



# Gecko Platform 2.7.1.0 GA

## Gecko SDK Suite 2.7

### January 24, 2020

The Gecko Platform provides infrastructure support for applications developed with higher-level protocols, and it provides an interface with the underlying hardware. It is composed of the following modules:

**CMSIS and EMLIB** are low-level core and peripheral support libraries. EMLIB provides a complete peripheral API for all Silicon Labs EFM32, EZR32 and EFR32 MCUs and SoCs.

**EMDRV** is the Gecko Platform driver library for EFM32, EZR32 and EFR32 on-chip peripherals. Drivers are typically DMA-based and use all available low-energy features.

**RAIL (Radio Abstraction Interface Layer)** provides a customizable radio interface layer that supports proprietary or standards-based wireless protocols. RAIL use by application protocols such as Silicon Labs Zigbee or Silicon Labs Connect is managed through the stack library. Direct RAIL use is exposed through the Flex SDK.

**NVM3 (Non-Volatile Memory Version 3)** is a data storage driver that provides a means to read and write data objects (key/value pairs) stored in flash memory. NVM3 can be used with the Bluetooth, Zigbee, Thread, and Connect protocol stacks.

**mbed TLS** provides an SSL library that makes it easy to use cryptography and SSL/TLS in your applications. mbed TLS is open source software licensed by ARM Limited.

The **Gecko Bootloader** is a code library configurable through Simplicity Studio's IDE to generate bootloaders that can be used with a variety of Silicon Labs protocol stacks. The Gecko Bootloader can be used with EFM32 and EFR32 Series 1 and later devices.

This document aggregates information that in previous releases was spread across multiple documents. In earlier versions of the Gecko SDK, this content would have been found in: 32-bit MCU SDK Release Notes, RAIL Library Release Notes, and the Gecko Bootloader change log.

These release notes cover SDK version(s):

Gecko Platform 2.7.1.0 GA released January 24, 2020  
Gecko Platform 2.7.0.0 GA released December 13, 2019.



#### KEY FEATURES

##### CMSIS

- Bug fixes

##### EMLIB

- Bug fixes and deprecations

##### EMDRV

- Bug fixes and deprecations

##### RAIL Library

- Added support for a mode to select the best PA for a given power level
- Added support for new IEEE 802.15.4G-2012 features

##### NVM3

- Fixed data corruption bug

##### mbed TLS

- Added AES-GCM support for Series-2
- Updated mbed TLS library to version 2.7.12

##### Gecko Bootloader

- Added certificate support
- Added EZSP GPIO plugin
- Added UART driver

##### Other Gecko Platform Software

- Updated LwIP Package to version 2.1.2

Contents

- 1 CMSIS ..... 4
  - 1.1 New Items..... 4
  - 1.2 Improvements..... 4
  - 1.3 Fixed Issues ..... 4
  - 1.4 Known Issues in the Current Release ..... 4
  - 1.5 Deprecated Items ..... 4
  - 1.6 Removed Items ..... 4
- 2 EMLIB..... 5
  - 2.1 New Items..... 5
  - 2.2 Improvements..... 5
  - 2.3 Fixed Issues ..... 5
  - 2.4 Known Issues in the Current Release ..... 5
  - 2.5 Deprecated Items ..... 5
  - 2.6 Removed Items ..... 5
- 3 EMDRV ..... 6
  - 3.1 New Items..... 6
  - 3.2 Improvements..... 6
  - 3.3 Fixed Issues ..... 6
  - 3.4 Known Issues in the Current Release ..... 6
  - 3.5 Deprecated Items ..... 6
  - 3.6 Removed Items ..... 6
- 4 RAIL Library ..... 7
  - 4.1 New Items..... 7
  - 4.2 Improvements..... 7
  - 4.3 Fixed Issues ..... 8
  - 4.4 Known Issues in the Current Release ..... 9
  - 4.5 Deprecated Items ..... 9
  - 4.6 Removed Items ..... 9
- 5 NVM3 (Non-Volatile Memory Version 3)..... 10
  - 5.1 New Items..... 10
  - 5.2 Improvements..... 10
  - 5.3 Fixed Issues ..... 10
  - 5.4 Known Issues in the Current Release ..... 10
  - 5.5 Deprecated Items ..... 10
  - 5.6 Removed Items ..... 10
- 6 mbed TLS..... 11

- 6.1 New Items..... 11
- 6.2 Improvements..... 11
- 6.3 Fixed Issues ..... 11
- 6.4 Known Issues in the Current Release ..... 11
- 6.5 Deprecated Items ..... 11
- 6.6 Removed Items ..... 11
- 7 Gecko Bootloader..... 12
  - 7.1 New Items..... 12
  - 7.2 Improvements..... 12
  - 7.3 Fixed Issues ..... 12
  - 7.4 Known Issues in the Current Release ..... 12
  - 7.5 Deprecated Items ..... 12
  - 7.6 Removed Items ..... 12
- 8 Other Gecko Platform Software Components ..... 13
  - 8.1 New Items..... 13
  - 8.2 Improvements..... 13
  - 8.3 Fixed Issues ..... 13
  - 8.4 Known Issues in the Current Release ..... 13
  - 8.5 Deprecated Items ..... 13
  - 8.6 Removed Items ..... 13
- 9 Legal..... 14
  - 9.1 Disclaimer..... 14
  - 9.2 Trademark Information ..... 14

# 1 CMSIS

## 1.1 New Items

None

## 1.2 Improvements

None

## 1.3 Fixed Issues

### Fixed in release 2.7.0.0

ID #	Description
334234	SystemHFClockGet() in CMSIS system file now accounts for HFRCODIV2 (Series-1 only).
426081	Fixed handling of USHFRCO frequency in SystemHFClockGet(). CMSIS system now keeps track of the frequency and EMLIB CMU works in concert with CMSIS system. This applies to EFM32HG, EFM32GG11 and EFM32GG12 families.]

## 1.4 Known Issues in the Current Release

None

## 1.5 Deprecated Items

None

## 1.6 Removed Items

None

## 2 EMLIB

### 2.1 New Items

#### Added in release 2.7.0.0

- MSC\_MassErase() function is added for Series-2 devices.
- Add remote frame support in EMLIB CAN.

### 2.2 Improvements

None

### 2.3 Fixed Issues

#### Fixed in release 2.7.0.0

ID #	Description
415819	CHIP_Init() sets HFRCOEM23 clock as TRACECLK.
447797	EMLIB IADC: The definition of 'iadcNegInputGnd' has been modified to set PINNEG to 1. This prevents a polarity error when performing IADC conversions between supply pins and ground.
370421	Fixed conversion of raw data in IADC_ConvertRawDataToResult().
428960	Fixed issue that could cause dcdcEm01LoadCurrent_mA, a parameter of EMU_DCDCOptimizeSlice(), to be used before value assignment.

### 2.4 Known Issues in the Current Release

None

### 2.5 Deprecated Items

Functions in em\_msc are placed in flash for Series-0 and Series-1 devices, except for the EFM32G. MSC\_WriteWordFast() function is deprecated. Calling the MSC\_WriteWordFast() function will have the same effect as calling MSC\_WriteWord().

### 2.6 Removed Items

None

## 3 EMDRV

### 3.1 New Items

#### Added in release 2.7.0.0

SPIDRV is now using Sleptimer instead of RTCDRV for time keeping in slave mode.

### 3.2 Improvements

None

### 3.3 Fixed Issues

None

### 3.4 Known Issues in the Current Release

None

### 3.5 Deprecated Items

RTCDRV driver is marked as deprecated and will be removed in a later release.

### 3.6 Removed Items

None

## 4 RAIL Library

### 4.1 New Items

#### Added in release 2.7.1.0

- Added the new RAIL\_STREAM\_10\_STREAM RAIL\_StreamMode\_t to allow you to send a 1010 stream for debugging.
- Added a new function, RAIL\_StartTxStreamAlt, which allows the specific antenna to be specified for a stream transmit.
- Added new RAIL\_RX\_PACKET\_HANDLE\_OLDEST\_COMPLETE packet handle to allow the user to get a reference to the oldest unreleased complete packet.
- Added a new External\_Thermistor interface to RAIL. This allows access the user to connect and read the impedance of an external thermistor on supported chips.
- Added RAIL\_IEEE802154\_ConvertRssiToEd() and RAIL\_IEEE802154\_ConvertRssiToLqi() to assist Zigbee 802.15.4 certification testing.

#### Added in release 2.7.0.0

- Added a new PA mode which will attempt to automatically choose the PA which consumes the least amount of current to reliably produce the requested output power. See RAIL\_EnablePaAutoMode() for details.
- On EFR32xG12 thru EFR32xG14, added support for 802.15.4G-2012 SUN PHY dynamic frame payload whitening on reception and transmit based on the PHY header's Data Whitening flag setting. This feature is automatically enabled when RAIL\_IEEE802154\_ConfigGOptions()' RAIL\_IEEE802154\_G\_OPTION\_GB868 is enabled, and assumes the radio configuration specifies the appropriate whitening algorithm and settings.
- On EFR32xG12 thru EFR32xG14, added support for 802.15.4G-2012 SUN PHY dynamic frame payload 2/4-byte FCS (CRC) on reception and transmit based on the PHY header's FCS Type flag setting. This feature is automatically enabled when RAIL\_IEEE802154\_ConfigGOptions()' RAIL\_IEEE802154\_G\_OPTION\_GB868 is enabled. The radio configuration's (single) CRC algorithm settings are ignored, overridden by RAIL.
- On EFR32xG12 thru EFR32xG14, 802.15.4 AutoACK behavior has also been updated so transmitted immediate ACKs reflect the Whitening and 2/4-byte FCS of the received frame being acknowledged.
- Added two new APIs, RAIL\_GetSyncWords and RAIL\_ConfigSyncWords(), to allow getting and setting the sync word configuration of your PHY at runtime.
- Added RAIL\_TX\_OPTION\_CCA\_ONLY to just perform CCA (CSMA/LBT), stopping short of automatically transmitting when the channel is clear.
- Added support for a new RAIL\_EVENT\_TX\_STARTED, triggered when the first preamble bit is about to go on-air. Also included the ability to retrieve the equivalent RAIL\_PACKET\_TIME\_AT\_PREAMBLE\_START timestamp of that event from the event's handler via RAIL\_GetTxTimePreambleStart(). Note: This new event shifted the bit positions of some events in RAIL\_Events\_t.
- Added an API, RAIL\_StopInfinitePreambleTx, that can stop an infinite preamble on PHYs configured to use infinite preambles.
- Added additional information to the packet trace stream for the Z-Wave protocol to indicate what region is currently active to help with decoding.
- Added support for RFSENSE Selective (OOK) mode for supported chips, which currently includes only EFR32xG22 devices. Please refer to RAIL internal chip specific documentation for more details.

### 4.2 Improvements

#### Changed in release 2.7.1.0

- The RAIL\_GetRadioEntropy() API will now ensure a valid radio configuration has been loaded using RAIL\_ConfigChannels() since it can cause problems if the radio is used before this.
- Changed the value of RAIL\_FREQUENCY\_OFFSET\_INVALID from -1 to -32768 since -1 is a reasonable frequency offset to pass to RAIL\_SetFreqOffset(). Also added convenience definitions RAIL\_FREQUENCY\_OFFSET\_MIN and RAIL\_FREQUENCY\_OFFSET\_MAX to specify the valid range of offset values the radio supports.

**Changed in release 2.7.0.0**

- Changed RAIL\_GetRxTimePreambleStartAlt(), RAIL\_GetRxTimeSyncWordEndAlt(), and RAIL\_GetRxTimeFrameEndAlt() to properly update its pPacketDetails' RAIL\_PacketTimeStamp\_t::timePosition to reflect the adjusted RAIL\_PacketTimeStamp\_t::packetTime rather than leaving it as RAIL\_PACKET\_TIME\_DEFAULT.
- Enforced and clarified that RAIL\_Init() should not be called more than once per protocol.
- Clarified documentation of the RAIL\_EVENT\_RX\_ACK\_TIMEOUT event and RAIL\_AutoAckConfig\_t::ackTimeout period which extends only to packet sync word detection of an expected ACK, not packet completion of that ACK.
- Documented RAIL's internal 16-packet metadata FIFO which exists on EFR32 platforms supplementing the receive FIFO of packet data. Refer to Data\_Management and efr32\_main for details. Included is support for a new RAIL\_EVENT\_RX\_FIFO\_FULL, triggered with any packet completion event in which the receive FIFO or packet metadata FIFO are full. This tells the application it must free up the oldest packets/data ASAP to reduce the chance of RAIL\_EVENT\_RX\_FIFO\_OVERFLOW (however, overflow may already have occurred). Note: This new event shifted the bit positions of some events in RAIL\_Events\_t.

**4.3 Fixed Issues****Fixed in release 2.7.1.0**

ID #	Description
444205	Fixed a transmit-from-idle issue with RAIL_StartCcaCsmaTx() or RAIL_StartCcaLbtTx(), which would always fail when the RAIL_StateTiming_t::idleToRx is configured below the minimum the radio is capable of achieving (typically 65-100 microseconds depending on platform).
452628	Fixed an issue where idling the radio from an Rx antenna diversity mode would consume extra power.
452690	Fixed an issue where Rx antenna diversity could be left enabled after switching to a radio configuration that lacks diversity support.

**Fixed in release 2.7.0.0**

ID #	Description
197573	Suppressed extraneous RAIL_EVENT_TX_START_CCA events that might occur during long CCA durations. Now only one such event should occur per CCA try.
411498	RAIL_StartAverageRssi() now returns RAIL_STATUS_INVALID_STATE if called when the radio is not idle, enforcing its documented behavior.
417340	Fixed an issue where RAIL_RxPacketDetails_t::isAck would incorrectly be set true for non-ACK or unexpected ACK packets received successfully (e.g. when RAIL_IEEE802154_ACCEPT_ACK_FRAMES is enabled) or aborted while waiting for the expected ACK. Note that when RAIL_RX_OPTION_IGNORE_CRC_ERRORS is in effect, an expected ACK includes one that fails CRC, and will have isAck set true.
418493	RAIL_ConfigRadio will now return RAIL_STATUS_INVALID_STATE if called from the inactive config in dynamic multiprotocol instead of returning success but not applying the change.
427934	Fixed a race condition that could cause a device to not re-enable frame detection after an Rx overflow event if the overflow was processed and cleared very quickly.
430081	Fixed an issue where the first Clear Channel Assessment (CCA) of a CSMA/LBT transmit from radio idle state would consistently fail when the RAIL_CsmaConfig_t::ccaBackoff or RAIL_LbtConfig_t::lbtBackoff time is smaller than the RAIL_StateTiming_t::idleToRx time.
436163	Fixed a post-receive transition timing issue for received packets that were on the air longer than 32 milliseconds. AutoACK turnaround timing should now behave properly at low data rates.
437054	Fixed an issue with the pa_customer_curve_fits.py that caused values below -12 to not be considered when computing the fit. Re-generated default, Silicon Labs-provided curves to consume this fix, resulting in minor changes to the lowest-power segment in curve-fit based PA's. If using a custom power curve created using the documentation in AN1127 customers should re-run the script on the already collected output data to get slightly more accurate curves.
441635	Return the correct RAIL_TxPowerMode_t value of RAIL_TX_POWER_MODE_NONE from RAIL_GetTxPowerConfig if called before RAIL_ConfigTxPower.
446289	Fixed RAIL_IDLE_ABORT to idle the radio sooner when in RAIL_RF_STATE_RX, especially now that RAIL_RxChannelHoppingConfigEntry_t::delay can extend the time in that state.

ID #	Description
447578	Fixed an issue where setting a transmit power over the maximum allowed for a given channel would result in no change in the output power instead of using the maximum allowed value.
450187	Fixed an issue where calling RAIL_Idle() with RAIL_IDLE_FORCE_SHUTDOWN while in receive with channel hopping enabled could corrupt some internal channel hopping state and trigger a bus fault or other radio problems.

#### 4.4 Known Issues in the Current Release

None

#### 4.5 Deprecated Items

None

#### 4.6 Removed Items

None

## 5 NVM3 (Non-Volatile Memory Version 3)

### 5.1 New Items

None

### 5.2 Improvements

None

### 5.3 Fixed Issues

#### Fixed in release 2.7.1.0

ID #	Description
453206	Fixed an issue in NVM3 that could cause an error in the content of an existing data object after firmware upgrade from GSDK 2.4.0 to GSDK 2.5.0 or higher. The problem is related to the fact that NVM3 released in GSDK 2.4.0 and earlier could write data objects in a format that was off spec. Although the format was incorrect, all functions handled the format correctly. From GSDK 2.5.0 this format issue was fixed, but as a side effect, repacking data written with GSDK 2.4.0 or earlier could unintentionally cause data error. The fix ensures that both the pre- and the post-GSDK 2.5.0 formats are handled correctly.

### 5.4 Known Issues in the Current Release

None

### 5.5 Deprecated Items

None

### 5.6 Removed Items

None

## 6 mbed TLS

### 6.1 New Items

#### Added in release 2.7.0.0

Added hardware-acceleration plugin for AES-GCM on EFR32xG21 products.

### 6.2 Improvements

#### Changed in release 2.7.1.0

Updated mbed TLS library to version 2.7.12

### 6.3 Fixed Issues

#### Fixed in release 2.7.0.0

ID	Description
445608	Hardware-accelerated AES-GCM on EFR32xG22 parts was not adhering to mbedTLS API contract.

### 6.4 Known Issues in the Current Release

ID #	Description	Workaround
429985	ECDSA curve P224 is not supported for xG21 and xGM21 products.	None

### 6.5 Deprecated Items

None

### 6.6 Removed Items

None

## 7 Gecko Bootloader

### 7.1 New Items

#### Added in release 2.7.0.0

- Added an AppBuilder plugin option APPLICATION\_VERIFICATION\_SKIP\_EM4\_RST to skip verification of the application only if the device has been to EM4.
- Added certificate support for secure boot and GBL image parser for EFR32xG21.
- Added first stage binaries for xG13 and xG14 devices that works with the second stage bootloader placed in the main flash.
- Added EZSP GPIO plugin.
- Added EUART driver.

### 7.2 Improvements

#### Changed in release 2.7.1.0

- The RMU reset level for soft resets is configured to be EXTENDED on Series-1 devices

#### Changed in release 2.7.0.0

- The size of ParserContext\_t for EFR32xG21 has been increased to 524 bytes to support certificate boot chain.

### 7.3 Fixed Issues

None

### 7.4 Known Issues in the Current Release

None

### 7.5 Deprecated Items

None

### 7.6 Removed Items

None

## 8 Other Gecko Platform Software Components

### 8.1 New Items

None

### 8.2 Improvements

#### Changed in release 2.7.0.0

- Updated LwIP package to version 2.1.2.

### 8.3 Fixed Issues

#### Fixed in release 2.7.0.0

ID	Description
340730	GLIB now offers a GLIB_invertBitmap() function, which inverts every bit in the bitmap.
340726	GLIB: Bugfix in optimized drawing of bitmaps for inverse monochrome displays.
340053	GLIB now supports characters wider than 16 pixels.
451076	DMD_writeData now consistently treats a bit value of 1 as white and 0 as black for monochrome displays.

### 8.4 Known Issues in the Current Release

None

### 8.5 Deprecated Items

None

### 8.6 Removed Items

None

## 9 Legal

### 9.1 Disclaimer

Silicon Labs intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Labs products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications.

Application examples described herein are for illustrative purposes only.

Silicon Labs reserves the right to make changes without further notice and limitation to product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Silicon Labs shall have no liability for the consequences of use of the information supplied herein. This document does not imply or express copyright licenses granted hereunder to design or fabricate any integrated circuits. The products are not designed or authorized to be used within any Life Support System. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Labs products are not designed or authorized for military applications. Silicon Labs products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons.

### 9.2 Trademark Information

Silicon Laboratories Inc.®, Silicon Laboratories®, Silicon Labs®, SiLabs® and the Silicon Labs logo®, Bluegiga®, Bluegiga Logo®, Clockbuilder®, CMEMS®, DSPLL®, EFM®, EFM32®, EFR, Ember®, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Ember®, EZLink®, EZRadio®, EZRadioPRO®, Gecko®, ISOmodem®, Micrium, Precision32®, ProSLIC®, Simplicity Studio®, SiPHY®, Telegesis, the Telegesis Logo®, USBXpress®, Zentri, Z-Wave and others are trademarks or registered trademarks of Silicon Labs.

ARM, CORTEX, Cortex-M0+, Cortex-M3, Cortex-M33, Cortex-M4, TrustZone, Keil and Thumb are trademarks or registered trademarks of ARM Holdings.

Zigbee® and the Zigbee logo® are registered trademarks of the Zigbee Alliance.

Bluetooth® and the Bluetooth logo® are registered trademarks of Bluetooth SIG Inc.

All other products or brand names mentioned herein are trademarks of their respective holders.