Release Notes for FreeRTOS Rel.1.5.1

Contents

1 Release Notes for FreeRTOS 1.5.1 Product

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.5.1

This release of the FreeRTOS for Analog Devices Processors product contains support for the following processors:

- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC)
- ADSP-SC5xx (SHARC+ Core) using CrossCore Embedded Studio (proprietary compiler)
- ADSP-21569 using CrossCore Embedded Studio (proprietary compiler)

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

1.1 New Features for this Release

No new features have been added in this release

1.2 Changes for this Release

- Bug fix to allow registering of UART I/O device for the ARM Core on SC57x/SC58x.
- configSCLK0_HZ define to 125MHz rather quarter core clock speed.

1.3 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

1.4 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with **version 10.0.0** of the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 10.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

ADSP-BF7xx	• CCES 2.10.0 - this version or later is required
ADSP-SC5xx (Cortex-A)	• CCES 2.10.0 - this version or later is required
ADSP-SC5xx (SHARC+)	• CCES 2.10.0 - this version or later is required
ADSP-21569	• CCES 2.10.0 - this version or later is required

1.5 Use of System Services and Device Driver libraries with FreeRTOS

As of the 1.3.0 release of the Analog Devices FreeRTOS product the pre-built versions of the System Services and Devices Driver libraries are no longer compatible with FreeRTOS for the ADSP-21569, ADSP-SC5xx and Blackfin BF7xx platforms. In order to use the System Services and Device Drivers the project must include the source versions of these libraries rather than linking against the pre-built versions of the libraries.

For more information on configuring FreeRTOS projects for use with System Services and Device Drivers please refer to the **Using CrossCore Embedded Studio System Services and Device Drivers with FreeRTOS** section of the **FreeRTOS User Guide**.

2 Release Notes for FreeRTOS 1.5.0 Product

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.5.0

This release of the FreeRTOS for Analog Devices Processors product contains support for the following processors:

- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC)
- ADSP-SC5xx (SHARC+ Core) using CrossCore Embedded Studio (proprietary compiler)
- ADSP-21569 using CrossCore Embedded Studio (proprietary compiler)

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

2.1 New Features for this Release

New and notable features for this release

- Support for ADSP-SC594 (ARM and SHARC+ Core) processor added

2.2 Changes for this Release

The following changes have been made to this release

- ADuCM3/4* support has been removed from this product

2.3 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

2.4 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with **version 10.0.0** of the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 10.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

ADSP-BF7xx	• CCES 2.10.0 - this version or later is required
ADSP-SC5xx (Cortex-A)	• CCES 2.10.0 - this version or later is required
ADSP-SC5xx (SHARC+)	• CCES 2.10.0 - this version or later is required
ADSP-21569	• CCES 2.10.0 - this version or later is required

2.5 Use of System Services and Device Driver libraries with FreeRTOS

As of the 1.3.0 release of the Analog Devices FreeRTOS product the pre-built versions of the System Services and Devices Driver libraries are no longer compatible with FreeRTOS for the ADSP-21569, ADSP-SC5xx and Blackfin BF7xx platforms. In order to use the System Services and Device Drivers the project must include the source versions of these libraries rather than linking against the pre-built versions of the libraries.

For more information on configuring FreeRTOS projects for use with System Services and Device Drivers please refer to the **Using CrossCore Embedded Studio System Services and Device Drivers with FreeRTOS** section of the **FreeRTOS User Guide**.

3 Release Note for FreeRTOS 1.4.0 Product

3.1 Introduction

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.4.0.

This release of the FreeRTOS for Analog Devices Processors product contains support for the following processors:

- ADuCM302x using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADuCM4x50 using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC)
- ADSP-SC5xx (SHARC+ Core) using CrossCore Embedded Studio (proprietary compiler)
- ADSP-21569 using CrossCore Embedded Studio (proprietary compiler)

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

3.2 New Features for this Release

New and notable features for this release

- Support for ADSP-21569 (SHARC+ Core) processor added

3.3 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

3.4 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with **version 10.0.0** of the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 10.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

ADuCM30x	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.9.0
ADuCM4x50	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.9.0
ADSP-BF7xx	• CCES 2.9.0 - this version or later is required
ADSP-SC5xx (Cortex-A)	• CCES 2.9.0 - this version or later is required
ADSP-SC5xx (SHARC+)	• CCES 2.9.0 - this version or later is required
ADSP-21569	• CCES 2.9.0 - this version or later is required

3.5 FreeRTOS for ADSP-21569 (SHARC+ Core)

This release of FreeRTOS for this processor contains one basic example for FreeRTOS.

3.6 Use of System Services and Device Driver libraries with FreeRTOS

As of the 1.3.0 release of the Analog Devices FreeRTOS product the pre-built versions of the System Services and Devices Driver libraries are no longer compatible with FreeRTOS for the ADSP-21569, ADSP-SC5xx and Blackfin BF7xx platforms. In order to use the System Services and Device Drivers the project must include the source versions of these libraries rather than linking against the pre-built versions of the libraries.

For more information on configuring FreeRTOS projects for use with System Services and Device Drivers please refer to the **Using CrossCore Embedded Studio System Services and Device Drivers with FreeRTOS** section of the **FreeRTOS User Guide**.

3.7 Known Issues

- The package of Lwip 2.6.0 is incompatible to work with CCES 2.9.0, so all examples with Lwip is unavailable in this release.

- For running the LwIP Example for ARM on ADSP-SC584 EZ-Kit with CrossCore Embedded Studio, it doesn't work with SC584 in silicon 0.1 if connected the hardwares with 1000 switch, others can work well.

4 Release Note for FreeRTOS 1.3.1 Product

4.1 Introduction

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.3.1.

This release of the FreeRTOS for Analog Devices Processors product contains support for the following processors:

- ADuCM302x using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADuCM4x50 using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC)
- ADSP-SC5xx (SHARC+ Core) using CrossCore Embedded Studio (proprietary compiler)

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

4.2 New Features for this Release

New and notable features for this release

- Fix issues related to use of System Service and Device Drivers with ADSP-SC5xx and ADSP-BF7xx processors
- Support for UART based I/O for ADSP-SC5xx Cortex-A core FreeRTOS

4.3 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

4.4 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with **version 10.0.0** of the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 10.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

ADuCM30x	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.8.0
ADuCM4x50	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.8.0
ADSP-BF7xx	• CCES 2.8.3 - this version or later is required
ADSP-SC5xx (Cortex-A)	• CCES 2.8.3 - this version or later is required
ADSP-SC5xx (SHARC+)	• CCES 2.8.3 - this version or later is required

4.5 FreeRTOS for ADSP-SC5xx (Cortex-A5 Core)

This release of FreeRTOS contains a release of FreeRTOS for the Cortex-A5 core of the ADSP-SC5xx family of processors.

The port of FreeRTOS for this processor contains two example projects:

- Basic example for FreeRTOS
- Basic example using Lightweight TCP/IP stack for CrossCore Embedded Studio

Change from previous release

This release contains support for UART based I/O when using FreeRTOS on the ADSP-SC5xx Cortex-A core.
This changes the method of I/O used for this processor core and care should be taken to understand this change when upgrading existing projects.

4.5.1 UART based I/O for Cortex-A5 Cores

The previous release of FreeRTOS for Analog Devices processors contained an known issue where use of I/O (printf, fscanf, etc) could result in instability of the core scheduling interrupt used by FreeRTOS.
This has been resolved by redirecting all default I/O operations to use the USB to UART device for the ADSP-SC5xx EZ-KITs.
For more information on this change please refer to the instructions for running the ADSP-SC5xx (cortex-A5) demo examples, in the User Guide provided in the Analog Devices FreeRTOS product.

4.6 Use of System Services and Device Driver libraries with FreeRTOS

As of the 1.3.1 release of the Analog Devices FreeRTOS product the pre-built versions of the System Services and Devices Driver libraries are no longer compatible with FreeRTOS for the ADSP-SC5xx and Blackfin BF7xx platforms.
In order to use the System Services and Device Drivers the project must include the source versions of these libraries rather than linking against the pre-built versions of the libraries.

For more information on configuring FreeRTOS projects for use with System Services and Device Drivers please refer to the **Using CrossCore Embedded Studio System Services and Device Drivers with FreeRTOS** section of the **FreeRTOS User Guide**.

Attempting to use the pre-built versions of the System Services and Device Driver libraries may result in application corruption and run time execution failure.

4.7 Known Issues

- No known issues

5 Release Note for FreeRTOS 1.3.0 Product

5.1 Introduction

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.3.0.

This release of the FreeRTOS for Analog Devices Processors product contains support for the following processors:

- ADuCM302x using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADuCM4x50 using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC) **BETA RELEASE**
- ADSP-SC5xx (SHARC+ Core) using CrossCore Embedded Studio (proprietary compiler) **BETA RELEASE**

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

5.2 New Features for this Release

New and notable features for this release

- FreeRTOS for Analog Devices Processors 1.3.0 has transitioned from using FreeRTOS 9.0.0 to FreeRTOS 10.0.0
- Support for ADSP-SC5xx (SHARC+) family of processors added
- LwIP example added for ADSP-SC5xx (Cortex-A5) processors

5.3 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

5.4 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with **version 10** of the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 10.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

ADuCM30x	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.8.0
ADuCM4x50	• IAR 5.2.1a • Keil 7.60.1 • CCES 2.8.0
ADSP-BF7xx	• CCES 2.8.0
ADSP-SC5xx (Cortex-A)	• CCES 2.8.0
ADSP-SC5xx (SHARC+)	• CCES 2.8.0

5.5 FreeRTOS for ADSP-SC5xx (Cortex-A5 Core) Beta Release

This release of FreeRTOS contains a **beta** release of FreeRTOS for the Cortex-A5 core of the ADSP-SC5xx family of processors.

The port of FreeRTOS for this processor contains two example projects:

- Basic example for FreeRTOS
- Basic example using Lightweight TCP/IP stack for CrossCore Embedded Studio

While this port is functionally complete, it is considered a beta release due to an issue with performance when host based I/O is enabled in an application debug session (see **known issues** below for more details). This issue will be addressed in a future version of the FreeRTOS product from Analog Devices.

5.6 Known Issues

- FreeRTOS and CrossCore Embedded Studio conflict on use of SVC interrupt. **ADSP-SC5xx Cortex-A5 port, only**
  The current implementation of FreeRTOS for ADSP-SC5xx (Cortex-A5 Core) relies on the SVC interrupt to perform context switching within the RTOS.
  However the runtime libraries the ADSP-SC5xx ARM core, provided with CrossCore Embedded Studio, also use the SVC interrupt to perform I/O operations with the host (printf etc).
  The result of this is that the emulator latches on to each SVC instruction issued by the target processor and this results in a significant slow down for applications running under the emulator.
  To work around this issue users should disable **semihosting** within the CrossCore Embedded Studio debug session. This will improve the performance of the application under the emulator.
  Please note that this will disable all target-to-host I/O operations. Calls to functions such as printf, fopen etc should either be comments out, or the low level I/O device should be replaced to use an alternative, such as UART.
  To disable semihosting within CrossCore Embedded Studio:

  1. Within the CrossCore Embedded Studio debug session launch the **Debug Configurations Manager**

  2. Select the **debug configuration** from the **left pane** in the **Debug Configurations Manager**

  3. Click the **Automatic Breakpoints** tab in the main window of the **Debug Configurations Manager**

  4. Uncheck the **Enable semihosting** checkbox at the bottom of the window

  5. Click the **Debug** button to debug your application

- Restrictions on size of semaphore where using FreeRTOS with CrossCore Embedded Studio OSAL. **ADSP-SC5xx and ADSP-BF7xx ports, only**

Both configUSE_TRACE_FACILITY and configUSE_QUEUE_SETS increase the size of static semaphores in FreeRTOS, when set to 1.
Using both together increases the size beyond the amount of space reserved by OSAL for its static semaphores, which may cause certain device-driver and service API calls to fail. This will prevent the setup of soft-switches, amongst other things.

The recommended workaround is to set configUSE_TRACE_FACILITY to 0 in all projects, since it is not required for normal program operation. This only applies to platforms that use OSAL, i.e. Blackfin and 215xx.

6 Release Note for FreeRTOS 1.2.0 Product

6.1 Introduction

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.2.0.

The releases is the first release of the FreeRTOS for Analog Devices Processors product and contains support for the following processors:

- ADuCM302x using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADuCM4x50 using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADSP-BF7xx using CrossCore Embedded Studio (proprietary compiler)
- ADSP-SC5xx (ARM Core) using CrossCore Embedded Studio (GCC) **BETA RELEASE**

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

6.2 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

6.3 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 9.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.

The following versions of tools have been tested against this product and are recommended for development:

6.4 FreeRTOS for ADSP-SC5xx (Cortex-A5 Core) Beta Release

This release of FreeRTOS contains a **beta** release of FreeRTOS for the Cortex-A5 core of the ADSP-SC5xx family of processors.

The port of FreeRTOS for this processor contains two example projects:

- Basic example for FreeRTOS
- Basic example using Lightweight TCP/IP stack for CrossCore Embedded Studio

While this port is functionally complete, it is considered a beta release due to first issue in the known issues section below.

1. This issue will be addressed in a future version of CrossCore Embedded Studio so as to allow host based I/O with an application using FreeRTOS.

6.5 Known Issues

- FreeRTOS and CrossCore Embedded Studio conflict on use of SVC interrupt. **ADSP-SC5xx Cortex-A5 port, only**
  The current implementation of FreeRTOS for ADSP-SC5xx (Cortex-A5 Core) relies on the SVC interrupt to perform context switching within the RTOS.
  However the runtime libraries the ADSP-SC5xx ARM core, provided with CrossCore Embedded Studio, also use the SVC interrupt to perform I/O operations with the host (printf etc).
  The result of this is that the emulator latches on to each SVC instruction issued by the target processor and this results in a significant slow down for applications running under the emulator.
  To work around this issue users should disable **semihosting** within the CrossCore Embedded Studio debug session. This will improve the performance of the application under the emulator.
  Please note that this will disable all target-to-host I/O operations. Calls to functions such as printf, fopen etc should either be comments out, or the low level I/O device should be replaced to use an alternative, such as UART.
  To disable semihosting within CrossCore Embedded Studio:

    1. Within the CrossCore Embedded Studio debug session launch the **Debug Configurations Manager**

    2. Select the **debug configuration** from the **left pane** in the **Debug Configurations Manager**

    3. Click the **Automatic Breakpoints** tab in the main window of the **Debug Configurations Manager**

4. Uncheck the **Enable semihosting** checkbox at the bottom of the window

5. Click the **Debug** button to debug your application

- Restrictions on size of semaphore where using FreeRTOS with CrossCore Embedded Studio OSAL. **ADSP-SC5xx and ADSP-BF7xx ports, only**

Both configUSE_TRACE_FACILITY and configUSE_QUEUE_SETS increase the size of static semaphores in FreeRTOS, when set to 1.
Using both together increases the size beyond the amount of space reserved by OSAL for its static semaphores, which may cause certain device-driver and service API calls to fail. This will prevent the setup of soft-switches, amongst other things.

The recommended workaround is to set configUSE_TRACE_FACILITY to 0 in all projects, since it is not required for normal program operation. This only applies to platforms that use OSAL, i.e. Blackfin and 215xx.

7 Release Note for FreeRTOS 1.1.0 Product

7.1 Introduction

This document contains the release notes for FreeRTOS for Analog Devices Processors version 1.1.0.

The releases is the first release of the FreeRTOS for Analog Devices Processors product and contains support for the following processors:

- ADuCM302x using IAR, Keil and CrossCore Embedded Studio (GCC)
- ADuCM4x50 using IAR, Keil and CrossCore Embedded Studio (GCC)

Detailed instructions on supported versions of tools, and installation instructions can be found in the User Guide which is included in the zip file and is also available from the FreeRTOS page on analog.com.

7.2 Support and Assistance

For documentation about FreeRTOS, please visit the FreeRTOS website where extensive documentation on the operating system can be found at http://www.freertos.org /FreeRTOS-quick-start-guide.html

For questions regarding the examples provided in this product please post questions in the FreeRTOS community in Engineer Zone at https://ez.analog.com/community/dsp /software-and-development-tools/freertos

7.3 Version Compatibility

This FreeRTOS product is intended to be used in conjunction with the FreeRTOS product as provided for free at FreeRTOS.org. This product was tested using version 9.0.0 of FreeRTOS and we strongly recommend that you use this version of the operating system.