MMUART_0
6	☐		SmartFusion2_MSS_NVM_Driver_0	SmartFusion2_MSS_NVM_Driver	2.4.100	SB_sb_MSS
7	☐		SmartFusion2_MSS_PDMA_Driver_0	SmartFusion2_MSS_PDMA_Driver	2.0.102	SB_sb_MSS:DMA
8	☑		SmartFusion2_MSS_RTC_Driver_0	SmartFusion2_MSS_RTC_Driver	2.2.100	SB_sb_MSS:RTC
9	☑		SmartFusion2_MSS_SPI_Driver_0	SmartFusion2_MSS_SPI_Driver	2.2.101	SB_sb_MSS:SPI_0
10	☐		SmartFusion2_MSS_System_Services_Driver_0	SmartFusion2_MSS_System_Services_Driver	2.7.100	SB_sb_MSS
11	☑		SmartFusion2_MSS_Timer_Driver_0	SmartFusion2_MSS_Timer_Driver	2.2.100	SB_sb_MSS

2.5 Setting Up the Demo Design

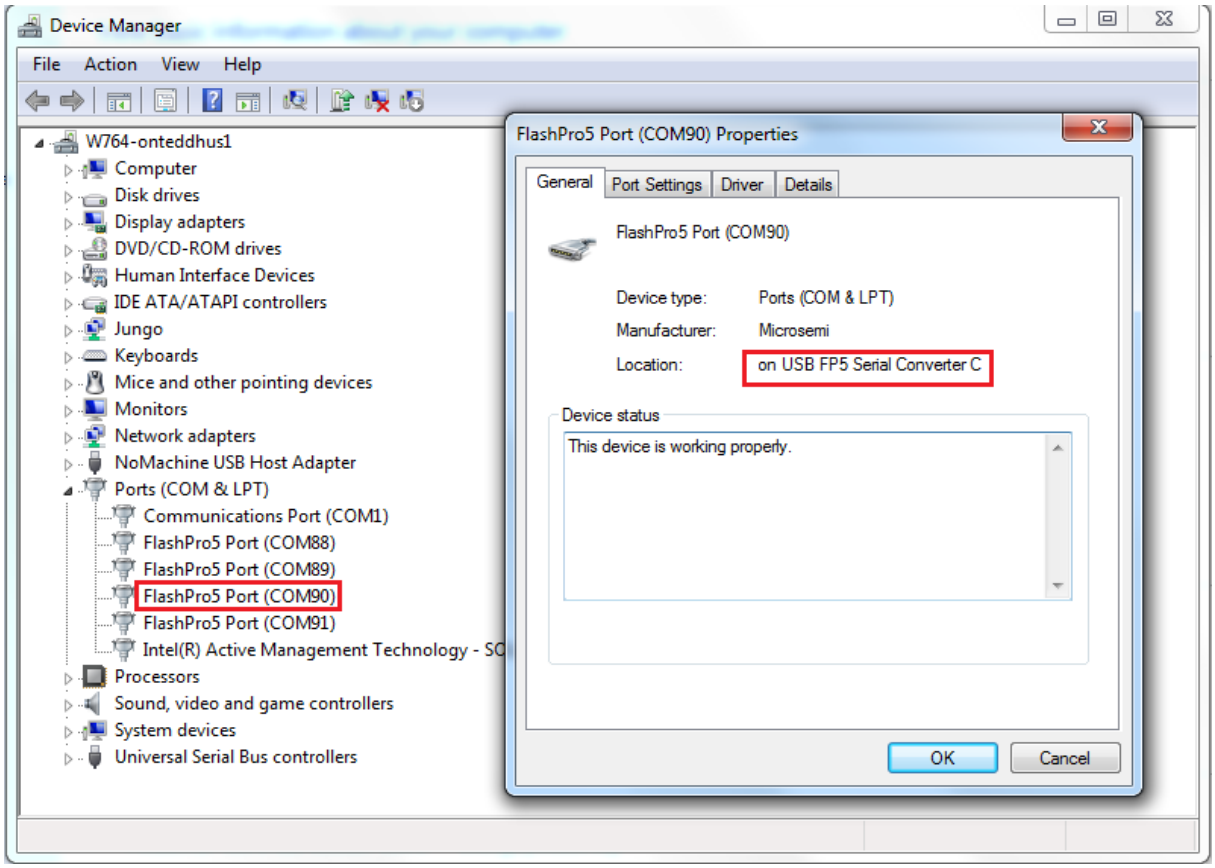
The following steps describe how to set up the demo for SmartFusion2 Advanced Development Board.

1. Connect the host PC to the **J33** connector using a USB A to mini-B cable.
   The COM ports are automatically detected and displayed in the Device Manager window.

Note: If the COM ports are not detected automatically, install the FTDI D2XX driver for serial terminal communication through the FTDI mini-USB cable. The driver, along with the installation guide, is available at *www.microsemi.com/soc/documents/CDM_2.08.24_WHQL_Certified.zip*.

2. Right-click each of the four detected COM ports, and click **Properties** to find the port with the location **on USB FP5 Serial Converter C**, as shown in the following figure.

Figure 7 • **Device Manager Window**



3. Make a note of the COM port number for use during serial terminal configuration. For more information, refer to Running the Demo Design, page 11.

4. Connect the jumpers on the SmartFusion2 Advanced Development Board as specified in the following table.
   Caution: Switch OFF the power supply switch, **SW7**, before connecting the jumpers.

Table 4 • **SmartFusion2 Advanced Development Kit Jumper Settings**

Jumper	Pin From	Pin To	Comments
J116, J353, J354, J54	1	2	Default jumper settings for the SmartFusion2 Advanced Development Board
J123	2	3	
J124, J121, J32	1	2	JTAG programming through FTDI
J118, J119	1	2	Programming through SPI flash

   For information about jumper locations, refer to Appendix 3: Jumper Locations, page 25.
5. Connect the power supply to the **J42** connector in the SmartFusion2 Advanced Development Kit.
6. Depending on the IP mode you want to use for the design, connect one of the following to the **J21** connector of the SmartFusion2 Advanced Development Kit Board using an RJ45 cable.
   - For static IP mode, connect the host PC.
   - For dynamic IP mode, connect any one of the open network ports.

Note: By default, programming files are provided for dynamic IP mode. To run the design in static IP mode, refer to Appendix 4: Running the Design in Static IP Mode, page 26.

2.5.1 Board Setup

For snapshots of the SmartFusion2 Advanced Development Board setup for the demo design, refer to Appendix 2: Board Setup for Running the Demo, page 24.

2.6 Running the Demo Design

In order to run the demo design, perform the following steps:

1. Download the demo design files from *http://soc.microsemi.com/download/rsc/?f=m2s_dg0472_df*.
2. Switch ON the power supply switch (SW7).
3. Start a serial terminal emulation program such as HyperTerminal, PuTTY, or TeraTerm.

Note: For this demo, HyperTerminal is used.

4. Configure the program's serial terminal settings as follows.
   - Baud Rate: 115200
   - Eight data bits
   - One stop bit
   - No parity
   - No flow control

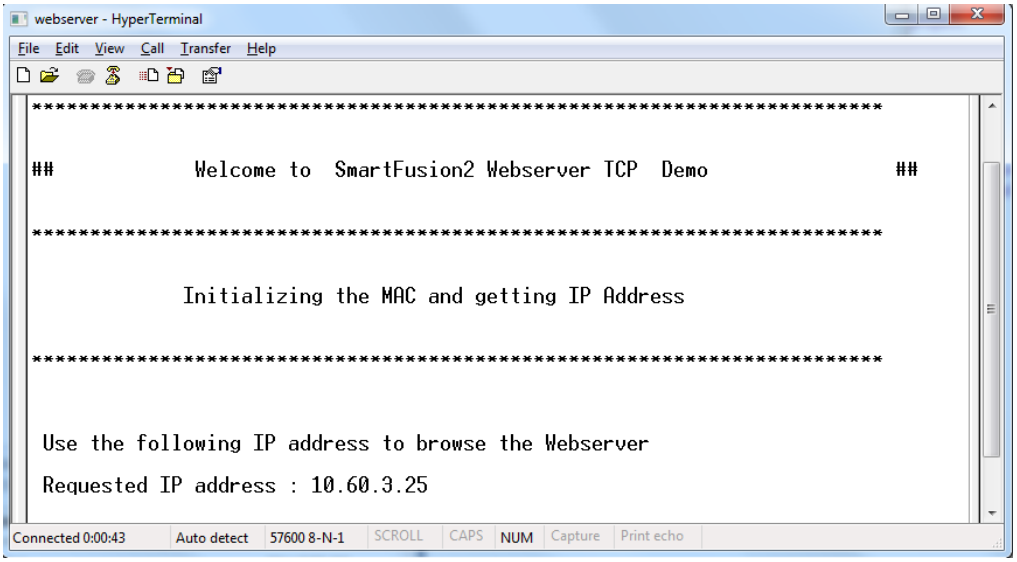
   For more information about configuring serial terminal emulation programs, refer to *Configuring Serial Terminal Emulation Programs Tutorial*.

2.6.1 Running Webserver Demo

The following steps describe how to run the Webserver demo.

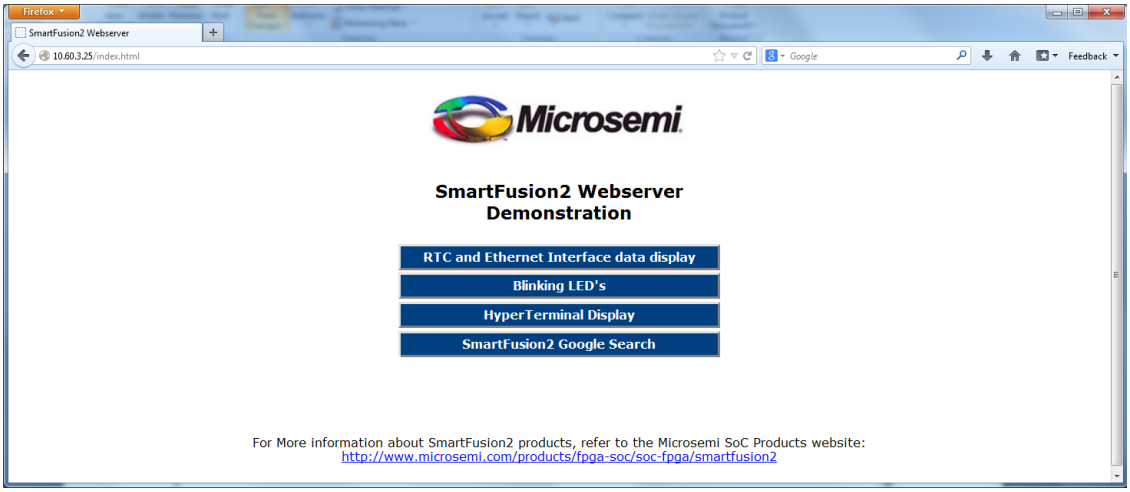
1. Program the SmartFusion2 Advanced Development Kit board with the job file provided as part of the design files using FlashPro Express software, refer to Appendix 1: Programming the Device Using FlashPro Express, page 21.
   The HyperTerminal window displays a welcome message with an IP address, as shown in the following figure.

Figure 8 • **HyperTerminal with IP Address**



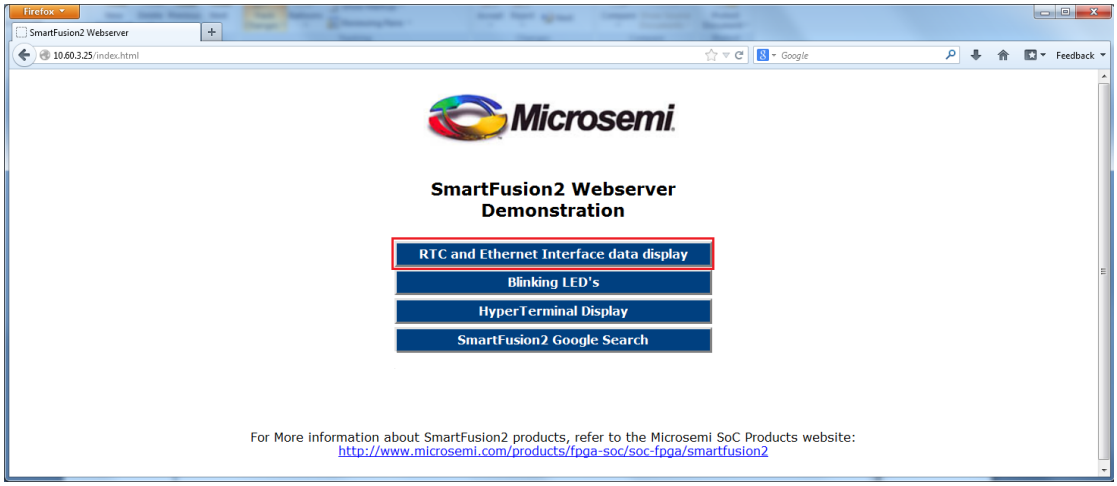
2. Open a web browser, and enter the IP address displayed on the HyperTerminal window in the address bar of the browser.
   The SmartFusion2 Webserver demo main menu appears, as shown in the following figure.

Figure 9 • **Webserver Demo Main Menu**



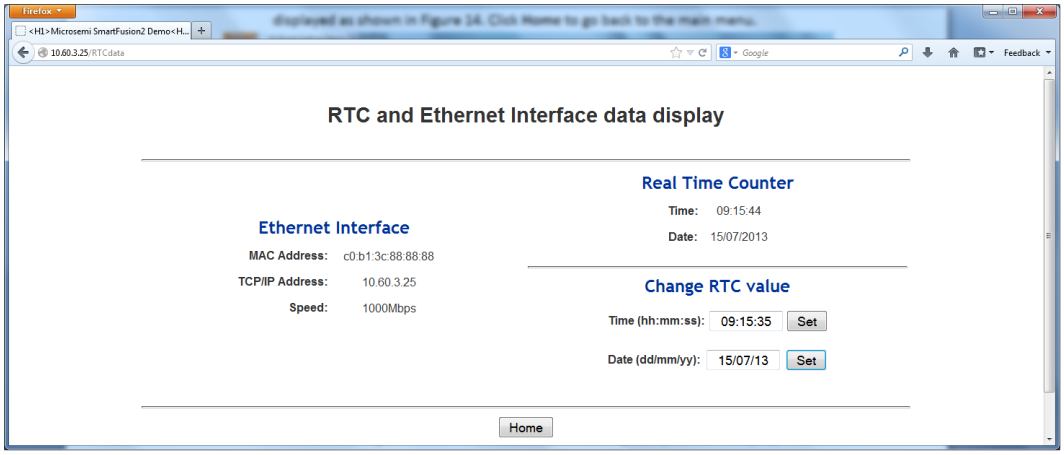
3. Click **RTC and Ethernet Interface data display**.

Figure 10 • **Selecting RTC and Ethernet Interface Data Display**



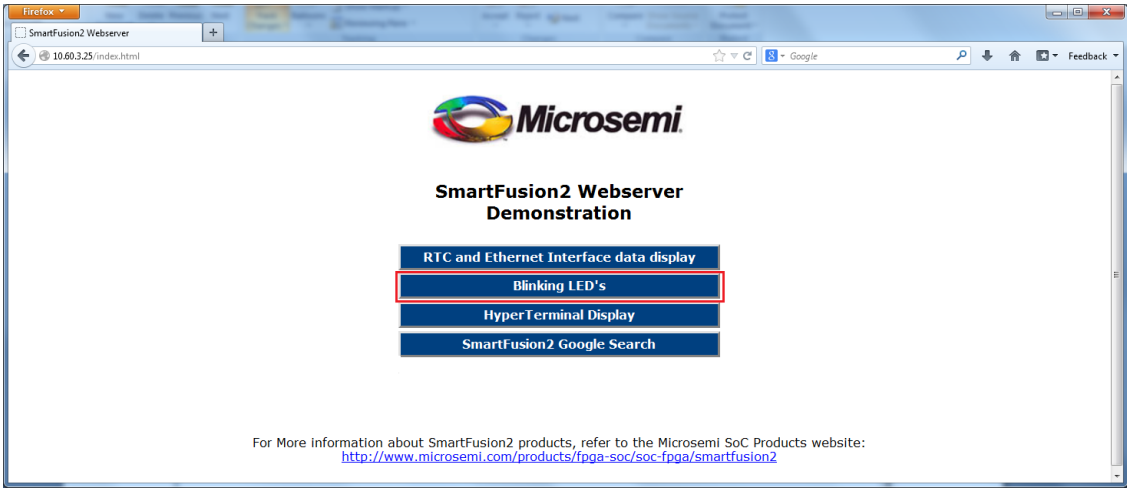
The following web page appears, displaying RTC values and Ethernet MAC properties.

Figure 11 • **Webserver RTC and Ethernet Interface Data Display**



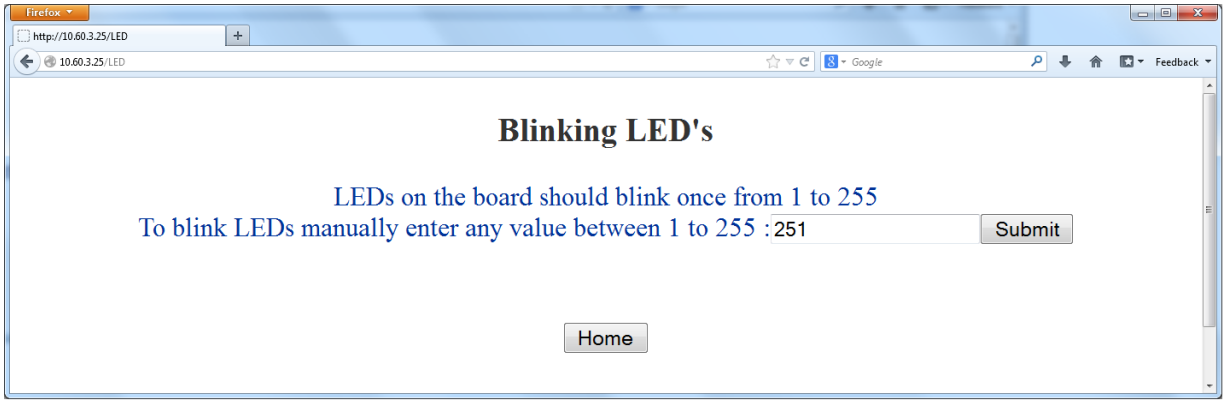
4. Click **Home** to go back to the main menu.
5. Click **Blinking LEDs** on the main menu.

Figure 12 • **Selecting Blinking LEDs**



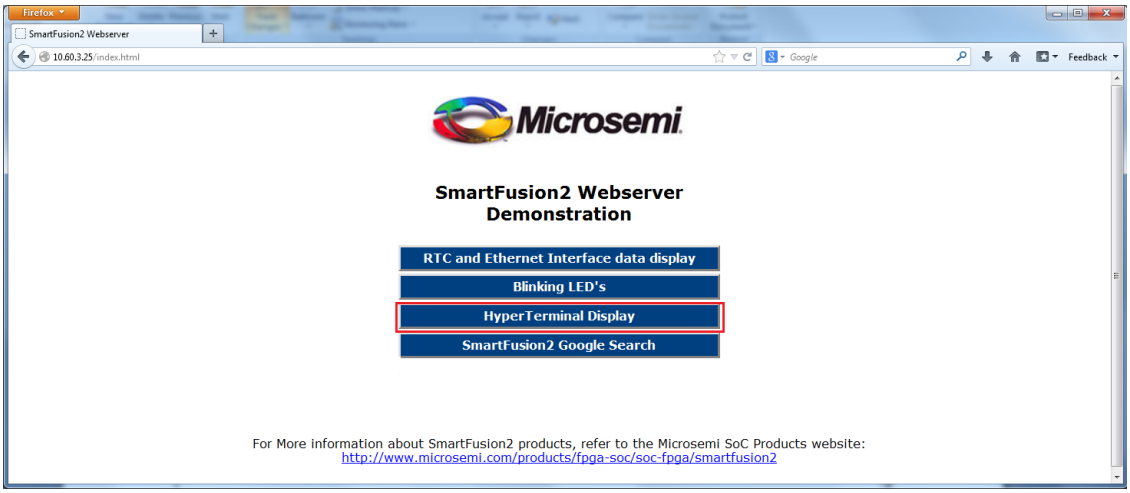
The LEDs on the board start blinking, and a web page appears, with an option to enter a value to toggle LEDs manually.

Figure 13 • **Entering Values for LEDs to Blink**



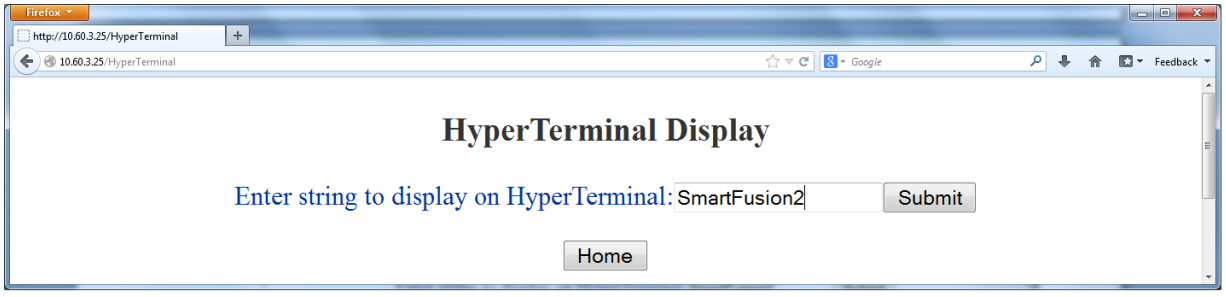
6. Enter any number between 1-255 to toggle the LEDs manually.
   Because the SmartFusion2 Advanced Development Kit has active-low LEDs, if 1 is entered, LED1 goes OFF; if 255 is entered, all the eight LEDs go OFF.
7. Click **Home** to go back to the main menu.
8. Click **HyperTerminal Display** on the main menu.

Figure 14 • **Selecting HyperTerminal Display**



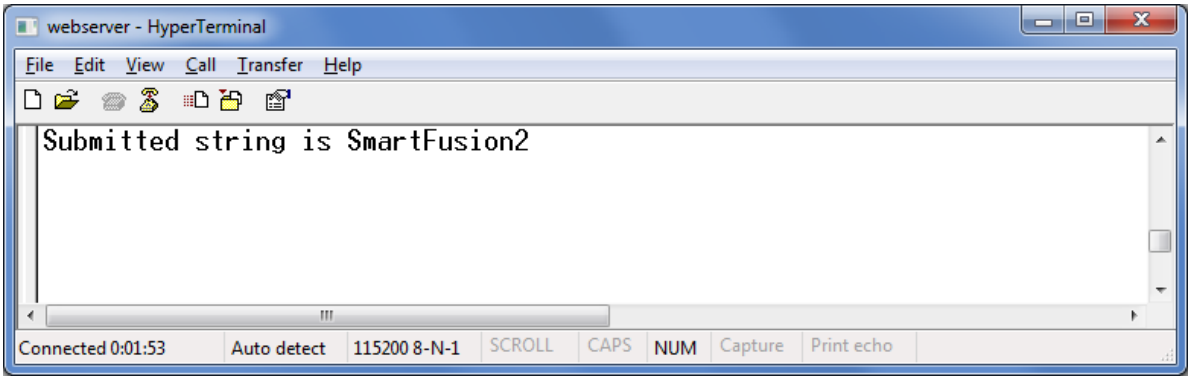
A web page appears with an option to enter a string value to be displayed in HyperTerminal.

Figure 15 • **Webserver HyperTerminal Display**



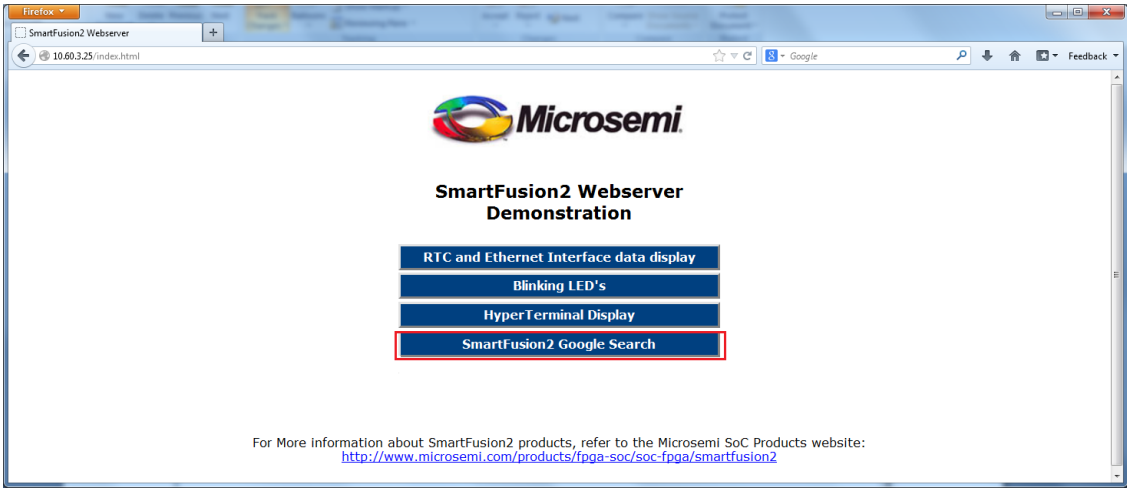
9. Enter the desired string value, and click **Submit**.
   The following message appears, indicating that the string was successfully submitted.

Figure 16 • **String Display on HyperTerminal**



10. Click **Home** to go back to the main menu.
11. Click **SmartFusion2 Google Search** on the main menu.

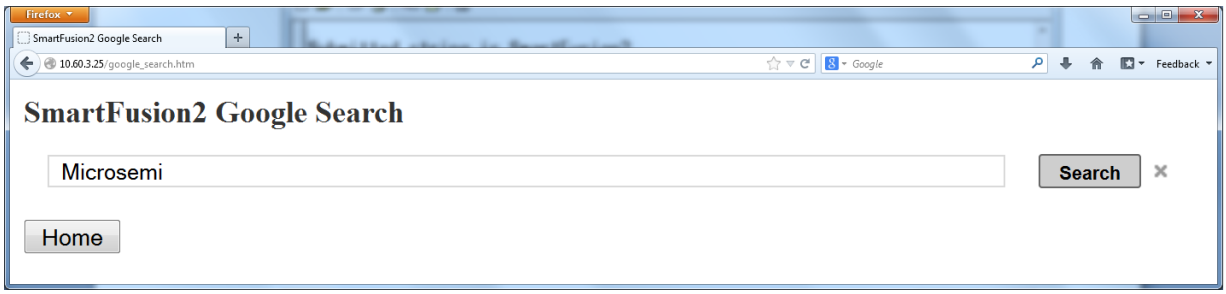
Figure 17 • **Selecting SmartFusion2 Google Search**



Note: An Internet connection is required to access the SmartFusion2 Google Search page.

A web page appears, with the **SmartFusion2 Google Search** option.

Figure 18 • **Webserver SmartFusion2 Google Search**



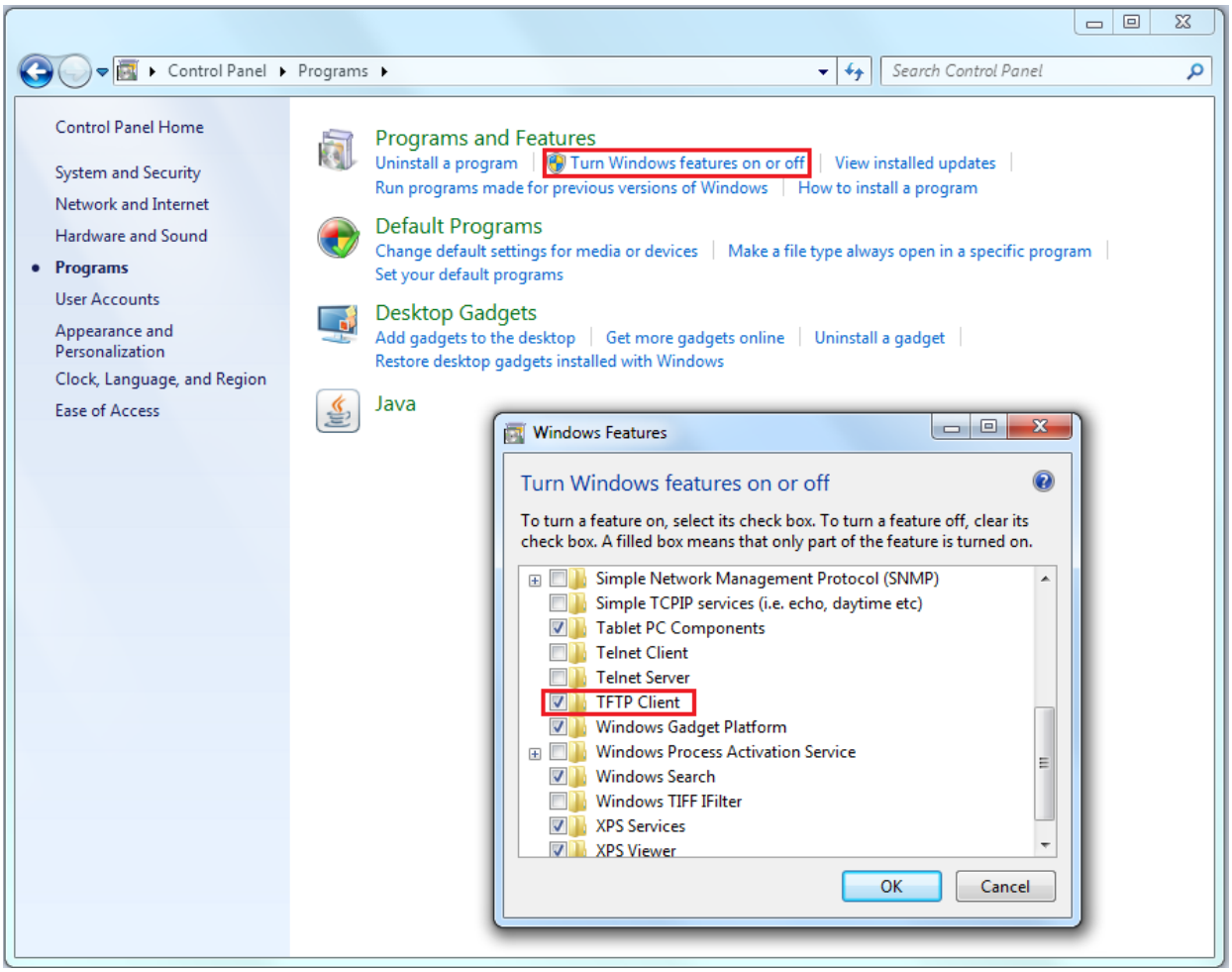
12. Click **Home** to go back to the main menu.

2.6.1.1 Running the TFTP Demo

The following steps describe how to run the TFTP demo.

1. To enable the TFTP client in the host PC, navigate to **Control Panel** > **Programs and Features**.
2. Click **Turn Windows Features On or Off**, select **TFTP Client** in the Windows Features dialog box, and click **OK**, as shown in the following figure.

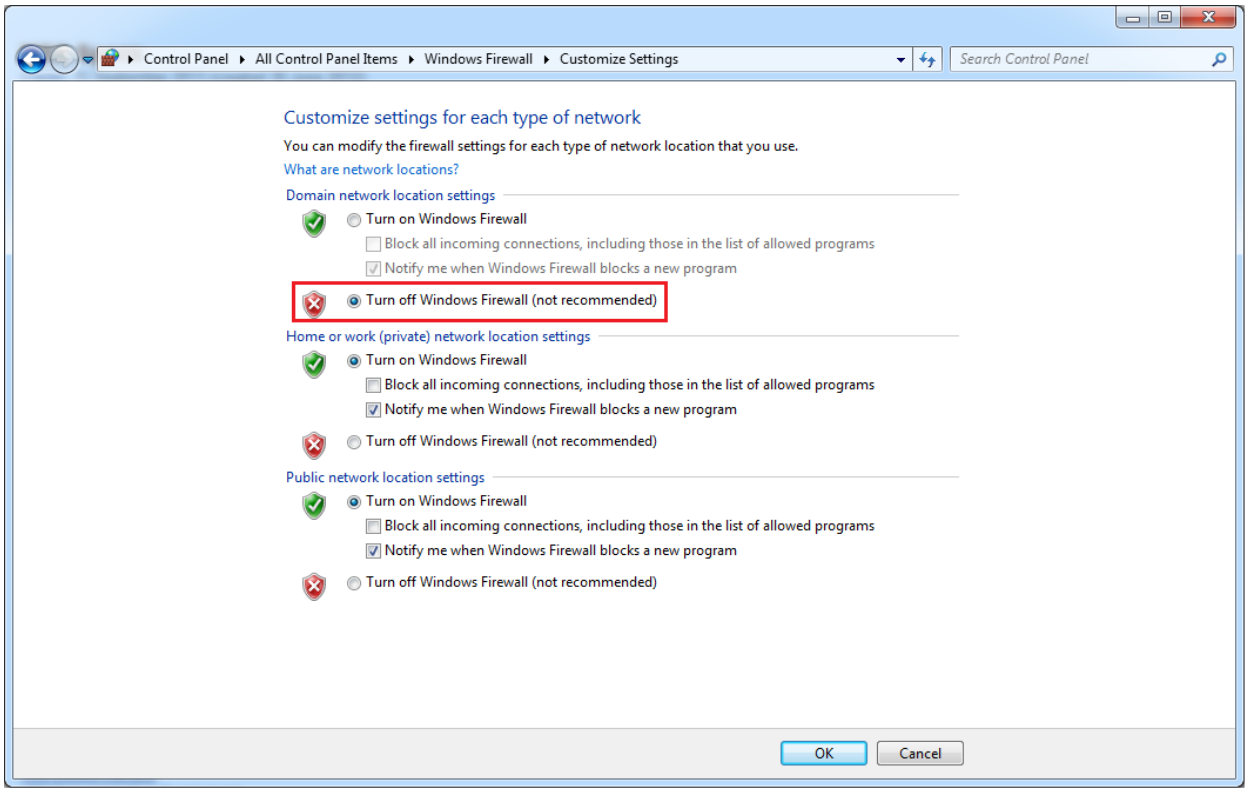
Figure 19 • **Enabling TFTP Client in Host PC**



3. Navigate to **Control Panel** > **Windows Firewall**, and click **Turn Windows Firewall On or Off**.

4. Select **Turn off Windows Firewall** under **Domain network location settings**, and click **OK**, as shown in the following figure.

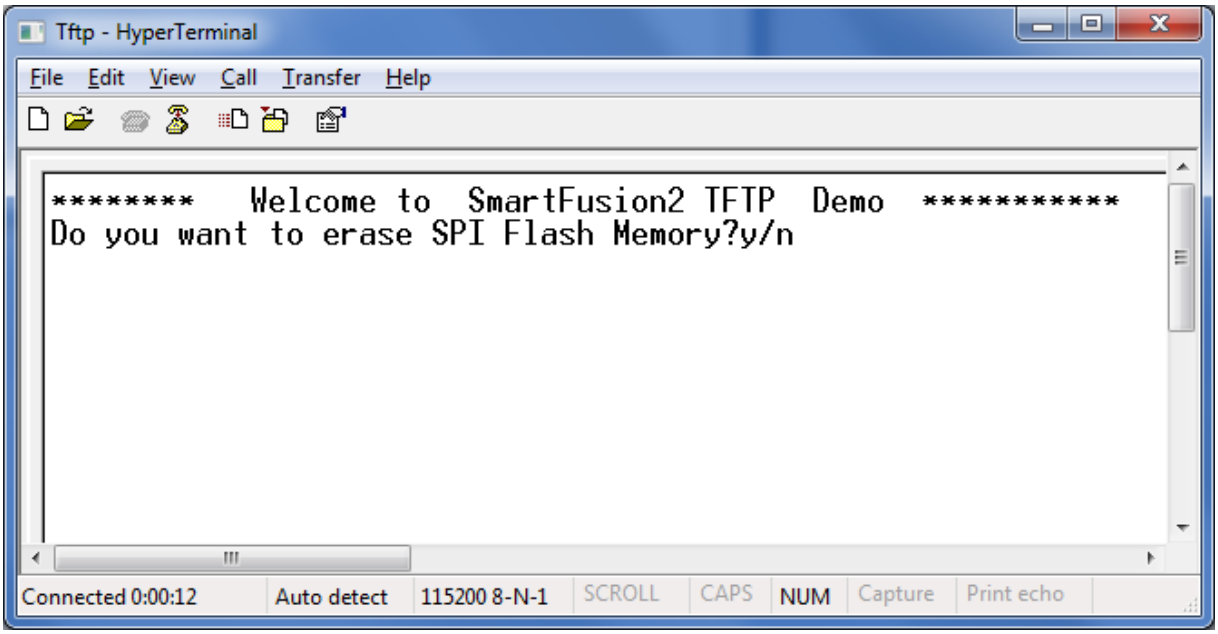
Figure 20 • **Windows Firewall Settings**



5. Launch the FlashPro Express software, and program the device with the `Webserver_TCP_top_tftp.job` file located at *<download_folder>\SF2_Webserver_Tftp_TCP_Demo_DF\ProgrammingFiles\Tftp_Server*. Wait until the PROGRM PASSED message is displayed. (Refer to steps 1 to 9 of Appendix 1: Programming the Device Using FlashPro Express, page 21.)

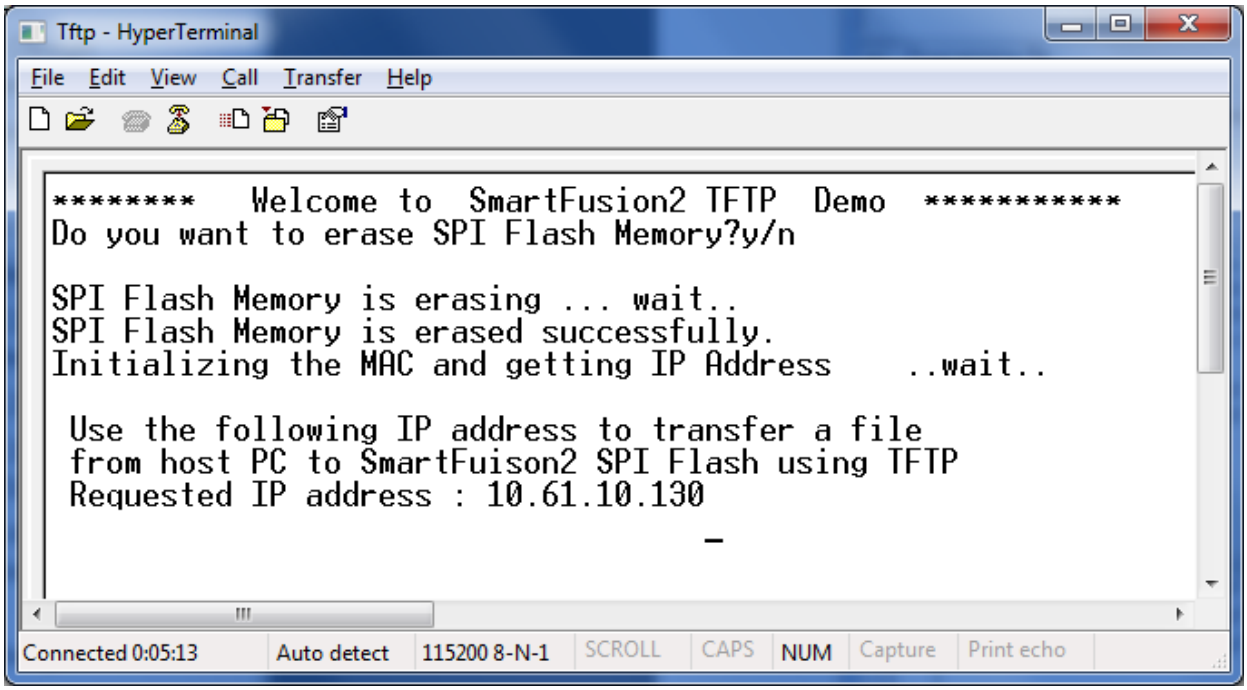
The HyperTerminal window displays a welcome message with an option to clear SPI flash contents, as shown in the following figure.

Figure 21 • **HyperTerminal Welcome Message**



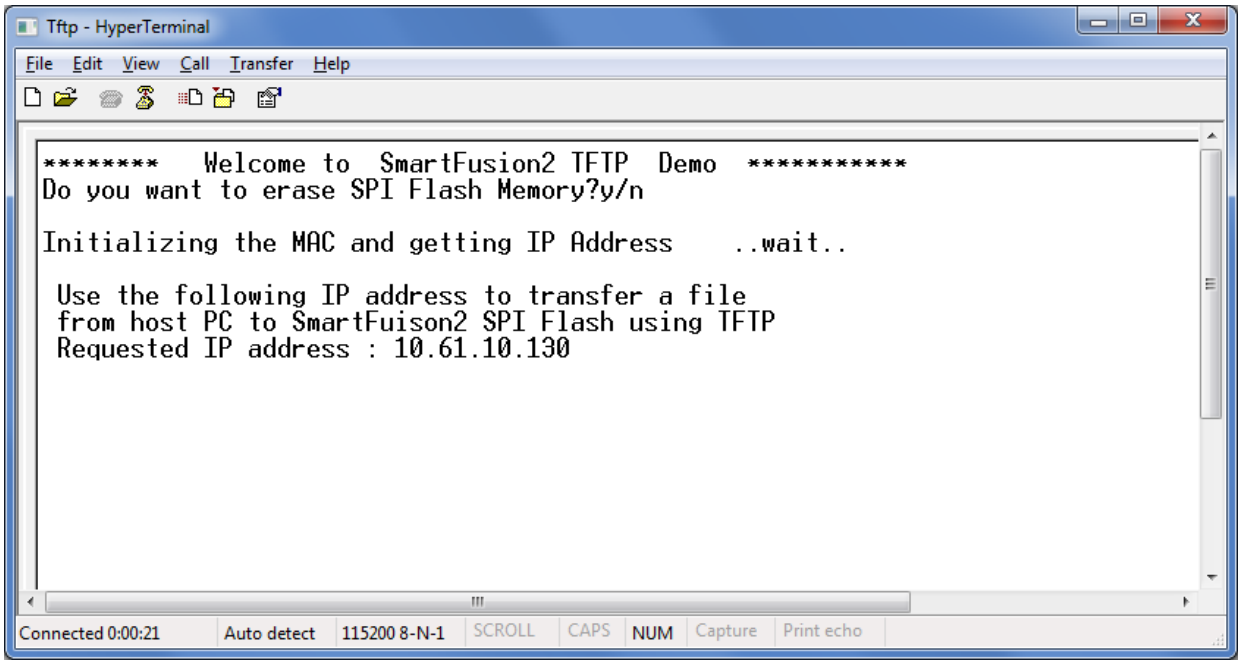
6. Type **y** to erase SPI flash memory, as shown in the following figure.

Figure 22 • **Erasing SPI Flash Memory**



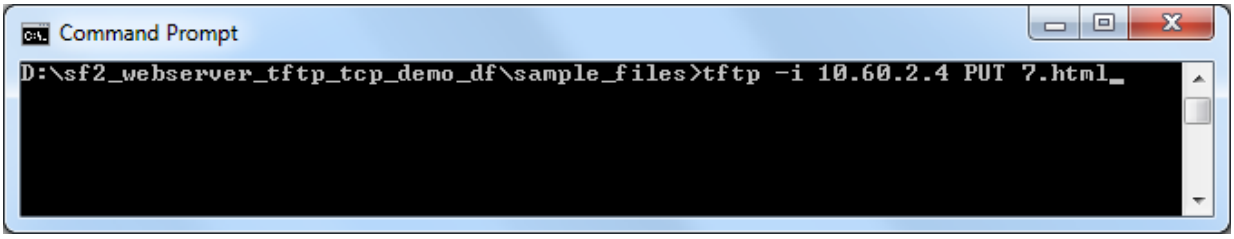
7. Type any key other than **y** to avoid erasing SPI flash.
   The HyperTerminal program displays a dynamic IP address, as shown in the following figure.

Figure 23 • **HyperTerminal with Dynamic IP Address**



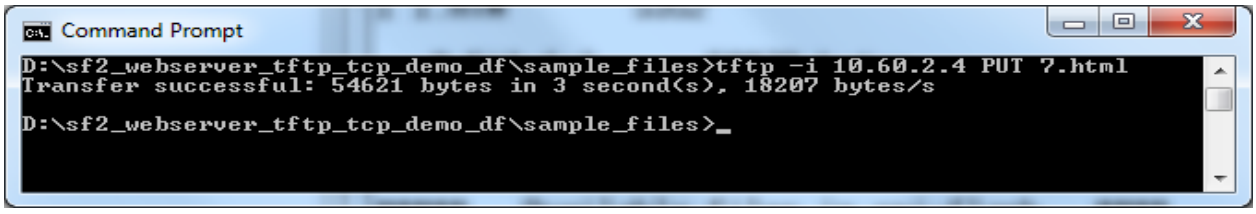
8. Open the command prompt on the host PC, and navigate to the directory where the files to be transferred to the SPI flash are located:
   <download_folder>\SF2_Webserver_Tftp_TCP_Demo_DF\sample_files
9. Select a file that needs to be transferred, and type the following TFTP command to transfer the file to the TFTP server (the SmartFusion2 device):
   `tftp -i < ip address> PUT <file name>`

Figure 24 • **Command Prompt**



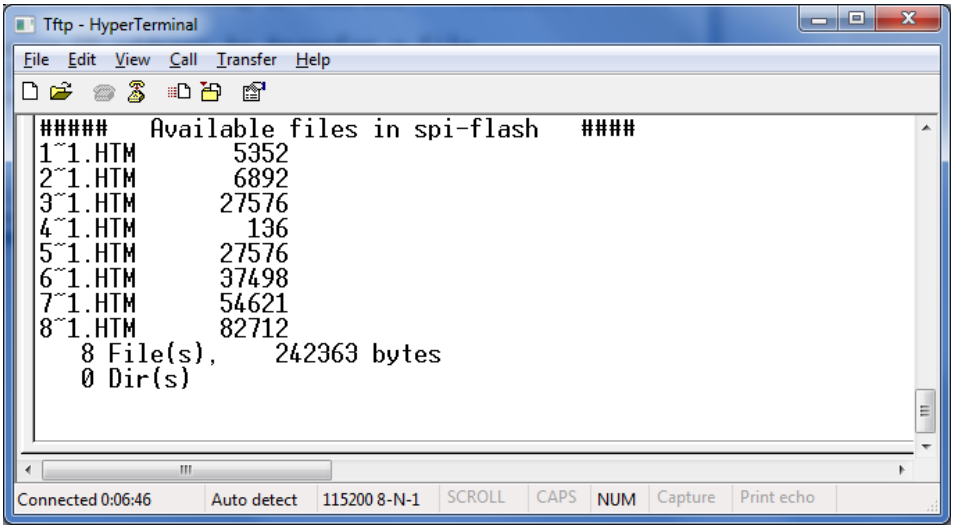
Upon successful file transfer from the host PC to the SmartFusion2 SPI flash, the command prompt displays a message indicating that the transfer was successful.

Figure 25 • **Successful Transfer Message**



HyperTerminal displays the available files in SPI flash, as shown in the following figure.

Figure 26 • **HyperTerminal with Available SPI Flash Files**



10. Repeat steps 9 and 10 for any additional files that need to be transferred from the host PC to the SmartFusion2 SPI flash.
11. After running the demo, close the HyperTerminal window.

Note: To run the SoftConsole project in debug mode, refer to Appendix 5: Running the SoftConsole Project in Debug Mode, page 29. To run the design from DDR memory, refer to Appendix 6: Running the Design from DDR Memory, page 31.

3 Appendix 1: Programming the Device Using FlashPro Express

This section describes how to program the SmartFusion2 device with the programming job file using FlashPro Express.

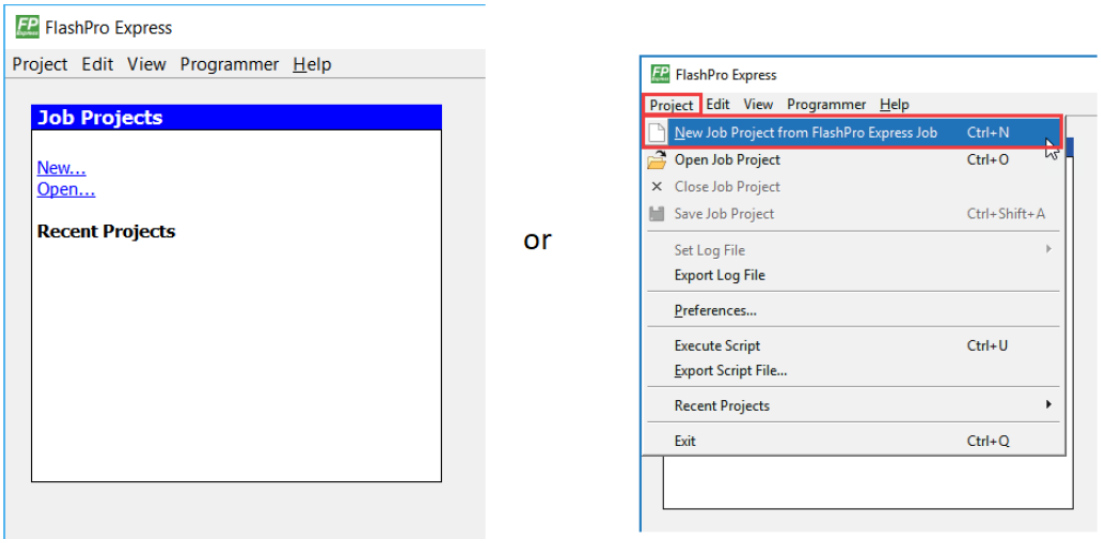
To program the device, perform the following steps:

1. Ensure that the jumper settings on the board are the same as those listed in Table 4, page 11.

Note: The power supply switch must be switched off while making the jumper connections.

2. Connect the power supply cable to the **J42** connector on the board.
3. Power **ON** the power supply switch **SW7**.
4. On the host PC, launch the **FlashPro Express** software.
5. Click **New** or select **New Job Project from FlashPro Express Job** from **Project** menu to create a new job project, as shown in the following figure.

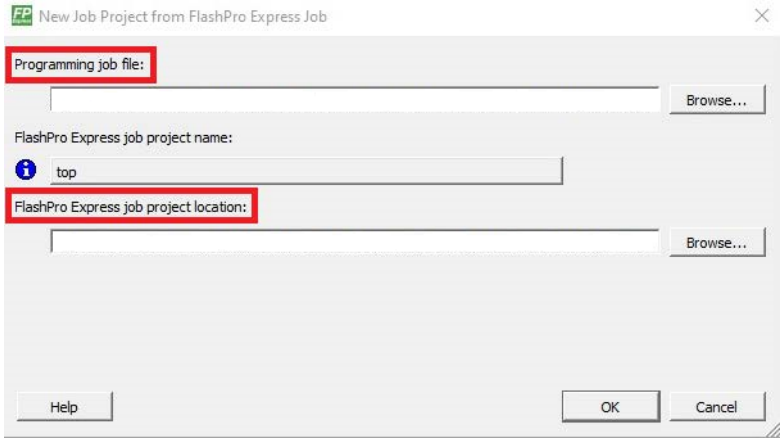
Figure 27 • **FlashPro Express Job Project**



6. Enter the following in the **New Job Project from FlashPro Express Job** dialog box:

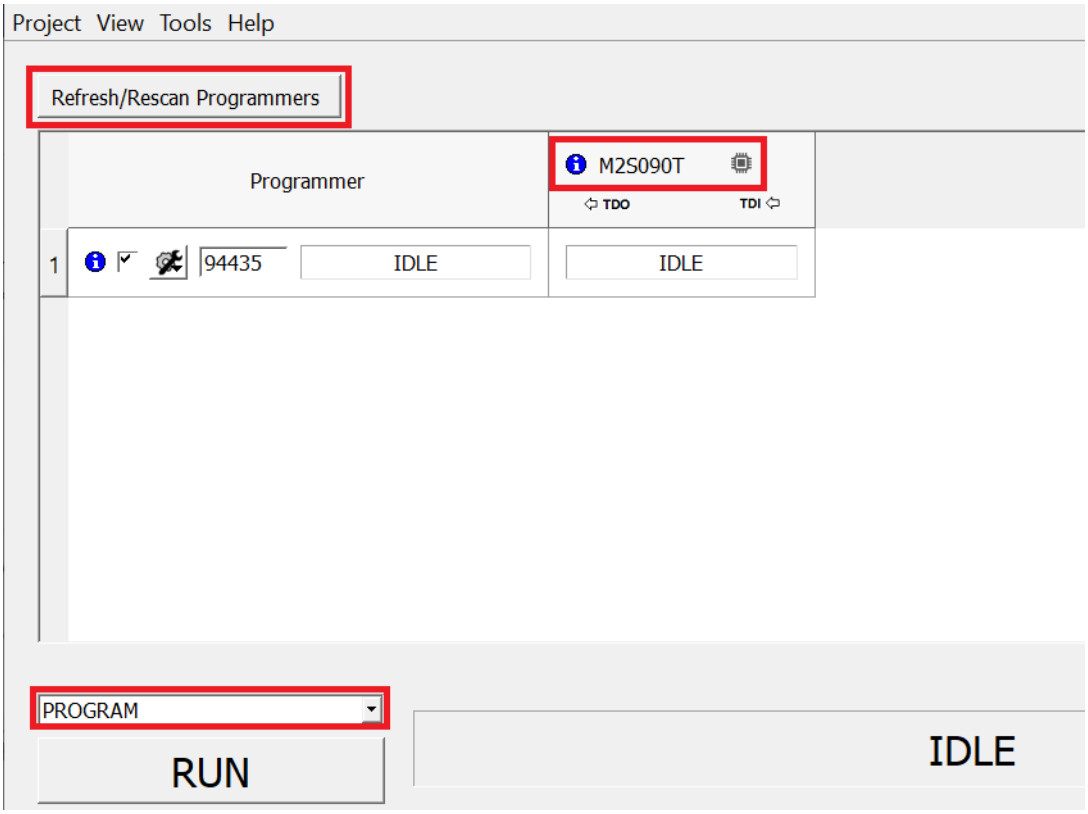
- **Programming job file:** Click **Browse**, and navigate to the location where the .job file is located and select the file. The default location is:
  <download_folder>\m2s_dg0472_df\Programming_Job
- **FlashPro Express job project name:** Click **Browse** and navigate to the location where you want to save the project.

Figure 28 • **New Job Project from FlashPro Express Job**



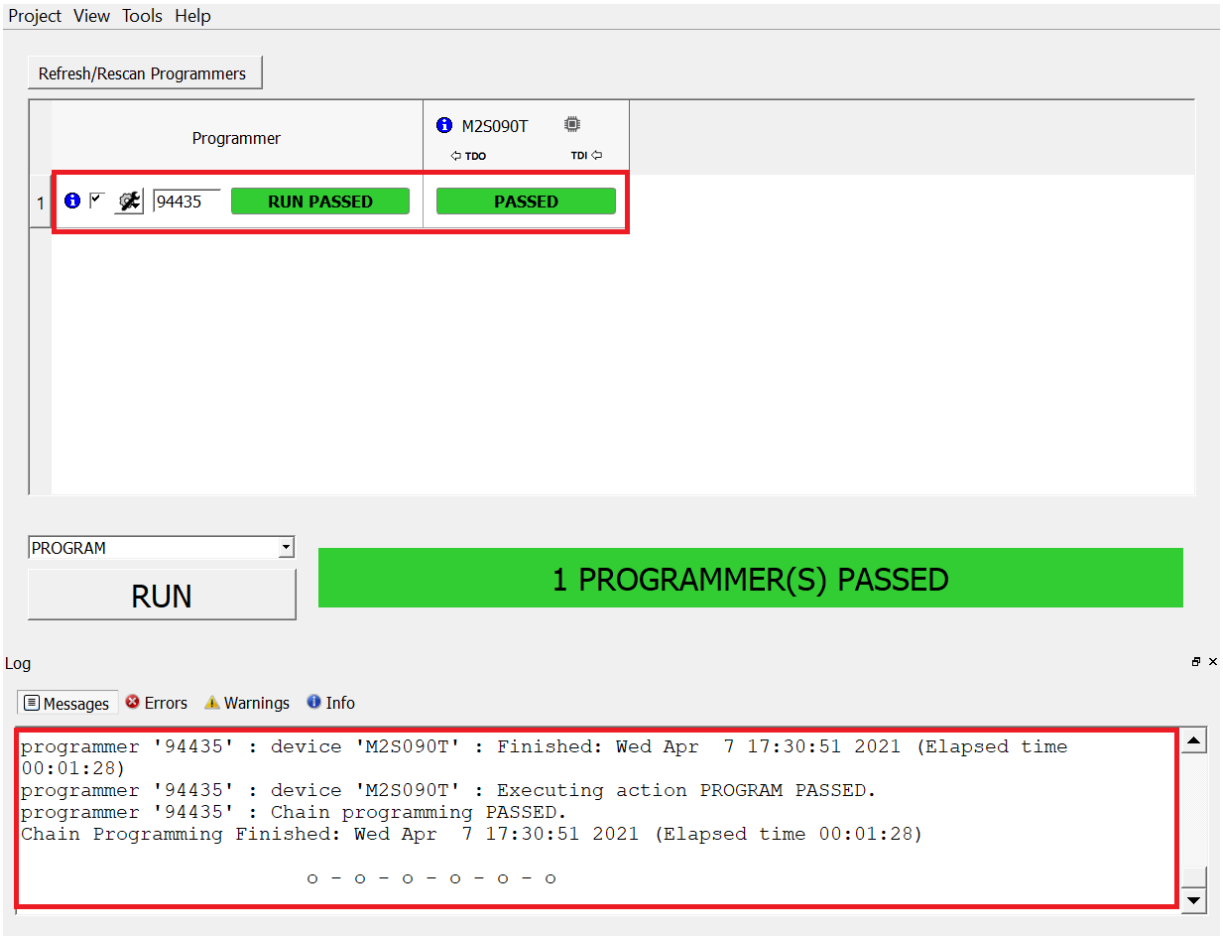
7. Click **OK**. The required programming file is selected and ready to be programmed in the device.
8. The FlashPro Express window appears as shown in the following figure. Confirm that a programmer number appears in the Programmer field. If it does not, confirm the board connections and click **Refresh/Rescan** Programmers.

Figure 29 • **Programming the Device**



9. Click **RUN**. When the device is programmed successfully, a **RUN PASSED** status is displayed as shown in the following figure.

Figure 30 • **FlashPro Express—RUN PASSED**

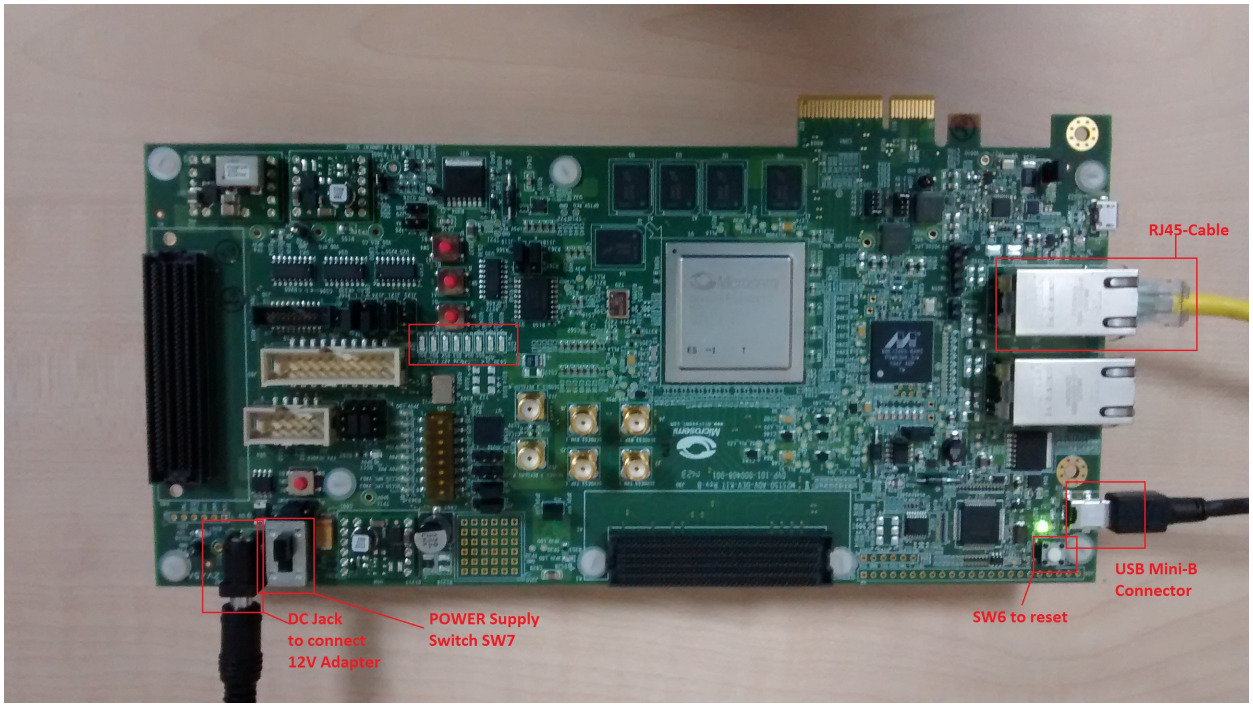


10. Close **FlashPro Express** or in the Project tab, click **Exit**.

4 Appendix 2: Board Setup for Running the Demo

The following figure shows the board setup for running the demo on the SmartFusion2 Advanced Development Board.

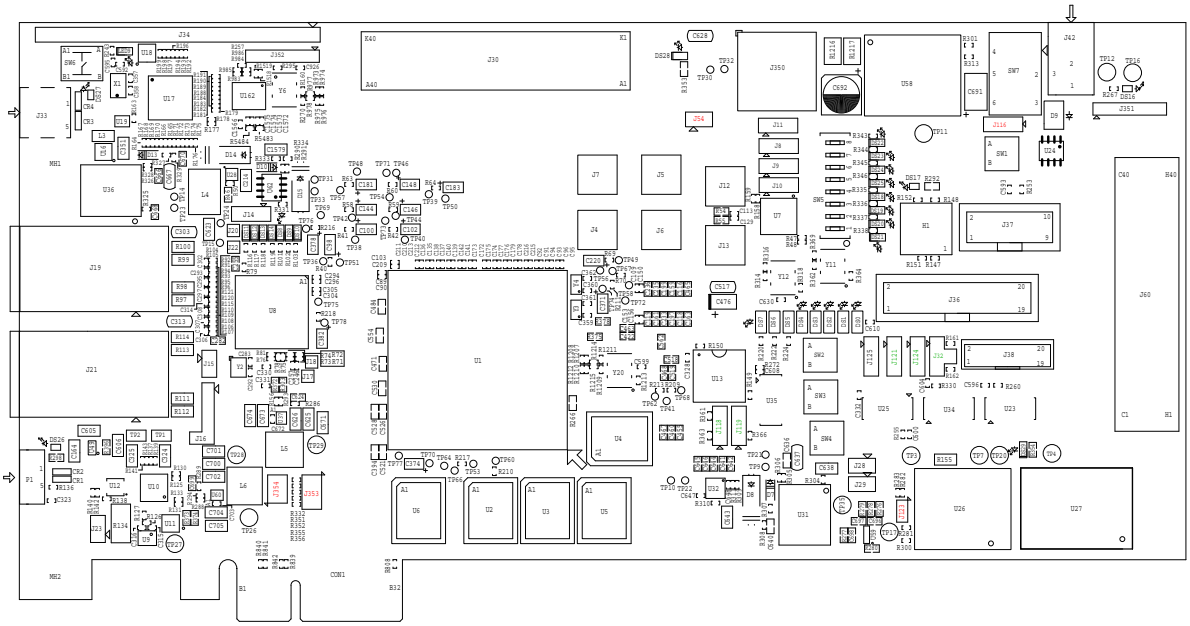
Figure 31 • **SmartFusion2 Advanced Development Board Setup**



5 Appendix 3: Jumper Locations

The following figure shows the jumper locations on the SmartFusion2 Advanced Development Board.

Figure 32 • **SmartFusion2 Advanced Development Kit Silkscreen Top View**



Note: Jumpers highlighted in red in the figure are set by default; jumpers highlighted in green must be set manually.

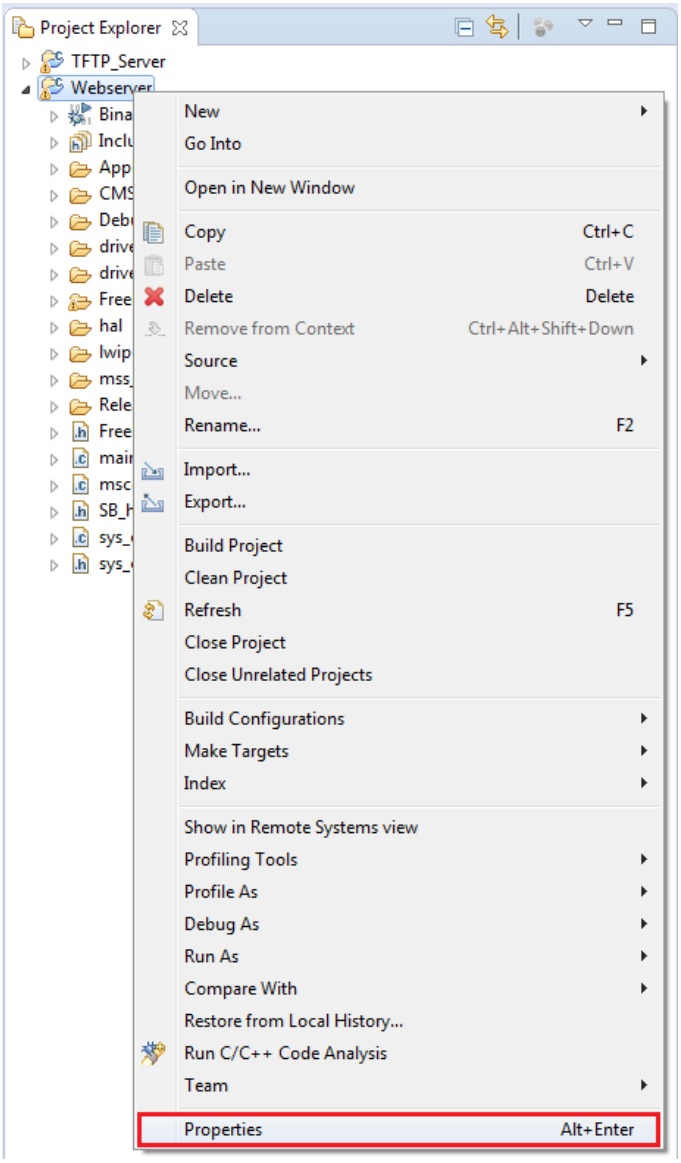
6 Appendix 4: Running the Design in Static IP Mode

The following steps describe how to run the design in static IP mode.

Note: This procedure provides steps to run the Webserver design. To run the TFTP server design, perform the same steps by selecting the TFTP_Server project in SoftConsole.

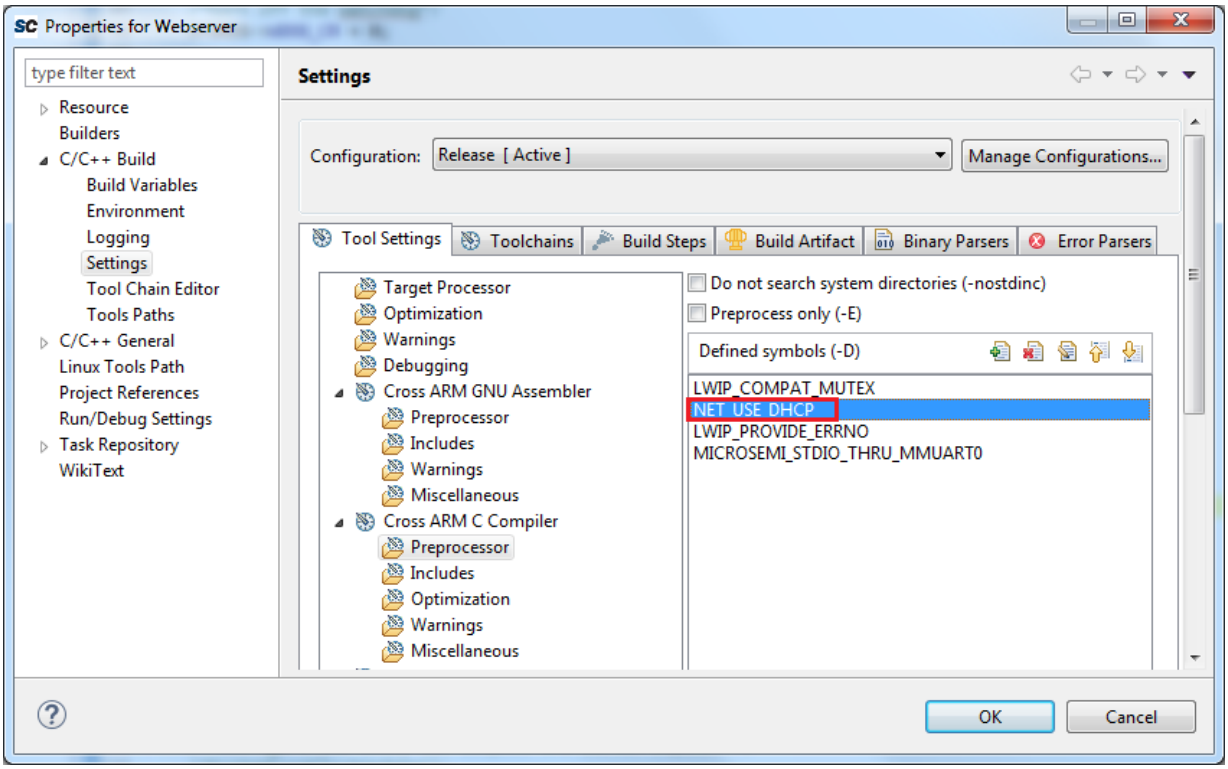
1. In SoftConsole Project Explorer window, right-click the **Webserver** project, and select **Properties,** as shown in the following figure.

Figure 33 • **SoftConsole Project Explorer Window**



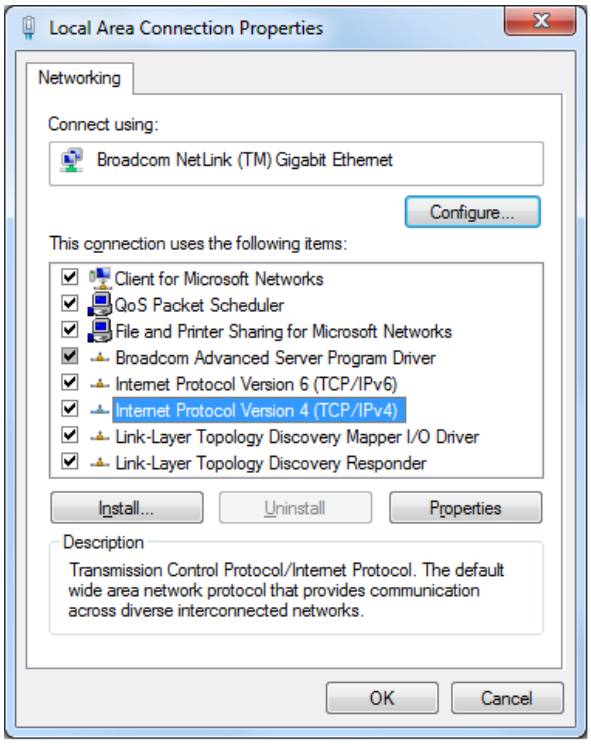
2. In the Tool Settings tab of the Properties for Webserver window, remove the **NET_USE_DCHP** symbol, and click **OK**, as shown in the following figure.

Figure 34 • **Webserver Properties Window**



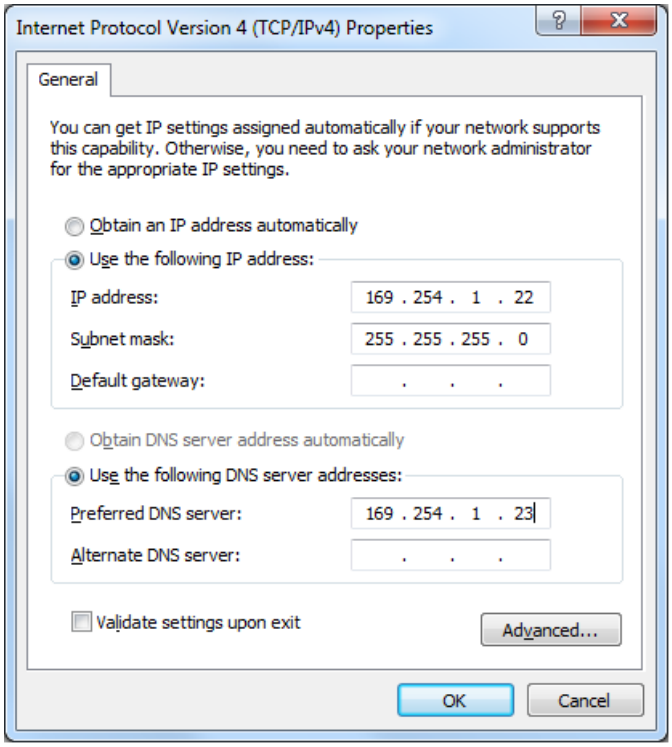
3. Change the host TCP/IP settings to reflect the board's static IP address, 169.254.1.23. The following figure shows the host PC TCP/IP settings.

Figure 35 • **Host PC TCP/IP Settings**



The following figure shows static IP address settings.

Figure 36 • **Static IP Address Settings**



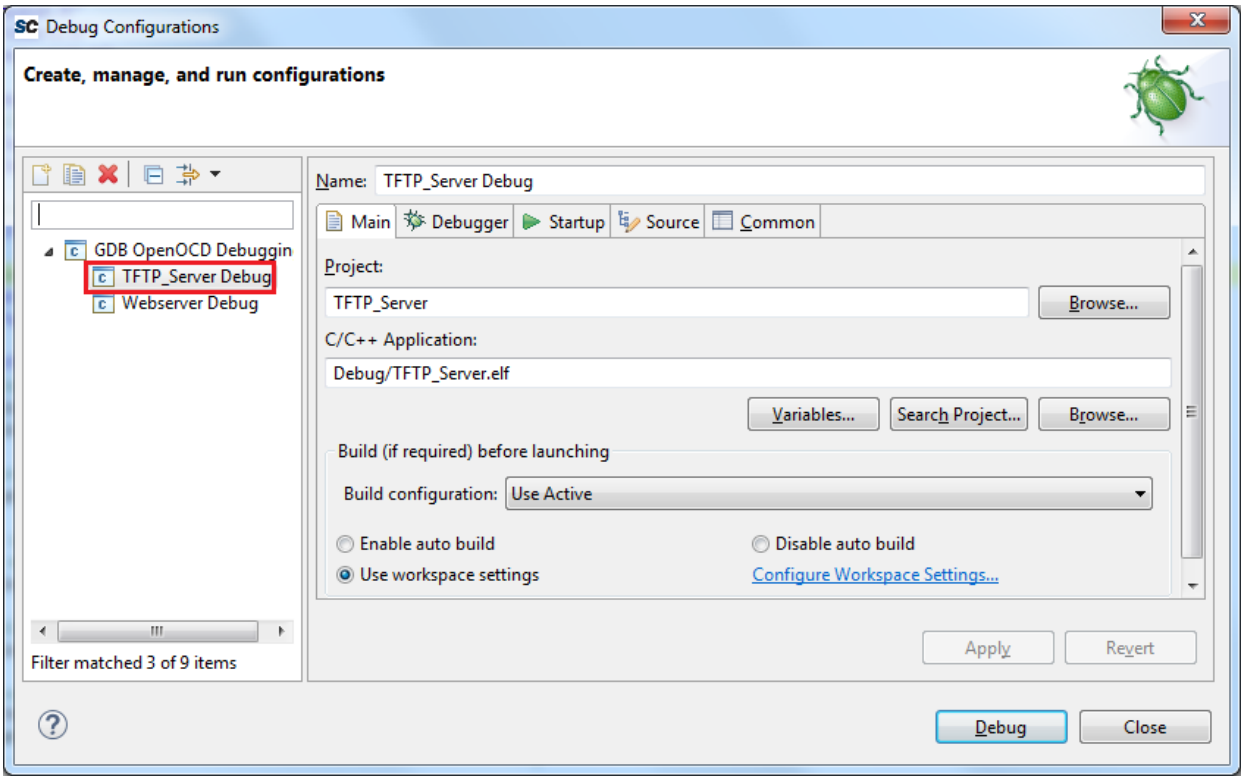
4. After configuring the settings, compile the design, load it into memory, and run it using SoftConsole.

7 Appendix 5: Running the SoftConsole Project in Debug Mode

The following steps describe how to run the SoftConsole project in debug mode.

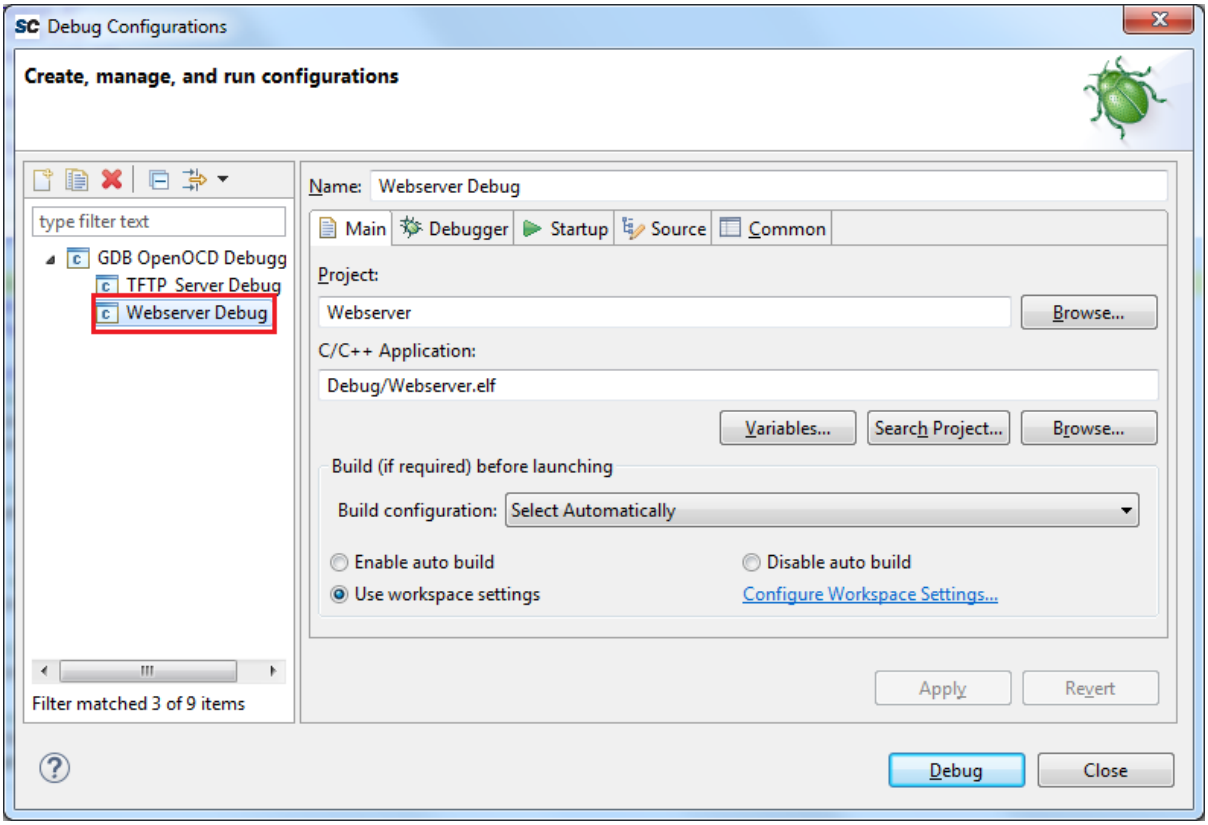
1. In SoftConsole, select **Run > Debug Configurations**.
   The Debug Configurations dialog box is displayed.
2. Select the appropriate project:
   - To debug the TFTP_Server project, select **TFTP_Server Debug**, as shown in the following figure.

Figure 37 • **Debug Configuration for TFTP_Server**



- To debug the Webserver project, select **Webserver Debug**, as shown in the following figure.

Figure 38 • **Debug Configuration for Webserver**



3. Click **Debug**.

8 Appendix 6: Running the Design from DDR Memory

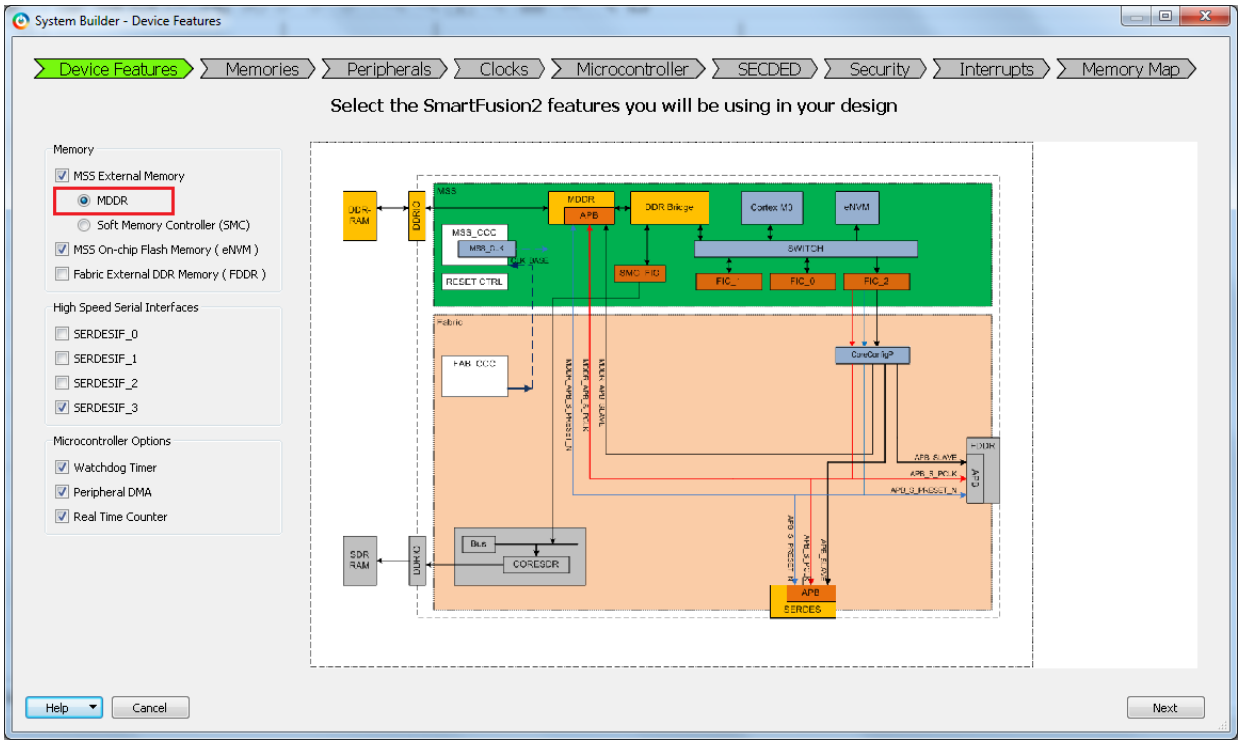
This appendix describes the changes to be made to the Libero SoC and SoftConsole projects in order to run the demo design from DDR memory.

8.1 Changes to Libero SoC Project

Open the project in Libero SoC, and perform the following steps.

1. In the System Builder, enable MDDR, as shown in the following figure.

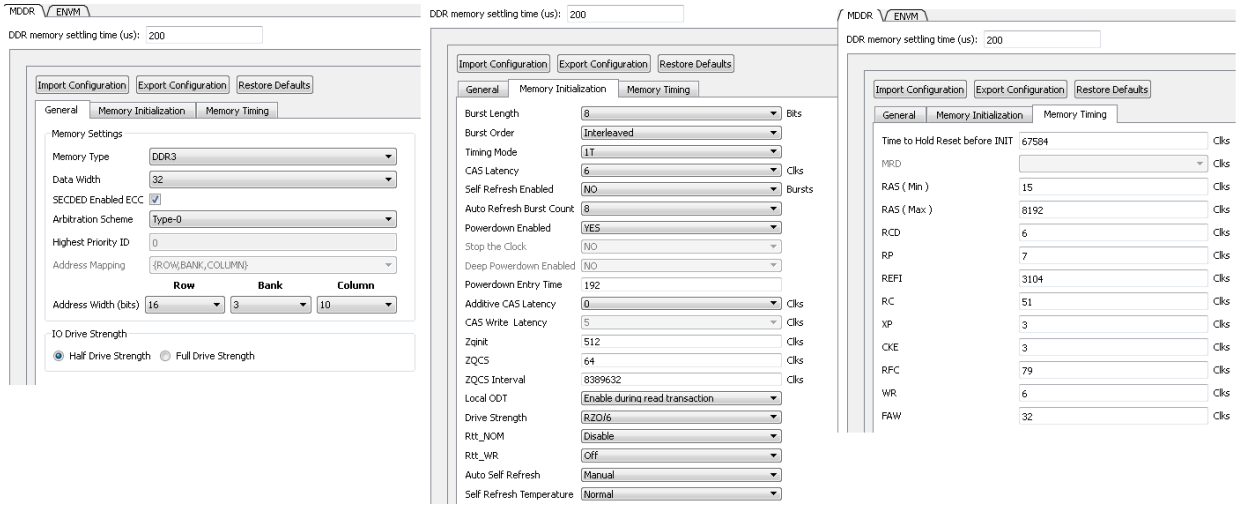
Figure 39 • **System Builder Device Features**



2. Configure the DDR3 settings as indicated in the following figure.

Note: The DDR configuration file, **`DDR_Config.txt`**, is available at: *<download_folder>\SF2_Webserver_Tftp_TCP_Demo_DF\sample_files\DDR_Config*

Figure 40 • **System Builder Memories**



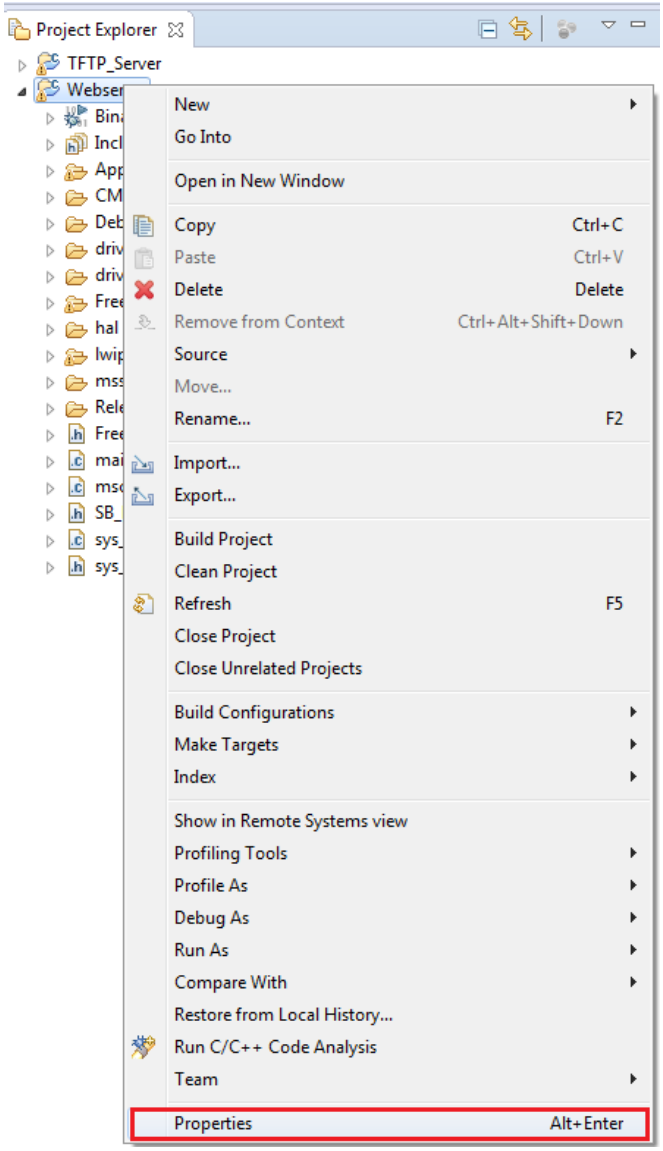
3. Generate the programming file, and program the board.

8.2 Changes to SoftConsole Project for Debug Mode

To run the project in debug mode, perform the following steps in SoftConsole.

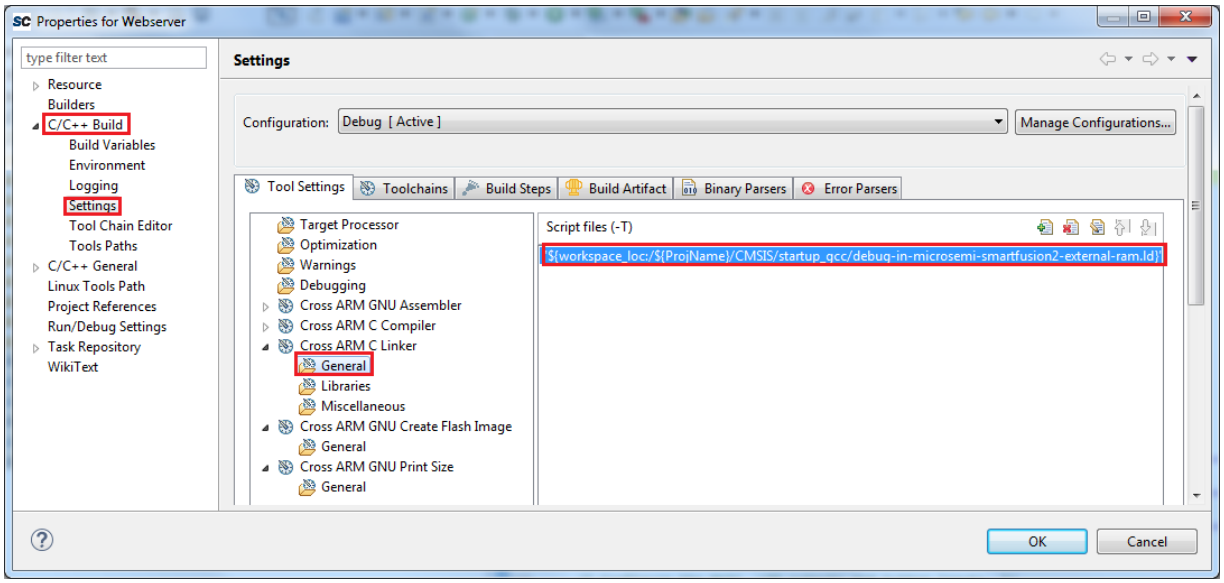
1. In the Project Explorer window, right-click the **Webserver** project, and select **Properties.**

Figure 41 • **Selecting Webserver Properties**



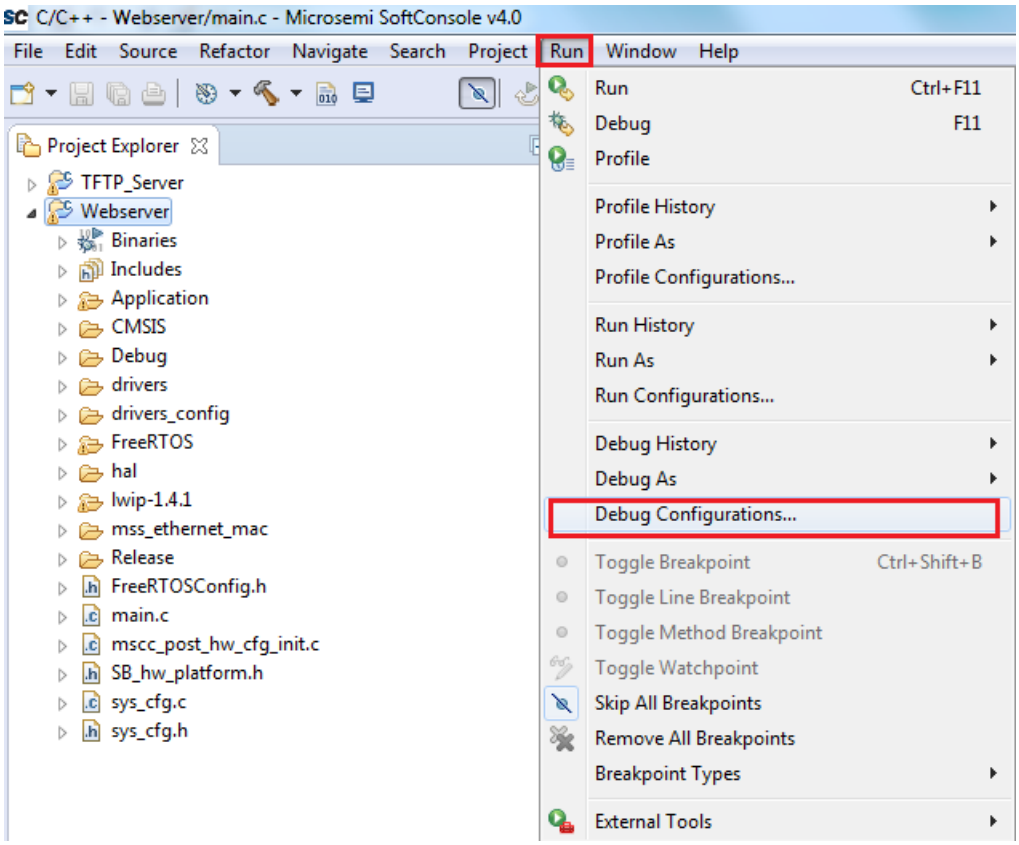
2. Set the **`debug-in-microsemi-smartfusion2-external-ram.ld`** linker script file, as shown in the following figure.

Figure 42 • **Setting the Script File**



3. Build the SoftConsole application, and select **Run > Debug Configurations,** as shown in the following figure.

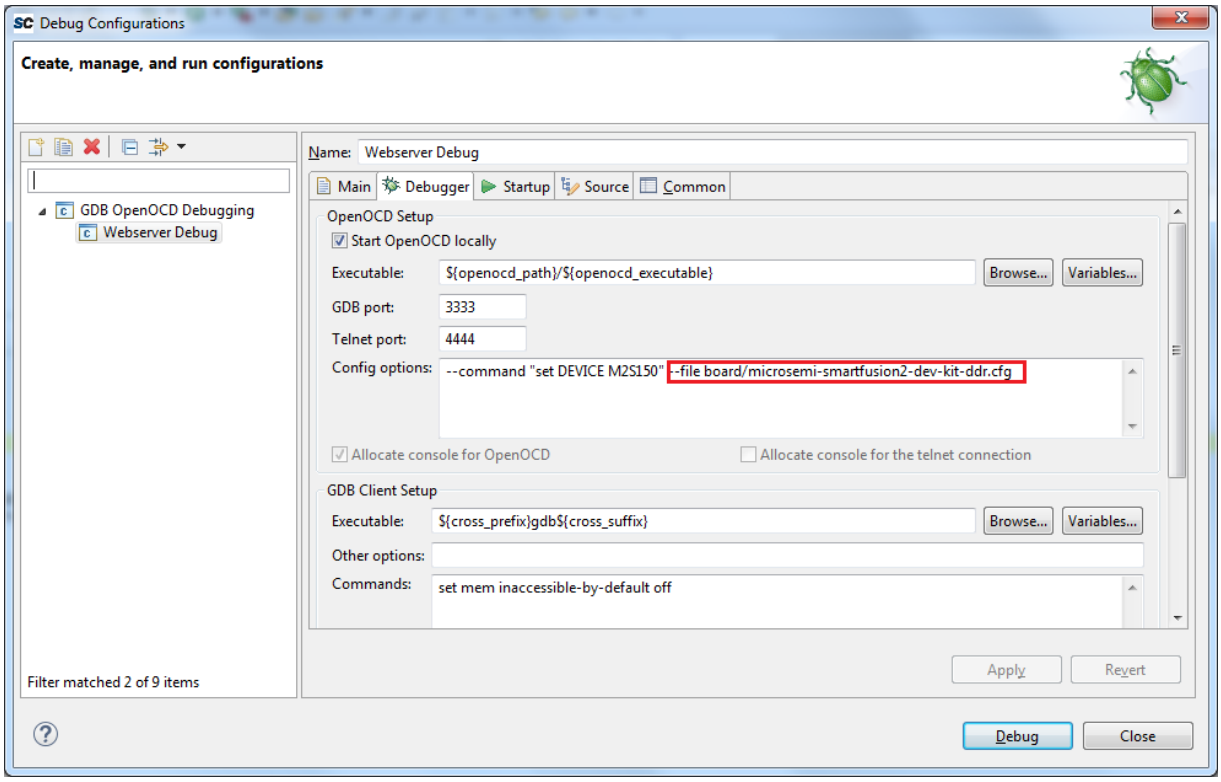
Figure 43 • **Selecting Debug Configurations**



4. In the Debug Configurations window, go to the Debugger tab.

5. In the **config options** field, replace the existing value with `-file board/microsemi-smartfusion2-dev-kit-ddr.cfg`, as shown in the following figure.

Figure 44 • **Debug Configurations Window**



6. Click **Debug** to run the project from DDR memory in debug mode.