NXP Semiconductors
Release Notes

Document Number: MKW41Z802154SW535RN
Rev. 0,
02/2018

IEEE® 802.15.4 Software for the Kinetis MKW41Z Dual Mode Wireless Microcontroller, Version 5.3.5

Release Notes

1 Overview

These release notes pertain to the IEEE® 802.15.4 MAC/PHY software that was developed for the Kinetis MKW41Z dual mode wireless microcontrollers. This document is for internal development and testing team reference only. These notes pertain to the MKW41Z IEEE® 802.15.4 Software version 5.3.5.

Contents

2 Release Contents

The Kinetis MKW41Z IEEE® 802.15.4 Software version 5.3.5 main wireless connectivity components are listed in the table below.

Table 1. Release Contents

(File | Folder) Name	Description
boards/[*board*]/wireless_examples/ieee_802_15_4/mac_fsci_black_box	MAC Freescale Serial Connectivity Interface (FSCI) host controlled device (a.k.a. black box)
boards/[*board*]/wireless_examples/ ieee_802_15_4//msn_*	MyStarNetwork embedded example applications
boards/[*board*]/wireless_examples/ ieee_802_15_4//otap_*	Over-The-Air-Programming demo application (server and client)
boards/[*board*]/wireless_examples/ieee_802_15_4//mwa_*	MyWirelessApp example applications (low power, security, dual-PAN, FSCI host support)
middleware/wireless/ieee_802_15_4_5.3.5/mac	Kinetis IEEE 802.15.4-2011 compliant, multi-instance MAC Kinetis IEEE 802.15.4-2006 compliant, multi-instance MAC
middleware/wireless/ieee_802_15_4_5.3.5/phy	IEEE 802.15.4 dual PAN-aware PHY
doc/wireless	Connectivity documentation
middleware/wireless/framework_5.3.5/Common	Connectivity Framework common files
middleware/wireless/framework_5.3.5/FSCI	Freescale Serial Connectivity Interface
middleware/wireless/framework_5.3.5/LowPower	Low Power Module
middleware/wireless/framework_5.3.5/MemManager	Memory Manager
middleware/wireless/framework_5.3.5/Messaging	Messaging API
middleware/wireless/framework_5.3.5/NVM	Non Volatile Memory support
middleware/wireless/framework_5.3.5/OtaSupport	Over-The-Air Programming support files
middleware/wireless/framework_5.3.5/Panic	Panic module
middleware/wireless/framework_5.3.5/RNG	Random Number Generator wrapper
middleware/wireless/framework_5.3.5/SerialManager	Serial Manager for various interface
middleware/wireless/framework_5.3.5/Shell	Shell/Console module
middleware/wireless/framework_5.3.5/TimersManager	Timers Manager module
middleware/wireless/framework_5.3.5/SecLib	Security Library
tools/wireless/MyStarNetwork Demo	MyStarNetwork Demo PC application
tools/wireless/binaries	Demo applications binaries

2.1 List of Pre-compiled Binaries

The *tools/wireless/binaries* folder contains the following pre-compiled binaries:

- *sniffer_usbkw41z_kw41z.bin* – Hybrid (802.15.4 and BLE) sniffer firmware for the KW41Z silicon on the USB-KW41Z board
- *sniffer_usbkw41z_k22f.bin*– Hybrid (802.15.4 and BLE) sniffer firmware for the K22F silicon on the USB-KW41Z board, linked at 0x0 (no OpenSDA bootloader provisioning)
- *sniffer_usbkw41z_k22f_0x8000.bin* – Hybrid (802.15.4 and BLE) sniffer firmware for the K22F silicon on the USB-KW41Z board, linked at 0x8000 (OpenSDA bootloader provisioning)
- *rndis_bridge_spi_slave_usbkw41z_k22f.bin* – RNDIS to FSCI bridge firmware for the K22F silicon on the USB-KW41Z board, linked at 0x0 (no OpenSDA bootloader provisioning)
- *rndis_bridge_spi_slave_usbkw41z_k22f_0x8000.bin* – RNDIS to FSCI bridge firmware for the K22F silicon on the USB-KW41Z board, linked at 0x8000 (OpenSDA bootloader provisioning)
- *bootloader_fsci_ack_frdmkw41z.bin* – FSCI Bootloader for the FRDM-KW41Z board with the ACK-enabled FSCI protocol
- *bootloader_fsci_ack_usbkw41z.bin* – FSCI Bootloader for the USB-KW41Z board with the ACK-enabled FSCI protocol
- *bootloader_fsci_frdmkw41z.bin* – FSCI Bootloader for the FRDM-KW41Z board with the ACK-disabled FSCI protocol
- *bootloader_fsci_usbkw41z.bin* – FSCI Bootloader for the USB-KW41Z board with the ACK-disabled FSCI protocol
- *bootloader_otap_frdmkw41z.bin* – OTAP Bootloader for the FRDM-KW41Z board
- *bootloader_otap_usbkw41z.bin* – OTAP Bootloader for the USB-KW41Z board

Please refer to http://www.nxp.com/connectivity for more information on NXP wireless connectivity platforms

3 What's New and Change Log

This section describes the major changes and new features implemented in the KW41Z MAC/PHY software releases:

3.1 MKW41Z MAC/PHY Software v5.3.5

- This version corresponds to a maintenance release of build of the MKW41Z MAC/PHY Software. Some of its major new features, compared to the previous MAC/PHY release on Kinetis MKW41Z wireless microcontrollers, include:
    - ZigBee 3.0 support
    - Added new functionalities in the Connectivity Framework modules
    - Added new functionalities in the Connectivity PHY module

3.2 MKW41Z MAC/PHY Software v5.3.4

- This version corresponds to a maintenance release of build of the MKW41Z MAC/PHY Software. Some of its major new features, compared to the previous MAC/PHY release on Kinetis MKW41Z wireless microcontrollers, include:
    - Updated transceiver driver for better RF performance
    - General bug fixing

3.3 MKW41Z MAC/PHY Software v5.3.3

- This version corresponds to a maintenance release of build of the MKW41Z MAC/PHY Software. Some of its major new features, compared to the previous MAC/PHY release on Kinetis MKW41Z wireless microcontrollers, include:
    - Adopted NVM wear-levelling for pairing and bonding data storage.
    - Enhanced NVM module to allow declaration of datasets from multiple files
    - MCUXpresso IDE support
    - Enhanced WLAN coexistence module with more configurability for the protocol
    - FreeRTOS v9.0.0 support
    - Updated transceiver driver for better RF performance
    - Updated DCDC converter driver with new voltage ranges
    - General bug fixing
    - Discontinued uC/OS-II RTOS support
    - Discontinued Kinetis Design Studio support

3.4 MKW41Z MAC/PHY Software v5.3.2

- This version is the general availability (GA) build release for the MKW41Z MAC/PHY software. Some of its new features compared to the Beta build are:
    - Better alignment of connectivity folder structure with the Kinetis SDK.

- Optional packaging in .tar.gz format for Linux host machines
- uC/OS-II support

3.5 MKW41Z MAC/PHY Software v5.3.1

- This version is the Beta build release for the MKW41Z MAC/PHY software. Some of its new features compared to the Alpha build are:
  - Support for the Kinetis Design Studio IDE and the GNU Toolchain
  - Dual mode (BLE and IEEE 802.15.4) support and hybrid demo applications
  - FSCI host applications running on the K22F MCU on USB-KW41Z

3.6 MKW41Z MAC/PHY Software v5.3.0

- This version is the Alpha build release for the MKW41Z MAC/PHY software. Some of its main features are:
  - KSDK 2.0 integration of the IEEE® 802.15.4 and Connectivity Framework software
  - Enablement for the FRDM-KW41Z and USB-KW41Z evaluation boards
  - Bootloader code re-factoring

4 Software Deployment Considerations

- The IEEE® 802.15.4 applications in this package have been built in a Kinetis SDK version 2 environment, making use of the FreeRTOS kernel and microcontroller peripheral drivers included in this SDK. This package includes a full build of the Kinetis SDK v2 for Kinetis MKW41Z/31Z/21Z.
- IAR Embedded Workbench for ARM® **v7.80.4** was used to build and test the MAC/PHY example IDE projects included in this release.
- MCUXpresso IDE **v10.1.1** with was used to build the Bluetooth low energy associated example applications IDE projects.
- This package contains the MyStarNetwork PC application used to interact with the corresponding embedded demonstration applications. Please refer *IEEE 802.15.4 MAC Demo Applications User's Guide* and *MyStarNetwork PC Application User's Guide.pdf* for more information**.**
- This release is compatible with the Test Tool for Connectivity Products **v12.7.6** or later. It is recommended to use the *MAC2006_5.3.5.xml* file found in the *tools/wireless/xml_fsci* folder of this package or the Test Tool installation, with the Test Tool Command Console functionality to interact with the FSCI black box applications provided in this package. For more information, please refer *TTUG.pdf* included in the Test Tool installation.

5 Embedded System Considerations

- This release supports the FRDM-KW41Z and USB-KW41Z evaluation boards
- The FRDM supported board feature an embedded OpenSDA debugger chip. For more information, please visit http://www.nxp.com/opensda. Variants of embedded firmware for the OpenSDA chip can be downloaded from the links below.
  - http://developer.mbed.org/handbook/CMSIS-DAP
  - https://www.segger.com/opensda.html
  - http://www.pemicro.com/opensda/
- The pre-compiled binaries for FRDM-KW41Z are optimized for the DCDC buck mode configuration of the board.
- If your FRDM-KW41Z board is configured for the buck or boost modes of the DCDC converter inside the KW41Z microcontroller, the firmware too needs to be configured for these modes of the DCDC, by setting the following defines: *gDCDC_Enabled_d* to 1 and *APP_DCDC_MODE* to *gDCDC_Mode_Buck_c* or *gDCDC_Mode_Boost_c* respectively, in the *app_preinclude.h* header file.

6 Known Limitations

- This release supports only the IAR Embedded Workbench and MCUXpresso IDEs and toolchains, the FreeRTOS kernel and a bare-metal non-preemptive task scheduler. Other RTOSes and toolchains supported in the KSDK have not been tested with this release.
- Maximum file path length in Windows® 7 Operating System: Windows OS 7 imposes a 260-character maximum length for file paths. The same limitation influences the command line for build tools in various toolchains, which cannot exceed 8191 characters. When deploying this package, it is recommended to place it in a directory close to the root of the disk drive to prevent the limitations described above. The recommended location is the C:\NXP folder."
- For the FRDM-KW41Z evaluation board, the default pin configuration when enabling in the code an off-chip IEEE 802.15.4/WLAN coexistence model, does not allow the LED software module and the SW3 button to be active.

7 Documentation Included in this Package

The following connectivity-supporting documentation is included in this package:

- *IEEE 802.15.4 MACPHY Application Developer's Guide.pdf*
- *IEEE 802.15.4 MAC Demo Applications User's Guide.pdf*
- *IEEE 802.15.4 FSCI Reference Manual.pdf*
- *IEEE 802.15.4 MACPHY API Reference Manual (HTML format)*
- *MyStarNetwork PC Application User's Guide.pdf*
- *IEEE 802.15.4 MACPHY Quick Start Guide.pdf*

8 Memory Footprints of MAC Layer Applications

The following table lists the memory footprint of a typical IEEE 802.15.4 MAC-based application:

Application – My Wireless App with Security Enabled **Configuration -** FreeRTOS, IAR Embedded Workbench, FRDM-KW41Z		
	RAM [bytes]	Flash [bytes]
Application code	93	3,925
Kinetis base SDK	60	6,661
Connectivity Framework	3,774	9,529
MAC	601	20,016
PHY	544	15,206
RTOS	12,672	5,518
Total	18,772	62,974

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Document Number: MKW41Z802154SW535RN
Rev. 0
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