Application Report
SPRAC32A–March 2016–Revised March 2018

Processor SDK RTOS Customization: Modifying Board Library to Change UART Instance on AM335x

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ABSTRACT

This document describes the procedure to modify the default UART0 BeagleBone Black example in the AM335x Processor SDK RTOS package to enable UART1. On the BeagleBone Black (BBB) P9 header, pins 24(TX) and 26(RX) are connected to UART1. This application note shows how to enable and verify that UART1 is functioning on the BBB.

Tutorial Environment

- Code Composer Studio™ (CCS) v 7.2.0
- Windows® 7 Host
- Processor SDK RTOS AM335x x.x.x.x install path C:\ti\pdk_am335x_x_x_x\packages. This location is referenced as ${PDK_INSTALL_DRI} in this document.
- BeagleBone Black Rev C (BBB) with a debugger header soldered to P2
- Blackhawk USB100v2

Prerequisites

1. Download the AM335x Processor SDK RTOS package for Windows.
2. Install the package.
3. Create the MyExampleProjects running the pdkProjectCreate.bat file described in the instructions in PDK Example and Test Project Creation. Here is a video showing the process: https://training.ti.com/processor-sdk-device-drivers-setup-test.

NOTE: Ensure that the new packages installed are registered with CCS prior to running the .bat file. Future versions of Processor SDK RTOS for AM335x might have variations in code that could alter the steps outline in this application note.

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1 Software Modification

1.1 Generating a New PinMux Configuration Using the PinMux Utility

This procedure uses the cloud-based pinmux utility (see Figure 1).

Figure 1. PinMux Utility

1. Select the PinMux parameters as in Figure 2.

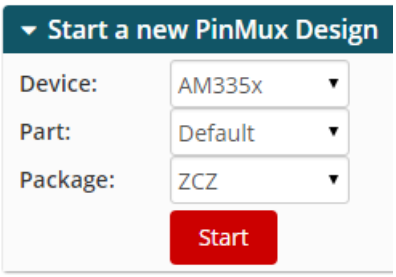

Figure 2. PinMux Parameters

2. Navigate to ${PDK_INSTALL_DIR}packages\ti\starterware\tools\pinmux_config\am335x.

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3. Load beaglebone_black_config (see Figure 3).

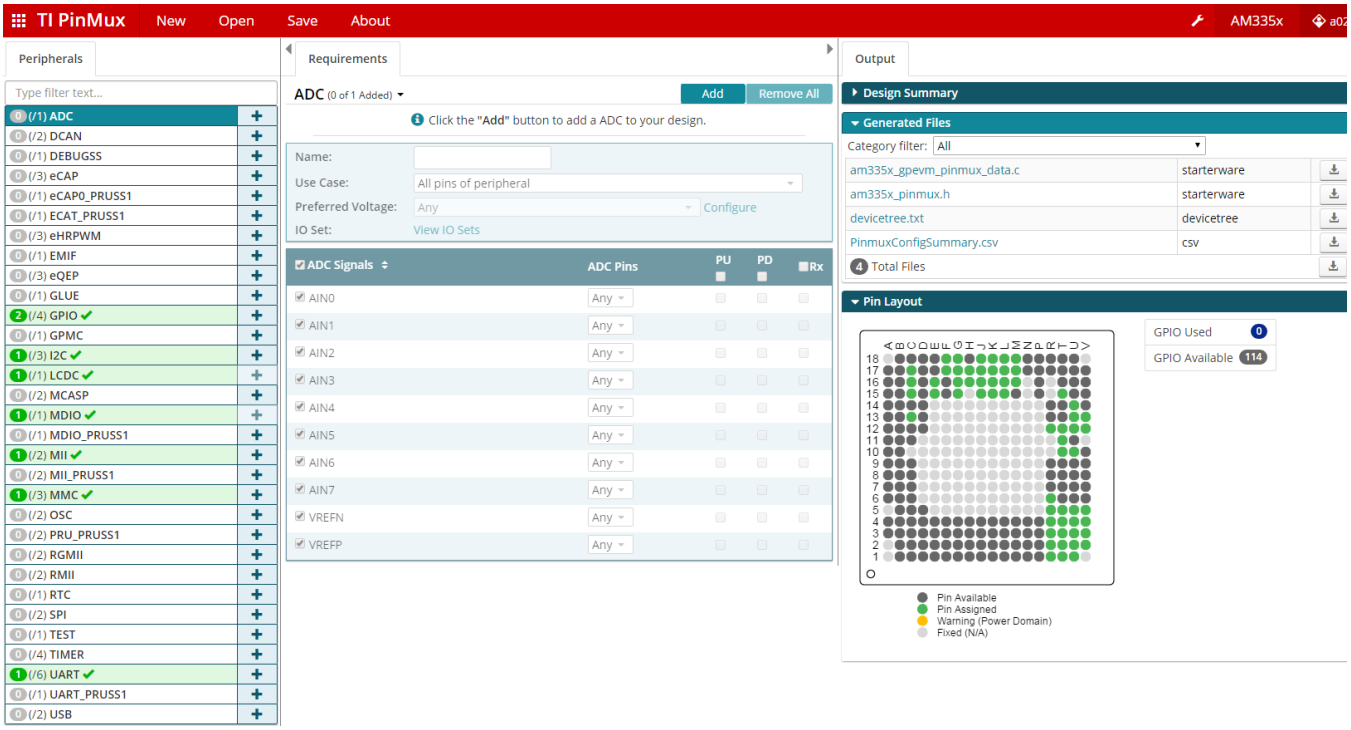

Figure 3. PinMux Configuration Loaded

4. Click the + symbol at the UART row to add UART 1 to the configuration. (The default config only has UART0. See Figure 4.)

Figure 4. Add UART 1

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This action creates the new UART instance in the requirements section (see Figure 5).

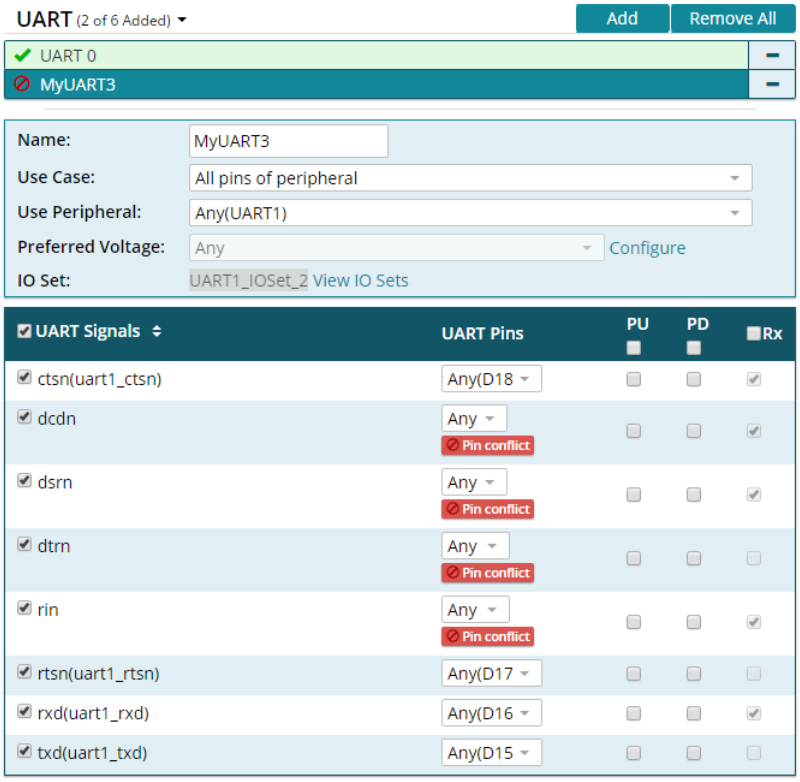

Figure 5. UART Instance

5. Change the description to match the fields in Figure 6.

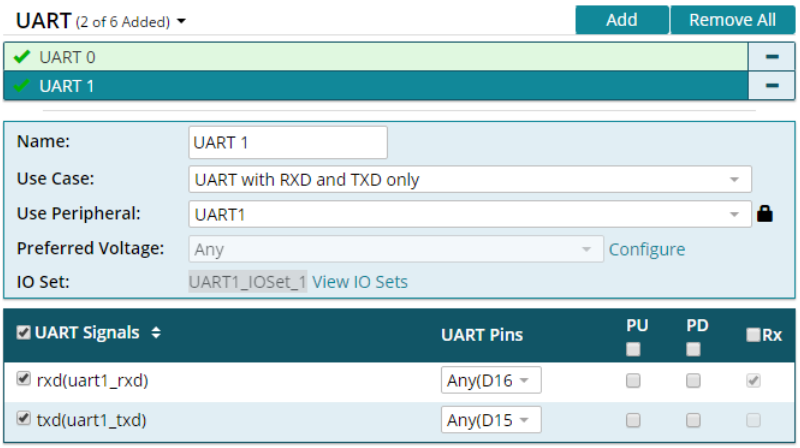

Figure 6. Description

Pins D15 (RX) and D16 (TX) are used.

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6. Change the Category filter to *starterware* (see Figure 7).
7. Download the pinmux files.

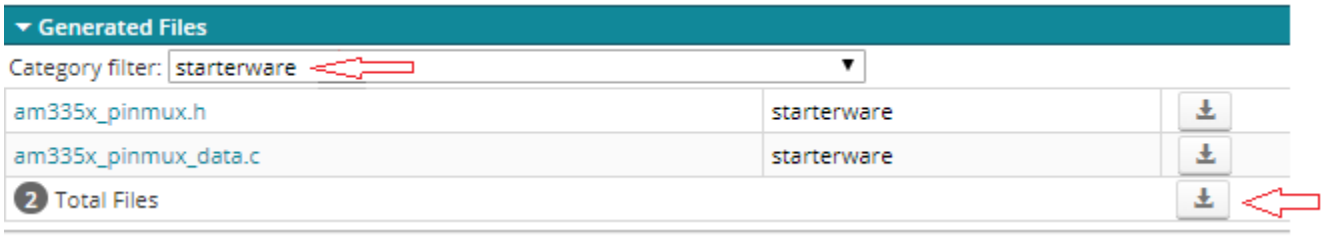

Figure 7. Generated Files

8. Unzip the files (see Figure 8).

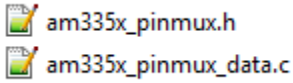

Figure 8. Unzipped Files

The current cloud-based pinmux utility downloads the AM335x pinmux files with a generic filename, without any platform affiliation.

9. At the bottom of am335x_pinmux.h, change *extern pinmuxBoardCfg_t gAM335xPinmuxData[];* to *extern pinmuxBoardCfg_t gBbbPinmuxData[];*.
10. Change am335x_pinmux_data.c to am335x_beagleboneblack_pinmux_data.c.
11. Change gAM335xPinmuxData to gBbbPinmuxData at the end of the file at pinmuxBoardCfg_t gAM335xPinmuxData[] = of am335x_beagleboneblack_pinmux_data.c.

    The previous modifications apply to the pinmux utility version 4.x and might be fixed in a future release.
12. Replace the existing files with the new files in ${PDK_INSTALL_DIR}packages\ti\starterware\board\am335x.

2 Platform Development Kit (PDK) Board Library Modifications

The following areas in the AM335x processor SDK RTOS package must be modified to enable UART1 on the BBB.

2.1 Power and Clocking

To modify the power and clocking, do as follows:

1. Modify the PRCMModuleEnable() instance from UART0 to UART1 in the file ${PDK_INSTALL_DIR}\packages\ti\board\src\bbbAM335x\bbbAM335x.c.

```
/* UART */status = PCRMModuleEnable (CHIPDB_MOD_ID_UART, 1U, OU);
```

2.2 Adding Peripheral Instances

To add peripheral instances, do as follows:

1. Change the UART instance in the file ${PDK_INSTALL_DIR}\packages\ti\board\src\bbbAM335x\include\board_cfg.h from 0 to 1.

```
#define BOARD_UART_INSTANCE 1
```

2. Change the UART instance from 0 to 1 inside PINMUXModuleConfig() in file ${PDK_INSTALL_DIR}\packages\ti\board\src\bbbAM335x\bbbAM335x_pinmux.c.

```
status = PINMUXModuleConfig (CHIPDB_MOD_ID_UART, 1U, NULL) ;
```


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2.3 Rebuild the Board Library

The board and starterware libraries must be recompiled for the changes to be effective. The *Processor SDK RTOS Customization: Modifying Board library to change UART instance on AM335x* wiki page has instructions on how to set up the pdk environment for rebuilding. The board library can be remade with > gmake board. Starterware can be remade with> gmake starterware (this can take a while).

3 Testing the Changes

3.1 CCS Project Modifications

To modify the CCS project, do as follows:

1. Import UART_BasicExample_bbbAM335x_armTestProject into the CCS project workspace.
2. Rebuild the UART example in CCS.

3.2 Hardware Setup to Run the Test Code

To set up the hardware to run the test code, do as follows:

1. Connect the device as shown in Figure 9 to pipe the UART1 data to the COM port where the FTDI cable is connected to test UART1.

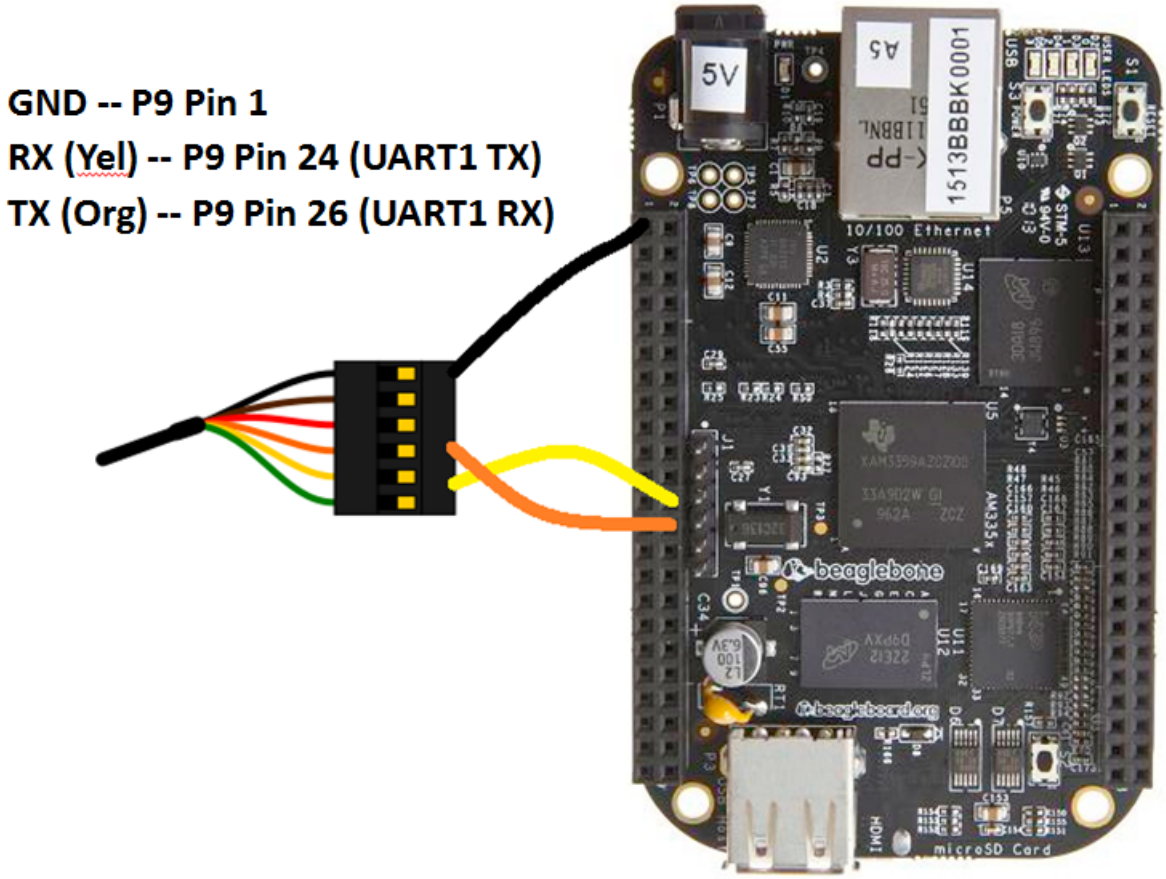

Figure 9. BBB With FTDI Cable Connected to UART1 Pins on Header P3

Figure 9 does not show the power and CCS debugger connections. The application note assumes these are connected.

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2. Connect the BBB target configuration.
3. Load the .out file onto the target.
4. Open a Teraterm or Putty console with the COM port for the FTDI cable at baud 115200:.
5. Click *Run* in CCS to see Figure 10.

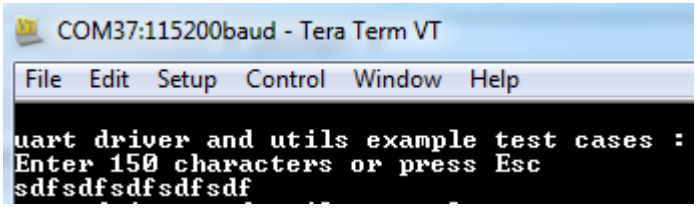

Figure 10. Test Output

Figure 10 shows the UART example now working on UART1.

For technical support, post questions at http://e2e.ti.com. Post only comments about *Processor SDK RTOS Customization: Modifying Board Library to Change UART Instance on AM335x* (SPRAC32).

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Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (March 2016) to A Revision **Page**

- Changed Code Composer Studio version from 6.1.2 to 7.2.0. 1
- Updated Prerequisites section. 1
- Updated Note. 1
- Updated navigation link. 3
- Updated enerating a New PinMux Configuration Using the PinMux Utility sequence. 6
- Updated Power and Clocking sequence. 6
- Updated Adding Peripheral Instances sequence. 6
- Removed Interrupt Configuration section. 7
- Updated CCS Project Modifications section. 7
- Updated Hardware Setup to Run the Test Code sequence. 8

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