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1 Introduction

This document is a step-by-step manual that describes how to install all required software and demonstrates creating a simple first project with the ZWIR4512 Development Kit (see Figure 1.1). The integrated development environment (IDE) CrossStudio™* for ARM®* from Rowley Associates is used. CrossStudio™ is available for Microsoft® Windows, Linux, MAC OS, and Solaris computers. This document describes the installation of the Microsoft® Windows version of CrossStudio™ that is included on the ZWIR4512 Development Kit DVD. If the DVD is unavailable or a different operating system is used, Rowley CrossStudio™ can be downloaded from the Rowley Associates web page: http://www.rowley.co.uk/arm/index.htm.

Figure 1.1 ZWIR4512 Development Kit

* CrossStudio™ is a trademark of Rowley Associates. ARM® is a trademark of ARM, Ltd.

2 Initial Preparation

During the following steps, the development environment will be installed with all packages. These steps are only done once to set up CrossStudio™.

1. Install CrossStudio™ for ARM from the DVD by activating the following executable:

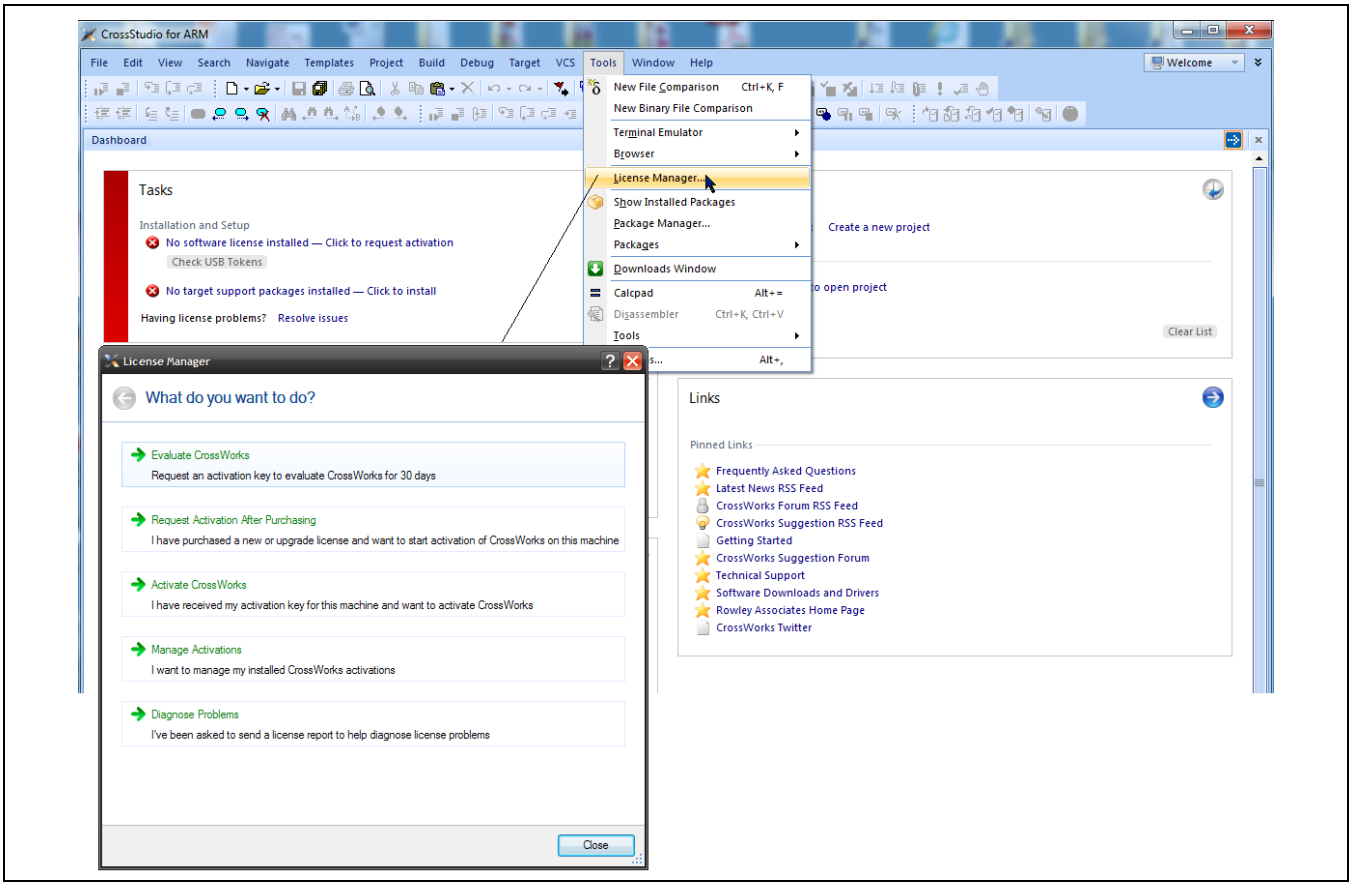
   `install\CrossStudio\arm_crossworks_2_3_5_win_x86_setup.exe`

   Alternately, download and install CrossStudio™ for ARM from Rowley's website: http://www.rowley.co.uk/arm/releases.htm

2. A valid license is required before CrossStudio™ can be used. For initial testing, it is possible to get a 30-day evaluation license. Get the license by following these steps after installing CrossStudio™ and starting the application:

   a. Open the license manager by clicking on the menu bar ***Tools → License Manager***. See Figure 2.1 for the resulting dialog box.

Figure 2.1 License Manager



b. Click on the ***Evaluate CrossWorks*** button, and follow the steps.

c. After receiving the activation key, click on the ***Activate CrossWorks*** button in the "License Manager" dialog box and enter the key.

3. To support the STM32 microcontroller and the ZWIR4512 modules, the corresponding support package must be installed from the DVD or downloaded from the web.

   The ZWIR4512 Board Support Package can be downloaded* from the ZWIR4512 product page on IDT's website: http://www.IDT.com/ZWIR4512.

   The STM32 CPU Support Package can be downloaded from Rowley's website: http://www.rowleydownload.co.uk/arm/packages/STM32.htm.

   Install the SMT32 CPU and ZWIR4512 Board Support Packages by double-clicking each of the following files in the package:

   ```
   install\CrossStudio\CMSIS_3.hzq
   install\CrossStudio\STM32.hzq
   install\CrossStudio\ZWIR4512.hzq
   ```

4. The connection between the microcontroller JTAG and UART interface and the development PC is via a USB virtual COM port interface, provided by a FTDI chip. This chip requires installation of a special VCP driver from the DVD or downloaded from the FTDI website: http://www.ftdichip.com/Drivers/VCP.htm

   Install the VCP driver by clicking on the following file:

   ```
   install\FTDI\CDM20830_Setup.exe
   ```

5. Connect the ZWIR4512 test board to the user's PC via the USB cable included in the kit. The PC operating system will automatically install the newly found USB device. An appropriate installation guide can be found under http://www.ftdichip.com/Support/Documents/InstallGuides.htm

   During the installation, two new COM ports are created. The first one performs the communication between CrossStudio™ and the microcontroller JTAG interface. The second one is connected to the microcontroller UART interface.

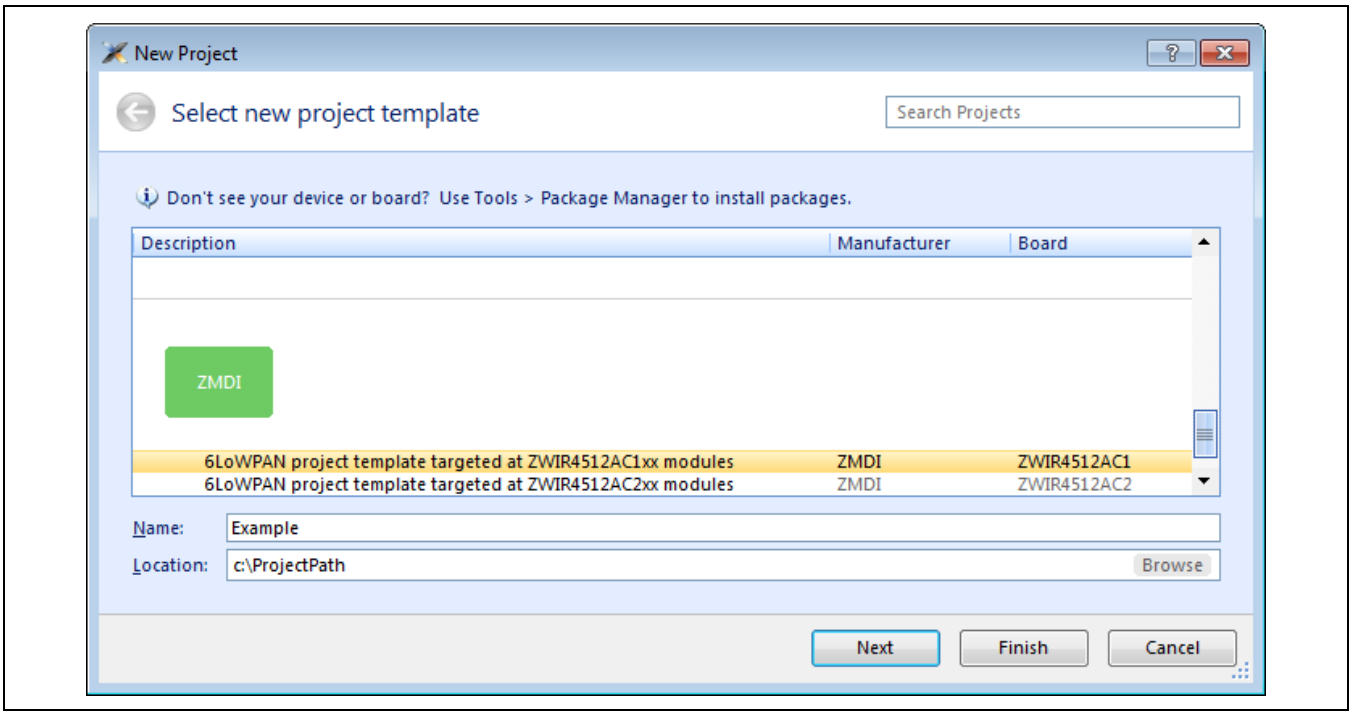
* Access to on-line ZWIR45xx software downloads requires a free customer login account. See section 7. After login, click on "ZWIR4512 API RCS" under the "Software" heading.

3 Creating a New Project

After the successful initial preparation, a first simple application can demonstrate the development process with CrossStudio™.

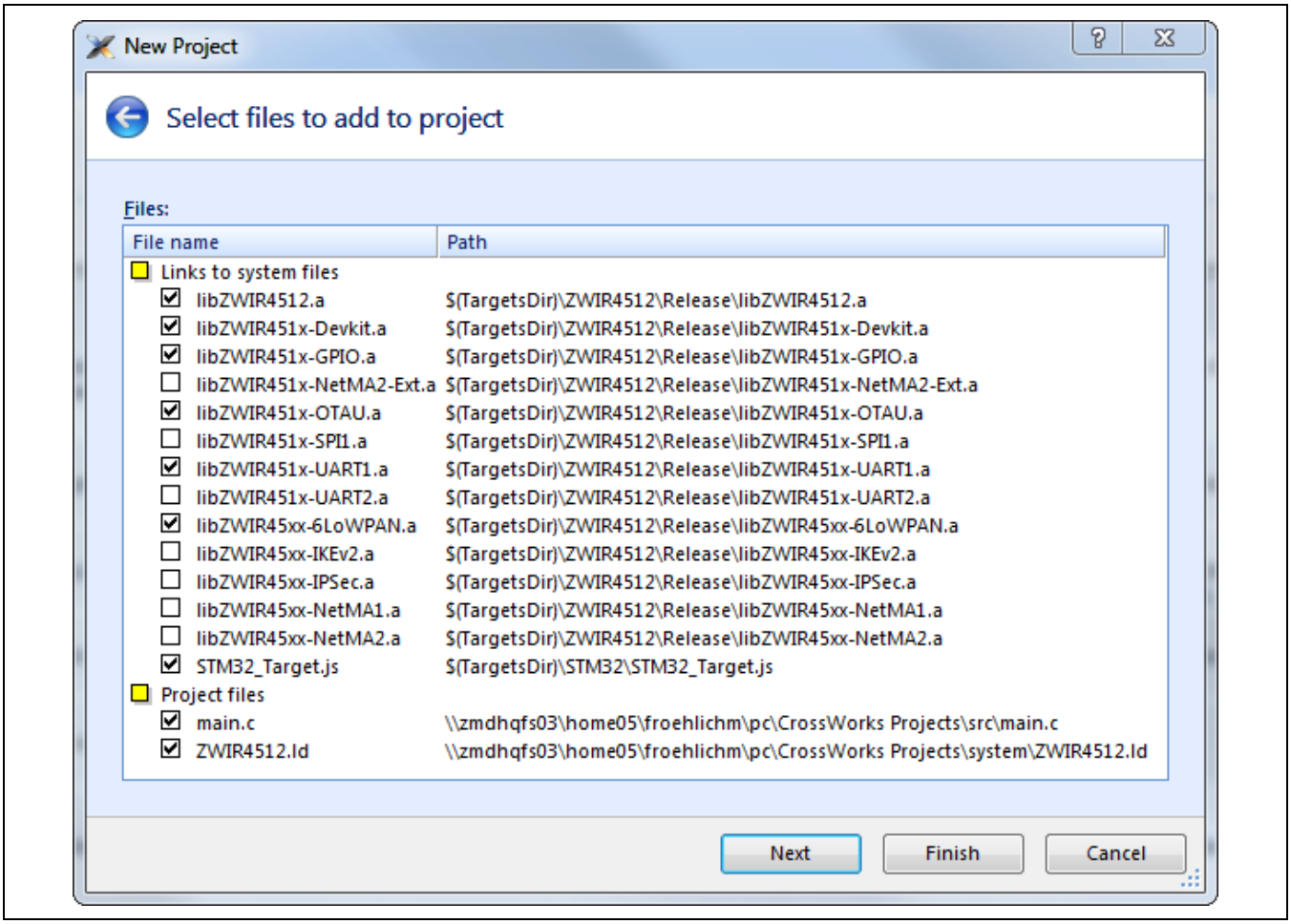
1. Start CrossStudio™.
2. In the menu bar, select ***File → New Project***.
3. In the ***New Project*** window, complete the following steps:
    a. Scroll to the ZMDI section as shown in Figure 3.1.
    b. In the project template window, click on **6LoWPAN project template targeted at ZWIR4512AC1xx modules** or **6LoWPAN project template targeted at ZWIR4512AC2xx modules** depending on which module is used.
    c. Enter a project name, and select a project path.
    Note: creating a separate folder for each project is recommended.
    d. Click **Next**.

Figure 3.1 New Project Window—Select a New Project Template



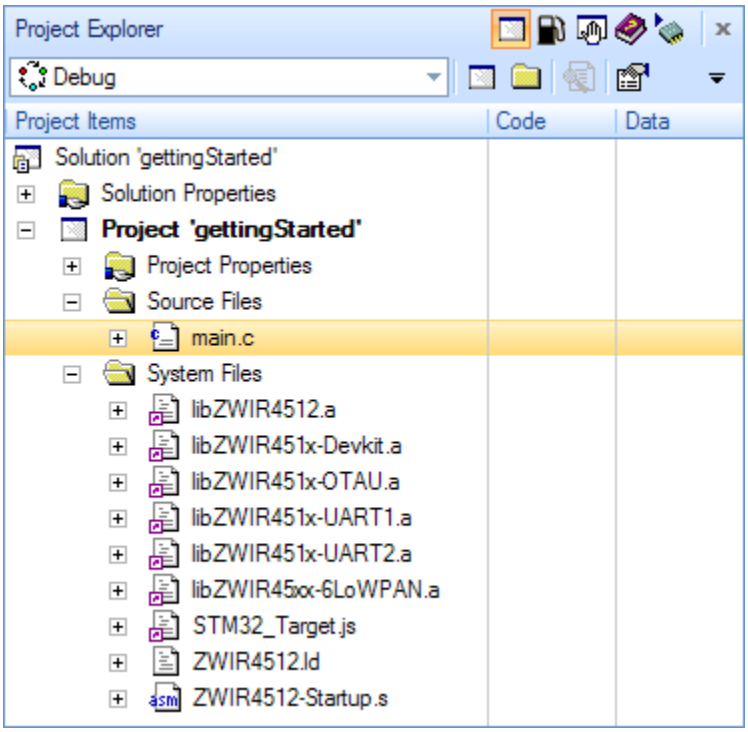
4. Select files to add to the project.
    a. Select all files as shown in Figure 3.2.
    b. Ensure that the libraries ***libZWIR45xx-IKEv2.a*** and ***libZWIR45xx-IPSec.a*** are NOT selected. Note: If the libraries ***libZWIR45xx-IKEv2.a*** and/or ***libZWIR45xx-IPSec.a*** are selected, communication over IPv6 is not possible without configuring the security module.
    c. Click **Finish**.

Figure 3.2 New Project Window - Select Files to Add to the Project



5. At this point, the project has been created and all required files have been added to the project.
   The ***Project Explorer*** on the right side shows all project files. All libraries, the startup code, the linker script, and the reset script can be found in the ***System Files*** folder as shown in Figure 3.3.
   The application-specific code is in the ***Source Files*** folder. For this example, open the automatically created ***main.c*** file by double clicking it.

Figure 3.3 Project Explorer



6. Write the program.

   A first example is the “getting started”. The code can be found on the DVD under

   `src/Examples/GettingStarted/src/gettingStarted.c.`

   It is also included in the IDT software zip file available for download* on the ZWIR4512 product web page: www.IDT.com/ZWIR4512.

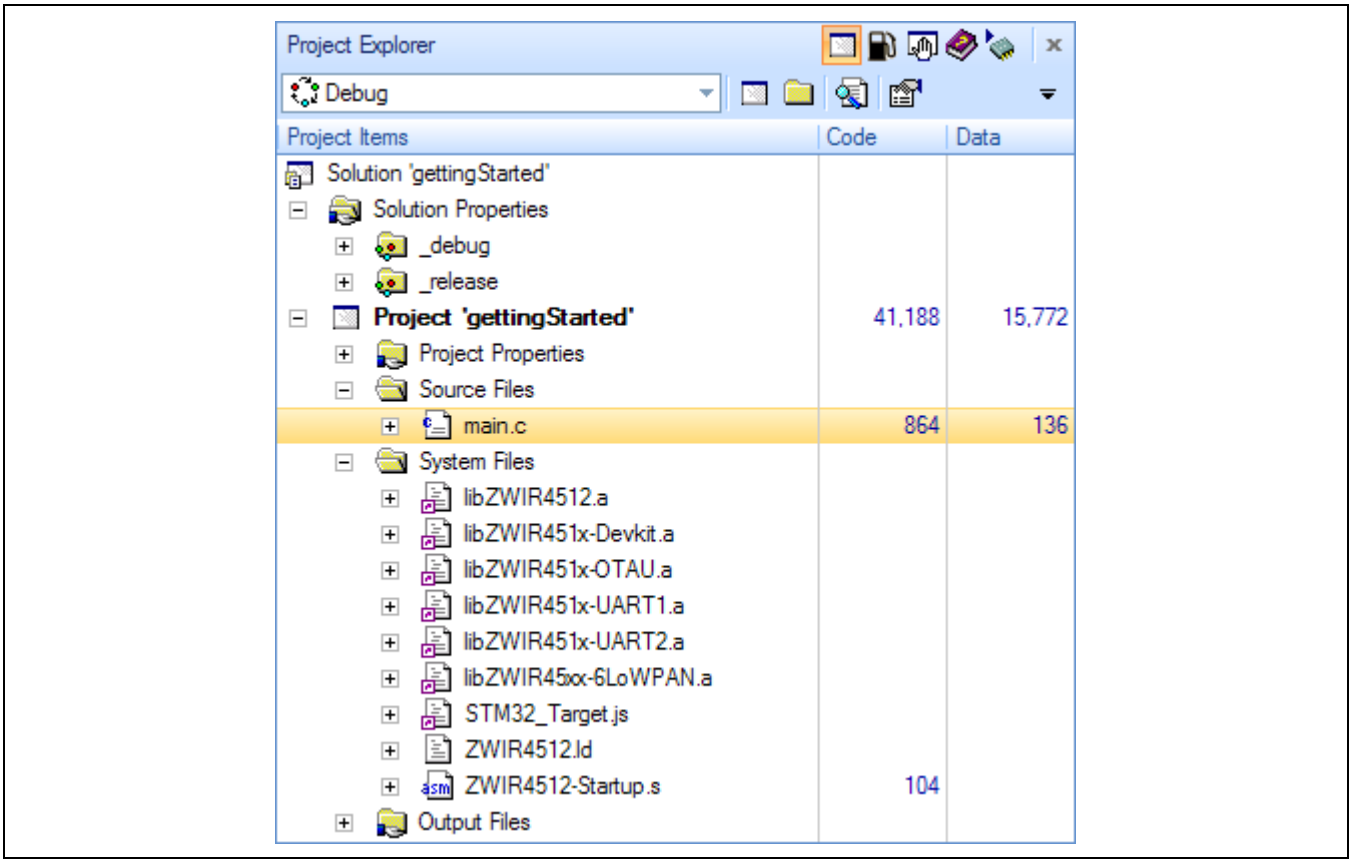
   To use this example, the “getting started” c-code (from the ***`gettingStarted.c`***) must be copied into the current project ***`main.c`*** (Figure 3.3)

   For more details about the “getting started” program, see section 4.

* Access to on-line ZWIR45xx software downloads requires a free customer login account. See section 7. After login, the **`gettingStarted.c`** example code is available under the “Software” heading.

7. Compile the program:
   Right click on the project in the ***Project Explorer*** and then click on ***Build*** on the resulting drop-down menu. Figure 3.4 shows the “Project Explorer” after the program has been compiled for this example.

Figure 3.4 Project Explorer after Compiling



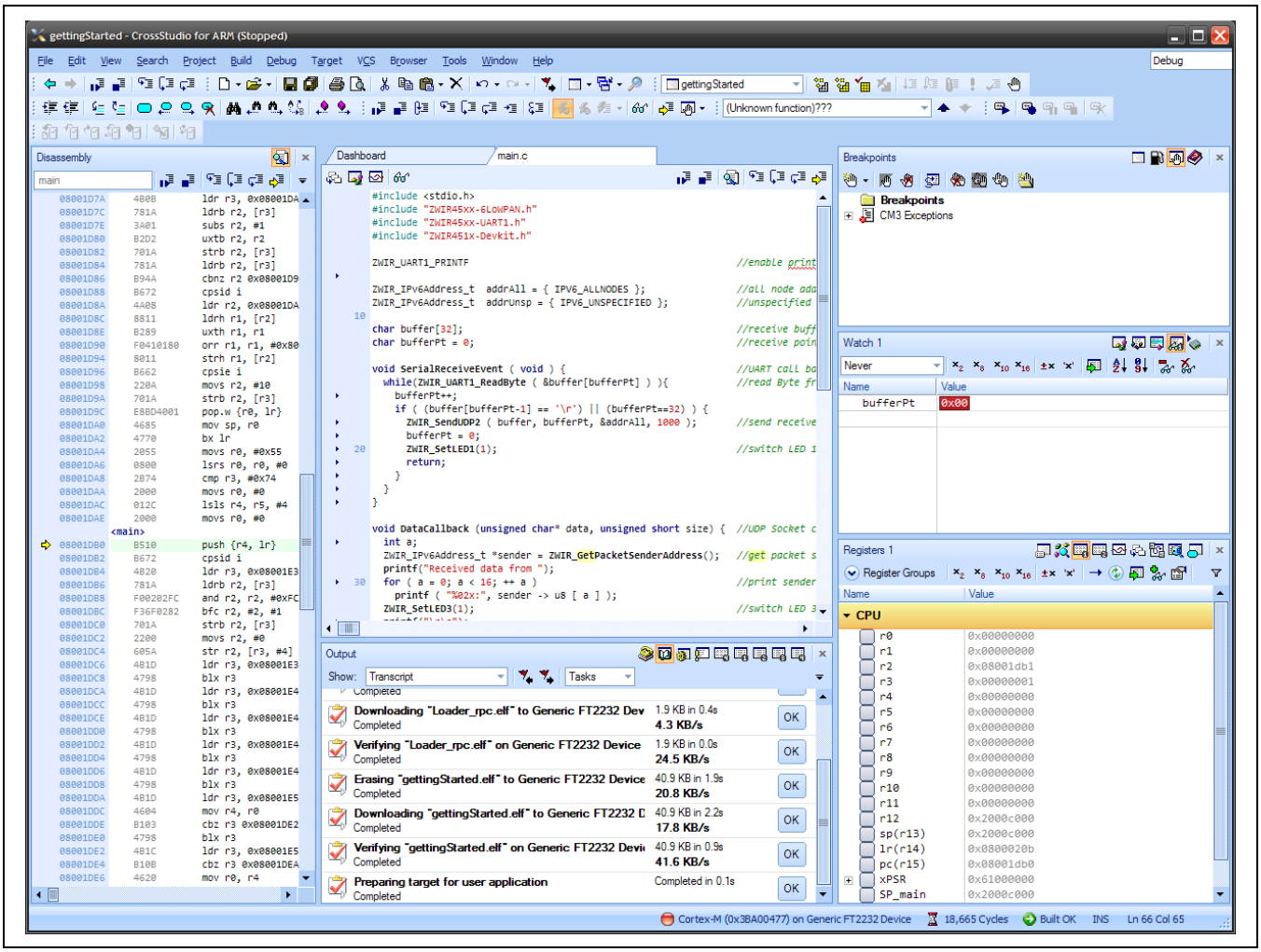
Note: The following steps must be done only at the project initialization.

8. Connect to the device:
   a. On the main menu bar, click ***Target → Targets***.
   b. Right click in the opened ***Target*** window.
   c. Select ***New Target Interface → Generic FT2232 Device***.
   d. On the main menu bar, click ***Target → Connect → Generic FT2232 Device***.

9. Start debugging:
    a. On the main menu bar, click ***Debug → Go*** (or press F5).
    b. Wait until the application was loaded successfully at the microcontroller.
    Note: if uploading errors occur, try the uploading again.

10. Start the program by pressing the ***Continue Execution*** button on the main menu or press F5.

Figure 3.5 CrossStudio™ in Debugging Mode



It is possible to debug the uploaded program in CrossStudio™. All debug features are explained in CrossStudio's Help function accessible via the main menu.

4 The “Getting Started” Example

The “getting started” example provides a basic introduction to the ZWIR4512-I-Development Kit. This program can be found on the DVD under **`src\examples\gettingstarted`**. For this example, at least two devices must be pre-programmed with the “getting started” code.

This example shows how to receive and send UDP packets. It also shows how data can be transmitted over the UART Interface.

During module initialization, two UDP sockets (port 1000 to receive data and port 1001 to receive blink packets) are opened and the UART receiver is enabled to receive user input.

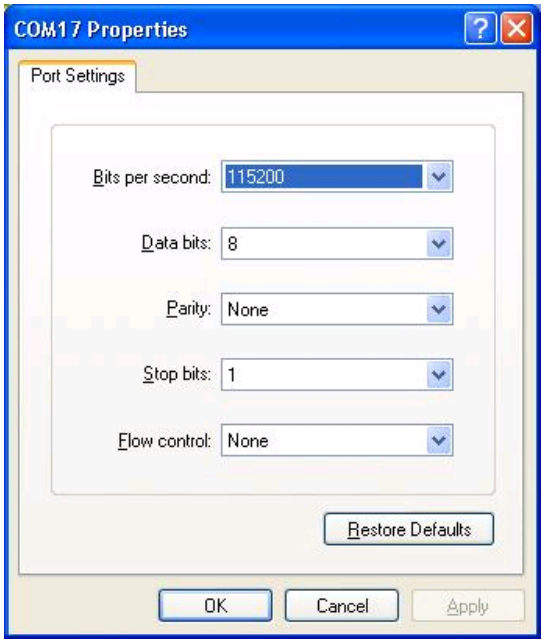
Every 5 seconds, the program sends one blink packet to all nodes. The sending device indicates packet transmission with LED 2 while the receiving device indicates packet reception with LED 4. The receiver writes a message containing the sender’s address to the serial interface.

All characters received by the UART interface are saved in a buffer until a return character is received or the buffer runs out of free space. In this case, the device broadcasts the buffer contents to all other nodes and indicates transmission with LED 1. Receiving devices will write the transmitted buffer contents to their serial interface and indicate packet reception with LED 3.

To use this example, connect at least one device with a PC and power the other devices either with an external power supply or also via the PC.

Open a UART terminal (e.g., Microsoft® HyperTerminal) on the PC and establish a connection to the *second* virtual COM port with the parameters set as in Figure 4.1.

Figure 4.1 COM Port Settings



If any other “getting started” device is powered, the terminal should print out the received blink packets as

```
Received blink from fe80:0000:0000:0000:0211:7d00:002f:0003: 5232
```

To test the data transfer function, connect a second device and open a second terminal. Now it is possible to enter a message (e.g., “hello world” in the example below) in one of the terminals and transmit it to the other one by pressing “return.” The second terminal should display the received message as follows (note that the sender address will differ from this example):

```
Received data from fe80:0000:0000:0000:0211:7d00:002f:0003:
hello world
```

5 Related Documents

Document
ZWIR4512 Data Sheet
*ZWIR451x Programming Guide**

Visit the ZWIR4512 product page www.IDT.com/ZWIR4512 or contact your nearest sales office for the latest version of these documents.

*Note: Documents marked with an asterisk (*) require a free customer login account for access.

6 Glossary

Term	Description
COM	Name of the serial port interface
JTAG	Joint Test Action Group
UART	Universal Asynchronous Receiver/Transmitter
UDP	User Datagram Protocol
VCP	Virtual COM Port

7 Document Revision History

Revision	Date	Description
1.00	October 25, 2010	First release.
1.10	March 25, 2011	Improved “getting started” example.
1.20	May 21, 2011	Improved specification of library setup. Added figure explaining COM port settings.
1.30	June 18, 2012	Updated installation instructions.
1.31	July 23, 2012	Minor edits for clarity. Minor corrections.
1.32	August 26, 2013	Changed example images to match new CrossWorks™ version.
1.40	October 2, 2014	Changed example images to match new libraries.
	April 15, 2016	Changed to IDT branding.

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