Freescale MQX™ 4.0.2 Patch for TWR-WIFI-AR4100P

Release Notes

PRODUCT:	Freescale MQX™ RTOS 4.0.2 Patch for TWR-WIFI-AR4100P
PRODUCT VERSION:	1.0
DESCRIPTION:	Enabling Atheros Wifi solution for TWR-WIFI-AR4100P over MQX 4.0.2
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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:
    - 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:
    - Kinetis K60 MCU: K60D100M and K60N512.
    - Kinetis K40 MCU: K40D100M.
    - Kinetis K21 MCU: K21F100M.
- The supported wifi cards are:
    - 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
    - Support available for Kinetis ARM®Cortex™ M4 devices
    - See build projects in `iar` subdirectories
- CodeWarrior Development Studio for Microcontrollers Version 10.3 (MCU build 121127)
    - Patch support available for Kinetis K21-1M device
    - See build projects in `cw10` subdirectories
- ARM MDK - Keil uVision Version 4.70
    - Support available for Kinetis ARM®Cortex™ M4 devices
    - 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
<install_dir>/demo/atheros_wifi/examples/hvac <install_dir>/demo/atheros_wifi/examples/telnet_to_serial	- TWR-K21F100M - TWR-K40D100M - TWR-K60D100M - TWR-K60N512	The board can connect to the internet via Wi-Fi.
<install_dir>/demo/atheros_wifi/examples/shell	- TWR-K21F100M - TWR-K40D100M - TWR-K60D100M - TWR-K60N512	The board can connect to the internet via Wi-Fi and can configure IP address, DNS and gateway for the board.
<install_dir>/demo/atheros_wifi/examples/httpsrv	- TWR-K21F100M - TWR-K40D100M - TWR-K60D100M - TWR-K60N512	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/web_hvac	- TWR-K21F100M - TWR-K60D100M - TWR-K60N512	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 - TWR-K40D100M - TWR-K60D100M - TWR-K60N512	Provide user to configure and test the performance of the AR4100(P) device. This consists of two components: configuration component and benchmark component.

3.3 Release contents

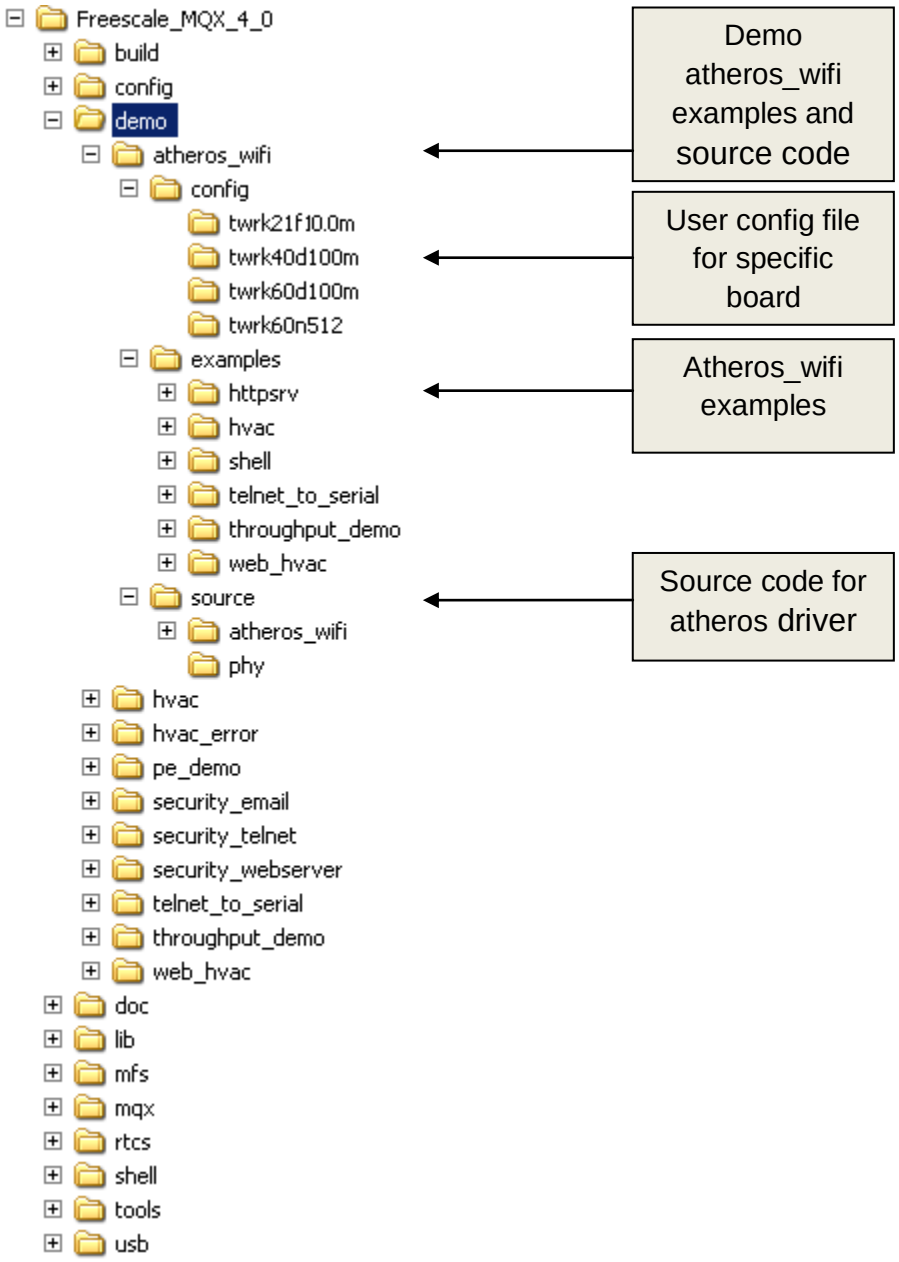
This section gives an overview about the release content.

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 RTCSCFG_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`