NXP Semiconductors
Release Notes

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Simple Media Access Controller (SMAC) Software for the Kinetis MKW2xD Wireless Microcontrollers and the MCR20A 2.4GHz Wireless Transceiver, Version 3.0.5

Release Notes

1 Overview

These release notes pertain to the SMAC software that was developed for the Kinetis MKW2xD wireless microcontrollers and the MCR20A 2.4GHz wireless transceiver, and the associated development boards FRDM-KW24, USB-KW24D512, FRDM-K64F and FRDM-KL46Z. These notes pertain to the MKW2xD/MCR20A SMAC Software version 3.0.5.

Contents

2 Release Contents

The Kinetis KW2xD/MCR20A SMAC software version 3.0.5 release main wireless connectivity components are listed in the table below.

Table 1. Release Contents

(File | Folder) Name	Description
boards/[**board**]/wireless_examples/smac/connectivity_test	SMAC Wireless UART example application
boards/[**board**]/wireless_examples/smac/wireless_uart	SMAC Connectivity Test example application
boards/[**board**]/wireless_examples/smac/wireless_messenger	SMAC Wireless Messenger example application
boards/[**board**]/wireless_examples/smac/low_power_node	SMAC low power node example application
middleware/wireless/smac_3.0.5	SMAC
middleware/wireless/ieee_802_15_4_5.0.5/phy	IEEE 802.15.4 2.4 GHz OQPSK PHY
doc/wireless	Wireless connectivity documentation
middleware/wireless/framework_5.0.5/Common	Connectivity Framework common files
middleware/wireless/framework_5.0.5/LowPower	Low Power Module
middleware/wireless/framework_5.0.5/MemManager	Memory Manager
middleware/wireless/framework_5.0.5/Messaging	Messaging API
middleware/wireless/framework_5.0.5/Panic	Panic module
middleware/wireless/framework_5.0.5/RNG	Random Number Generator wrapper
middleware/wireless/framework_5.0.5/SerialManager	Serial Manager for various interface
middleware/wireless/framework_5.0.5/TimersManager	Timers Manager module
middleware/wireless/framework_5.0.5/SecLib	Security Library
tools/wireless/binaries	Example applications pre-compiled binaries

2.1 List of Pre-compiled Binaries

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

smac_connectivity_test_frdmkw24.bin – Connectivity Test for FRDM-KW24D
smac_connectivity_test_usbkw24d512.bin – Connectivity Test for USB-KW24D512
smac_connectivity_test_frdmk64f.bin – Connectivity Test for FRDM-K64F + FRDM-CR20A
smac_connectivity_test_frdmkl46z.bin – Connectivity Test for FRDM-KL46Z + FRDM-CR20A
smac_wireless_uart_frdmkw24.bin – Wireless UART for FRDM-KW24D
smac_wireless_uart_ usbkw24d512.bin – Wireless UART for USB-KW24D512
smac_wireless_uart_frdmk64f.bin – Wireless UART for FRDM-K64F + FRDM-CR20A
smac_wireless_uart_frdmkl46z.bin – Wireless UART for FRDM-KL46Z + FRDM-CR20A

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 MKW2xD/MCR20A SMAC software releases:

3.1 MKW2xD/MCR20A SMAC Software v3.0.5

- Kinetis SDK v2.0 integration
- Kinetis Design Studio and associated GNU toolchain support for the example applications

3.2 MKW2xD/MCR20A SMAC Software v3.0.4

- Kinetis SDK v1.3.0 integration
- Dual PAN functionality in the Connectivity Test application

4 Software Deployment Considerations

- The SMAC applications in this package have been built in a Kinetis SDK version 2.0 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 v2.0 for Kinetis MKW24D512, MKW21D512, MKW21D256.
- IAR Embedded Workbench for ARM® **v7.80.1** was used to build and test the corresponding IDE projects included in this release.
- Kinetis Design Studio **v3.2.0** with the latest J-Link runtime software installed from www.segger.com was used to build and test the corresponding IDE projects included in this release.
- The *tools\wireless\binaries* folder contains pre-compiled binaries, ready to flash for example applications.
- The package contains a project cloner Windows® executable in the *tools\wireless\project_cloner* folder, which allows copying to a chosen location the example applications files that are likely to be modified by the user, such as IDE projects and configuration headers. It is recommended to use this cloner instead of opening directly the IDE projects from the installation folder, to preserve the original installation files for future use.

5 Embedded System Considerations

- This release contains example applications supporting the following evaluation board setups:
  - FRDM-KW24
  - USB-KW24D512
  - FRDM-K64F + FRDM-CR20A
  - FRDM-KL46Z + FRDM-CR20A
- The FRDM boards feature 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 OpenSDA device, among which:

  http://developer.mbed.org/handbook/CMSIS-DAP

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

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

6 Known Limitations

- This release supports only the IAR Embedded Workbench and Kinetis Design Studio (KDS) 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.
- The only supported OpenSDA firmware with the KDS IDE is the Segger J-Link.
- Only the KDS IDE/toolchain is supported on Linux host platforms.
- Maximum file path length in Windows® 7 Operating System: Windows OS 7 imposes a 260-character maximum length for file paths. When installing this package, choose a folder close to the root of the file system to prevent file paths from exceeding the maximum character length specified by Windows OS. The same limitation influences the command line for build tools in various toolchains, which cannot exceed 8191 characters. The recommended installation location is the C:\NXP folder.
- Kinetis KW24D has a two-block 64KB RAM array. Due to architectural constraints, one variable cannot span over the 32KB border of the two blocks and be safely accessed by the code. The GNU/gcc linker is not aware of the respective border, nor does it offer the possibility to reserve the associated memory area and still do automatic link-time placement in the whole RAM. Because of this, when using gcc to build applications, special care must be taken for variables not to span across the 0x1FFF_FFFF - 0x2000_0000 border.

7 Documentation Included in this Package

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

- *Kinetis SMAC Demo Applications User's Guide.pdf*
- *Kinetis SMAC Reference Manual.pdf*
- *Kinetis KW24D and MCR20A SMAC Quick Start Guide.pdf*
- *Connectivity Framework Reference Manual.pdf*

The package also includes extensive Kinetis SDK v2.0 documentation in the "*docs*" folder.

8 Memory Footprints of SMAC Applications

8.1 Application Sizes on FRDM-KW24

Target Board/Platform: FRDM-KW24 (IAR Embedded Workbench compiler)				
Component/ Application	Code Size (bytes)	Data Size (bytes)		Comments
	READ ONLY	READ ONLY	READ/WRITE	
Connectivity Test	39617	4885	18494	FreeRTOS
Wireless UART	29003	387	18285	FreeRTOS
Wireless Messenger	34731	2614	18645	FreeRTOS
Low Power Demo	34557	3162	18300	FreeRTOS
Connectivity Test	34534	4880	6022	Bare-metal
Wireless UART	23993	377	5813	Bare-metal
Wireless Messenger	29599	2605	6169	Bare-metal
Low Power Demo	29377	3154	5836	Bare-metal
Connectivity Test	41873	5111	21374	MQX
Wireless UART	31269	609	21161	MQX
Wireless Messenger	36981	2839	21553	MQX
Low Power Demo	36841	3386	21184	MQX

8.2 Application Sizes on USB-KW24D512

Target Board/Platform: USB-KW24 (IAR Embedded Workbench compiler)				
Component/ Application	Code Size (bytes)	Data Size (bytes)		Comments
	READ ONLY	READ ONLY	READ/WRITE	
Connectivity Test	48691	5416	20622	FreeRTOS
Wireless UART	37943	874	20380	FreeRTOS
Wireless Messenger	43805	3137	20772	FreeRTOS
Connectivity Test	48507	5408	12634	Bare-metal
Wireless UART	37825	866	12384	Bare-metal
Wireless Messenger	43573	3129	12776	Bare-metal

8.3 Application sizes on FRDM-K64F_FRDM-CR20A

Target Board/Platform: FRDM-K64F_FRDM-CR20A (IAR Embedded Workbench compiler)				
Component/ Application	Code Size (bytes)	Data Size (bytes)		Comments
	READ ONLY	READ ONLY	READ/WRITE	
Connectivity Test	39569	4904	18570	FreeRTOS
Wireless UART	28959	402	18361	FreeRTOS
Wireless Messenger	34677	2630	18721	FreeRTOS
Low Power Demo	34463	3183	18384	FreeRTOS
Connectivity Test	34427	4896	6038	Bare-metal
Wireless UART	23883	392	5829	Bare-metal
Wireless Messenger	29485	2620	6185	Bare-metal
Low Power Demo	29219	3173	5848	Bare-metal

8.4 Application sizes on FRDM-KL46_FRDM-CR20A

Target Board/Platform: FRDM-KL46_FRDM-CR20A(IAR Embedded Workbench compiler)				
Component/ Application	Code Size (bytes)	Data Size (bytes)		Comments
	READ ONLY	READ ONLY	READ/WRITE	
Connectivity Test	38911	6802	18549	FreeRTOS
Wireless UART	29365	363	18315	FreeRTOS
Wireless Messenger	36775	2813	18551	FreeRTOS
Low Power Demo	35149	3176	18338	FreeRTOS
Connectivity Test	33896	6795	6085	Bare-metal
Wireless UART	24401	355	5855	Bare-metal
Wireless Messenger	31763	2805	6087	Bare-metal
Low Power Demo	30037	3168	5874	Bare-metal

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