NXP Semiconductors
Release Notes

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ZigBee® 3.0 Software for the Kinetis MKW41Z Dual Mode Wireless Microcontroller, Version 6.0.9.5

Release Notes

1 Overview

These release notes pertain to the ZigBee 3.0 software that was developed for the MKW41Z Kinetis-based dual mode microcontrollers platforms, and the associated development board, FRDM-KW41Z. These notes pertain to the Kinetis ZigBee 3.0 Software version 6.0.9.

Contents

2 Release Contents

The NXP Kinetis MKW41Z ZigBee 3.0 Software version 6.0.9 release main wireless connectivity components are listed in the table below.

Table 1. Release Contents

(File | Folder) Name	Description
boards/[**board**]/wireless_examples/zigbee_3.0	
middleware/wireless/zigbee_3.0_6.0.9	ZigBee 3.0 Stack
middleware/wireless/bluetooth_1.2.8/host	Bluetooth® LE v4.2 host stack
middleware/wireless/bluetooth_1.2.8/controller	Bluetooth® LE v4.2 controller
middleware/wireless/bluetooth_1.2.8/profiles	Bluetooth® LE GATT profiles
middleware/wireless/ieee_802_15_4_5.3.8/mac	Kinetis IEEE 802.15.4 upper MAC
middleware/wireless/ieee_802_15_4_5.3.8/phy	Kinetis IEEE 802.15.4 lower MAC
doc/wireless	Wireless connectivity documentation
middleware/wireless/framework_5.3.8/Common	Connectivity Framework common files
middleware/wireless/framework_5.3.8/DSP	Signal processing and bit manipulation helper functions
middleware/wireless/framework_5.3.8/FSCI	Freescale Serial Connectivity Interface
middleware/wireless/framework_5.3.8/LowPower	Low Power Module
middleware/wireless/framework_5.3.8/MemManager	Memory Manager
middleware/wireless/framework_5.3.8/Messaging	Messaging API
middleware/wireless/framework_5.3.8/NVM	Non Volatile Memory support
middleware/wireless/framework_5.3.8/Panic	Panic module
middleware/wireless/framework_5.3.8/RNG	Random Number Generator wrapper
middleware/wireless/framework_5.3.8/SerialManager	Serial Manager for various interface
middleware/wireless/framework_5.3.8/Shell	Shell/Console module
middleware/wireless/framework_5.3.8/TimersManager	Timers Manager module
middleware/wireless/framework_5.3.8/SecLib	Security Library
tools/wireless/binaries	Example applications binaries
tools/wireless/host_sdk	Host SDK

2.1 List of Pre-compiled Binaries

The *tools/wireless/binaries* folder contains the following pre-compiled binaries, which are referenced and used in the application notes included in this package:

- *bdb_coordinator_frdmkw41z.bin*
- *bdb_end_device_frdmkw41z.bin*
- *bdb_router_frdmkw41z.bin*
- *ble_coordinator_frdmkw41z.bin*
- *ble_end_device_frdmkw41z.bin*
- *ble_router_frdmkw41z.bin*
- *bootloader_fsci_frdmkw41z.bin*
- *bootloader_otap_frdmkw41z.bin*
- *color_scene_controller_frdmkw41z.bin*
- *color_temperature_light_frdmkw41z.bin*
- *control_bridge_frdmkw41z.bin*
- *dimmable_light_frdmkw41z.bin*
- *dimmer_switch_frdmkw41z.bin*
- *eh_switch_frdmkw41z.bin*
- *extended_color_light_frdmkw41z.bin*
- *light_sensor_frdmkw41z.bin*
- *occupancy_sensor_frdmkw41z.bin*
- *lto_sensor_frdmkw41z.bin*
- *zb_fsci_black_box_frdmkw41z.bin*
- *zb_fsci_black_box_bdb_frdmkw41z.bin*

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 ZigBee 3.0 software releases:

3.1 MKW41Z ZigBee 3.0 Software v6.0.9.5 Changes

This version corresponds to the Maintenance Release 4 of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- Zigbee 3.0 bug fixes

3.2 MKW41Z ZigBee 3.0 Software v6.0.9 Changes

This version corresponds to the Maintenance Release 3 of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- Update for ZCL to Release 7 version
- Zigbee 3.0 core stack optimizations
- Zigbee BLE hybrid black box project
- Zigbee 3.0 OTA optimizations
- Zigbee 3.0 bug fixes
- Documentation Updates

3.3 MKW41Z ZigBee 3.0 Software v6.0.8 Changes

This version corresponds to the Maintenance Release 2 of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- Certified Zigbee R22 Compliant Platform.
- ZLO bug fixes
- BDB bug fixes
- Documentation Updates

3.4 MKW41Z ZigBee 3.0 Software v6.0.7 Changes

This version corresponds to the Maintenance Release 1 of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- Integration of latest XCVR driver PJ_XCVR_GEN2_DRV_KW41_01.05.00R_GA_RC5
- Thread and BLE bug fixes
- Touchlink suport for Control Bridge and Dimmable Light.
- Integration of latest ZCL and Zigbee 3.0 R21 Core Stack updates
- Dimmable Light bug fixes
- ZLO bug fixes

- Rebase of KW41Z Connectivity Software on the KSDK version having the source files updated for BSD3-Clause-Clear
- Support for Zigbee Large Network up to 250 nodes
- Documentation Updates

3.5 MKW41Z ZigBee 3.0 Software v6.0.6 Changes

This version corresponds to the fifth release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- ZigBee 3.0 core stack R21 has undergone the official certification testing process
- Over-The-Air Updates support for the Sensors and BDB Application Notes.
- Support for ZigBee Large Network up to 75 nodes.
- Documentation Updates

3.6 MKW41Z ZigBee 3.0 Software v6.0.5 Changes

This version corresponds to the fifth release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- Green Power support
- Sensors applications and application notes
- OTA Cluster support in Dimmable Light, Extended Color Light and Color Temperature Light applications

3.7 MKW41Z ZigBee 3.0 Software v6.0.4 Changes

- This version corresponds to the forth release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:
  - BLE dual mode BDB applications
  - OTA Cluster support in Dimmable Light applications
  - Sensors applications and application notes
  - Controller/Switches applications and application notes

3.8 MKW41Z ZigBee 3.0 Software v6.0.3 Changes

- This version corresponds to the third release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:
  - Shell/console support for BDB applications
  - NTAG install codes sharing for BDB applications

3.9 MKW41Z ZigBee 3.0 Software v6.0.2 Changes

- This version corresponds to the second release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:

- FSCI black-box support with control bridge commands
- ZigBee PRO child aging feature
- Host SDK support for the FSCI host
- Test Tool for Connectivity Products integration of the ZigBee Gateway UI and Color Scene Controler Remote Control UI
- MCUXpresso IDE support
- Example applications re-architecture for better integration with other stacks in dual mode setups (BLE or Thread)

3.10 MKW41Z ZigBee 3.0 Software v6.0.1 Changes

- This version corresponds to the first release of the MKW41Z ZigBee 3.0 Software. Some of the key features included in this release are listed below:
  - ZigBee 3.0 compliant solution ported from NXP JN517x devices
  - ZigBee PRO R21 compliant core stack (certification pending on the KW41Z platform)
  - Base Device Behavior implementation and associated application templates
  - ZigBee Cluster Library (ZCL)
  - ZigBee Lighting & Occupancy Devices and associated applications
  - ZigBee Gateway UI tool to use with the Control Bridge application
  - FreeRTOS v9.0.0 support
  - Kinetis SDK v2.2 integration

4 Software Deployment Considerations

- IAR Embedded Workbench for ARM® **v8.50.1** was used to build and test the ZigBee example IDE projects included in this release.
- MCUXpresso IDE **v11.1.1** was used to build the ZigBee associated example applications IDE projects.
- The Color Scene Controller Remote Control User Interface desktop application can be found in the *tools/wireless* folder. For more information about its usage, please consult the AN12063-MKW41Z-AN-ZigBee-3-0-ControlBridge application note.
- This release is compatible with the Test Tool for Connectivity Products **v12.8.6** or later. It is recommended to use the *ZigBee3_0_6.0.9.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.
- Please refer to each Application Note for information related to code sizes. The Application Notes are available in the *\docs\wireless\ZigBee\Application Notes* folder.

5 Embedded System Considerations

- This release supports the FRDM-KW41Z evaluation board
- The FRDM-KW41Z board features a composite USB device called OpenSDA which serves as debugger interface and as USB to serial converter via a virtual COM port application. Several firmware images can be programmed on the FRDM-KW41Z OpenSDA device, among which:

  https://github.com/mbedmicro/CMSIS-DAP

  https://www.segger.com/opensda.html

  http://www.pemicro.com/opensda/

6 Known Limitations

- The OTA server implementation is recommended for maximum 8 simultaneous OTA clients using the same image.
- This release supports only the IAR Embedded Workbench IDE, the MCUXpresso IDE and toolchains and the FreeRTOS kernel. 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."
- One may experience a warning for “cmsis_iar.h” with IAR EWARM 8.22.x. The patch can be found on the IAR’s My Pages.
- One may experience a warning for “Warning[Pa182]: bitwise operation drops significant bits from a constant” with IAR EWARM 8.30.1. This is a false warning and will be fixed in new IAR release.
- One may experience problems with MCUXpresso IDE v10.3.0 when importing more than one project from SDK. Workaround is to import just one project. The issue will be fixed in the future version.

7 Documentation Included in this Package

The following connectivity-supporting documentation is included in this package, in the *docs/wireless* folder:

- ZigBee 3.0 user guides
  - *ZigBee 3.0 Devices User Guide.pdf*
  - *ZigBee Cluster Library User Guide.pdf*
  - *ZigBee Green Power User Guide.pdf*
  - *ZigBee Stack User Guide.pdf*

- ZigBee 3.0 application notes
  - *AN12061-MKW41Z-AN-Zigbee-3-0-Base-Device.pfd*
  - *AN12062-MKW41Z-AN-Zigbee-3-0-Base-Device-BLE-Dual-Mode.pdf*
  - *AN12063-MKW41Z-AN-ZigBee-3-0-ControlBridge.pdf*
  - *AN12064-MKW41Z-AN-ZigBee-3-0-Controller-and-Switch.pdf*
  - *AN12065-MKW41Z-AN-ZigBee-3-0-Light-Bulbs.pdf*
  - *AN12066-MKW41Z-AN-ZigBee-3-0-Sensors.pdf*

- IEEE 802.15.4 MAC documentation
  - *IEEE 802.15.4 MACPHY Application Developer's Guide.pdf*
  - *IEEE 802.15.4 MACPHY API Reference Manual*

- Bluetooth low energy v4.2 host stack documentation
  - *BLE Host Stack API Reference Manual*
  - *BLE Application Developer's Guide*

- Kinetis Connectivity Framework supporting documentation
  - *Connectivity Framework Reference Manual.pdf*

- Host SDK supporting documentation
  - *Kinetis FSCI Host Application Programming Interface.pdf*

This release also contains extensive Kinetis SDK v2 documentation in the *docs* folder.

8 Recommended Memory Configurations

The following are some of the default memory configurations for the different ZigBee projects available in this release. The memory footprints have been computed using the Release configuration of the corresponding projects and the IAR Embedded Workbench IDE.

For a complete list of code sizes corresponding to each demo project available in this release, please consult the information provided in each Application Note. The Application Notes are placed in the *\docs\wireless\ZigBee\Application Notes* folder.

- BLE ZigBee Coordinator default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	7047	15438
BLE Controller	1850	43360
BLE Host	3755	66844
Framework	9076	36096
Freertos	16332	5559
KSDK	208	7529
MAC/PHY	231	21510
ZCL	81	2292
ZigBee	11083	121631
TOTAL	49663	320259

- BLE ZigBee Router default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	6978	15047
BLE Controller	1850	43361
BLE Host	3755	66844
Framework	9017	36090
Freertos	17056	5555
KSDK	208	7529
MAC/PHY	231	21509
ZCL	91	4396
ZigBee	8703	117031
TOTAL	47889	317362

- BLE End Device default configuration:

MODULE	RAM [bytes]	Flash [bytes]

Application	7070	15460
BLE Controller	1850	43363
BLE Host	3755	66842
Framework	8789	36083
Freertos	16532	5559
KSDK	208	7531
MAC/PHY	231	21213
ZCL	81	2293
ZigBee	6696	95924
TOTAL	45212	294268

- ZigBee Control Bridge default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	6127	27758
Framework	8606	28275
Freertos	11672	5558
KSDK	208	9134
MAC/PHY	230	20958
ZCL	630	22784
ZigBee	13651	134829
TOTAL	41124	249296

- ZigBee Coordinator default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	2655	12802
Framework	8964	29606
Freertos	11672	5603
KSDK	208	9155
MAC/PHY	230	20958
ZCL	81	2289
ZigBee	11083	121545
TOTAL	34893	201958

- ZigBee Router default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	2502	10716
Framework	8965	29622
Freertos	11672	5559
KSDK	208	7529
MAC/PHY	230	20958
ZCL	91	4391
ZigBee	8707	117323
TOTAL	32375	196098

- ZigBee End Device default configuration:

MODULE	RAM [bytes]	Flash [bytes]
Application	2666	8954
Framework	8300	27649
Freertos	11672	5558
KSDK	208	6900
MAC/PHY	230	20662
ZCL	81	2288
ZigBee	6624	96066
TOTAL	29781	168077

9 Known Issues

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