NXP Semiconductors
User's Guide

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Kinetis MKW2xD and MCR20A SMAC Software

Quick Start Guide

This document is a brief presentation of the Kinetis Simple Media Access Controller (SMAC) Software for the MKW2xD wireless microcontrollers and the MCR20A 2.4 GHz wireless transceiver, version 3.0.5. This software package is built using the Kinetis Software Development Kit (KSDK) version 2.0. This document covers installation of the software packages, hardware setup, build and usage of the provided demo applications.

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1 Installation

This section covers the steps for a successful installation of the connectivity software.

1.1 MKW2xD and MCR20A SMAC Software Installation

Execute the installer and follow the steps presented in the example.

Kinetis MKW2xD and MCR20A SMAC Software Installation Example

The first page is just a preamble for the installation. Choose next to continue.

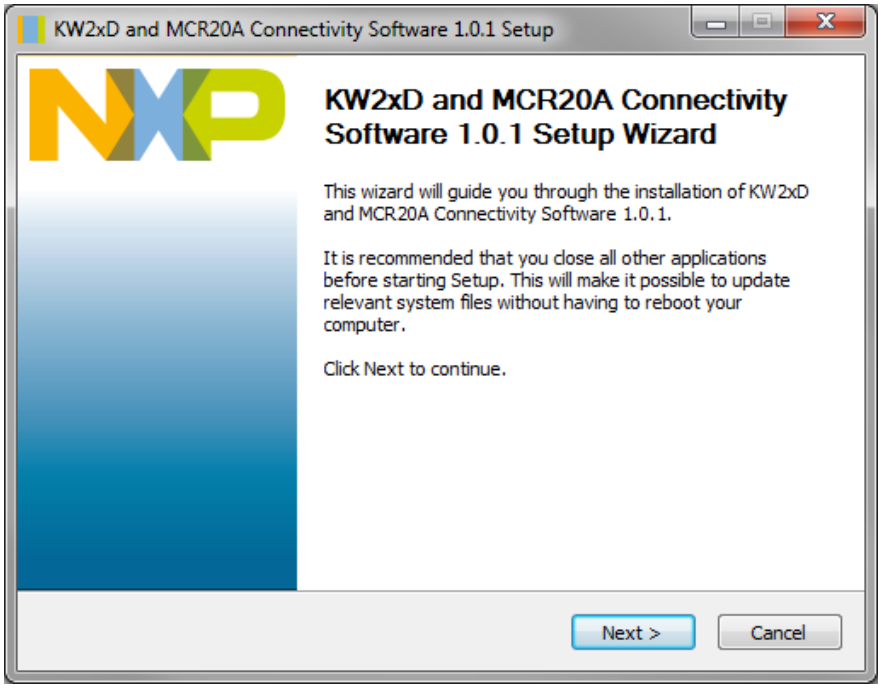

Figure 1: SMAC software install wizard first screen

The next two page represents the license agreement. If you accept the terms and conditions please select "I Agree" to continue the installation.

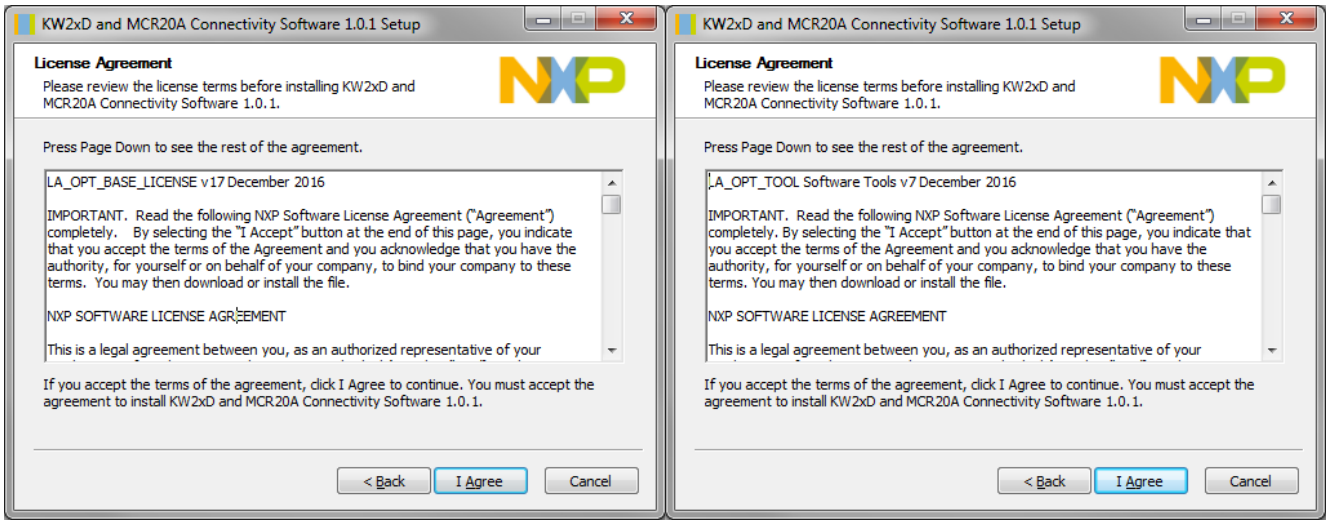

Figure 2: SMAC software install wizard license screen

In the next step you have to check the components you want to install and uncheck the components you don't want to install. In order to install SMAC Software be sure that the corresponding checkbox is enabled as shown in the next figure.

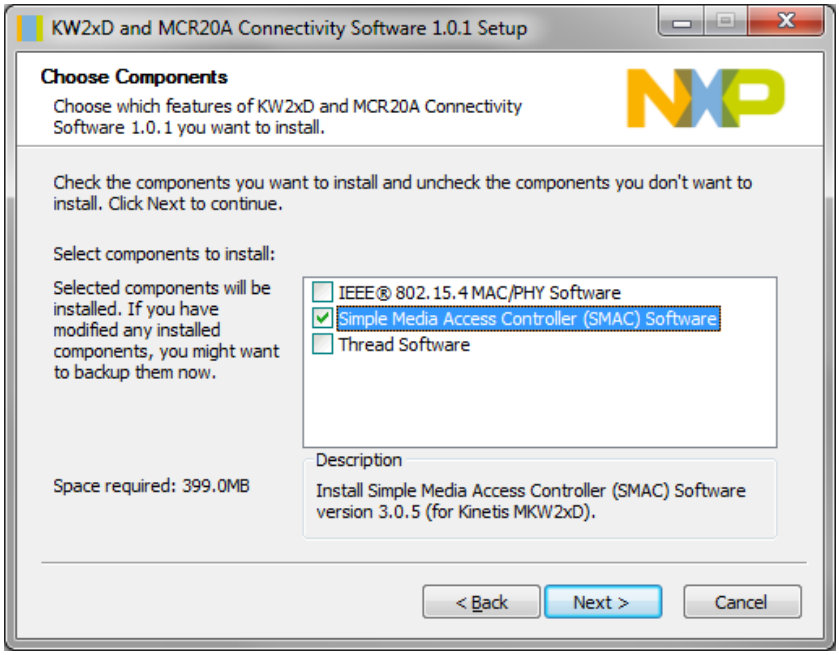

Figure 3: SMAC Software checkbox enable

The next step is to select the install location for the Kinetis SMAC software. By default the installer uses "C:\NXP", but this may be changed, depending on your needs.

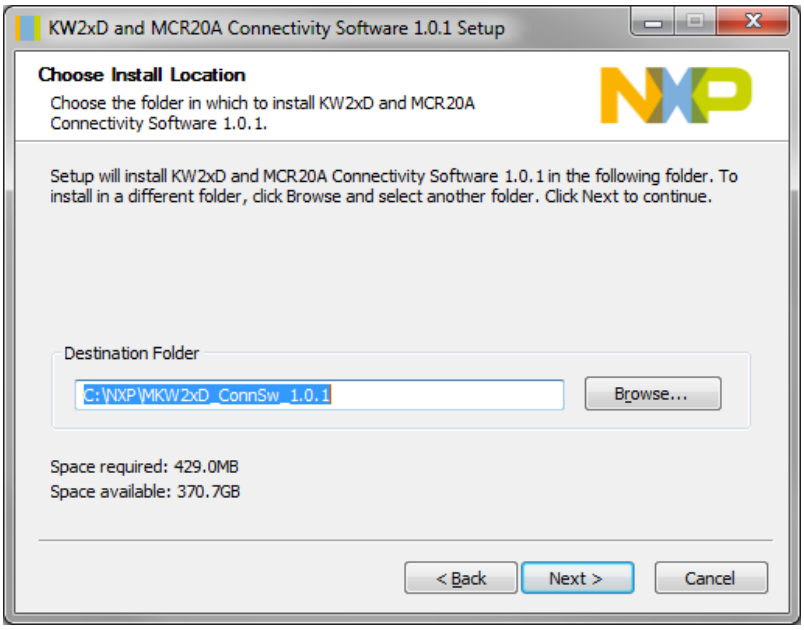

Figure 4: SMAC software install wizard location selection

The last step is to choose whether you wish to create shortcuts for the SMAC software installation.

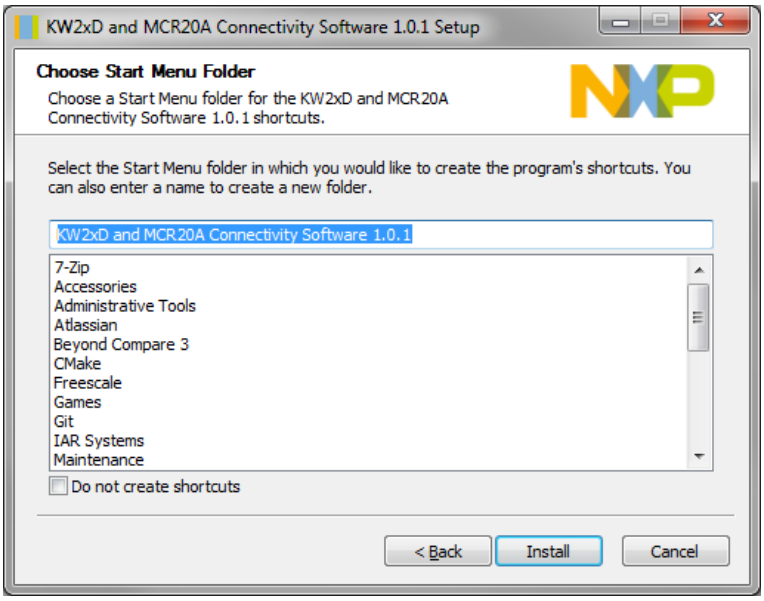

Figure 5: SMAC software install wizard creates shortcuts

NOTE

The MKW24D software installer will also contain the KSDK version 2.0 drivers and RTOS enablement for KW24D/KW22D/KW21D, KL46Z and K64F.

2 Cloning a project

Navigate to the KW24D Connectivity Software installation folder and run the Project Cloner application (**MKW2xD_ConnSw_1.0.1\tools\wireless\ProjectCloner\ProjectCloner.exe**).

At the first run, the Project Cloner will search for the location of the KW24D Connectivity Software installation folder. This location can be modified at any time.

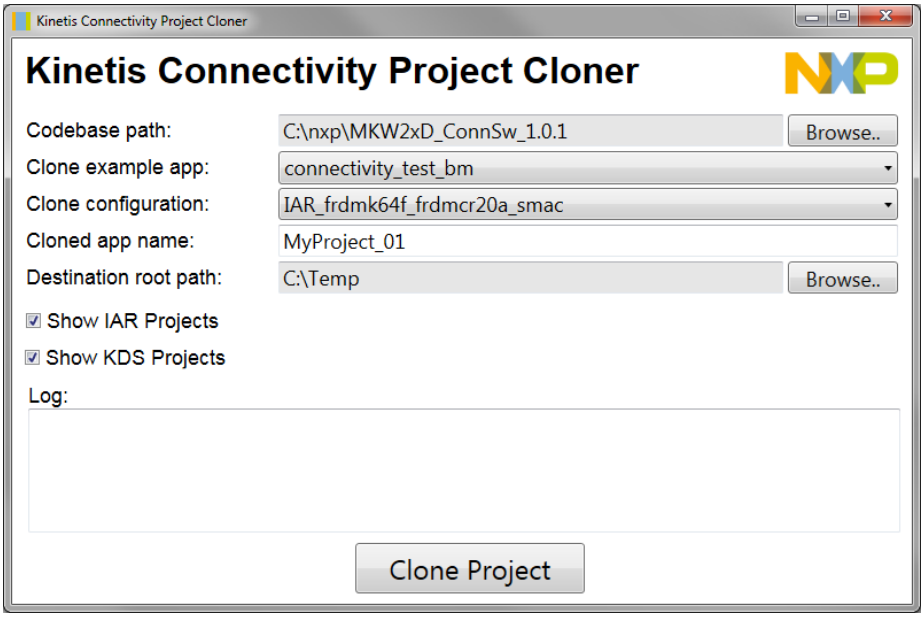

Figure 6: Connectivity Project Cloner

Select the example application to be cloned (**Clone example app**), and the desired configuration (**Clone Configuration**).

After this, the **Cloned app name** text box will contain a default name for the selected application. This name can be modified to any value.

The default **Destination root path** for the cloned application is the "C:\Temp" folder. To change this path click the **Browse** button to select a new location.

By default both IAR and KDS projects are shown in the **Clone configuration** dropdown menu. This can be modified by deselecting one of the two corresponding checkboxes.

Now press the **Clone Project** button to start the cloning process. The log window will display "Cloning completed" when the process ends.

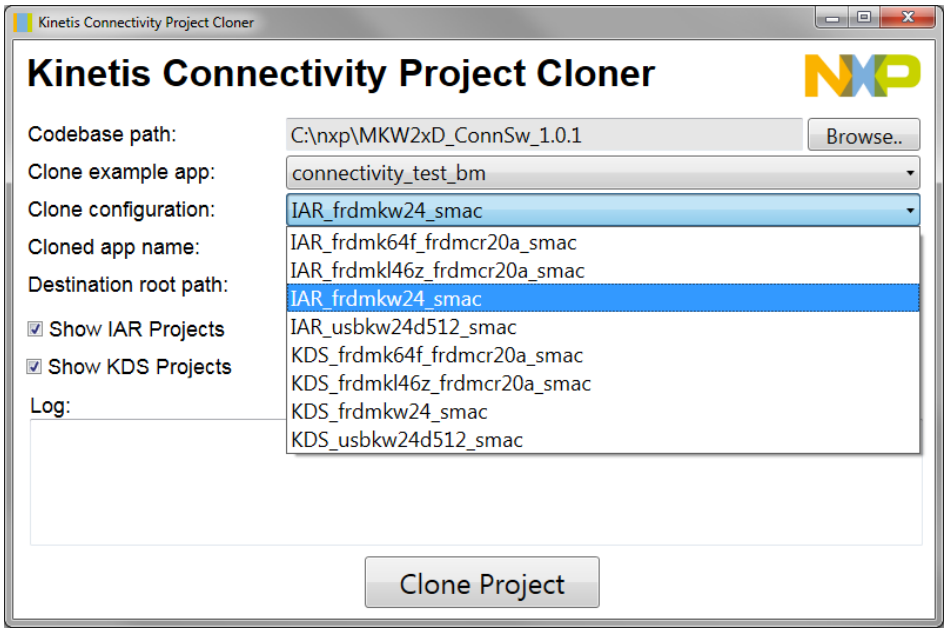

Figure 7: Available configurations for the selected example application

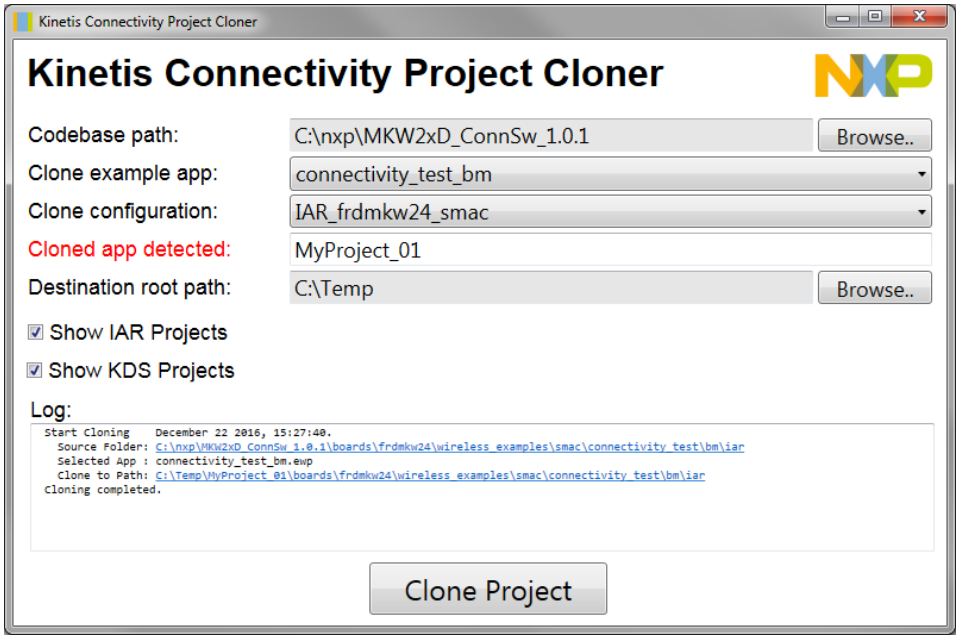

Figure 8: Application cloning done

3 Building the Binaries

This section details the required steps for obtaining the binary files for usage with the boards.

NOTE

The examples from below have been build using the IAR Embedded Workbench for ARM® version 7.80.1 or higher and Kinetis Design Studio Integrated Development Environment version 3.2.0 or higher. This connectivity software package does not include support for any other toolchains.

The packages must be built with the debug configuration in order to enable debugging information.

This package includes various demo applications that can be used as a starting point.

The next section presents the steps required for building the Connectivity Test application. In case the Project Cloner is not used, all applications can be found using the following placeholders for text:

- <connectivity_path> : represents the root path of the cloned application, or the root path for the SMAC software package
- <board> : represents the target board for the demo app, can be “frdmkw24d”, “usbkw24d512”, “frdmk64f_frdmcr20a” or “frdmkl46z_frdmcr20a”
- <RTOS>: represents the scheduler or RTOS used by the app, can be “bm” or “FreeRTOS”
- <demo_app> : represents the demo app name
- <IDE> : represents the integrated development studio used to build projects and can be “iar” or “kds”

The demo applications general folder structure is the following:

<connectivity_path>\boards\<board>\wireless_examples\smac\<demo_app>\<RTOS>\<IDE>\

Kinetis SMAC Software Demo Application Build Example

Selected app: Connectivity Test

Cloned app name: Connectivity_Test

Board: frdmkw24

RTOS: bare-metal scheduler

Resulting location in the connectivity software installation directory:
<connectivity_path>\boards\frdmkw24\Connectivity_Test\frdmkw24\bare_metal\build\<IDE>

3.1 Building and Flashing the SMAC Software Demo Applications using KDS

Step 1:

Open the KDS IDE and create a new workspace.

Step 2:

Import the project into Workspace: File -> Import -> General -> Existing Projects into Workspace.

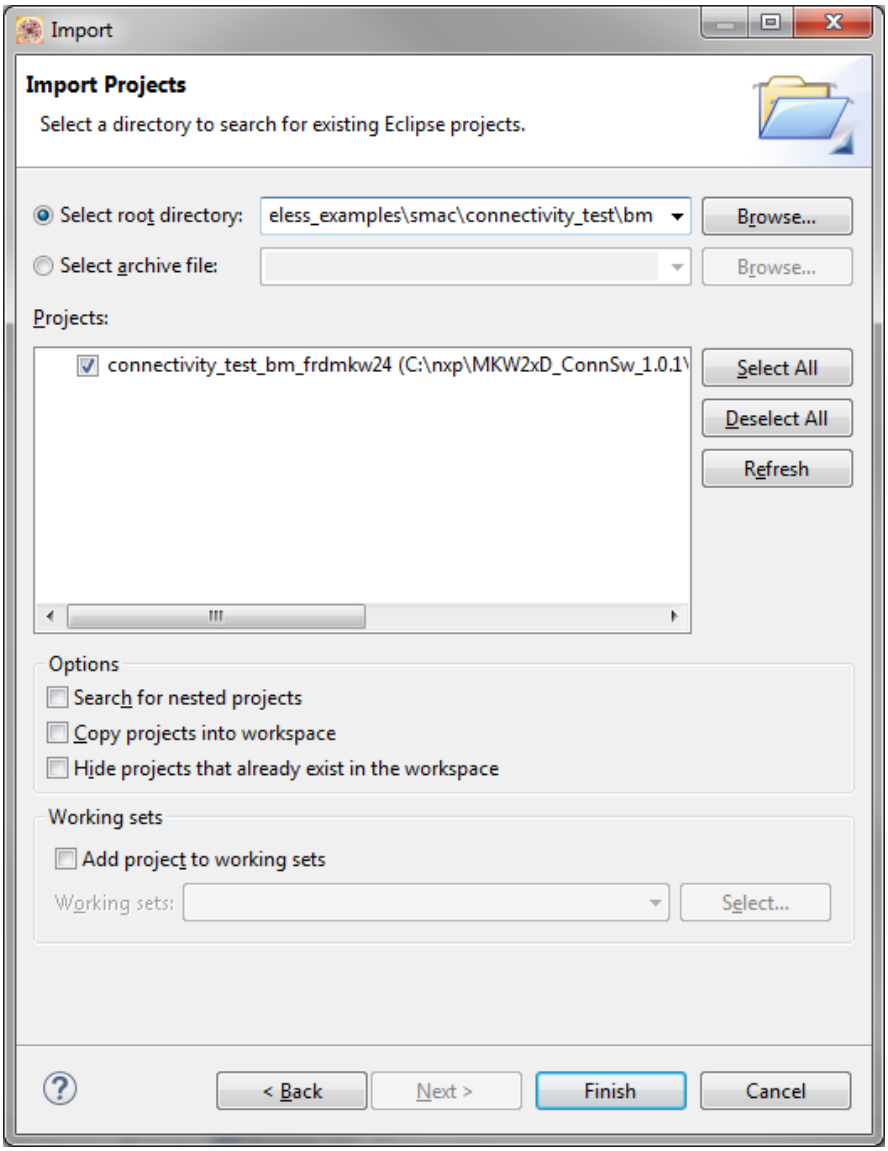

Figure 9: "Connectivity Test" import project

Step 3:

Select the Connectivity Test project.

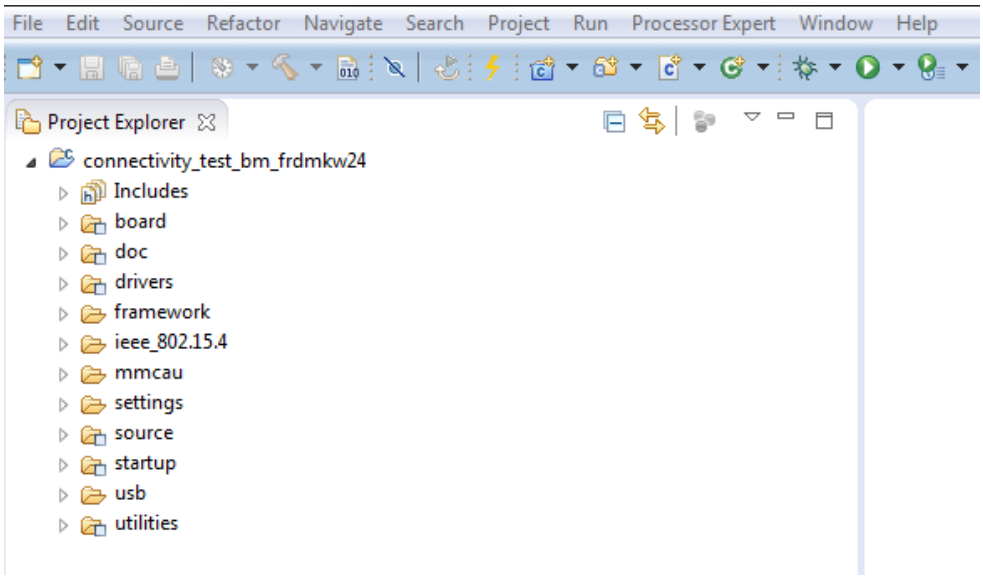

Figure 10: "Connectivity Test" bare-metal KDS project

Step 4:

Build the Connectivity Test project.

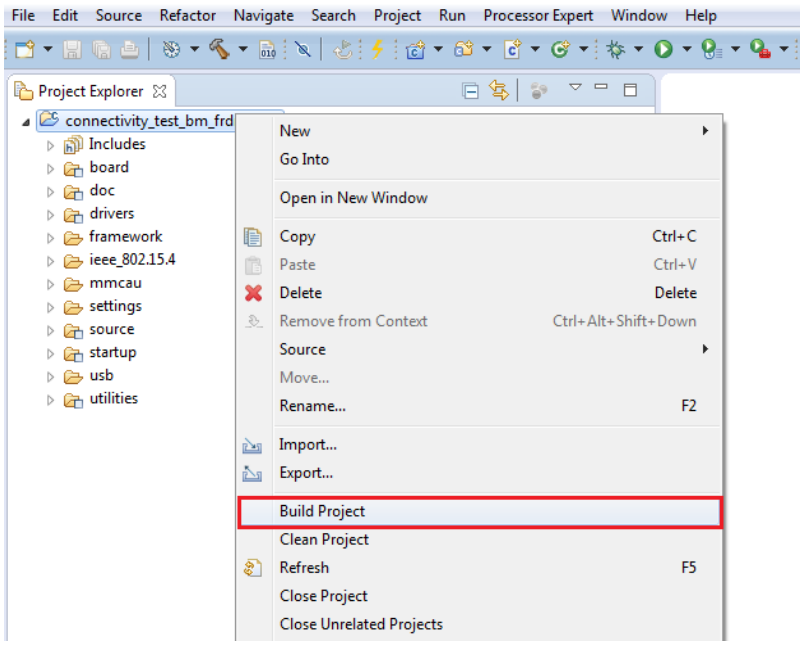

Figure 11: "Connectivity Test" bare-metal build

Step 5:

Click the “Debug” button to flash the executable onto the board.

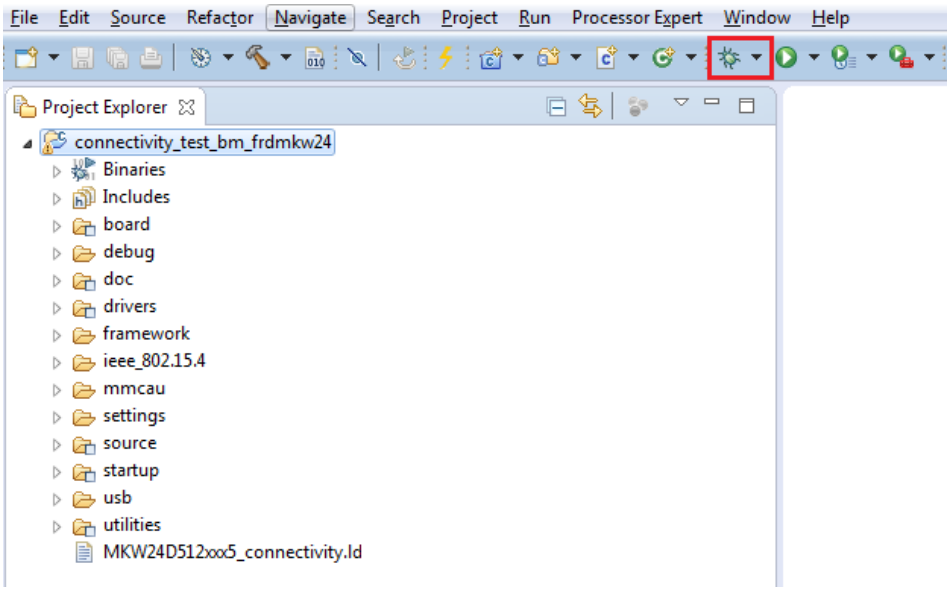

Figure 12: “Connectivity Test” Debug

NOTE

Please make sure that you install the latest J-Link driver and associate it with KDS. To do this, download the driver from https://www.segger.com/jlink-software.html and install it. When you are asked to associate the applications which use J-Link driver with this version of driver you only have to check the box near Kinetis Design Studio and click Ok.

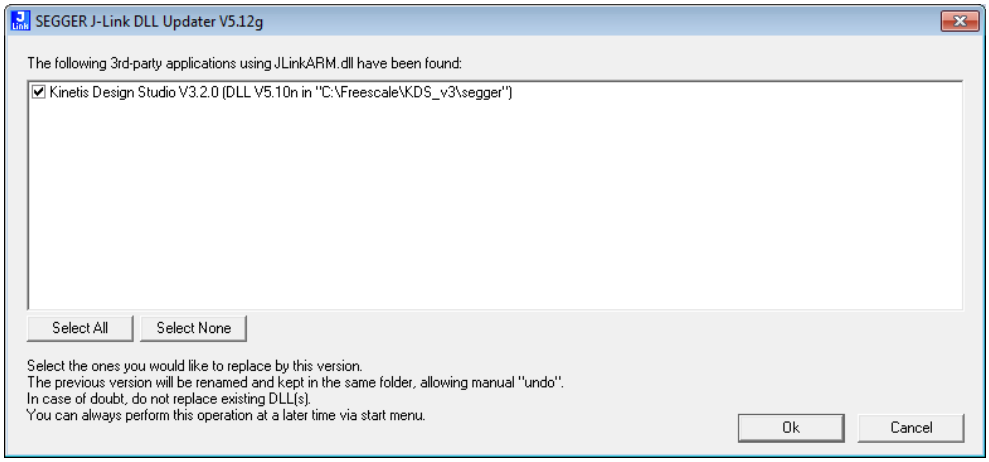

Figure 13: Update KDS J-Link Driver

Step 6:

Select the J-Link debug configuration option when asked for Launch Configuration.

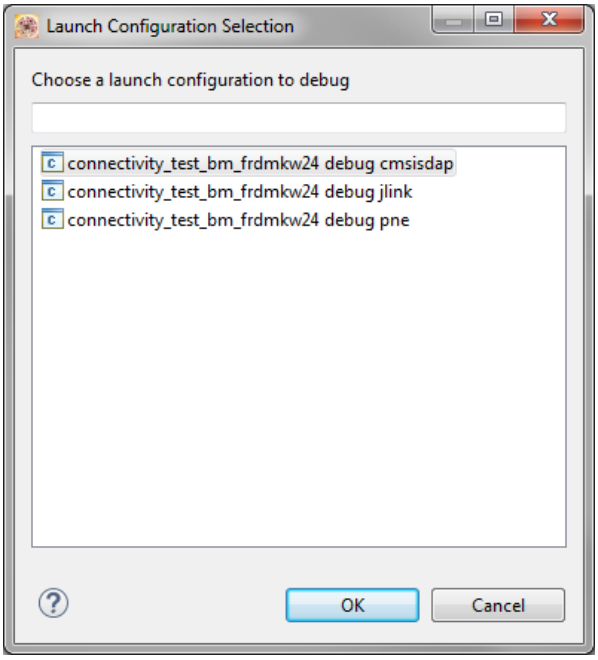

Figure 14: "Connectivity Test" debug configuration

NOTE

The projects are configured to use "CMSIS-DAP" as the default debugger. Please make sure that your board's OpenSDA chip contains a J-Link firmware or that the debugger selection corresponds to the physical interface used to interface to the board. See the section 3.3 for more information.

3.2 Building and Flashing the SMAC Software Demo Applications using IAR

Step 1:

Navigate to the cloned application location. If the cloner is not used, navigate to the resulting location in the connectivity software installation directory.

Step 2:

Open the highlighted IAR workspace file (*.eww file format):

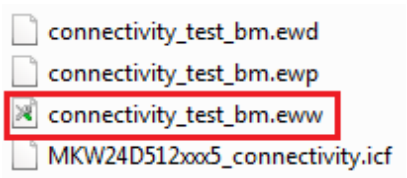

Figure 15: Cloned "Connectivity Test" demo project location

Step 3:

Select the desired configuration for the Connectivity Test project.

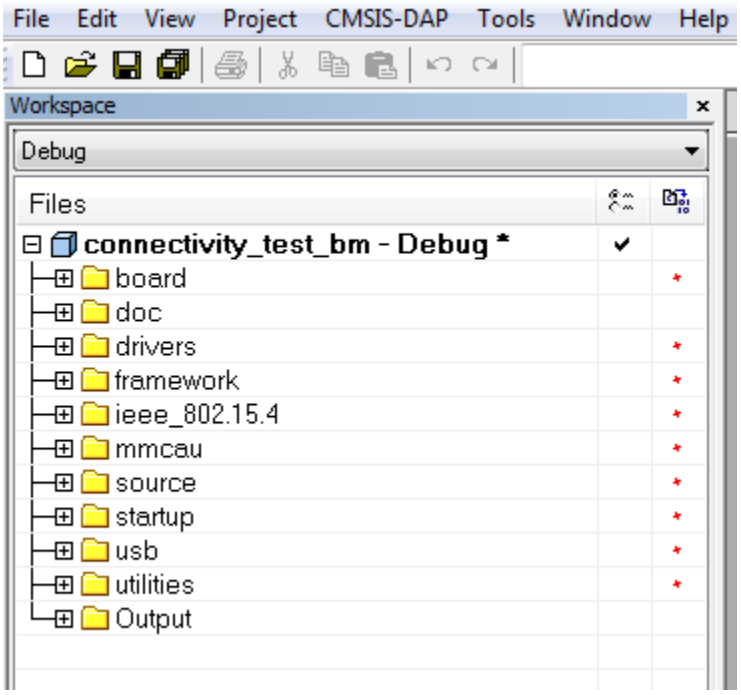

Figure 16: Connectivity Test IAR project

Step 4:

Build the project.

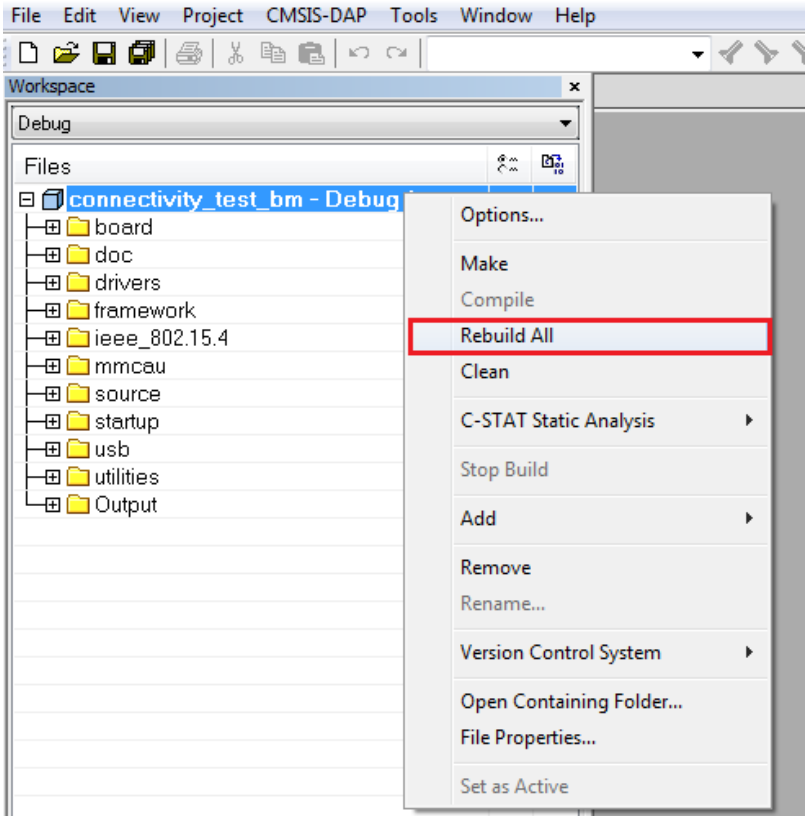

Figure 17: Connectivity Test bare-metal build

Step 5

Make the appropriate debugger settings in the project options window:

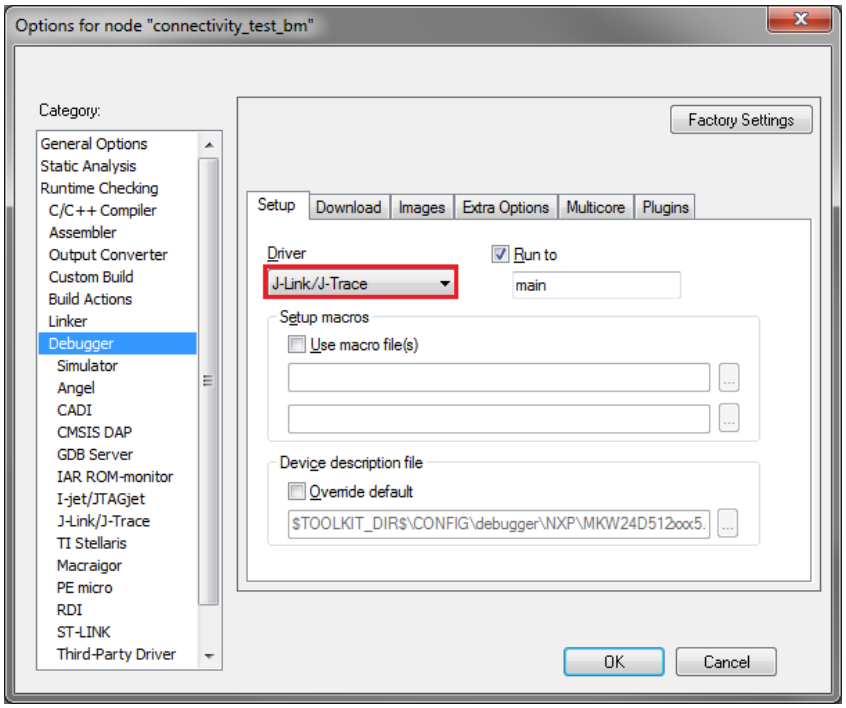

Figure 18: Debugger Settings

Step 6:

Click the "Download and Debug" button to flash the executable onto the board.

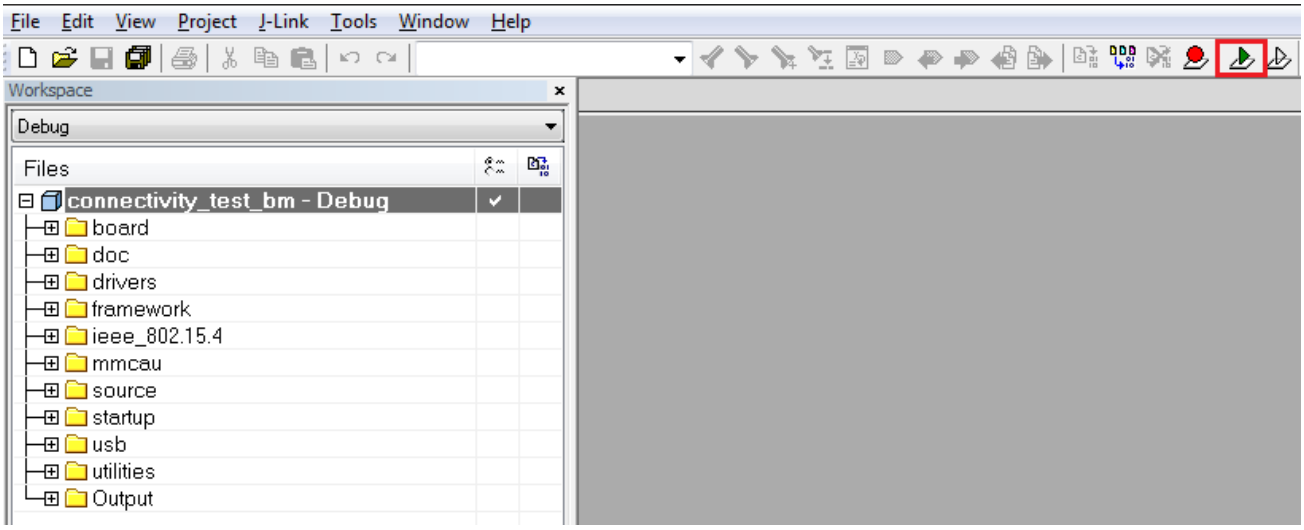

Figure 19: Connectivity Test Download and Debug

NOTE

The projects are configured to use "J-LINK / J-Trace" as the default debugger. Please make sure that your board's OpenSDA chip contains a J-Link firmware or that the debugger selection corresponds to the physical interface used. See the section below for more information.

3.3 Flashing a Binary Image File Without Using an IDE

The MKW2xD connectivity software package contains in the *<installation_path>\tools\wireless\binaries* folder a series of pre-compiled binary applications that can be flashed onto a development board.

In order to flash the corresponding binaries to the FRDM-KW24 board, the best approach is to use the OpenSDA on-board interface J-Link Mass Storage Device functionality, by simply dragging and dropping the binary image in the mass storage drive exposed by this OpenSDA firmware.

In order to flash the firmware on the USB-KW24D512, a J-Link probe is needed along with the latest J-Link software from www.segger.com.

Run the *jlink.exe* executable provided in the J-Link software installation and type the commands below for flashing the image on the microcontroller. Make sure that the binary file is in the same folder with the *jlink.exe* executable, or specify the absolute path to the file.

```
unlock kinetis
device MKW24D512xxx5
loadbin connectivity_test_frdmkw24.bin 0
```

4 Hardware Setup

The hardware setup in this example uses a FRDM-KW24 development platform. This platform as well as FRDM-CR20A connected to FRDM-K64F and FRDM-KL46Z are shown in the figure below:

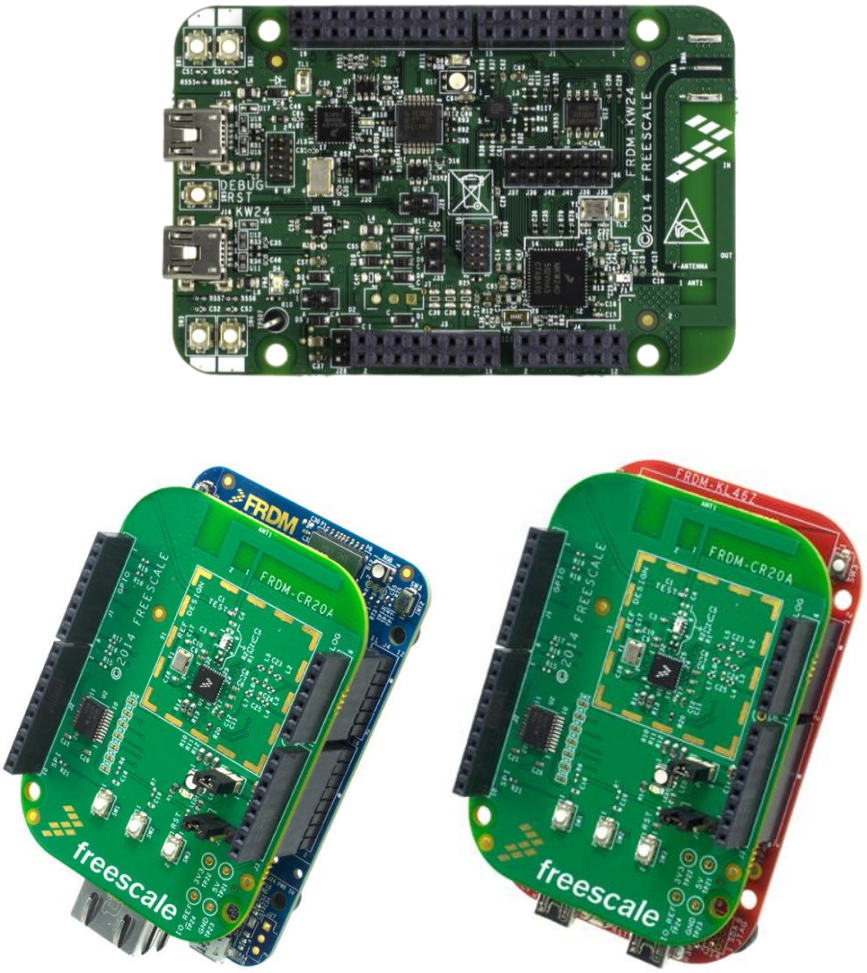

Figure 18: FRDM-CR20A connected to FRDM-K64F and FRDM-KL46 and FRDM-KW24

The FRDM-KW24, FRDM-K64F and FRDM-KL64Z boards should have their OpenSDA USB ports connected via mini and micro-USB cables respectively to a Windows PC. The OpenSDA chip on the motherboards should have appropriate firmware flashed, with debugging and virtual serial COM port capabilities. For more information on OpenSDA please refer to the following webpage: www.nxp.com/opensda.

Variants of embedded firmware for the OpenSDA chip can be downloaded from:

https://github.com/mbedmicro/CMSIS-DAP

https://www.segger.com/opensda.html
http://www.pemicro.com/opensda/

CMSIS-DAP is the default interface selected in the IDE projects for FRDM-KW24 and FRDM-K64F with MCR20A included in this release.

5 Example: Running the Connectivity Test Demo Application

The SMAC "Connectivity Test" demo application requires a serial terminal program to connect to the boards. For this example, Tera Term was chosen.

Step 1:

Load the applications on the boards using IAR Embedded Workbench for ARM® by clicking "Download and Debug".

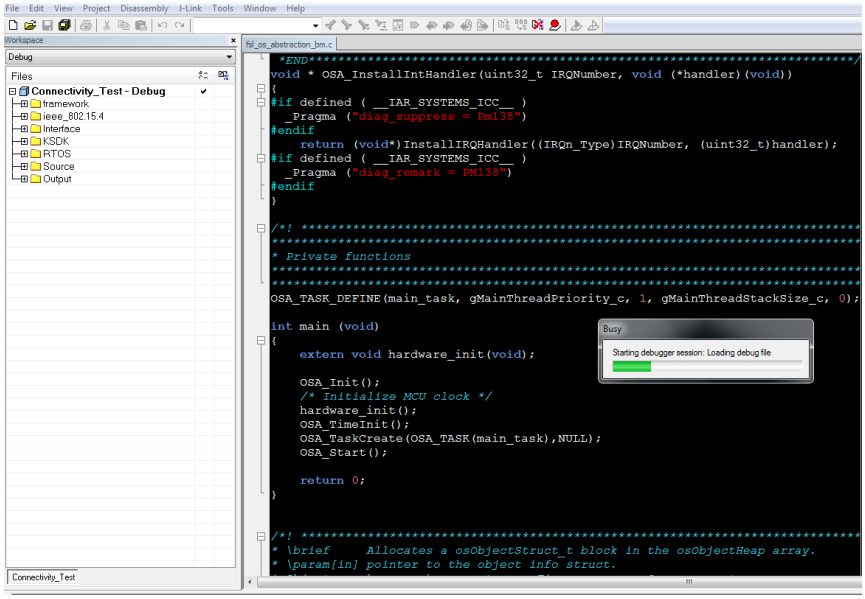

Figure 20: Connectivity Test loading stage example

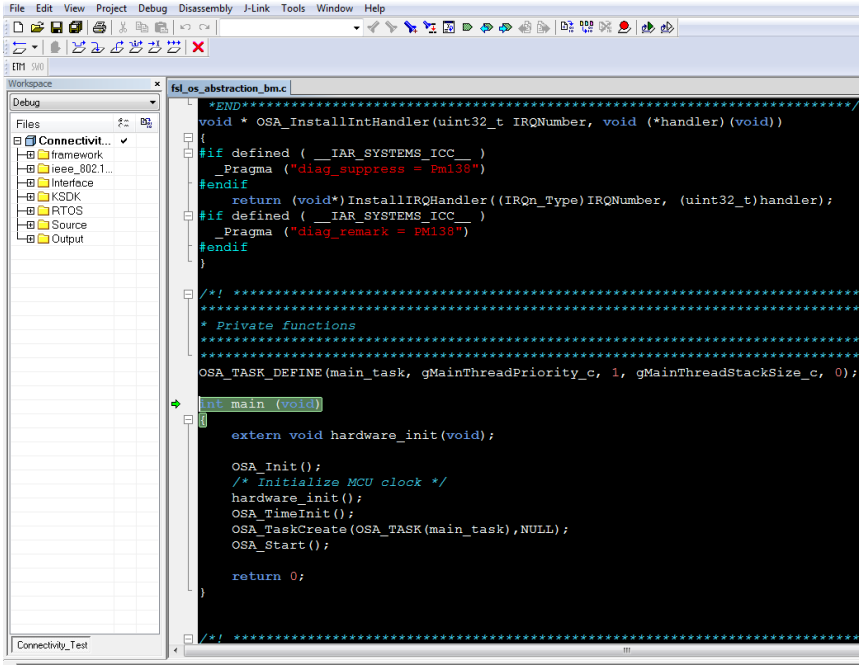

Figure 21: Connectivity Test application loaded

Step 2:

After loading the application check “Device Manager” to get the serial ports numbers. These should appear with the prefix “JLink”.

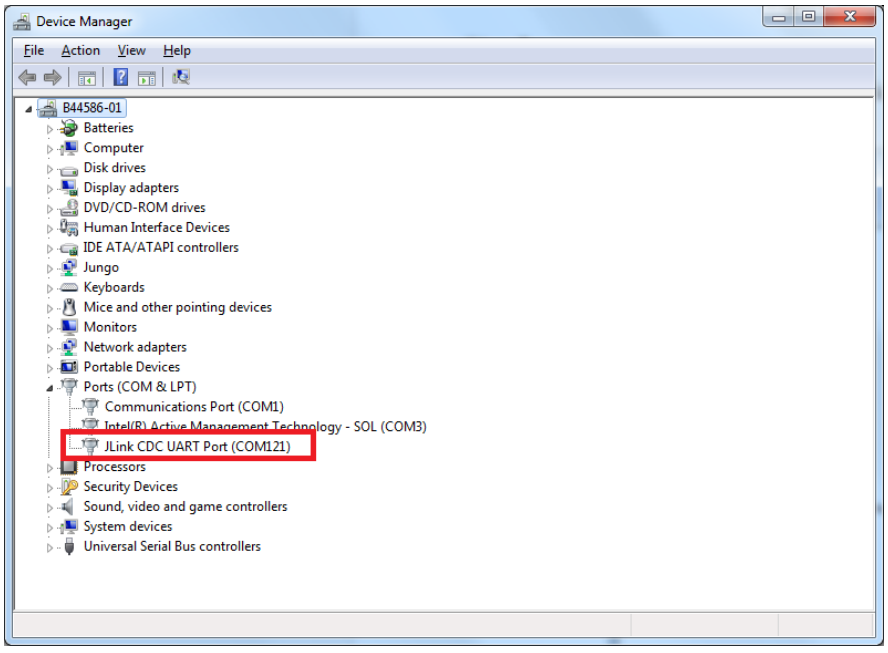

Figure 22: Device Manager serial port lookup

Step 3:

Using the port numbers specified in Device Manager, open a Tera Term instance and connect to the device using the 115200 baud rate. To change the baud rate of the terminal go to “Setup-> Serial Port” menu.

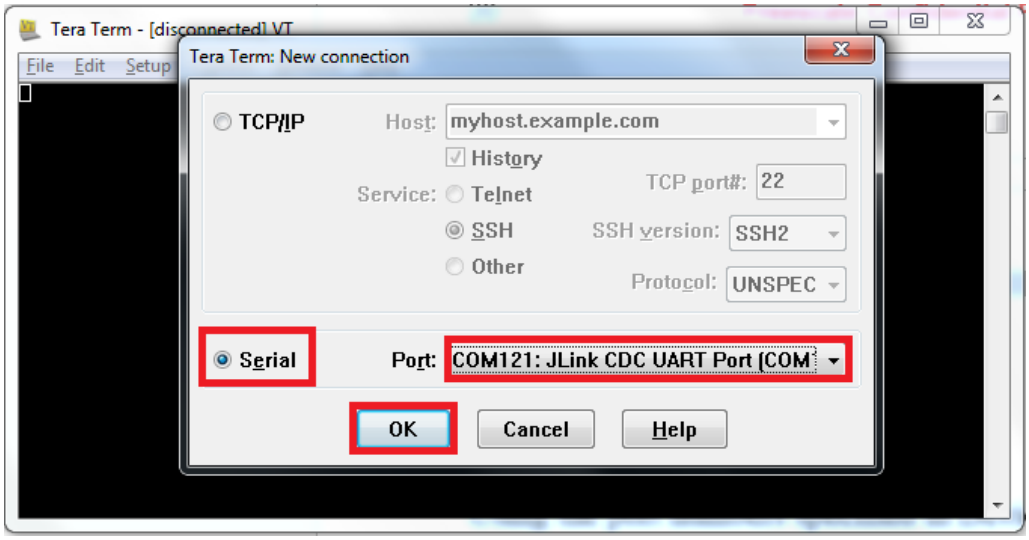

Figure 23: Select JLink serial connection COM port

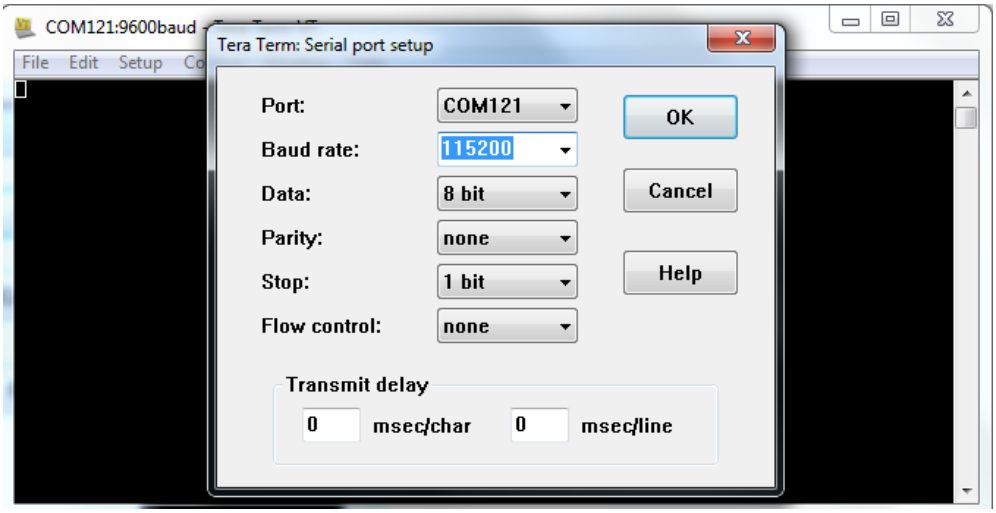

Figure 24: Setting correct baud rate

Step 4:

Start the applications by pressing the ENTER key. Any other key will display the logo screen again.

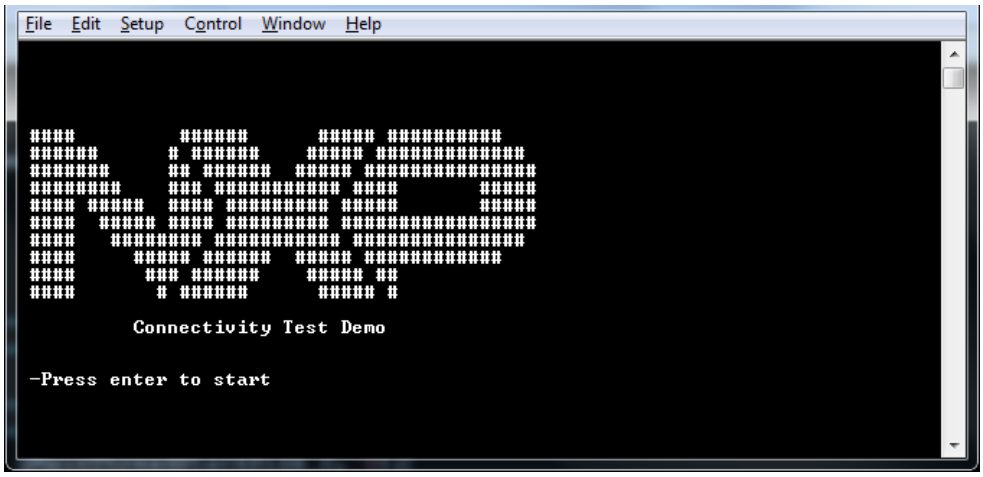

Figure 25: Application after a reset

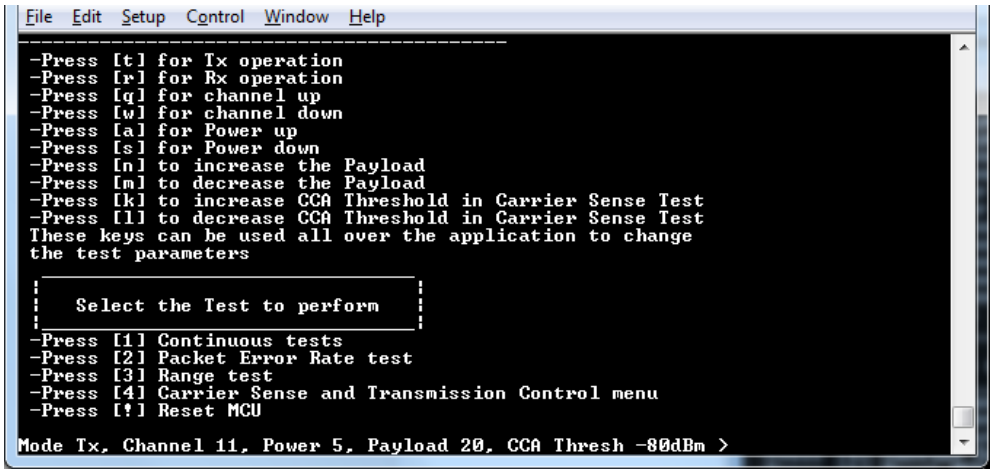

Figure 26: Connectivity Test main menu

Follow the on-screen instructions to run each test. If a test needs a second platform, follow the steps above to set it up.

The previous section demonstrates the basic steps to run a demo application. For detailed information about the demo applications, please refer the Demo Applications User's Guide included in the installer (*Kinetis SMAC Demo Applications User's Guide.pdf*).

How to Reach Us:

Home Page:
www.nxp.com

Web Support:
www.nxp.com/support

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