

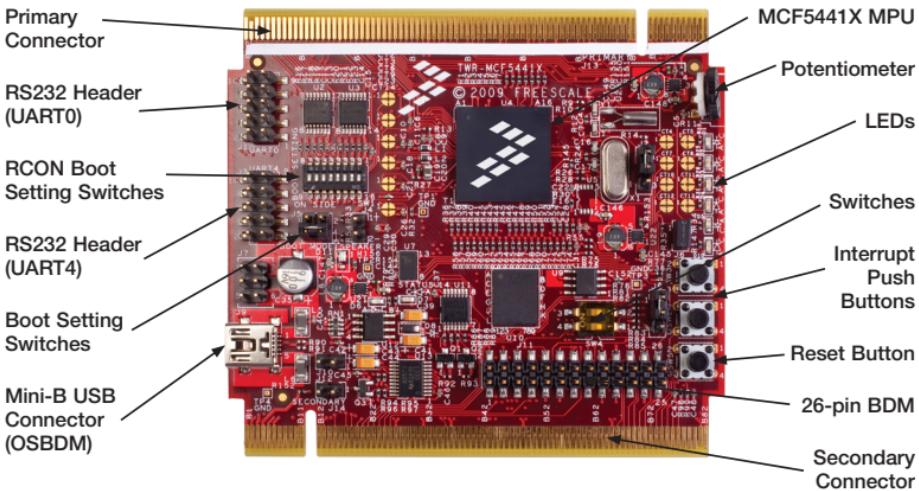
LAB
2

MCF5441X

MQX™—Telnet to serial bridge
using optional UART ports



Get to know the TWR-MCF5441x



TWR-MCF5441X-KIT Freescale Tower System

The TWR-MCF5441X module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System today.

**LAB
2**

MQX™—Telnet to Serial Bridge Using Optional UART Ports

Introduction

This lab demonstrates how to create a bridge between a TCP/IP (telnet) connection and a serial line. The user will then have the option of recompiling the Freescale MQX RTOS to utilize any one of the five available serial communication interfaces available on the TWR-MCF5441X.

This lab demonstrates

- MQX RTCS TCP/IP network stack
- Custom telnet server implementation
- Re-directing STDIN and STDOUT within an MQX task
- Re-compiling the Freescale MQX RTOS

Step by Step Instructions

1. If you have not done so already, install the required software described in Steps 1 and 2 of Lab 1.
2. Construct the TWR-MCF5441X-KIT as instructed in Step 3 of Lab 1. Then make the following connections from the TWR-MCF5441X-KIT to the computer.
 - a. USB cable between the OSBDM debugger (J14 on the TWR-MCF51CN module) and an USB port on PC
 - b. Ethernet cable between the TWR-SER2 module (using Port A) and an Ethernet port on an external network
 - c. Serial port on the TWR-SER2 module (DB9 Connector) to a serial port on PC (cable not included)

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3. The first time you connect the USB debugger cable to your PC, Windows® will install a driver for the debugger. Follow the prompts to automatically detect and install the driver.
4. The default Ethernet IP address for this lab is 169.254.3.3. Typically, when you connect your computer directly to a switch or to the TWR-SER2, the computer will default to an auto IP address on the same subnet as the board (169.254.x.x), therefore requiring no setup.
5. If you did not install the MQX project in the default **C:\Program Files\Freescale\Freescale MQX 3.6** directory and have not done so as part of Lab 1, you must first recompile the MQX libraries to reflect the new path name. See the release notes for more information before continuing the lab.
6. Similar to Steps 9–14 of Lab 1 import the existing MQX demo project: **telnet2serial_twrmcf54418** located in the folder: **C:\Program Files\Freescale\Freescale MQX 3.6\demo\telnet_to_serial\cw10\telnet2ser_twrmcf54418**

Note: The PC may take a few minutes to default to the auto IP address and may report Limited or No Connection. Alternatively, you may also configure the IP address of the computer manually. Select Start > Settings > Network Connections > Local Area Connection. Note your original TCP/IP settings, and then set your IP address to 169.254.3.4 and your subnet mask to 255.255.0.0.

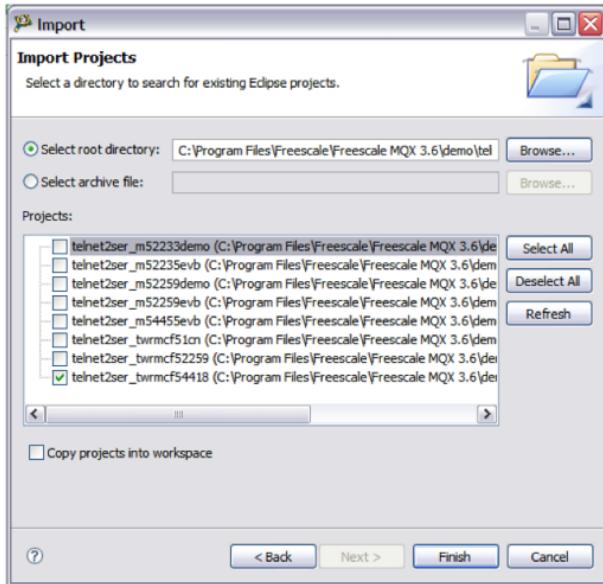


Figure 1

7. Build the project by clicking the build icon in the toolbar.



8. Now go to “Run” > “Debug Configurations” and select the “telnet2serial_twrmcf54418_Ext_RAM_Debug_OSBDM” debug configuration.

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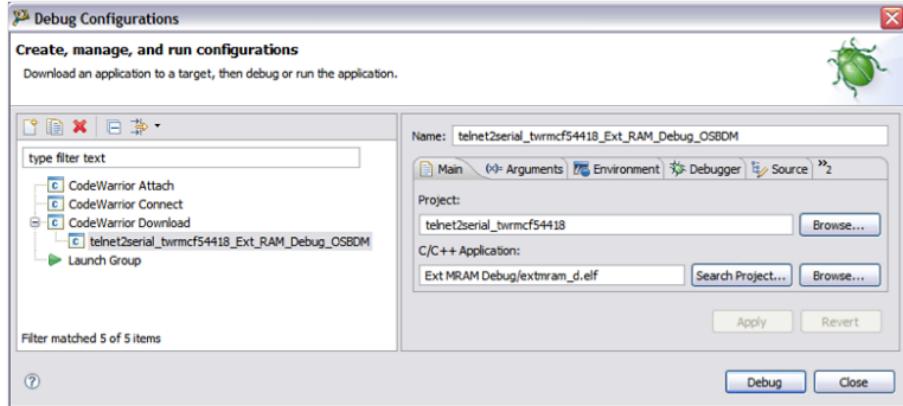


Figure 2

9. Now press the “**Debug**” button in the lower right corner, and wait for the program to be copied into the RAM on the TWR-MCF5441X.
10. The debug view will come up, and the code will pause at the start of the MQX main() function.
11. Hit the run icon to continue the program execution.

12. Open a command prompt on the PC (Start > All Programs > Accessories > Command Prompt). At the prompt invoke a telnet session to the board by typing **telnet 169.254.3.3**. You are now connected to the MQX shell via telnet.
13. Open a serial terminal window (using HyperTerminal or similar application) and connect to the TWR-MCF5441X module using the following settings:
 - Bits per second: 115200
 - Data bits: 8

- Parity: None
 - Stop bits: 1
 - Flow control: None
14. The serial console and the telnet sessions should be “bridged.”
Type some characters into the telnet session, and you should see the characters appearing on the console terminal window.
Try typing into the console terminal window and you will see the characters appearing in the telnet session.
15. The remaining portion of this lab will guide the user in modifying the Freescale MQX RTOS libraries to utilize optional UART ports that are accessible with the TWR-MCF5441X-KIT. This section of the lab can be repeated to evaluate access to the various UART interfaces.
16. Import the MQX BSP project file: **bsp_twrmcf54418** located in the folder:
C:\Program Files\Freescale\Freescale MQX 3.6\mqx\build\cw10\bsp_twrmcf54418
Un-check the **“Copy projects into workspace”** option.

17. Double-click the **user_config.h** file located under the **“bsp_twrmcf54418 User Config”** folder in the CodeWarrior program pane.

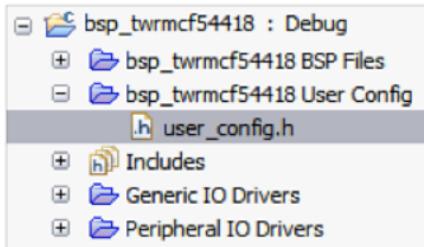


Figure 3

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18. Modify the `user_config.h` file to designate which default UART is used for the console messaging.

Replace the **X** in the following lines of codes with the appropriate MQX serial port name (A, B, C, D or E). The lines of code below are case-sensitive; the first `#define` is upper-case and the second is lower case. Refer to the table at right for details on each port instantiation.

Locate and modify the following line:

`#define BSPCFG_ENABLE_TTYA 0`
as follows:

`#define BSPCFG_ENABLE_TTYX 1`

Add the following lines

`#define BSP_DEFAULT_IO_CHANNEL "ttyx:"`
`#define BSP_DEFAULT_IO_CHANNEL_DEFINED`

Available UART port designations:

MQX Port Name	HW Port Name	TWR-MCF5441X-KIT Location
TTYA	UART0	2x5 Header on TWR-MCF5441X (UART0)
TTYB	UART2	2x5 Header on TWR-SER2 (UART2)
TTYC	UART4	2x5 Header on TWR-MCF5441X (UART4)
TTYD	UART5	DB9 Connector on TWR-SER2
TTYE	UART6	USB Connector on TWR-SER2

19. Compile the MQX BSP library by clicking the build icon in the toolbar



Note: This compiled library will impact all future TWR-MCF5441X MQX projects that are recompiled with this library. To ensure that additional labs function according to the provided documentation it is recommended to set the default UART back to the original value (TTYD).

20. Select the **telnet2serial_twrmcf54418** project and re-build the project by clicking the build icon in the toolbar



21. Reconnect the physical COM connection to the host computer based on the UART port enabled as the default UART in the MQX library.

- TTYA, TTYB and TTYC require the use of a 2x5 header to DB9 adapter cable, which is included with the TWR-MCF5441X. For details regarding the pinout of this header refer to the TWR-MCF5441X User Manual.

- TTYD requires the use of a "Straight-through" serial cable (not included).

- TTYE requires the use of a USB A-miniB cable, included in the TWR-MCF5441X. The USB cable attaches to the SERIAL/USB port on the TWR-SER2. The driver required to properly enumerate the virtual COM port is included on the TWR-SER2 CD.

22. Follow steps 8–14 to execute the program and reconnect the Telnet and Serial connection using the newly defined UART port.

About the Tower System

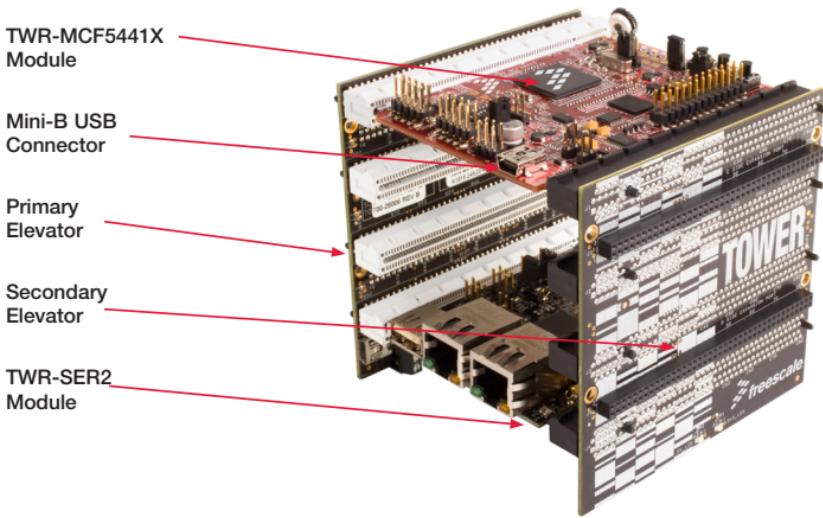


Figure 1: Tower System

Learn more at freescale.com/tower.

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