

# Freescalē MQX™ 4.0.2 Patch for TWR-WIFI-AR4100P

## Release Notes

<b>PRODUCT:</b>	Freescalē MQX™ RTOS 4.0.2 Patch for TWR-WIFI-AR4100P
<b>PRODUCT VERSION:</b>	1.0
<b>DESCRIPTION:</b>	Enabling Atheros Wifi solution for TWR-WIFI-AR4100P over MQX 4.0.2
<b>RELEASE DATE:</b>	Aug 2 <sup>nd</sup> , 2013

© Freescalē Semiconductor, Inc., 2013. All rights reserved.



## **How to Reach Us:**

### **Home Page:**

[www.freescale.com](http://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](http://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](http://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](mailto: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](mailto: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](mailto:LDCForFreescaleSemiconductor@hibbertgroup.com)

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.



Freescale™ and the Freescale logo are trademarks of Freescale Semiconductor, Inc. ARC, the ARC logo, ARCangel, ARCform, ARCHitect, ARCompact, ARCTangent, BlueForm, CASSEIA, High C/C++, High C++, iCon186, MetaDeveloper, MQX, Precise Solution, Precise/BlazeNet, Precise/EDS, Precise/MFS, Precise/MQX, Precise/MQX Test Suites, Precise/RTCS, RTCS, SeeCode, TotalCore, Turbo186, Turbo86, V8 µRISC, V8 microRISC, and VAutomation are trademarks of ARC International. High C and MetaWare are registered under ARC International. All other product or service names are the property of their respective owners.

© Freescale Semiconductor, Inc. 2012. All rights reserved.

Rev. 1  
2/2013

# Table of Contents

<b>Table of Contents .....</b>	<b>1</b>
<b>1 Introduction .....</b>	<b>2</b>
<b>2 Supported Hardware and Software.....</b>	<b>2</b>
2.1 Hardware support .....	2
2.2 Development tools .....	2
2.3 System Requirements.....	2
2.4 Target Requirements.....	2
<b>3. Features .....</b>	<b>3</b>
3.1 Key Features .....	3
3.2 Example Applications.....	3
3.3 Release contents .....	4
<b>4 Installation Instructions .....</b>	<b>4</b>
4.1 Installation Guide .....	4
4.2 Building procedure .....	5
4.3 Jumper settings .....	6
4.4 Board-specific build targets: .....	6
<b>5 Know issues and Limitations .....</b>	<b>6</b>
<b>6 Other Notes.....</b>	<b>7</b>
6.1 Enet source code for TWR-K21F100M.....	7

# 1 Introduction

This document serves as the release notes for Atheros Wi-Fi driver. The release includes:

- Source code for Atheros Wi-Fi driver and some demos for:
  - o Kinetis family of MCUs Running Freescale MQX 4.0.2 RTM.

For more detailed information about MQX please see Freescale MQX™ 4.0.2 Release notes and Getting started documents.

## 2 Supported Hardware and Software

### 2.1 Hardware support

- The reference platforms officially supported in this release are:
  - o Kinetis K60 MCU: K60D100M and K60N512.
  - o Kinetis K40 MCU: K40D100M.
  - o Kinetis K21 MCU: K21F100M.
- The supported wifi cards are:
  - o TWR-WIFI-AR4100 Rev.C with AR4100P silicon (silver).

### 2.2 Development tools

The TWR-WIFI-AR4100P release was tested with the following development tools:

- IAR Embedded Workbench for ARM Version 6.50.1
  - o Support available for Kinetis ARM®Cortex™ M4 devices
  - o See build projects in [iar](#) subdirectories
- CodeWarrior Development Studio for Microcontrollers Version 10.3 (MCU build 121127)
  - o Patch support available for Kinetis K21-1M device
  - o See build projects in [cw10](#) subdirectories
- ARM MDK - Keil uVision Version 4.70
  - o Support available for Kinetis ARM®Cortex™ M4 devices
  - o See build projects in [uv4](#) subdirectories

### 2.3 System Requirements

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.

### 2.4 Target Requirements

The TWR-WIFI-AR4100P Release was tested with the following hardware configuration:

- TWR-K21F100M Rev.A processor board.
- TWR-K40D100M Rev.A processor board.
- TWR-K60D100M Rev.A processor board.
- TWR-K60N512 Rev.B processor board.
- TWR-SER Rev. C serial board
- TWR-ELEV Primary and Secondary - four-storey elevator boards
- TWR-WIFI-AR4100 Rev.C with AR4100P silicon (silver)

## 3. Features

### 3.1 Key Features

This package brings initial Wi-Fi solution support of Atheros for TWR-K21F100M, TWR-K40D100M, TWR-K60D100M and TWR-K60N512 platforms. Standard set of features and RTCS example application is provided.

#### New TWR-WIFI-AR4100P support files:

- Atheros Wi-Fi peripheral for K21F100M, K40D100M, K60D100M and K60N512.
- Example and demo applications connect to the internet by Atheros Wi-Fi card.

### 3.2 Example Applications

This package contains applications which connect to the internet by Atheros Wi-Fi. The applications can be found on following location:

The following tables summarize all demo and example applications provided in this release.

Name	Availability	Description
<code>&lt;install_dir&gt;/demo/atheros_wifi/examples/hvac</code>  <code>&lt;install_dir&gt;/demo/atheros_wifi/examples/telnet_to_serial</code>	<ul style="list-style-type: none"><li>- TWR-K21F100M</li><li>- TWR-K40D100M</li><li>- TWR-K60D100M</li><li>- TWR-K60N512</li></ul>	The board can connect to the internet via Wi-Fi.
<code>&lt;install_dir&gt;/demo/atheros_wifi/examples/shell</code>	<ul style="list-style-type: none"><li>- TWR-K21F100M</li><li>- TWR-K40D100M</li><li>- TWR-K60D100M</li><li>- TWR-K60N512</li></ul>	The board can connect to the internet via Wi-Fi and can configure IP address, DNS and gateway for the board.
<code>&lt;install_dir&gt;/demo/atheros_wifi/examples/httpsrv</code>	<ul style="list-style-type: none"><li>- TWR-K21F100M</li><li>- TWR-K40D100M</li><li>- TWR-K60D100M</li><li>- TWR-K60N512</li></ul>	Board runs as http server. User can get information about the board and status of network. User can also control some action of LEDs via Wi-Fi.
<code>&lt;install_dir&gt;/demo/atheros_wifi/examples/web_hvac</code>	<ul style="list-style-type: none"><li>- TWR-K21F100M</li><li>- TWR-K60D100M</li><li>- TWR-K60N512</li></ul>	Board runs as http server. User can get information about the board and status of network. User can also control some action of LEDs via Wi-Fi.

<install_dir>/demo/atheros_wifi/examples/throughput_demo	- TWR-K21F100M	Provide user to configure and test the performance of the AR4100(P) device. This consists of two components: configuration component and benchmark component.
	- TWR-K40D100M	
	- TWR-K60D100M	
	- TWR-K60N512	

### 3.3 Release contents

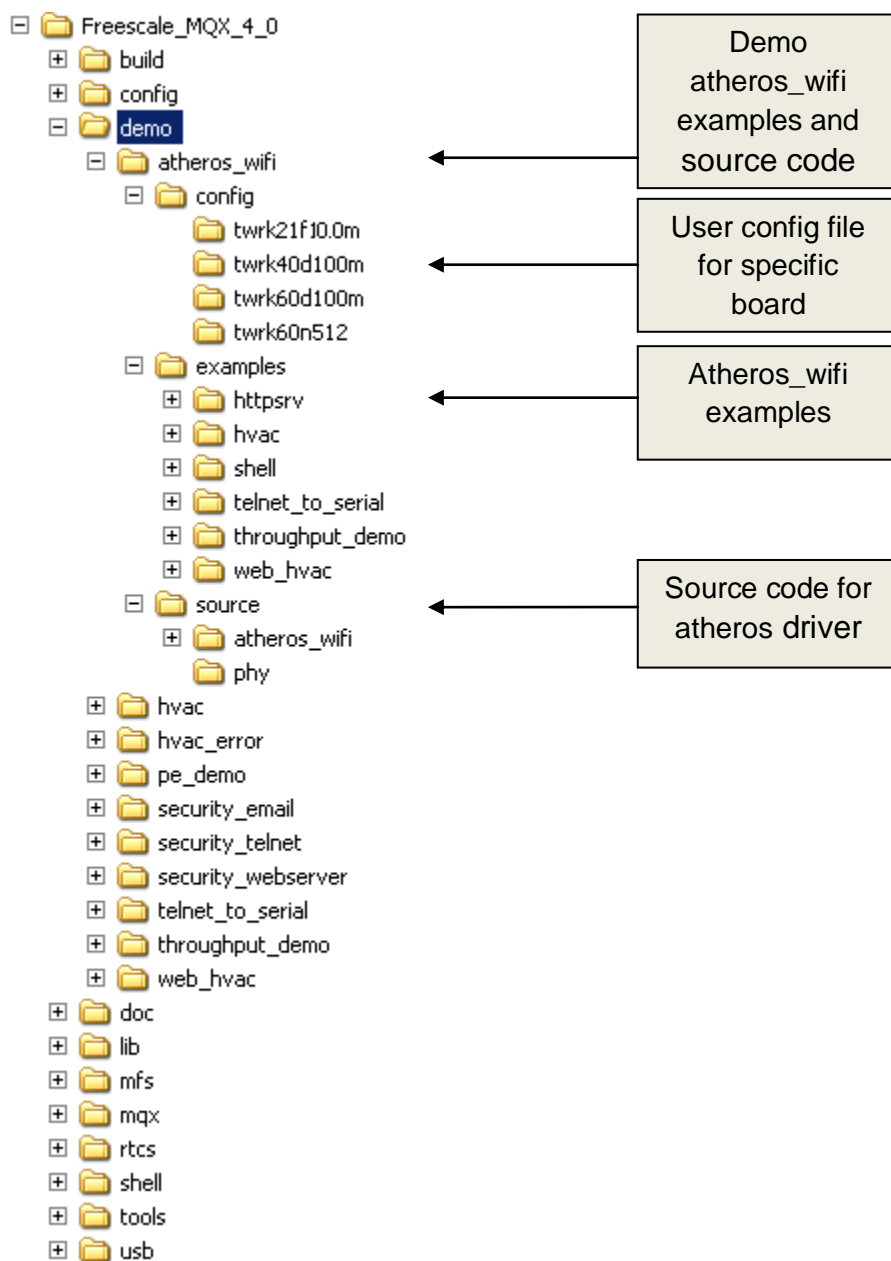
This section gives an overview about the release content.

Deliverable	Location	Status
MQX Config		
user_config	<install_dir>/demo/Atheros_wifi/config/ /<board>/user_config.h	Modify
Demo examples		
Atheros_wifi examples	<install_dir>/demo/atheros_wifi/examples...	Add new
Source		
Atheros Source driver	<install_dir>/demo/atheros_wifi/source	Add new

## 4 Installation Instructions

### 4.1 Installation Guide

- Install MQX 4.0.2 first.
- Install FSLMQXOS\_4\_0\_2\_ATHEROS\_WIFI standalone package into the location of installed MQX4.0.2 package.
- The following picture shows structure of source:



## 4.2 Building procedure

Step1 - Copy user config file from `<install_dir>\demo\atheros_wifi\config\<board>\` to `<install_dir>\config\<board>`.

Step2 – Build PSP library

Step3 – Build BSP library

Step4 – Build MFS library

Step5 – Build SHELL library

Step6 – Build RTCS library

Step7 – Build USBH library.

Step8 – Build `<board_name>` example

## 4.3 Jumper settings

There is no special jumper settings, just simply use default setting.

## 4.4 Board-specific build targets:

Internal Flash (Debug and Release) - these targets enable to build applications suitable for booting the system up from Internal Flash memory. After the reset the code will be executed from Internal Flash.

## 5 Know issues and Limitations

- The Stack offload is a feature support host driver to use an on-chip IP stack of AR4100P instead of the RTCS stack of MQX OS. It is disabled by default.

Stack offload is only supported with the throughput demo application see

`<install_dir>\demo\atheros_wifi\examples\throughput_demo`

To enable stack offload, in the `a_config.h` file:

```
<install_dir>\demo\atheros_wifi\source\atheros_wifi\custom_src\include\
a_config.h
```

```
#define WIFI_ENABLE_STACK_OFFLOAD 1 // 1 or 0 this will enable or
disable stack offload
```

- DHCP server is hardcoded to be enabled when operating in SoftAP or adhoc modes, it is disabled when operating infrastructure (STA) mode
- The application is expected to explicitly disconnect from one AP before it will be successful in connecting to another AP, even in the case of WPS (this is the expected behavior)
- The store-recall feature to achieve low power should not be used along with the traditional IEEE power-save mode
- The RTCS stack has been configured with re-assembly enabled in the demos by enabling `RTCS_CFG_ENABLE_IP_REASSEMBLY`; this configuration allows receiving packets larger than 1500 bytes
- In STA mode, the AR4100(P) is unable to scan/connect to AP in channel 14, 802.11b mode, JP country code (MKKA regdomain)
- When an IoE STA connects with an IoE SoftAP supporting 802.11n rates, it will connect only in the 802.11g rate
- In SoftAP mode, the AR4100P supports only one STA
- The AR4100P in Soft AP mode does not support background or foreground scan
- Due to low memory of ROM, TWRK40D100M cannot fit for demo `web_hvac`
- The web browser need to refresh sometime in order to have fully information due to its caching in the demo `httpsrv`



## 6 Other Notes

### 6.1 How to patch for TWR-K21F100M Standalone package

Currently, TWRK21F100M standalone package is based on MQX 4.0.1. In order to run the Atheros driver, there some extra steps needed to upgrade to RTCS of MQX 4.0.2

#### a. BSP Ethernet driver

Because the K21F100M doesn't have enet peripheral and it doesn't contain io/enet source code. Hence in order to use RTCS, it requires to copy enet source code from

```
<MQX_4.0.2_RTM_install_dir>\mqx\source\io\enet to  
<install_dir>\mqx\source\io\enet
```

#### b. RTCS Stack

Backup the current RTCS stack of the K21F100M and overwrite the following folders to K21F100M standalone installation directory:

```
<MQX_4.0.2_RTM_install_dir>\rtcs\source to <install_dir>\rtcs\source
```