RedPine WiFi patch for Freescale MQX™ RTOS 3.6.1

Release Notes

PRODUCT:	RedPine WiFi patch for Freescale MQX™ RTOS 3.6.1
PRODUCT VERSION:	1.0
DESCRIPTION:	RedPine WiFi patch for Freescale MQX™ RTOS 3.6.1 version 1.0
RELEASE DATE:	Nov 8th, 2010

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor, Inc.
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 10 5879 8000
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or +1-303-675-2140
Fax: +1-303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Rev. 1
11/2010

Table of Contents

1 Read Me First

This release note documents the RedPine WiFi patch for Freescale MQX™ RTOS version 3.6.1.

1.1 Requirements

1.1.1 Software Requirements

This patch can be installed only as an update of previously in installed Freescale MQX™ RTOS version 3.6.1 Standalone use of this patch is not possible.

1.1.2 System Requirements

This Freescale MQX™ RTOS Patch was compiled and tested with the CodeWarrior Development Studio for ColdFire Architectures Version 7.2 (Build 91218) and CodeWarrior for MCU version 10 (Build 100621).

The system requirements are defined by the development tool requirements. There are no special host system requirements for hosting the Freescale MQX™ RTOS distribution itself.

1.1.3 Target Requirements

The RedPine patch for Freescale MQX™ RTOS in this release supports the evaluation boards mentioned below. There are no special requirements for the target hardware which would be out of scope of what each board requires for its operation (power supply, cabling, jumper settings etc). Please refer to Section 4 which considers Board-specific Information Related to RedPine WiFi patch.

Evaluation boards supported:

ColdFire V2 - TWR-MCF52259-KIT which consists of

MCF52259 processor board
RedPine WiFi Storey board
Serial Storey board
Two 4-storey elevator boards

The RedPine WiFi driver can be ported to various other platforms see chapter *Integration instructions* for further details.

1.2 Special instructions

1.2.1 Setup Installation instructions

Run the self-extracting RedPine Patch installer application and proceed according to instructions.

There are two options in how to install the RedPine patch:

RedPine files installed directly into the MQX 3.6 folder. Existing files will be overwritten.

Caution: If the RedPine Patch is installed over existing MQX 3.6.1. The TWRMCF52259 BSP files will be overwritten. Once installed, the files will not be able to uninstall.

RedPine files installed into separate folder. Manual copying into MQX 3.6.1 installation folder is needed. Use this option if you want to compare and review code changes prior to applying the patch content.

The MQX 3.6.1 RedPine WiFi patch does not contain pre-built MQX libraries; re-compile BSP and RTCS libraries after applying the patch.

See MQX 3.6.1 release notes and Getting Started document for detail information on library build process.

2 Change Log

Changes in RedPine WiFi Patch for MQX 3.6.1

- RedPine WiFi driver was added into existing ENET driver.
- TWR-MCF52259 BSP was modified to support RedPine WiFi functionality. RedPine-specific initialization structure was defined in enet_ini.c file in BSP. The parameter defaults can be overridden in the application.
- RTCS httpsrv and rtcs_shell example were modified to support WiFi functionality
- Redpine WiFi documentation is provided `<MQX patch install dir>/doc/rs2101_wifi`

3 Release Overview

This is RedPine patch for MQX 3.6 RTOS release done by Freescale Semiconductor. This patch enables using RedPine WiFi extension board and WiFi functionality for TWR-MCF52259 BSP. The

3.1 Compile-time Configuration

To enable RedPine Wifi Driver in the TWRMCF52259 BSP add the following line to `user_config.h` and rebuild all MQX libraries

```
#define BSPCFG_ENABLE_RSI    1
```

3.2 Demo Applications

The RedPine example application can be found in the directory:

```
<install_dir>/demo/light_webserver_wifi
```

The Light Webserver Wifi demo is accompanied with Guide document – describing step-by-step how to run them on the target board - see `doc\rs2101_wifi\TWR-WIFI-RS2101_Lab-v1.0.pdf.`

The following tables summarize RedPine enabled example applications provided in this patch.

Application name	Description
rtcs/examples/httpsrv	Simple web server with cgi scripts and web pages stored in internal flash. WiFi setup done via ENET media control commands
demo/light_webserver_wifi	Web server with cgi scripts and web pages stored in internal flash. WiFi setup done via ipcfg commands. See detailed step-by-step description in the `doc\rs2101_wifi\TWR-WIFI-RS2101_Lab-v1.0.pdf` guide.

rtcs/examples/shell	Shell command line interface providing commands for network management. New iwconfig command is implemented. Use the following sequence to obtain IP address from wireless router.
	`ipconfig 1 init`
	`iwconfig 1 scan`
	`iwconfig 1 ssid <Network SSID>`
	`ipconfig 1 dhcp`

4 Board-specific Information Related to RedPine WiFi patch

All jumper and other hardware switches not specifically described below are expected in factory-default positions. Please refer to the board User's Guide for the default settings.

5 Integration instructions

Following sections describes steps needed for porting RedPine WiFi driver to MQX BSPs. All the directory paths mentioned are relative paths with respect to MQX installation path – by default **C:\Program Files\Freescale\Freescale MQX 3.6**.

- In the enet_ini.c (mqx/source/bsp/<board_name>/enet_ini.c), insert following include

```
#include "rs21_mqx.h"
```

And declare WIFI configuration structure :

```
#if BSPCFG_ENABLE_RSI
const struct rsi_mcu_iface rs21_mcu_iface = {

BSPCFG_RSI_SPI_CHANNEL,
BSPCFG_RSI_SPI_INTR_PIN,
BSPCFG_RSI_PWR_ON_PIN

};
#endif
```

The BSPCFG_RSI_SPI_CHANNEL, BSPCFG_RSI_SPI_INTR_PIN, BSPCFG_RSI_PWR_ON_PIN macros represent WiFi SPI communication channel and interrupt and power on GPIO pins.

- Declare variable describing MQX enet interface:

```
#if BSPCFG_ENABLE_RSI
const ENET_IF_STRUCT ENET_1 = {
    &RSI_MAC_IF,
    &phy_rsi_IF,
    1,
    1,
    0,
};
#endif
```

- Extend the ENET_default_params by second Ethernet interface ENET_1 as follows. The ENET_1 entry describes interface for RS9110-N-11-21 module

```
const ENET_PARAM_STRUCT
ENET_default_params[BSP_ENET_DEVICE_COUNT] = {
  {
    &ENET_0,
    Auto_Negotiate,
    0,

    BSPCFG_TX_RING_LEN,   // # tx ring entries
    BSPCFG_TX_RING_LEN,   // # large tx packets
    ENET_FRAMESIZE,       // tx packet size

    BSPCFG_RX_RING_LEN,   // # rx ring entries
    BSPCFG_RX_RING_LEN,   // # normal rx packets - must be >= rx ring entries
    ENET_FRAMESIZE,       // ENET_FRAMESIZE,   // rx packet size
    BSPCFG_RX_RING_LEN,   // # rx PCBs - should be >= large rx packets.

    0,
    0,
    NULL
  }
#if BSPCFG_ENABLE_RSI
  ,
   {
    &ENET_1,
     // # Default WiFi Device parameter
    Auto_Negotiate,
    0,

    BSPCFG_TX_RING_LEN,  /* UNUSED */
    BSPCFG_TX_RING_LEN,   /* UNUSED */
    ENET_FRAMESIZE,
    /* How shall we use them SCOPE */
```

```
    BSPCFG_RX_RING_LEN,   /* UNUSED */
    BSPCFG_RX_RING_LEN,   /* UNUSED */
    ENET_FRAMESIZE,
    BSPCFG_RSI_PCB,

    0,
    0 ,
    (void *)&rs21_mcu_iface
  }
 #endif
};
```

- Add / Modify the following defines in the mqx/source/bsp/<board_name>/<board_name>.h file. Highlighted defines representing SPI channel used for WiFi communication, WiFi SPI interrupt pin and WiFi reset pin should be redefined according to target platform needs.

```
/* RSI WLAN Module enable macro. */
#ifndef BSPCFG_ENABLE_RSI
  #define BSPCFG_ENABLE_RSI    0
  #define RSI_DEVICE_COUNT     0
#else
  #define RSI_DEVICE_COUNT ((BSPCFG_ENABLE_RSI) ? 1:0)
  #define BSPCFG_RSI_SPI_CHANNEL <spi used by driver>
  #define BSPCFG_RSI_SPI_INTR_PIN {<PORT TO ELEVATOR IRQ_A SIGNAL> | <PIN TO ELEVATOR IRQ_A SIGNAL> | GPIO_PIN_IRQ, GPIO_LIST_END}
  #define BSPCFG_RSI_PWR_ON_PIN { <PORT TO PRIMARY ELEVATOR A9 PIN> | <PIN TO PRIMARY ELEVATOR A9 PIN> | GPIO_PIN_STATUS_1, GPIO_LIST_END}
  #ifdef BSP_LED1
    #define BSPCFG_RSI_LED_1   BSP_LED1
  #endif
  #ifdef BSP_LED2
    #define BSPCFG_RSI_LED_2   BSP_LED2
  #endif
  #ifdef BSP_LED3
    #define BSPCFG_RSI_LED_3   BSP_LED3
  #endif
```

#endif

#ifndef BSPCFG_RSI_PCB
  #define BSPCFG_RSI_PCB 16
#endif

#define BSP_ENET_DEVICE_COUNT (MCF5XXX_FEC_DEVICE_COUNT + RSI_DEVICE_COUNT)

- Define the BSPCFG_ENABLE_RSI macro in the config\<board_name>\user_config.h file as follows:

#define BSPCFG_ENABLE_RSI 1

- Enable the spi driver used for communication with WiFi module, as shown below (e.g. for SPI0) in the config\<board_name>\\user_config.h file

#define BSPCFG_ENABLE_SPI0 1

- Add following file to BSP project (should be in the Drivers/enet/Phy/ project folder)

MQX\src\mqx\source\io\enet\Phy\phy_rsi.c

MQX\src\mqx\source\io\enet\Phy\phy_rsi.h

- Add all files from \src\mqx\source\io\enet\rs2101_wifi folder to the BSP project.

- Create _bsp_assert_rsto (boolean assert) function in the gpio setting file mqx\source\bsp\<board_name>\gpio_init.c file. This function should toggle WiFi reset signal RSTOUT_b connected to Side A elevator pin A63.

- Insert function prototype extern void _bsp_assert_rsto(boolean assert) to file \mqx\source\bsp\<board_name>\bsp.h.

- To file \mqx\build\bat\bsp_<board?name>.bat add line

copy /Y ..\..\..\mqx\source\io\enet\rs2101_wifi\rsi_config.h .

- Rebuild BSP and RTCS libraries