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1. Introduction

This document describes the release notes for SSP software release version 1.1.0.

2. Release information

<table>
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<tr>
<th>SSP Release Version</th>
<th>1.1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Date</td>
<td>May 13th 2016</td>
</tr>
</tbody>
</table>

Important notices for this release:

- Intended audiences for this release are Renesas Synergy customers, prospective customers, partners, and support staff.
- Existing projects may not migrate seamlessly to the newer e² studio 5.0.0.043 as there are substantial improvements in the way modules are added that may break compatibility. Users are strongly advised to back up their existing projects before installing e² studio and SSP 1.1.0 versions.

3. MCUs supported

S7G2, S3A7, and S124 groups.

4. Compatible and tested tools (software and hardware environment)

<table>
<thead>
<tr>
<th>Tool</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>e² studio</td>
<td>5.0.0.043</td>
<td>Software development and debugging tool. Link: <a href="https://synergygallery.renesas.com/">https://synergygallery.renesas.com/</a></td>
</tr>
<tr>
<td>GNU ARM Compiler</td>
<td>eabi-4_9-2015q3-20150921-win32</td>
<td>GNU ARM® compiler GCC_4.9.3.20150529. Refer to section Known issues and limitations in v1.1.0 release.</td>
</tr>
<tr>
<td>IAR Compiler</td>
<td>7.40.5</td>
<td>Software development tool. Refer to section Known issues and limitations in v1.1.0 release.</td>
</tr>
<tr>
<td>PE-HMI1</td>
<td>2.0</td>
<td>Product Example (PE) for Human Machine Interface to evaluate the Renesas Synergy™ S7G2 240 MHz ARM® Cortex®-M4 microcontroller.</td>
</tr>
<tr>
<td>DK-S124</td>
<td>1.0</td>
<td>Development Kit for Renesas Synergy™ S124, 32 MHz ARM® Cortex®-M0+ microcontroller in a LQFP64 package.</td>
</tr>
<tr>
<td>DK-S7G2</td>
<td>3.0</td>
<td>Development Kit for Renesas Synergy™ S7G2, 240 MHz ARM® Cortex®-M4 microcontroller in a BGA224 package.</td>
</tr>
<tr>
<td>DK-S3A7</td>
<td>2.0</td>
<td>Development Kit for Renesas Synergy™ S3A7, 48 MHz ARM® Cortex®-M4 microcontroller in a LQFP144 package.</td>
</tr>
<tr>
<td>J-Link Software</td>
<td>5.x</td>
<td>Segger J-Link™ debug probe is the quasi standard for ARM® Cortex®-M based MCUs.</td>
</tr>
</tbody>
</table>

5. Express Logic, Inc. component version information

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>ThreadX®</td>
<td>5.7</td>
</tr>
<tr>
<td>NetX™</td>
<td>5.9</td>
</tr>
</tbody>
</table>
### 6. Information for migrating existing projects

**IMPORTANT:** Read the “Project Migration Guide - SSP 1.0.0 to SSP 1.1.0” document before installation of e² studio 5.0.0 and/or SSP 1.1.0 and follow the instructions provided in the document.

Users are strongly advised to back up their existing projects before installing e² studio v5.0 and SSP 1.1.0.

### 7. Release package and installation information

Before installing the SSP, ensure that the following items are installed on the PC:

- Renesas e² studio ISDE v5.0.0 (download from Renesas Gallery [https://synergygallery.renesas.com/](https://synergygallery.renesas.com/))
- GNU ARM Compiler (included in Renesas e² studio ISDE v5.0.0 installer)

To install the SSP, follow these steps:

1. Download the following items for the SSP Release from Synergy Gallery:
   - SSP_Distribution_1.1.0.zip (SSP Package Installer, including SSP Package, HTML User’s Manual and readme_SSP.txt); MD5 checksum = b834741905fba2138f53bb13b7f8410f
   - Release_Notes_SSP_ver1.1.0.pdf
   - Synergy Software Package 1.1.0 User’s Manual r01us0171eu0094_synergy_ssp.pdf
   - Project Migration Guide - SSP 1.0.0 to SSP 1.1.0.pdf

2. Unzip the package and run the SSP_Distribution_1.1.0.exe installer.

3. Install the SSP in the root folder of a compatible e² studio installation.

**Note:** The default installation folder for the SSP is C:\Renesas\e²_studio.

The SSP documentation installs by default to ~Renesas\Synergy\SSP_Documentation. You can change the default location during the installation. The following documents will be installed:

- ssp-user-manual-html-v0.94-sspv1.1.0.zip (HTML version of the SSP user’s manual)
- readme_SSP.txt (critical information and last-minute updates)
- Renesas® Synergy™ Software Package (SSP) Developer examples r11an0024eu0100_synergy_ssp.pdf
8. Changes from v1.1.0-alpha.1 to v1.1.0 release

8.1 New features

8.1.1 bsp (Board Support Package)

8.1.1.1 Description

Updated IAR linker scripts to support download to QSPI flash through debugger.

 Applies to: DK-S124, DK-S3A7, DK-S7G2

8.1.2 nx (NetX)

8.1.2.1 Description

Upgraded to NetX 5.9 version.

 Applies to: DK-S7G2, DK-S3A7

8.1.2.2 Description

Added missing NetX functionality: Auto IP, POP3, PPP, SMTP, and SNTP.

 Applies to: DK-S7G2, DK-S3A7

8.1.2.3 Description

Added nx_bsd component, which provides BSD 4.3 Sockets API Compliancy Wrapper for NetX. Refer to the NetX BSD User Guide for details on the usage. Use the compiler flag _POSIX_SOURCE to build NetX BSD source using GCC compiler. No tests were performed on this component.

 Applies to: DK-S7G2

8.1.3 nxd (NetX Duo Stack)

8.1.3.1 Description

Added prebuilt libraries for NetX Duo services: Auto IP, DHCP, DHCP, DNS, NAT, HTTP, POP3, PP, SMTP, SNTP, Telnet, TFTP.

 Applies to: DK-S7G2, DK-S3A7

8.1.3.2 Description

Added nxd_bsd component, which provides BSD 4.3 Sockets API Compliancy Wrapper for NetX Duo. Refer to the NetX Duo BSD User Guide for details on the usage. Use the compiler flag _POSIX_SOURCE to build NetX Duo BSD source using GCC compiler. No tests were performed on this component.

 Applies to: DK-S7G2

8.1.4 r_can (Controller Area Network)

8.1.4.1 Description

Added CAN module.

 Applies to: DK-S7G2, DK-S3A7, PE-HMI, DK-S124

8.1.5 r_ctsu (Capacitive Touch Sensing Unit)

8.1.5.1 Description

Added tuning projects for DK-S124 and SK-S7G2.

 Applies to: DK-S124, SK-S7G2

8.1.6 r_qspi (Quad Serial Peripheral Interface)

8.1.6.1 Description

Updated IAR linker scripts to support download to QSPI flash through debugger.
8.1.7 r_sce (Secure Crypto Engine)

8.1.7.1 Description

Added ISDE configuration options for Crypto drivers.

 Applies to: DK-S3A7, PE-HMI

8.1.8 sf_el_nx (Synergy NetX Interface)

8.1.8.1 Description

Added support for receiving IPv6 packet types.

 Applies to: DK-S7G2, DK-S3A7

8.1.9 sf_touch_ctsu_button (Capacitive Touch Sensing Unit Button)

8.1.9.1 Description

Added tuning projects for DK-S124 and SK-S7G2.

 Applies to: DK-S124, SK-S7G2

8.1.10 sf_touch_ctsu_slider (Capacitive Touch Sensing Unit Slider)

8.1.10.1 Description

Added new module: Framework support for Capacitive Touch Sliders and Wheels. This module uses the Capacitive Touch Framework to read the state of configured sliders and wheels, perform debouncing, and invoke callbacks when any point on the slider/wheel is touched.

 Applies to: S124, S3A7, S7G2

8.1.10.2 Description

Implemented slider, including support for S124.

 Applies to: DK-S124, DK-S3A7, DK-S7G2

8.1.10.3 Description

Added periodic callbacks while a slider touch is held.

 Applies to: DK-S124, DK-S3A7, DK-S7G2

8.1.10.4 Description

Added unit tests for sf_touch_ctsu_slider.

 Applies to: DK-S124, DK-S3A7, DK-S7G2

8.1.10.5 Description

Added tuning projects for DK-S124 and SK-S7G2.

 Applies to: DK-S124, SK-S7G2

8.2 Updated features

8.2.1 bsp (Board Support Package)

8.2.1.1 Description

Improved bitfield entry in the Configurator. OFS registers are now configurable as individual bitfields from the BSP properties tab.

 Applies to: DK-S124, DK-S3A7, SK-S7G2, PE-HMI
8.2.1.2 Description
S1 powers up in Low-Voltage mode, incompatible with the default ISDE ICLK speed. If the requested ICLK source is HOCO or the Main Oscillator AND the requested frequency is > 4 MHz, switch to High-Speed mode before setting the clock.

Applies to: DK-S124

8.2.1.3 Description
Clock Configurators of S124 and S3A7 do not match User’s Manual (HOCO). The pull-down option for 29.491 MHz has been removed.

Applies to: DK-S124, DK-S3A7

8.2.1.4 Description
To create a custom BSP with SSP v1.1.0 and e² studio v5, a new version of the Custom BSP Creator is required. The minimum required version is v1.03.

Applies to: All

8.2.2 r_ctsu (Capacitive Touch Sensing Unit)
8.2.2.1 Description
Added support for S124.

Applies to: DK-S124, SK-S7G2

8.2.2.2 Description
Added unit tests for DK-S124 and SK-S7G2.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.3 r_flash_lp (Flash Memory, Low Power)
8.2.3.1 Description
Updated Flash_LP module to support S124 MCU.

Applies to: DK-S124

8.2.4 r_iwdt (Independent Watchdog Timer)
8.2.4.1 Description
r_iwdt APIs and API structure updated to include “const” in passed parameters.

Applies to: DK-S124, DK-S3A7, SK-S7G2, PE-HMI1

8.2.4.2 Description
e² studio XML modified to add “const” keyword to generated r_iwdt configuration structure.

Applies to: DK-S124, DK-S3A7, SK-S7G2, PE-HMI1

8.2.5 r_lpm (Low Power Mode)
8.2.5.1 Description
Added support for S124.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.5.2 Description
Added the request for ending snooze through WUPEN register setting.

Applies to: DK-S124, DK-S3A7, DK-S7G2
8.2.6 r_lvd (Low Voltage Detection Driver)
8.2.6.1 Description
Added support for S124.
Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.7 r_riic (IIC)
8.2.7.1 Description
Modified RIIC driver to add support for S124 devices, changed clock source from PCLKA to PCLKB for S124 device.
Applies to: DK-S124

8.2.8 r_rspi (Serial Peripheral Interface)
8.2.8.1 Description
Updated RSPI driver to support S124, changed clock source from PCLKA to PCLKB, modified register initializations, changed data register to half-word register (S124 supports only 16-bit data register).
Applies to: DK-S124

8.2.9 r_sci_i2c (Serial Communication Interface I2C)
8.2.9.1 Description
Modified SCI I2C driver to add support for S124 devices, changed clock source from PCLKA to PCLKB for S124 device.
Applies to: DK-S124

8.2.10 r_sci_spi (Serial Communication Interface SPI)
8.2.10.1 Description
Modified SCI SPI driver to add support for S124 devices, changed clock source from PCLKA to PCLKB for S124 device.
Applies to: DK-S124

8.2.10.2 Description
Fixed warnings in SCI SPI driver.
Applies to: DK-S7G2, DK-S3A7, DK-S124

8.2.11 r_sdmmc (SDHI driver for SDIO and SD/MMC memory devices)
8.2.11.1 Description
Interrupts and DMA were optional for SDMMC/SDIO in Release 1.0.0. All read and write functions were blocking, meaning the functions did not return until the operations were complete.

The read and write media and extended read and write SDIO functions have been made non-blocking in Release 1.1.0 and now require interrupts and a transfer function, either DMAC or DTC. The interrupts required are as follows:

Using SD/MMC with DTC:

- SDHIMMCx ACCS
- SDHIMMCx DMA REQ

Using SD/MMC with DMAC:

- SDHIMMCx ACCS
- DMACx (DMAC transfer interrupt)

Using SDIO with DTC:

- SDHIMMCx ACCS
- SDHIMMCx SDIO
- SDHIMMCx DMA REQ

Using SDIO with DMAC:
- SDHIMMCx ACCS
- SDHIMMCx SDIO
- DMACx (DMAC transfer interrupt)

SDHIMMCx CARD is still optional.

x= channel used

There are no errors generated if the DMA interrupts are not set up properly.

 Applies to: DK-S7G2, DK-S3A7, PE-HMI1

8.2.12 r_wdt (Watchdog Timer)

8.2.12.1 Description

 r_wdt APIs and API structure updated to include “const” in passed parameters.

 Applies to: DK-S124, DK-S3A7, SK-S7G2, PE-HMI1

8.2.13 sf_block_media_sdmmc (Block Media Interface for SD Multi Media Card)

8.2.13.1 Description

 sf_block_media_sdmmc has been changed to work with the non-blocking SD/MMC functions. Read and write functions suspend the thread until the transfers are complete, then return to sf_el_fx, FileX.

 Applies to: DK-S7G2, DK-S3A7, PE-HMI1

8.2.14 sf_el_gx (Synergy GUIX Interface)

8.2.14.1 Description

 Supports ARGB8888/RGB8888 formats in addition to RGB565 format.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1

8.2.14.2 Description

 Screen rotation feature is newly implemented. See SSP User’s Manual, Chapter 4 User Guides, GUIX Adaptation Framework section for the detail of feature. For this update, the following new Synergy Configuration properties are added:

- Screen Rotation Angle (default : 0)
- GUIX Canvas Buffer (default : Not used)
- Memory section for GUIX Canvas Buffer (default : sdram)

 The updated module configuration should be backward compatible with existing projects if default values are applied.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1

8.2.14.3 Description

 GUIX Studio (v5.3.0.1) made a specification change in GUIX Studio auto-generated code named xxx_specifications.c to generate GUIX display driver setup function table named _gx_synergy_display_driver_setup(), which was defined in gx_display_driver_synergy_dave2d.c in SSP1.1.0-alpha.1. By this specification change, the function table was removed from gx_display_driver_synergy_dave2d.c.

 IMPORTANT: GUIX v5.3.0 in SSP v1.1.0 only works with GUIX Studio (v5.3.0.1). You must use this version of GUIX Studio and regenerate GUIX specifications/resources file, specifying the “GUIX Library Version” to “5.3.0” on the GUIX Studio “Configure Project” Menu.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1
8.2.14.4 Description
gx_display_driver_synergy_dave2d.c was moved from the \framework\el\gx\gx_src\ directory to \framework\sf_el_gx\ since the implementation is Synergy Port GUIX draw functions.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

8.2.15 sf_jpeg_decode (JPEG Decode)
8.2.15.1 Description
Updated configuration structure definition, which was defined in the old SSP coding style. No change is required in user application code as long as you configure JPEG Framework module through Synergy Configurator on e² studio.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

8.2.16 sf_power_profiles (Power Mode Profile)
8.2.16.1 Description
Added support for S124.

Applies to: DK-124, DK-S3A7, DK-S7G2

8.2.17 sf_touch_ctsu_button (Capacitive Touch Sensing Unit Button)
8.2.17.1 Description
API changes:
- A callback function was added to the button configuration.
- Elements in the API were renamed for standards adherence.

Applies to: S124, S3A7, S7G2

8.2.17.2 Description
Minor updates to button cfg and ctrl structures.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.17.3 Description
Fixed build errors due to removed button_cfgs member of cfg structure.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.17.4 Description
Added support for S124.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.18 sf_touch_ctsu_slider (Capacitive Touch Sensing Unit Slider)
8.2.18.1 Description
Added support for S124.

Applies to: DK-S124, DK-S3A7, DK-S7G2

8.2.19 sf_touch_panel_i2c (Touch Panel I2C)
8.2.19.1 Description
Fixed wrong payload structure type in the sf_touch_panel_i2c module XML.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1
8.2.20 tx (ThreadX)

8.2.20.1 Description

When RTOS objects are created for a thread in the Synergy Configurator, those objects are now initialized during RTOS initialization (tx_application_define()). Previously, RTOS objects were initialized when the owning thread first ran.

Applies to: All

8.2.20.2 Description

The following build time options were defined for size optimization for all prebuilt ThreadX libraries. Refer to the ThreadX User Guide for more information on these options.

#define TX_TIMER_PROCESS_IN_ISR
#define TX_DISABLE_PREEMPTION_THRESHOLD
#define TX_DISABLE_NOTIFY_CALLBACKS

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

8.2.21 ux (USBX Host and Device)

8.2.21.1 Description

Updated USBX (device) stack to support S124 devices.

To support S124 devices, you need to define following macros at the project level in this release:

- UX_SYSTEM_DEVICE_ONLY
- UX_THREAD_STACK_SIZE (512)
- UX_SLAVE_REQUEST_DATA_MAX_LENGTH (512)

Configuration through Synergy Configurator is planned for the next SSP package release.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

8.3 Deprecated features

8.3.1 sf_console (Console)

8.3.1.1 Description

The sf_console_cb_args_t typedef is deprecated and will be removed in the future. Use sf_console_callback_args_t instead.

Function/API: sf_console_cb_args_t typedef

8.3.2 sf_el_gx (Synergy GUIX Interface)

8.3.2.1 Description

The sf_el_gx module configuration property “Name of JPEG Work Buffer” was removed from the Synergy Configurator because the buffer is automatically named as “g_sf_el_gxN_jpegbuffer” and statically allocated by the Synergy Configurator.

This update should be backward compatible with existing projects (SSP1.1.0-alpha.1 based project) as long as the Synergy Configurator is used.

Function/API: XML configuration

Applies to: All

8.3.3 sf_el_ux (Synergy USBX Interface)

8.3.3.1 Description

In all USBX port filenames, function names, and macros, “_rx_” has been replaced with “_synergy_”. Translation header files “ux_dcd_rx.h” and “ux_hcd_rx.h” are provided to minimize compatibility issues. These translation files will be removed in a future release.

Function/API: ux*_rx_
Applies to: All

8.3.3.2 Description

The base address of the USB registers used must now be passed into the dcd_io and hcd_io parameters, respectively. Previously, these parameters were unused. An example of the correct format is `_ux_dcd_synergy_initialize((ULONG) R_USBFS);

Function/API: _ux_dcd_synergy_initialize _ux_hcd_synergy_initialize

Applies to: All

8.3.4 sf_message (Inter-Thread Messaging)

8.3.4.1 Description

The sf_message module configuration property “Message buffer size in bytes” was removed from the Synergy Configurator because the buffer size is now calculated automatically. This update should be backward compatible with existing projects (SSP1.1.0-alpha.1 based project) since the buffer size is to be the maximum size of message payloads used in an application.

Function/API: XML configuration

Applies to: All

9. Changes from v1.0.0 to v1.1.0-alpha.1 release

9.1 New features

9.1.1 All modules

9.1.1.1 Description

The ISDE now supports using instance tokens in the Module Configurator. An instance token allows the Configurator to give unique names to instantiated modules. Previously, they would have been the same, resulting in a name duplication error. If you add two identical modules in the ISDE, the names will now be <default_name>0 and <default_name>1, avoiding a naming conflict.

Applies to: e² studio

9.1.1.2 Description

The ISDE has been updated with a new stack representation view. To enable this new view, the Module Configurator was updated. If you are using an older pack, you must first update to this release to get the new stack view.

Applies to: e² studio

9.1.2 nx (NetX HTTP, DNX, DHCP, FTP, TFTP, Telnet)

9.1.2.1 Description

NetX BSD Adaptation Layer functionality support is provided. Use the compiler flag _POSIX_SOURCE when building NetX module sources. No tests were performed on this component.

Applies to: S7G2, S3A7

9.1.3 nxd (NetX Duo Dual IPv4/IPv6)

9.1.3.1 Description


You must generate and install an updated SSP Development and Production License from the Synergy Gallery to view the protected source code for NetX Duo.

Applies to: S7G2, S3A7

9.1.3.2 Description

If you are using the web server demo application with the NetX Duo stack and application bundle, you must manually update the files demo_nx_http_application.c and demo_nx_httpserver_query.c files to deselect the ‘nx’ and ‘nx_http_server’ components from the configuration tab and select ‘nxd’ and ‘nxd_http_server’ components in their place.
If you are using the web server demo application with the NetX Duo stack and application bundle, you must manually update the files demo_nx_http_application.c and demo_nx_httpserver_query.c files.

Replace the following line in demo_nx_http_application.c and demo_nx_httpserver_query.c files:

```
#include "nx_http.h"
```

with

```
#ifndef __PRODUCT_NETXDUO__
#ifndef NX_HTTP_NO_FILEX
#include "fx_api.h"
#else
#include "fx_stub.h"
#endif
#include "nxd_http_server.h"
#else
#include "nx_http.h"
#endif
```

In the Synergy configuration, on the Components tab, deselect the ‘nx’ and ‘nx_http_server’ components and select the ‘nxd’ and ‘nxd_http_server’ components in their place.

Applies to: S7G2, S3A7

9.1.4  r_can (Controller Area Network)

9.1.4.1  Description

New module added. The Controller Area Network (CAN) Driver is a generic API for CAN networks. The CAN Driver is implemented on r_can and supports the CAN peripherals available on the Synergy microcontroller hardware.

The module supports the following functions:

- **R_CAN_Open()** - Open function for CAN device.
- **R_CAN_Read()** - Read function for CAN device, non-blocking.
- **R_CAN_Write()** - Write function for CAN device.
- **R_CAN_Close()** - Close function for CAN device
- **R_CAN_Control()** - Control function for CAN device.
- **R_CAN_InfoGet()** - Get CAN channel info function.

Applies to: PE-HMI1, DK-S7G2, DK-S3A7

9.1.5  r_ctsu (Capacitive Touch Sensing Unit)

9.1.5.1  Description

Driver for the Capacitive Touch Sensing Unit. The driver supports mutual and self-capacitance modes of operation. There is no update to the driver itself. Test cases were added to test self-capacitance mode operation. Previously, self-capacitance mode was not tested.

Applies to: DK-S3A7

This was tested by connecting a mutual-capacitance mode matrix board and a self-capacitance mode board to the DK-S3A7. The mutual-capacitance mode board and self-capacitance mode board were taken from the RX113 Capacitive Touch Kit.
9.1.5.2 **Description**

Configuration module that allows you to perform tuning for any capacitive touch board. This module creates definitions that are required by the Workbench 6 tool to perform the tuning process.

**Applies to:** DK-S3A7

This was tested by connecting a mutual-capacitance mode matrix board and a self-capacitance mode board to the DK-S3A7. The mutual-capacitance mode board and self-capacitance mode board were taken from the RX113 Capacitive Touch Kit.

9.1.6 **r_gpt_input_capture (General PWM Timer with Input Capture)**

9.1.6.1 **Description**

The GPT input capture module supports pulse width measurement from external GPT input pins. Callback events are triggered when a pulse is captured or a counter overflow occurs.

**Applies to:** DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.1.7 **r_lvd (Low Voltage Detection Driver)**

9.1.7.1 **Description**

Low Voltage Detection (LVD) driver. The LVD driver provides functions for configuring the LVD hardware peripheral. The process of configuring and enabling a Low Voltage Detection monitor has very specific timing constraints and register write ordering. Because of these constraints, the entire process of configuring and enabling a voltage monitor is most effectively performed by a single function. The API function performs configuration and enables the monitor to properly enforce the timing and register write ordering constraints. The LVD driver configures all settings for the available configurable LVD monitors.

**Applies to:** S3A7, S7G2

9.1.8 **r_pdc (Parallel Data Capture Unit)**

9.1.8.1 **Description**

New module added. The PDC driver module captures an image from an externally connected camera. This module makes use of the transfer interface.

The module supports the following functions:

- **R_PDC_Open()** - Power on and configure the PDC peripheral. The PDC PCLKO output is enabled. Some camera modules require the clock to be running before they can be configured.
- **R_PDC_Close()** - Power down the PDC peripheral, stop and close the transfer interface, disable interrupts, and clear internal data.
- **R_PDC_CaptureStart()** - Start an image capture from a camera. This function enables interrupts, configures and starts the transfer interface, and starts the capture. If a callback is provided, then it will be called when the capture completes.
- **R_PDC_StateGet()** - Provide the current state of the VSYNC and HSYNC pins.
- **R_PDC_VersionGet()** - Return the version of the driver.

**Applies to:** DK-S7G2

9.1.9 **r_sce (Secure Crypto Engine: TRNG, AES, RSA, TDES, HASH, DSA, ARC4)**

9.1.9.1 **Description**

Added interface API `hashUpdate()` for HASH functions.

**Applies to:** PE-HMI1

9.1.9.2 **Description**

Added APIs `hashSign()` and `verifySign()` for DSA functions.

**Applies to:** PE-HMI1
9.1.9.3 Description

Added interface APIs `zeroPaddingEncrypt()` and `zeroPaddingDecrypt()` to the AES/GCM mode to process arbitrarily sized authentication and encryption data.

 Applies to: PE-HMI1, DK-S3A7

9.1.10 r_sci_spi (Serial Communications Interface SPI)

9.1.10.1 Description

Added support for SPI data transfer through DTC in the SCI SPI driver. Data can now be transferred over SPI mode or over transfer mode through DTC.

 Limitation: SCI SPI performs only 8-bit data transfer, both in DTC and SPI transfer modes.

 Applies to: DK-S7G2, DK-S3A7

9.1.11 r_sci_uart (Serial Communications Interface UART)

9.1.11.1 Description

Added non-FIFO support in the SCI UART driver module for S124 devices. The driver uses non-FIFO transfer when using channels 1 and 9 of the S124 device, where the MCU does not support FIFO data transfer mode.

 Applies to: DK-S124

9.1.12 r_spi (Serial Peripheral Interface)

9.1.12.1 Description

Added support for SPI data transfer through DTC in the RSPI driver. You can now transfer the data over SPI mode or over transfer mode through DTC.

 Limitation: Since RSPI transmit receive data registers are 32 bits, RSPI supports only 32-bit data transfer in DTC transfer mode.

 Applies to: DK-S7G2, DK-S3A7

9.1.13 r_ssi (Serial Sound Interface)

9.1.13.1 Description

I2S (Inter IC Sound) audio communication functionality is implemented on the SSI Synergy peripheral. Reading and writing over the I2S protocol in master mode are supported.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.1.14 sf_audio_playback_hw_i2s (Audio Playback HW I2S)

9.1.14.1 Description

An audio framework port for I2S is provided. This allows the existing audio framework to be used with the new SSI driver.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.1.15 sf_touch_ctsu (Capacitive Touch Sensing Unit)

9.1.15.1 Description

Framework support for the Capacitive Touch driver. This module drives the CTSU driver at the configured scan rate and allows the user to read touch data.

 Applies to: DK-S3A7

This was tested by connecting a mutual-capacitance mode matrix board and a self-capacitance mode board to the DK-S3A7. The mutual-capacitance mode board and self-capacitance board were taken from the RX113 Capacitive Touch Kit.
9.1.16  sf_touch_ctsu_button (Capacitive Touch Sensing Unit Button)
9.1.16.1  Description

Framework support for Capacitive Touch Buttons. This module uses the Capacitive Touch Framework to read the state of configured buttons, perform debouncing, and invoke callbacks on button state change.

Applies to:  DK-S3A7

This was tested by connecting a mutual-capacitance mode matrix board and a self-capacitance mode board to the DK-S3A7. The mutual-capacitance mode board and self-capacitance board were taken from the RX113 Capacitive Touch Kit.

9.1.17  USBX
9.1.17.1  Description

Added driver functionality to support S124 USB device controller.

Applies to:  Not tested in this release.

9.2  Updated features
9.2.1  All drivers
9.2.1.1  Description

Interrupt service routine (ISR) names were updated to reflect ELC event names. The ELC event names had been updated in a previous release, but the ISR names were not. If you have implemented your own ISR, not using an SSP module, then you must update the function’s name.

Applies to:  All

9.2.2  bsp (Board Support Package)
9.2.2.1  Description

Added support for the S124 MCU and reorganized how ELC and IPOPORT MCU information is stored within the BSP.

Applies to:  DK-S3A7, DK-S7G2, DK-S124

9.2.3  gx (GUIX)
9.2.3.1  Description

Express Logic GUIX is updated from v5.2.9 to v5.3.

Applies to:  DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.2.4  r_glcd (Graphics LCD Controller)
9.2.4.1  Description

Enhancements were made in the module configuration on the Synergy Configuration tool:

- Made the name of frame buffers to be configurable.
- Automatically calculate size of frame buffers from horizontal memory stride, vertical pixel size and color format.

Applies to:  DK-S7G2, SK-S7G2, PE-HMI1

9.2.5  r_iic (IIC)
9.2.5.1  Description

Renamed RIIC ISR event names based on the updated ELC event names.

Applies to:  DK-S7G2, DK-S3A7

9.2.6  r_lpm (Low Power Mode)
9.2.6.1  Description

The function enterLowPowerMode was changed to lowPowerModeEnter to match coding guidelines.
Applies to: All

9.2.7 **r_slcdc (Segment LCD Controller)**
9.2.7.1 **Description**
Modified close function: Reset all segment register values to 0x00 in close function. This clears the SLCD panel display when close function is called.
Applies to: DK-S3A7

9.2.8 **r_spi (Serial Peripheral Interface)**
9.2.8.1 **Description**
Renamed RSPI ISR event names based on the updated ELC event names.
Applies to: DK-S7G2, DK-S3A7

9.2.8.2 **Description**
Added SPI module version data structure in RSPI driver code. This helps in providing the code and API versions of the driver to error return macro and VersionGet function.
Applies to: DK-S7G2, DK-S3A7

9.2.9 **sf_audio_playback (Audio Playback)**
9.2.9.1 **Description**
Audio Playback Framework XML provides Audio Playback Event Class and Events for Messaging Configurator on e² studio 5.0.
Applies to: e² studio

9.2.10 **sf_console (Console)**
9.2.10.1 **Description**
The maximum write length and maximum read length can now be configured from the Synergy Configuration tool.
Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.2.11 **sf_el_gx (Synergy GUIX Interface)**
9.2.11.1 **Description**
GUIX Port module (sf_el_gx) is updated with GUIX library code changes.
Applies to: DK-S7G2, SK-S7G2, PE-HMI1

9.2.11.2 **Description**
ARGB8888 and XRGB8888 color formats are now supported in addition to RGB564 format.
Applies to: DK-S7G2, SK-S7G2, PE-HMI1

9.2.12 **sf_message (Inter-thread Messaging)**
9.2.12.1 **Description**
Users no longer need to create ThreadX queues. The new Messaging Configurator in e² studio 5.0 and updated Messaging Framework XML generate the code to create and initialize ThreadX queues.
Applies to: e² studio

9.2.12.2 **Description**
Messaging Framework XML provides basic Event code for Messaging Configurator on e² studio 5.0.
Applies to: e² studio
9.2.12.3 Description

To support the new Messaging Configurator on e² studio 5.0, any existing projects that use the Messaging Framework must be updated. The Messaging Framework support tool named sf_message_configurator is no longer included in SSP. To convert an existing project based on e² studio 4.x and SSP v1.0.0 to e² studio 5.0 and SSP v1.1.0, see the “Project Migration Guide - SSP 1.0.0 to SSP 1.1.0” on the Synergy Gallery and Knowledge Base sites.

Applies to: Existing projects

9.2.13 sf_touch_panel_i2c (Touch Panel I2C)
9.2.13.1 Description

The Touch Panel I2C Framework XML provides Touch Event Class for Messaging Configurator on e² studio 5.0.

Applies to: e² studio

9.2.14 USBX
9.2.14.1 Description

Fixed driver issue where pipes mismatched endpoints.

Applies to: PE-HMI1, DK-S7G2, SK-S7G2

9.2.14.2 Description

Recoded driver to take USB controller as argument. This change allows you to seamlessly switch between USB controllers.

Applies to: PE-HMI1, DK-S7G2, SK-S7G2

9.3 Deprecated features

9.3.1 r_glcd (Graphics LCD Controller)
9.3.1.1 Description

Size of frame buffer is now calculated automatically, so this module configuration property is deprecated.

Function/API: Synergy Configuration, Input - Size of Graphics screen1 frame buffer, Input - Size of Graphics screen2 frame buffer

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

9.3.2 r_sce (Secure Crypto Engine; TRNG, AES, RSA, TDES, HASH, DSA, ARC4)
9.3.2.1 Description

This function is deprecated. Replaced by hashUpdate().

Function/API: updateHash() for HASH

Applies to: PE-HMI1

9.3.2.2 Description

This function is deprecated. Replaced by hashSign().

Function/API: sign() for DSA

Applies to: PE-HMI1

9.3.2.3 Description

This function is deprecated. Replaced by hashVerify().

Function/API: verify() for DSA

Applies to: PE-HMI1

9.3.3 sf_console (Console)

The sf_console_cb_args_t typedef is deprecated and will be removed in the future. Use sf_console_callback_args_t instead.
Function/API: `sf_console_cb_args_t` typedef
Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.3.4 `sf_el_gx` (Synergy GUIX Interface)

9.3.4.1 Description

These configuration properties are duplicated. The alternatives are defined in `gx_src` module:

- 2D Drawing Engine Support
- JPEG Codec Support

Function/API: `Synergy Configuration`
Applies to: DK-S7G2, SK-S7G2, PE-HMI1

9.3.5 `sf_el_ux` (Synergy USBX Interface)

9.3.5.1 Description

In all USBX port filenames, function names, and macros, “_rx_” has been replaced with “_synergy_”. Translation header files “ux_dcd_rx.h” and “ux_hcd_rx.h” are provided to minimize compatibility issues. These translation files will be removed in a future release.

Function/API: `ux*_rx_*`
Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.3.5.2 Description

The base address of the USB registers used must now be passed into the `dcd_io` and `hcd_io` parameters respectively. Previously, these parameters were unused. An example of the correct format is `_ux_dcd_synergy_initialize((ULONG) R_USBFS);`

Function/API: `_ux_dcd_synergy_initialize`, `_ux_hcd_synergy_initialize`
Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

9.3.6 `sf_message` (Inter Thread Messaging)

9.3.6.1 Description

Because of the new Messaging Configurator in e² studio 5.0, the Messaging Framework support tool named `sf_message_configurator` is no longer included in SSP.

Applies to: e² studio

9.3.7 USBX

9.3.7.1 Description

Any references to RX or other platforms (RZ, Atmel, ST) were removed from the code. Use `ux_[h|d] cd_*` functions.

Function/API: `*_rx_*`
Applies to: All

10. Summary of bug fixes

10.1 All modules

10.1.1 Description

The `ssp_version_t` structure used in the `versionGet` API provided by all SSP modules had the API minor version in the most significant byte. Now it has the API major version in the most significant byte.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.1.2 Description

In the Japanese version of Windows, some characters were corrupted in the SSP installer package.
Synergy Software Package (SSP) Release Notes

Applies to: All

10.2  BSP, BSP XML, DMAC XML, DTC XML

10.2.1 Description
The event list was reviewed for each MCU and invalid events were removed as needed. Places of modification include BSP code, BSP XML, DMAC XML, and DTC XML.

Applies to: All

10.2.2 Description
The LED enum for BSP_LEDS_LED2 on the SK-S7G2 board previously incorrectly corresponded to LED3.
The prior workaround was: Use index 1 to index the BSP LEDs array in place of the enum BSP_LEDS_LED2.

Applies to: SK-S7G2

10.2.3 Description
BSP XML files failed to do range checking and validation for user-modifiable BSP properties. These fields are now validated and the valid range of values shown for each field.

Applies to: S3A7, S7G2, S124

10.2.4 Description
Some S7G2 BSP files failed to meet the stated mandatory MISRA requirements. The affected files have been updated to meet the stated mandatory MISRA requirements.

Applies to: S7G2

10.2.5 Description
LED enumeration for the SK-S7G2 board was incorrect for LED 2, which prevented the LED from being controlled when using the information returned by \texttt{R\_BSP\_LedsGet}. This has been fixed.

Applies to: SK-S7G2

10.3  bsp (Board Support Package)

10.3.1 Description
The BSP for S124 allowed interrupt priority levels 1-15. The CM0+ core only supports interrupt priority levels 0-3. The interrupt priority selection on the ICU tab of the Synergy Configuration tool now lists the available interrupts priorities 0-3.

Applies to: DK-S124

10.3.2 Description
The lowest interrupt priority level cannot be used when ThreadX is used. This was not documented. This is now mentioned in the lowest available priority level selections.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.3.3 Description
BSP now provides its own provide \texttt{sbrk()} implementation for GCC. This resolves issue where previously \texttt{malloc()} could return an address that was outside the allocated Heap area.

Applies to: SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.3.4 Description
Linker script places data designated for Data Flash in the RAM section.

Applies to: SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.3.5 Description
Warnings from bsp_qspi.c removed.

Applies to: SK-S7G2
10.3.6 **Description**
Clocks Configurator of S124 DK BSP project does not match user’s manual (UCLK).

 Applies to: SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.4 **nx (NetX)**

10.4.1 **Description**
The file filex_stub.h is now included with NetX Application Layers that require file system support. Users who do not use FileX can implement the functions themselves.

 Applies to: All

10.5 **r_adc (A/D Converter)**

10.5.1 **Description**
Unit 1 was not usable on S7G2. This has been fixed to allow both unit 0 and unit 1 usage on the S7G2.

 Applies to: DK-S7G2

10.6 **r_agt (Asynchronous General Purpose Timer)**

10.6.1 **Description**
The AGT open could fail if the timer_ctrl_t structure is allocated on the stack.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.6.2 **Description**
Using the AGT timer module and the GPT input capture module in the same file causes a build error.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.6.3 **Description**
The AGT cannot be reopened if the period is too large and open fails.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.7 **r_cgc (Clock Generation Circuit)**

10.7.1 **Description**
The SysTick period was not being properly set when the R_CGC_SystemClockSet function was called in release 1.0.0. That has been fixed in this release.

 Applies to: DK-S7G2, PE-HMI1, DK-S3A7

10.7.2 **Description**
In the r_cgc module, in function R_CGC_SystemClockSet, SystemCoreClock is updated before the system dividers are set. This puts the wrong value in SystemCoreClock. This variable is only for CMSIS compliance and is not used anywhere but in unit tests.

 Applies to: DK-S7G2, PE-HMI1, DK-S3A7

10.8 **r_dmac (Direct Memory Access Controller)**

10.8.1 **Description**
The reset API in repeat mode did not reset the number of times to repeat the transfer.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.9 **r_glcd (Graphics LCD Controller)**

10.9.1 **Description**
Removed the limitation described in the SSP1.0.0 Release Notes, section 9.16.1. You can now configure GLCDC parameters without violating AC timing settings against LCD panels that have small number of horizontal cycles in a line.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1
10.9.2 Description
Corrected the SSP User’s Manual as described in the SSP1.0.0 Release Notes, section 9.16.3. Corrected the default setting values for “Output - Data Enable Signal Polarity” and “Output – Sync edge”.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.10 r_gpt (General Purpose Timer)
10.10.1 Description
The initial output was documented to be controlled by the stop level field of the GPT extension. The initial output was always low, regardless of this setting. The initial output now matches the stop level field as documented.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.10.2 Description
An overflow could occur in the GPT duty cycle set calculation when the GPT is used in PWM mode.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.11 r_ioport (General Purposes I/O Ports)
10.11.1 Description
Pins associated with the Vbatt domain were at risk of not being properly configured if they were changed at runtime using the IOPORT pinCfg API.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.11.2 Description
Fix to protect currently non re-entrant sections of the IOPORT module.

Applies to: DK-S124, DK-S3A7, SK-S7G2, PE-HMI1

10.12 r_lpm (Low Power Mode)
10.12.1 Description
Back-to-back register writes can cause operating mode and low-power mode transitions to fail. This only impacts operating mode transitions.

Applies to: All boards

10.13 r_jpeg_decode (JPEG Decode)
10.13.1 Description
Fixed the XML file to generate extern declaration for the configuration structured data instance. This fix is required to compile code without an error when you use the sf_jpeg_decode module.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.14 r_rspi (Serial Peripheral Interface)
10.14.1 Description
Resolved issue in reopening of RSPI in SPI mode after it has been opened in clock synchronous mode.

Applies to: DK-S7G2, DK-S3A7, DK-S124

10.15 r_rtc (Realtime Clock)
10.15.1 Description
Resolved calendar mode initialization issue in RTC, corrected CNTMD bit setting procedure.

Applies to: DK-S7G2, DK-S3A7, DK-S124

10.15.2 Description
Resolved issue in RTC open function when using sub clock, added sufficient time for sub clock oscillation to become stable after selecting the sub clock operation with the SOSTP bit.
Applies to: DK-S7G2, DK-S3A7, DK-S124

10.16 r_sce (Secure Crypto Engine: TRNG, AES, RSA, TDES, HASH, DSA, ARC4)

10.16.1 Description
Fixed an issue where setGcmTag() and getGcmTag() APIs for 192-bit AES GCM mode may return an incorrect return value.

 Applies to: PE-HMI1, DK-S7G2

10.16.2 Description
Fixed an issue where sign() and verify() functions for the RSA and DSA APIs may exhibit intermittent failures.

 Applies to: PE-HMI1, DK-S7G2

10.17 r_sci_spi (Serial Communications Interface SPI)

10.17.1 Description
Corrected defect in the SCI SPI polarity and phase settings. Previously, polarity was set according to the register description instead of ISDE configuration. Polarity setting is now corrected to meet the required output as configured in the ISDE configuration.

 Note: With this change certain configuration of polarity and phase of the existing applications (using SCI SPI) may need to be changed. Refer to the hardware specification of the slave device to get the correct settings.

 Applies to: DK-S7G2, DK-S3A7

10.18 r_sci_uart (Serial Communication Interface UART)

10.18.1 Description
Resolved issue of UART transmitter disable and enable during each write function call and transmit line goes low for each write operation.

 Applies to: DK-S7G2, DK-S3A7, DKS124

10.19 r_slcdc (Segment LCD Controller)

10.19.1 Description
Fixed defect in the contrast adjustment functions of segment LCD driver. With this fix, you can adjust the contrast of the segment LCD using R_SLCDC_C contrastIncrease and R_SLCDC_C contrastDecrease API functions, provided SLCD panel supports this feature.

 Applies to: DK-S3A7

10.20 sf_console (Console)

10.20.1 Description
The timeout argument is now passed to the underlying read() function in SF_CONSOLE_Parse. A bug affecting the letter ‘e’ and escape characters such as arrow keys when sf_console is used with IAR was also fixed.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.21 sf_el_gx (Synergy GUIX Interface)

10.21.1 Description

 • Fixed issue in the D/AVE 2D accelerated Arc/Circle/Ellipse/Polygon draw. Such drawings did not work as expected.

 • Fixed issue in the JPEG hardware accelerated draw. It did work correctly if JPEG work buffer was smaller than the size of frame buffer.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.21.2 Description
Fixed the bug described in the SSP1.0.0 Release Notes, section 9.29.1. The issue caused a hard-fault error if D/AVE 2D driver failed in the initialization.
10.21.3 Description
Fixed the bug described in the SSP1.0.0 Release Notes, section 9.29.2. Now you can perform vertical line drawing with a pattern using GUIX API `gx_canvas_line_draw` with 2D Drawing Engine (DRW) enabled.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.21.4 Description
GUIX Block move function was not functional if 2D Drawing Engine (DRW) support was enabled. Now you can perform block move.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.21.5 Description
GUIX canvas copy and blend function were not functional if 2D Drawing Engine (DRW) support was enabled. Now GUIX is able to handle the canvas copy or blend to the composite canvas.

Applies to: DK-S7G2, SK-S7G2

10.22 sf_el_nx (Synergy NetX Interface)

10.22.1 Description
The sf_el_nx module requires an interrupt named ETHER EINTx. This interrupt has been renamed to EDMACx EINT. Enable the EDMACx EINT interrupt to use this module.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.23 sf_message (Inter-Thread Messaging)

10.23.1 Description
A configuration property “Message Queue Depth” is added. The default value is “16”, which means each message queue of subscribers can store messages up to 16 messages.

This update effects the behavior of user application since the queues depth may be changed.

Applies to: All

10.24 sf_touch_panel_i2c (Touch Panel I2C)

10.24.1 Description
• Modified sx8654 touch chip driver to enable PENRELEASE interrupt. This way does not require detecting IRQ timeout and processes PENUP event efficiently.

• Fixed the issue in the internal touch thread of sf_touch_panel_i2c module, in which the module cannot handle SSP_ERR_WAIT_ABORTED possibly retuned from sx8654 touch chip driver.

• Deleted the mutex used in the internal touch thread of sf_touch_panel_i2c module.

• Added missing process to clear open flag.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.24.2 Description
Fixed the issue in sf_touch_panel_i2c module XML, which wrongly generated “sf_touch_panel_event_t” type member instead of “sf_touch_panel_payload_t” in sf_message_payload_t union.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

10.24.3 Description
User-defined touch chip driver instance could not be attached to the Touch Panel I2C Framework module. Now you can attach your own touch chip drivers to the framework.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1
10.25 tx (ThreadX)

10.25.1 Description
RTOS objects created on the Threads tab of the Synergy configuration tool were created in the thread context. This meant the user had to ensure the highest priority thread owned the RTOS object so it would be created before it is used. Now RTOS objects are created before the RTOS is running, so the RTOS objects can be owned by any thread.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.25.2 Description
If two threads with the same thread priority are ready to run, the scheduler is expected to switch between them. Instead, only one of them would run. Now the scheduler alternates between threads as expected.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7, DK-S124

10.25.3 Description
The ThreadX port for CM0+ was not functional when built with the IAR compiler. This is fixed and ThreadX can be used for CM0+ with the IAR compiler.

 Applies to: DK-S124

10.25.4 Description
Fixes warnings when passing a string to string-related C library functions which expect strings to be declared as “char” with no modifier.

 Applies to: DK-S7G2, DK-S3A7

10.25.5 Description
The trace buffer size and number of registries cannot be updated in the Synergy Configuration Tool for the ThreadX Source component.

 Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

10.26 USBX

10.26.1 Description
Fixed driver issue where pipes mismatched endpoints.

 Applies to: PE-HMI1, DK-S7G2

10.26.2 Description
Recoded driver to take USB controller as argument. This allows you user to seamlessly switch between USB controllers.

 Applies to: PE-HMI1, DK-S7G2

11. Known backward compatibility issues in v1.1.0 release with respect to v1.0.0

11.1 Description
In the sf_spi, sf_i2c, and sf_audio_playback modules, the shared components were added to the HAL/Common thread in SSP1.0.0. From SSP 1.1.0 onwards these modules are added to the user Threads. Therefore, for porting an existing application (which uses the above modules) to SSP 1.1.0, you must add the shared component to the Thread. These components will be present in the Thread module tree in Red color, and they need to be added manually. Click on the box and add the component.

For sf_spi, add SPI Framework Shared Bus to the thread. This can be done clicking on the Red box of "Add SPI Framework Shard Bus”.

For sf_i2c, add I2C Framework Shared Bus to the thread. This can be done clicking on the Red box of "Add I2C Framework Shard Bus”.

For sf_audio_playback, add Audio Playback Shared Framework and similar missing components to the thread. This can be done clicking on the corresponding Red boxes in the thread modules tree.
11.2 Description
Any projects using the messaging framework will need to be updated to use the new messaging framework configurator in the Messaging tab next to the Threads tab. Instructions are provided in the Knowledge Base and on the Synergy Gallery. See document: Project Migration Guide - SSP 1.0.0 to SSP 1.1.0.

11.3 Description
If the Communications Framework on sf_el_nx_comms is used in a project migrated from version 1.0.0, the Communications Framework on sf_el_nx_comms component will be removed from the project after migration. It must be added back and reconfigured.

12. Known issues and limitations in v1.1.0 release

12.1 User projects
12.1.1 Description
This only affects projects. The SSP now implements its own version of the library function _sbrk. Version 4.8 of the GCC ARM Embedded toolchain does not tolerate the duplication of this function. Users must update to Version 4.9 of the GCC ARM Embedded toolchain.

Applies to: All

12.2 Developer Examples
12.2.1 Description
Errors may occur in the decoding process when the sf_audio_playback ‘play’ command is used. When these errors occur, a message about corrupt or missing data in the bitstream is printed to the console. The audio file still plays, but some data may be skipped.

Applies to: DK-S7G2

12.3 Documentation
12.3.1 Description
Section e² studio ISDE User Guide in the SSP User’s Manual for this release does not describe the Threads tab functionality correctly. Multiple screen shots of the Synergy Project Editor do not reflect e² studio v5.0 with this SSP release.

Workaround: Threads tab is self-explanatory and fully functional without documentation.

Applies to: SSP User’s Manual

12.4 All Modules
12.4.1 Description
The information in the Description column of the Components pane in e² studio has not been updated for v1.1 and may contain inaccurate information. This will be fixed in a future release.

Applies to: All

12.5 bsp (Board Support Package)
12.5.1 Description
A problem that existed when using the GCC compiler where malloc() could allocate an area that did not belong to the Heap has been fixed. Part of the fix is that the BSP now provide its own _sbrk(), which prevents allocation outside of the Heap. The other part is that we now require a minimum 4K Heap be allocated for applications that use any of the standard library functions. Because the library version of malloc() being used requires 4K pages, it is possible that requests for memory may fail even though less than the 4K Heap has actually be used up.

Impact Analysis:

• The extent of this problem is dependent on where the Heap is allocated in memory. The best case scenario is that the Heap is allocated on a 4K boundary, or just beyond it. In this case, all or most of Heap should be available. The worst case scenario is that the Heap is allocated just below a 4K boundary. In this case, only the amount in the existing 4K page may be available.
Also required for GCC builds is GCC ARM Embedded compiler version 4.9.3 or higher. Using previous versions of the compiler will result in project builds that generate a _sbrk function duplicate error. If this is not an option, there is another workaround: In the project settings, the default linker flag: --specs=rdimon.specs should be changed to: --specs=nosys.specs. This fixes the build error; however, with this workaround, semihosting the console will not be possible.

**Applies to:** PE-HMI1, SK-S7G2, DK-S3A7, DK-S124

### 12.5.2 Description
SDRAM is initialized after bsp_section_zero() or bsp_section_copy(). As a result, data in SDRAM that has been specified as ‘initialized’ will not be set correctly as the SDRAM setup takes place after the C runtime initialization.

**Workaround:** You could add another file in the board specific folder (or merge with an existing one) with code to initialize any extra user-defined sections as needed.

**Applies to:** PE-HMI1, SK-S7G2, DK-S3A7, DK-S124

### 12.5.3 Description
The ISDE now supports multiple pin configurations to support power profiles. While making this change some of the BSP code was missed and now all IAR projects will build with many warnings.

**Workaround:** None

**Applies to:** e² studio

### 12.5.4 Description
The S124 BSP does not transition the MCU out of Low-Voltage mode even when a frequency is requested where the power mode must be changed. In Low-Voltage mode, the maximum ICLK frequency is 4 MHz.

**Workaround:** None

**Applies to:** DK-S124

### 12.6 gx (GUIX)

#### 12.6.1 Description
Arc GUIX gx_canvas_line_draw() may not draw a horizontal or vertical line (not diagonal line) if the width is 1.

**Applies to:** DK-S7G2, SK-S7G2, PE-HMI1

#### 12.6.2 Description
GUIX: If you want to use a macro named “IS_SIGNAL” defined in gx_api.h, you need to define a macro #define LAST_SIGNAL (0x00ffffff) in “Tool Settings – Cross ARM C Compiler – Preprocessor – Defined symbols” in your e² studio project.

**Applies to:** DK-S7G2, SK-S7G2, PE-HMI1

#### 12.6.3 Description
There are errors on pages 163 and 357 of GUIX User’s Manual: Software. The type for the second argument of gx_horizontal_list_selected_set and gx_vertical_list_selected_set is shown as GX_WIDGET. In each case, the actual type for the second argument is INT.

**Applies to:** DK-S7G2, SK-S7G2, PE-HMI1

#### 12.6.4 Description
GUIX Studio always generates pixelmap data to be mapped to .rodata memory section and the section is not configurable. Users have to edit the GUIX resources file (<GUIX Studio project name>_resources.c) by themselves. To do this, you can find “__attribute__((aligned(8)))” in the file in case of GNU GCC build and modify it as follows:

```
“attribute__((aligned(8)))”
```

Or, you can find:

```
#pragma data_alignment=8
```

in the file in case of IAR build and modify it as follows:
“#pragma data_alignment=8
#pragma location = "qspi_flash"

Applies to: None

12.6.5 Description
Some compiler warnings were not resolved.

Workaround: None

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.7 nx (NetX)

12.7.1 Description
Use the compiler option -DNX_DISABLE_INCLUDE_SOURCE_CODE to build NetX source code.

Applications using nx_http.h or nx_http_server.h should also include either fx_api.h or fx_stub.h as shown below:

```c
#ifndef NX_HTTP_NO_FILEX
#include   "fx_api.h"
#else
#include   "filex_stub.h"
#endif
#include "nx_http.h"
```

Refer to the *NetX Hypertext Transfer Protocol (HTTP) User Guide* for more details.

Applies to: PE-HMI1, DK-S7G2, DK-S3A7

12.7.2 Description
The DHCP Server running on Synergy times out when connecting from the Android Phone DHCP Client.

Applies to: DK-S7G2

12.7.3 Description
Chained packet support in dual Ethernet driver. Issues when sending chained NetX packets to the driver: If the packet pool packet size is set to packet sizes lower than the transmit MTU, the driver requires chained packets to work. This would be an issue for systems with constrained resources, or for users who want to take advantage of creating packet pools with smaller packet sizes.

Workaround: None

Applies to: PE-HMI, DK-7G2, DK-S3A7

12.8 nxd (NetX Duo)

12.8.1 Description
Use the compiler option -DNX_DISABLE_INCLUDE_SOURCE_CODE to build NetX Duo source code.

Applications using nx_dhttp_server.h should also include either fx_api.h or fx_stub.h as shown below:

```c
#ifndef NX_HTTP_NO_FILEX
#include   "fx_api.h"
#else
#include   "filex_stub.h"
#endif
```

```c
#ifdef __PRODUCT_NETXDUO__
```
Refer to the *NetX Duo Hypertext Transfer Protocol (HTTP) User Guide* for more details.

**Applies to:** PE-HMI1, DK-S7G2, DK-S3A7

### 12.8.2 Description

The user thread that starts the AutoIP may run before IP thread initialization is finished. In this case, the network driver is not fully initialized yet, which cause the probe packet to contain an invalid MAC address. Synergy Ethernet driver contains `wait()` statements, which may delay the IP initialization process.

**Workaround:** Before creating an auto IP instance, the application thread should check for the interface status:

```c
/* Wait for driver to be ready. */
status = nx_ip_interface_status_check(&ip_0, interface_index, NX_IP_LINK_ENABLED, &actual_status, NX_WAIT_FOREVER);
```

**Applies to:** PE-HMI1, DK-S7G2, DK-S3A7

### 12.8.3 Description

NetX Duo and NetX Duo application bundle protected sources have a build issue. A prebuilt library is provided for NetX Duo and NetX Duo http server application.

DHCP and DNS application demo projects and other NetX Duo application bundle services are not functional.

**Workaround:** None

**Applies to:** PE-HMI1

### 12.9 r_adc (A/D Converter)

#### 12.9.1 Description

Channels 8, 22, 23, 24, 25, 26 and 27 on the S3A7 MCU are not usable.

**Applies to:** DK-S3A7

### 12.10 r_agt (Asynchronous General Purpose Timer)

#### 12.10.1 Description

Due to hardware limitations on S3A7 MCU, the maximum clock input to AGT is dependent on the selection of power domains between Vcc and Vbatt. When Vcc is selected, both AGTs can operate with a maximum input clock of 32 MHz. When Vbatt is selected, both AGTs can only operate with a maximum input clock of 32 KHz. Workarounds, such as operating only one AGT channel at maximum input clock (cascade mode) are also being tested.

Due to hardware limitations on the S3A7 MCU, when transitioning operating mode from Normal to Standby, Vbat can go out of regulation temporarily. In some cases, the interrupt required for transitioning operating mode from Standby to Normal (wakeup) is not negated. The result of this condition is that the interrupt that should cause an operating mode transition from Standby to Normal (wakeup) is not detected and the MCU remains in Standby mode. Several workarounds are being tested.

**Applies to:** DK-S3A7

### 12.11 r_cac (Clock Frequency Accuracy Measurement Circuit)

#### 12.11.1 Description

Using the CAC module could result in the inadvertent powering on of the MCU-specific secure module. SCE7 module (S7 MCU), the SCE5 module (S3 MCU) or the AES module (S1 MCU).

**Applies to:** DK-S124, DK-S3A7, SK-S7G2, PE-HMI1
12.12  r_can (Controller Area Network)

12.12.1 Description
CAN Module Configurator has errors which have the following impact on the module:

- Mailbox 20 id cannot be changed, it is fixed at 20.
- Mailbox 12-15 group mask cannot be changed, it is fixed at 0xFFFFFFFF, meaning all mailboxes within the group can only have one ID each.

 Applies to: DK-S124, DK-S3A7, DK-S7G2, PE-HMI1

12.13  r_cgc (Clock Generation Circuit)

12.13.1 Description
If the user calls the R_CGC_SystemClockSet function, the SysTick interrupt is set to the lowest priority, causing the interrupt to fail to fire.

 Workaround: After calling the R_CGC_SystemClockSet function, call NVIC_SetPriority (SysTick_IRQn, 0x00).

 Applies to: DK-S3A7

12.14  r_ctsu (Capacitive Touch Sensing Unit)

12.14.1 Description
Manufacturing variations from MCU to MCU prevent tuning values generated for one device to work accurately with another. A minimal overhead software patch has been developed and is under testing to address this.

 Applies to: DK-S7G2, SK-S7G2, DK-S3A7

12.14.2 Description
Four pins on devices that support more than 20 Capacitive Touch Pins do not have similar characteristics as the rest of the peripheral and so are not supported in this release. You cannot use these pins with the current driver. The affected pins are TS23, TS24, TS25, and TS28.

 Applies to: DK-S7G2, SK-S7G2, DK-S3A7

12.14.3 Description
One Capacitive Touch Input channel on the S124 device has different characteristics from the rest of the peripheral and therefore is not supported for Capacitive Touch Sensing in this release. This channel is TS29 for the S124 device in 64-pin, 48-pin, 40-pin, and 36-pin versions.

 Applies to: DK-S124

12.14.4 Description
Dynamic allocation of memory for different configurations is not supported. This only makes a difference in cases where the user is loading and unloading multiple configurations. In such cases, the memory used at any time will be that required by the largest configuration.

 Workaround: When setting up the “maximum channels” entry in ISDE for the CTSU Driver, make sure that the largest configuration size is used here.

 Applies to: DK-S7G2, SK-S7G2, DK-S3A7

12.15  r_dac (Digital to Analog Converter)

12.15.1 Description
The S3A7 MCU has a register to select one of four voltage references for the DAC. For now, only Vcc is supported.

 Applies to: DK-S3A7

12.16  r_fmi (Factory Microcontroller Information)

12.16.1 Description
Factory MCU Information consists of three record types: Product Information, Software Provisioning, and IP Information.
Product Information is the only record programmed into the S7G2 WS2 MCUs, and is the only record fetched by the FMI driver.

Applies to: PE-HMI1, DK-S7G2

12.17 r_gpt (General PWM Timer)

12.17.1 Description
The GPT close function does not power down the GPT peripheral. If powering down the GPT is desired, it must be done in the application code by setting the appropriate bit in the R_MSTP register after calling the close API. Refer to the hardware manual for details.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.18 r_ioport (General Purpose I/O Ports)

12.18.1 Description
Reentrancy issue with HW_IOPORT_PFSWrite():

1. There is no protection of a pin’s PFS register when calling this API. The current PFS is stored locally. So, if this function is interrupted by an ISR or context switch to another thread (when using an RTOS) and this API (HW_IOPORT_PFSWrite()) is called again for the same pin, it is possible that the PFS update in the second call will be overwritten by the PFS update from the original call.

2. The value from the original call may not be written to the PFS as write access to the PFS registers may remain disabled from the call to this API from the ISR or thread.

It is recommended that the PFS register for an individual pin is not modified in both ISR and non-ISR contexts and, when using an RTOS, in multiple threads. Note that updates to different pin PFS registers are not affected by item 1 above.

HW_IOPORT_PFSWrite() is called by the following APIs:

R_IOPORT_Init()
R_IOPORT_PinCfg()
R_IOPORT_PinWrite()
R_IOPORT_PinDirectionSet()

Non-public APIs:

HW_IOPORT_PFSSetDirection()
HW_IOPORT_PinDirectionSet()
HW_IOPORT_PinWrite()

Impact analysis: A pin’s PFS register content could be updated with an incorrect value. As the PFS register controls a pin’s configuration (such as direction, pull-up configuration, peripheral functionality, drive strength), the pin may not operate as intended.

Applies to: All

12.19 r_lpm (Low Power Mode)

12.19.1 Description
The internal flash is disabled and clocks to flash are stopped (gated). RAM power save is not yet supported.

Workaround: Workaround is not needed. The features may be supported in the future.

Applies to: All

12.19.2 Description
When a project uses ThreadX, the application should only switch to LPM_LOW_POWER_MODE_STANDBY or LPM_LOW_POWER_MODE_DEEP immediately before calling the API function lowPowerModeEnter/R_LPM_LowPowerModeEnter. If LPM_LOW_POWER_MODE_STANDBY or
LPM_LOW_POWER_MODE_DEEP are used with ThreadX, the user must make sure to revert the low power mode to LPM_LOW_POWER_MODE_SLEEP immediately after the MCU wakes from LPM_LOW_POWER_MODE_STANDBY.

Workaround: Workaround is not needed. The features may be supported in the future.

Applies to: All

12.20 r_pdc (Parallel Data Capture Unit)
12.20.1 Description
The r_pdc driver currently only supports the DMAC transfer interface. A high camera frame rate may exclude the use of the DTC. Investigation whether the DTC can be used is required.

Applies to: DK-S7G2

12.21 r_rspli (Serial Peripheral Interface)
12.21.1 Description
Since RSPI transmit receive data registers are 32 bits, RSPI supports only 32-bit data transfer in DTC transfer mode. For 8-bit and 16-bit data transfers, use SPI mode (remove DTC module from the ISDE configurator).

Applies to: DK-S7G2, DK-S3A7

12.21.2 Description
RSPI cannot be used with DTC module (default configuration) in S124 devices and requires transfer drivers to be removed before using it on S124 devices.

Applies to: DK-S124

12.21.3 Description
RSPI data registers on S124 devices are of 16-bit length, so the RSPI Driver supports only 8-bit and 16-bit data transfers.

Applies to: DK-S124

12.22 r_sce (Secure Crypto Engine: TRNG, AES, RSA, TDES, HASH, DSA, ARC4)
12.22.1 Description
Known limitation: AES GCM mode encrypt() and decrypt() functions currently only support 16-byte and multiples of 16-bytes of authentication data and plain-text/cipher-text data.

Workaround: None

Applies to: PE-HMI1, DK-S7G2, DK-S3A7

12.23 r_sci_spi (Serial Communication Interface SPI)
12.23.1 Description
SCI SPI performs only 8-bit data transfer, both in DTC and SPI transfer modes.

Applies to: DK-S7G2, DK-S3A7, DK-S124

12.24 r_sci_uart (Serial Communication Interface UART)
12.24.1 Description
Applications that close r_sci_spi, then open r_sci_uart on the same SCI channel will hang. To use r_sci_uart after closing r_sci_spi on the same SCI channel, clear SMR and SMR_SMCI registers after closing r_sci_spi and before opening r_sci_uart.

Applies to: DK-S7G2, SK-S7G2, DK-S3A7, DK-S124, PE-HMI1

12.25 r_sdmmc (SDHI driver for SDIO and SD/MMC memory devices)
12.25.1 Description
The r_sdmmc driver could misidentify a Normal SD card as a High-Speed card.

Certain SD cards (below Speed Class 10) may not work reliably when PCLKA divided by 2 or 4 is higher than 25 MHz.
Workaround:
- Use a PCLKA rate of 50 MHz or lower.
- Use SD cards with rating of Class 10 or higher.

Applies to: DK-S7G2, DK-S3A7

12.26 r_slcdc (Segment LCD Controller)
12.26.1 Description
Function prototypes are available in the Instance header file (for example, sf_block_media_sdmmc.h). These prototyped functions should not be called directly because they will be removed. Instead, use the Instance’s API structure through the p_api pointer in the Interface’s instance structure (for example, sf_block_media_instance_t).

Applies to: All

12.27 sf_audio_playback_hw_dac (Audio Playback HW DAC)
12.27.1 Description
Function prototypes are available in the Instance header file (for example, sf_block_media_sdmmc.h). These prototyped functions should not be called directly because they will be removed. Instead, use the Instance’s API structure through the p_api pointer in the Interface’s instance structure (for example, sf_block_media_instance_t).

Applies to: All

12.28 sf_audio_playback_hw_i2s (Audio Playback HW I2C)
12.28.1 Description
Function prototypes are available in the Instance header file (for example, sf_block_media_sdmmc.h). These prototyped functions should not be called directly because they will be removed. Instead, use the Instance’s API structure through the p_api pointer in the Interface’s instance structure (for example, sf_block_media_instance_t).

Applies to: All

12.29 sf_block_media_sdmmc
12.29.1 Description
Function prototypes are available in the Instance header file (for example, sf_block_media_sdmmc.h). These prototyped functions should not be called directly because they will be removed. Instead, use the Instance’s API structure through the p_api pointer in the Interface’s instance structure (for example, sf_block_media_instance_t).

Applies to: All

12.30 sf_el_gx (Synergy GUIX Interface)
12.30.1 Description
Multiple display instance is not supported in this release.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

12.30.2 Description
Arc drawing with Synergy DRW hardware acceleration draws the outline wider than expected.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1

12.30.3 Description
Screen Rotation feature newly added in this version supports 90 or 270 degree rotation but not 180 degree if Synergy DRW hardware acceleration is not enabled.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1
12.31 sf_el_nx_comms (Synergy NetX Communication Interface)

12.31.1 Description
The sf_el_nx_comms module calls nx_system_initialize(), which is a common function. This can clear initializations made for other USB code at the application level. Workaround is to wait for sf_el_nx_comms initialization to complete prior to initializing any other USB code and not call nx_system_initialize() in the application code.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.32 sf_el_ux (Synergy USBX Interface)

12.32.1 Description
USBX CDC read spins forever when receiving an actual length buffer that is a multiple of 64 bytes (wMaxPacketSize of the endpoint) but less than the maximum read length parameter.

Workaround: If you expect packets that are multiples of 64 bytes, give the exact expected length or read 64 bytes at a time.

Applies to: DK-S3A7

12.32.2 Description
USB Host Controller Driver (HCD) is not able to drive USB Full-speed port (USBFS) in this release. The support (both of USBHS and USBFS ports) will be available in the next SSP release. Note that USB Device Controller Driver (DCD) is only tested on USB Full-speed port (USBFS) but not on USB High-speed port (USBHS) in this release.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.32.3 Description
Existing applications using ux_host_stack_hcd_register function must now be given valid arguments that have been renamed to Synergy-specific defines.

For example, function call,

status = ux_host_stack_hcd_register((UCHAR*)"YRDKRX63N", _ux_hcd_rx_initialize, UX_RX_HC_USB_BASE, UX_RX_CONTROLLER_RX62N);

Must be changed to:

status = ux_host_stack_hcd_register((UCHAR*) "ANYTHING", _ux_hcd_synergy_initialize, 0x40060000UL, UX_SYNERGY_CONTROLLER_S7G2);

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.33 sf_el_ux_comms (Synergy USBX Communication Interface)

12.33.1 Description
The read API timeout will only return with a timeout error if the device is not plugged in. Read will not time out if the device is enumerated but no data arrives in the specified time.

Workaround: If a timeout is needed for reading data after the connection is established, we recommend buffering the data in a separate thread. This can be done in a separate thread that pends on USB data by waiting forever then posts received data to a queue. Then, the application thread can pend on the queue with a timeout.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.34 sf_power_profiles (Power Mode Profile)

12.34.1 Description
The power profiles API function sleep does not revert the low-power mode of the MCU back to the default state expected by ThreadX. If, after returning from the sleep function, ThreadX enters the idle thread, either because a thread is not ready to run or by tx_thread_sleep(), the MCU never wakes up. The user must revert the low-power mode immediately after the return from the power profiles sleep function using the following code:

R_LPM_LowPowerConfigure(LPM_LOW_POWER_MODE_SLEEP, LPM_OUTPUT_PORT_ENABLE_RETAIN,
LPM_POWER_SUPPLY_DEEPCUT0,
LPM_IO_PORT_NO_CHANGE);

Applies to: All

12.34.2 Description
Power Profiles does not enable wake up by numbered IRQs (IRQ0-IRQ15...), so extra work is required. To wake the MCU using a numbered IRQ, the application must use the r_lpm API functions wupenGet and wupenSet to enable wake from Standby mode by a numbered IRQ. The code is as follows using IRQ14 as an example:

```c
uint32_t wupen_preSleep = 0;
/** Get the current WUPEN value */
R_LPM_WUPENGet(&wupen_preSleep);
/* Enable IRQ14 as a wake up source */
wupen_preSleep |= 1 << 14;
R_LPM_WUPENSet(wupen_preSleep);
```

Applies to: All

12.34.3 Description
The close API is not functional and should not be used. The USBX communications framework can only be configured once. There is no workaround at this time. The configuration parameters passed into open and the descriptors defined in sf_el_ux_comms_port.h are permanent and cannot be updated at runtime after open is called.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.34.4 Description
The sf_el_ux_comms module calls ux_system_initialize(), which is a common function. This can clear initializations made for other USB code at the application level. Workaround is to wait for sf_el_ux_comms initialization to complete prior to initializing any other USB code and not call ux_system_initialize() in the application code.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.35 tx (ThreadX)

12.35.1 Description
EPK support us missing from the ThreadX XML. The impact is that users cannot yet enable EL EPK support through the ISDE Configurator.

Workaround: EPK support can be enabled by editing the tx_port.h header file.

Applies to: Boards with WS2 parts

12.35.2 Description
The file tx_port.h was editable in previous releases. It is no longer editable, and changes made to this file will be overwritten. Use the Properties in the ThreadX Source (tx_src) module to modify tx_port.h.

Applies to: Boards with WS2 parts

12.35.3 Description
When adding ThreadX source (tx_src module), you should make sure to not uncheck “tx” in the Components pane. If you uncheck the “tx” Component, all threads will be removed from your application. The configured software stacks in each thread will also be removed. Rechecking the “tx” Component will not bring the threads back.

Applies to: All
12.35.4 Description
There is a 10 s delay during re-enumeration of CDC ACM device after disconnecting. It does successfully connect and transmission works as expected after that. This may cause large delays for data transfer over serial port due to disconnect and re-connect.

Applies to: All

12.35.5 Description
For USB device modes that have intensive control endpoint communications such as RNDIS, the FIFO ready flag FRDY in the CFICOCR register is not setting, causing the device to lock up.

Applies to: All

12.35.6 Description
Code will hard fault if the CM0+ ThreadX source is built with GCC with no optimization (-O0). To use ThreadX source with no optimization, apply -O2 optimization to the file ssp/src/framework/el/tx/tx_src/synergy/tx_thread_schedule.c.

Applies to: All

12.36 ux (USBX Host and Device)

12.36.1 Description
UX_THREAD_STACK_SIZE is set to 1024, but should be set to 2048. Workaround is to define UX_THREAD_STACK_SIZE to 2048 at the project level.

Note that, if your application is targeted S124 and UX_SYSTEM_DEVICE_ONLY is defined, UX_THREAD_STACK_SIZE can be set to 512.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.36.2 Description
The USB controller driver does not take advantage of the DMA features of the USB controller.

This affects performance of large data transfers.

Applies to: DK-S7G2, SK-S7G2, PE-HMI1, DK-S3A7

12.36.3 Description
Various USBX issues: 32-bit FIFO writes, customer supported issues with reads and writes, and support of composite devices. The CDC ACM host example in the current SSP fails to operate properly.

Workaround: None

Applies to: DK-S7G2, SK-S7G2, PE-HMI

12.37 MISRA Compliance

12.37.1 Description
SSP 1.1.0 complies with mandatory MISRA C:2012 rules with the exception of following non-conformance items:

- sf_el_ux_comms MISRA-C:2012 R.9.1
- sf_el_nx_comms MISRA-C:2012 R.9.1
- r_iwdt MISRA-C:2012 R.9.1
- r_wdt MISRA-C:2012 R.9.1
- sf_el_gx MISRA-C:2012 R.9.1
- sf_touch_ctsu MISRA-C:2012 R.9.1
- r_flash_lp MISRA-C:2012 R.8.3, R.8.4

During verification, these were deemed to have no material impact on functionality and operation of the module. As a matter of policy, Renesas will correct these issues in the next release.
Additionally, module r_sce does not conform to MISRA-C:2012 R.9.1 mandatory MISRA rule, and the impact of this non-compliance has been described in this release note.

**12.38 XML Configuration**

**12.38.1 Description**
The wrong XTAL frequency is shown for the DK-S124 in the ISDE.

**Workaroud:** Users can click on clock frequency and change it.

**Applies to:** XML Configuration

## 13. Complete list of modules available in this release and their availability for S124 MCUs

<table>
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<tr>
<th>Module Name</th>
<th>SSP Feature</th>
<th>Release Status of Module for S124</th>
</tr>
</thead>
<tbody>
<tr>
<td>sf_adc_perodic</td>
<td>Periodic Sampling ADC</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_audio_playback</td>
<td>Audio Playback</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_audio_playback_hw_dac</td>
<td>Audio Playback HW DAC</td>
<td>Yes</td>
</tr>
<tr>
<td>dave2d</td>
<td>2D Drawing Engine Driver</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_block_media_sdmmc</td>
<td>Block Media Interface for SD Multi Media Card</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_console</td>
<td>Console</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_el_fx</td>
<td>Synergy FileX Interface</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_el_gx</td>
<td>Synergy GUIX Interface</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_el_nx</td>
<td>Synergy NetX Interface</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_el_nx_comms</td>
<td>Synergy NetX Communication Interface</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_el_ux</td>
<td>Synergy USBX Interface</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_el_ux_comms</td>
<td>Synergy USBX Communication Interface</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_external_irq</td>
<td>External Interrupt Framework</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_i2c</td>
<td>I2C Framework</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_jpeg_decode</td>
<td>JPEG Decode</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_message</td>
<td>Inter-Thread Messaging</td>
<td>No</td>
</tr>
<tr>
<td>sf_power_profiles</td>
<td>Power Mode Profile</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_spi</td>
<td>SPI Framework</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_tes_2d_drw</td>
<td>2D Drawing Engine Framework</td>
<td>N/A</td>
</tr>
<tr>
<td>sf_thread_monitor</td>
<td>Thread Monitor (Watchdog)</td>
<td>Yes</td>
</tr>
<tr>
<td>sf_touch_ctsu</td>
<td>Capacitive Touch Sensing Unit</td>
<td>No</td>
</tr>
<tr>
<td>sf_touch_ctsu_button</td>
<td>Capacitive Touch Sensing Unit Button</td>
<td>No</td>
</tr>
<tr>
<td>sf_touch_ctsu_slider</td>
<td>Capacitive Touch Sensing Unit Slider</td>
<td>No</td>
</tr>
<tr>
<td>Module Name</td>
<td>SSP Feature</td>
<td>Release Status of Module for S124</td>
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<tr>
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<td>--------------------------------------------------</td>
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<tr>
<td>sf_touch_panel_i2c</td>
<td>Touch Panel I2C</td>
<td>No</td>
</tr>
<tr>
<td>sf_uart_comms</td>
<td>UART framework</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Driver</strong></td>
<td></td>
<td></td>
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<tr>
<td>bsp</td>
<td>Board Support Package</td>
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<tr>
<td>r_adc</td>
<td>A/D Converter</td>
<td>Yes</td>
</tr>
<tr>
<td>r_agt</td>
<td>Asynchronous General Purpose Timer</td>
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<tr>
<td>r_adc</td>
<td>A/D Converter</td>
<td>Yes</td>
</tr>
<tr>
<td>r_agt</td>
<td>Asynchronous General Purpose Timer</td>
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</tr>
<tr>
<td>r_cac</td>
<td>Clock Frequency Accuracy Measurement Circuit</td>
<td>Yes</td>
</tr>
<tr>
<td>r_can</td>
<td>Controller Area Network</td>
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<tr>
<td>r_cgc</td>
<td>Clock Generation Circuit</td>
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</tr>
<tr>
<td>r_crc</td>
<td>Cyclic Redundancy Check calculator</td>
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<tr>
<td>r_ctsu</td>
<td>Capacitive Touch Sensing Unit</td>
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<tr>
<td>r_dac</td>
<td>Digital to Analog Converter</td>
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</tr>
<tr>
<td>r_dmac</td>
<td>Direct Memory Access Controller</td>
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<tr>
<td>r_doc</td>
<td>Data Operation Circuit</td>
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<tr>
<td>r_dtc</td>
<td>Data Transfer Controller</td>
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<tr>
<td>r_elc</td>
<td>Event Link Controller</td>
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<tr>
<td>r_flash_hp</td>
<td>Flash Memory, High Performance</td>
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<tr>
<td>r_flash_LP</td>
<td>Flash Memory, Low Power</td>
<td>Yes</td>
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<tr>
<td>r_fmi</td>
<td>Factory Microcontroller Information</td>
<td>N/A</td>
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<tr>
<td>r_glcd</td>
<td>Graphics LCD Controller</td>
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</tr>
<tr>
<td>r_gpt</td>
<td>General Purpose Timer</td>
<td>Yes</td>
</tr>
<tr>
<td>r_gpt_input_capture</td>
<td>General Input Capture</td>
<td>Yes</td>
</tr>
<tr>
<td>r_icu</td>
<td>Interrupt Controller Unit</td>
<td>Yes</td>
</tr>
<tr>
<td>r_ioport</td>
<td>General Purpose I/O Ports</td>
<td>Yes</td>
</tr>
<tr>
<td>r_iwdt</td>
<td>Independent Watchdog Timer</td>
<td>Yes</td>
</tr>
<tr>
<td>r_jpeg_decode</td>
<td>JPEG Decode</td>
<td>N/A</td>
</tr>
<tr>
<td>r_kint</td>
<td>Keyboard Interrupt Interface</td>
<td>Yes</td>
</tr>
<tr>
<td>r_lpm</td>
<td>Low Power Mode</td>
<td>Yes</td>
</tr>
<tr>
<td>r_lvd</td>
<td>Low Voltage Detection Driver</td>
<td>Yes</td>
</tr>
<tr>
<td>r_pdc</td>
<td>Parallel Data Capture Unit</td>
<td>N/A</td>
</tr>
<tr>
<td>Module Name</td>
<td>SSP Feature</td>
<td>Release Status of Module for S124</td>
</tr>
<tr>
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<tr>
<td>r_qspi</td>
<td>Quad Serial Peripheral Interface</td>
<td>N/A</td>
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<tr>
<td>r_rlic</td>
<td>IIC</td>
<td>Yes</td>
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<tr>
<td>r_rspi</td>
<td>Serial Peripheral Interface</td>
<td>Yes</td>
</tr>
<tr>
<td>r_rtc</td>
<td>Real-time Clock</td>
<td>Yes</td>
</tr>
<tr>
<td>r_sce</td>
<td>Secure Crypto Engine (TRNG, AES, RSA, TDES, HASH, DSA, ARC4)</td>
<td>No</td>
</tr>
<tr>
<td>r_sci_i2c</td>
<td>Serial Communication Interface I2C</td>
<td>No</td>
</tr>
<tr>
<td>r_sci_spi</td>
<td>Serial Communication Interface SPI</td>
<td>Yes</td>
</tr>
<tr>
<td>r_sci_uart</td>
<td>Serial Communication Interface UART</td>
<td>Yes</td>
</tr>
<tr>
<td>r_sdmmc</td>
<td>SDHI driver for SDIO and SD/MMC memory devices</td>
<td>No</td>
</tr>
<tr>
<td>r_slcdc</td>
<td>Segment LCD Controller</td>
<td>N/A</td>
</tr>
<tr>
<td>r_ssi</td>
<td>(Inter-IC Sound) interface [old: Serial Sound Int.] or r_i2s</td>
<td>N/A</td>
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<td>r_wdt</td>
<td>Watchdog Timer</td>
<td>Yes</td>
</tr>
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### Services

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<thead>
<tr>
<th>Module Name</th>
<th>SSP Feature</th>
<th>Release Status</th>
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<tbody>
<tr>
<td>CMSIS</td>
<td>CMSIS DSP Library</td>
<td>No</td>
</tr>
<tr>
<td>r_sce</td>
<td>Crypto Library</td>
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### X-Ware Stacks

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<tr>
<th>Module Name</th>
<th>SSP Feature</th>
<th>Release Status</th>
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<tbody>
<tr>
<td>fx</td>
<td>FileX</td>
<td>N/A</td>
</tr>
<tr>
<td>gx</td>
<td>GUIX</td>
<td>N/A</td>
</tr>
<tr>
<td>nx</td>
<td>NetX (HTTP, DNS, DHCP, FTP, TFTP, Telnet)</td>
<td>N/A</td>
</tr>
<tr>
<td>nxd</td>
<td>NetX Duo Stack</td>
<td>N/A</td>
</tr>
<tr>
<td>tx</td>
<td>ThreadX</td>
<td>Yes</td>
</tr>
<tr>
<td>ux</td>
<td>USBX (Device Mode)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Yes = Available in SSP 1.1.0.  
No = Not available or not tested in SSP 1.1.0  
N/A = Not applicable for S124.

### 14. Additional Technical Notices

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<thead>
<tr>
<th>Technical Contact Details</th>
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<tbody>
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<td>America:</td>
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<td>Europe:</td>
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<td>Japan:</td>
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