



Proprietary Flex SDK 3.4.5.0 GA

Gecko SDK Suite 4.1

June 28, 2023

The Proprietary Flex SDK is a complete software development suite for proprietary wireless applications. Per its namesake, Flex offers two implementation options.

The first uses Silicon Labs RAIL (Radio Abstraction Interface Layer), an intuitive and easily-customizable radio interface layer designed to support both proprietary and standards-based wireless protocols.

The second uses Silicon Labs Connect, an IEEE 802.15.4-based networking stack designed for customizable broad-based proprietary wireless networking solutions that require low power consumption and operates in either the sub-GHz or 2.4 GHz frequency bands. The solution is targeted towards simple network topologies.

The Flex SDK is supplied with extensive documentation and sample applications. All examples are provided in source code within the Flex SDK sample applications.

These release notes cover SDK version(s):

- 3.4.5.0 GA released June 28, 2023 (RAIL library: support for EFR32xG21, Revision C and later)
- 3.4.4.0 GA released January 18, 2023
- 4.3.0 GA released October 19, 2022 (early access part support, one RAIL Library fixed issue)
- 3.4.2.0 GA released September 28, 2022
- 3.4.1.0 GA released August 17, 2022
- 3.4.0.0 GA released June 8, 2022

Compatibility and Use Notices

For information about security updates and notices, see the Security chapter of the Gecko Platform Release notes installed with this SDK or on the TECH DOCS tab on <https://www.silabs.com/developers/flex-sdk-connect-networking-stack>. Silicon Labs also strongly recommends that you subscribe to Security Advisories for up-to-date information. For instructions, or if you are new to the Silicon Labs Flex SDK, see [Using This Release](#).

Compatible Compilers:

IAR Embedded Workbench for ARM (IAR-EWARM) version 9.20.4

- Using wine to build with the IarBuild.exe command line utility or IAR Embedded Workbench GUI on macOS or Linux could result in incorrect files being used due to collisions in wine's hashing algorithm for generating short file names.
- Customers on macOS or Linux are advised not to build with IAR outside of Simplicity Studio. Customers who do should carefully verify that the correct files are being used.

GCC (The GNU Compiler Collection) version 10.3-2021.10, provided with Simplicity Studio.



RAIL APPS AND LIBRARY KEY FEATURES

- EFR32xG24 GA with Antenna Diversity support
- FGM230S proprietary module GA
- Secure Vault integration to Connect stack
- BGM220 Range Test + DMP pre-compiled demo with EFR Connect Mobile Application

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1 Connect Applications

1.1 New Items

Added in release 3.4.0.0

- PSA Crypto API usage
- Major update of Connect - SoC ECDH Key Exchange

1.2 Improvements

None

1.3 Fixed Issues

None

1.4 Known Issues in the Current Release

Issues in bold were added since the previous release. If you have missed a release, recent release notes are available on the TECH DOCS tab on <https://www.silabs.com/developers/flex-sdk-connect-networking-stack>.

ID #	Description	Workaround
652925	EFR32XG21 is not supported for "Flex (Connect) - SoC Light Example DMP" and "Flex (Connect) - SoC Switch Example"	

1.5 Deprecated Items

None

1.6 Removed Items

None

2 Connect Stack

2.1 New Items

Added in release 3.4.0.0

- All of the crypto operations are now made through ARM PSA Crypto API, enabling the storage of the network security key in the Secure Vault.
- Added a new API `emberSetPsaSecurityKey()` that indicates which PSA Crypto key handler has to be used by the stack. It is the application's responsibility to create the key. The old `emberSetSecurityKey()` no longer designates the key used by the network. It can be used to erase an old key from its previous location in NVM.
- Added a new API `emberRemovePsaSecurityKey()` that cancels the effects of `emberSetPsaSecurityKey()`. It does not erase the key. It is the application's responsibility to destroy the key.

2.2 Improvements

None

2.3 Fixed Issues

Fixed in release 3.4.2.0

ID #	Description
1022904	Fixed an error that was causing the application task to be blocked by the stack task during an active scan. As a result, the application was missing beacons.

Fixed in release 3.4.0.0

ID #	Description
833232	Fixed an error that was causing Connect Application Framework IPC to write to the address 0.

2.4 Known Issues in the Current Release

Issues in bold were added since the previous release. If you have missed a release, recent release notes are available on the TECH DOCS tab on <https://www.silabs.com/developers/gecko-software-development-kit>.

ID #	Description	Workaround
	When running the RAIL Multiprotocol Library (used for example when running DMP Connect+BLE), IR Calibration is not performed because of a known issue in the RAIL Multiprotocol Library. As result, there is an RX sensitivity loss in the order of 3 or 4 dBm.	
501561	In the Legacy HAL component, the PA configuration is hard-coded regardless of the user or board settings.	Until this is changed to properly pull from the configuration header, the file <code>ember-phy.c</code> in the user's project will need to be modified by hand to reflect the desired PA mode, voltage, and ramp time.
711804	Connecting multiple devices simultaneously may fail with a timeout error.	

2.5 Deprecated Items

None

2.6 Removed Items

None

3 RAIL Applications

3.1 New Items

Added in release 3.4.0.0

- EFR32xG24 support
- FGM230S support
- RAIL Bluetooth DMP - SoC Range Test BLE and IEEE802.15.4 demos for some XGM210 boards

3.2 Improvements

None

3.3 Fixed Issues

None

3.4 Known Issues in the Current Release

None

3.5 Deprecated Items

None

3.6 Removed Items

None

4 RAIL Library

4.1 New Items

Added in release 3.4.2.0

- Added early support for IEEE802.15.4G dynamic forward error correction PHYs on the EFR32xG12 platform. Use requires help from support to create an appropriate PHY.

Added in release 3.4.0.0

- The RAIL channel of a received packet is now available in the packet's RAIL_RxPacketDetails_t::channel field. This can be of value when scanning or hopping across multiple channels while letting packets accumulate in the receive FIFO for later processing.
- Added the RAIL_ConfigPaAutoEntry API to allow for easier configuration of PA auto mode operation in RAIL.
- Added the RAIL_SetRssiDetectThreshold API to allow the user to detect when the RSSI is at or above a configurable threshold. Once configured, the RAIL_EVENT_DETECT_RSSI_THRESHOLD event can be used to detect when this happens.
- Added support for the MGM240L022RNF module.
- Added support for the FGM230SA27HGN and FGM230SBHGN modules.
- Added the RAIL_GetChannelAlt API. This function returns the channel the radio is currently using. If using DMP and run on the inactive protocol it returns the channel that will be used when next switching to that protocol. When using channel hopping, mode switch, and other features that change channels dynamically this may be different than what is returned by RAIL_GetChannel, as this function will track what channel the radio is actually on at that moment and not what it started on.

4.2 Improvements

Changed in release 3.4.2.0

- Improved PA configurations for the xGM240 modules based on additional test data.

Changed in release 3.4.1.0

- Added support in "RAIL Utility, Coexistence" component for configuring priority options when directional priority is enabled but no static priority GPIO is defined.

Changed in release 3.4.0.0

- The "RAIL Utility, PTI" component will now validate that the correct set of pins are in use for the desired PTI mode.
- RAIL will now error if attempting to start a CSMA or LBT transmit while a scheduled RX is still in progress or vice versa.
- Added PA curves for BGM240P and MGM240P modules.
- Restricted the SL_RAIL_UTIL_PA_RAMP_TIME_US to 10us on some EFR32 modules to match the certification conditions.

4.3 Fixed Issues

Fixed in release 3.4.4.0

ID #	Description
1063152	Fixed an issue where radio reception would not be fully cleaned up when a receive error occurs with receive state transitions set to idle on error but transmit on success, a configuration mostly associated with Bluetooth LE. On the EFR32xG24 this could cause a SYNTH calibration to not be properly restored and eventually cause the radio to stop working.

Fixed in release 3.4.3.0

ID #	Description
1041997	Fixed the librail_config libraries for the following xGM240 modules: BGM240PA22VNA, BGM240PA32VNA, BGM240PA32VNN, BGM240PB22VNA, BGM240PB32VNA, BGM240PB32VNN, MGM240PA22VNA, MGM240PA32VNA, MGM240PA32VNN. Without this update these modules will assert when trying to load the supported BLE and IEEE 802.15.4 PHYs.

Fixed in release 3.4.2.0

ID #	Description
844377	Fixed a Bluetooth LE 2 Mbps AoX issue on EFR32xG24 when using a 38.4 MHz crystal.
1029710	Fixed an issue with RAIL's PA auto mode that would cause it to select an unsupported RAIL_TxPowerMode_t on chip OPNs that are missing the higher power PAs.

Fixed in release 3.4.1.0

ID #	Description
819544	Improved reception on EFR32xG23 and EFR32xG24 when using a PHY with fast detect enable (preamble sense mode).
843708	Moved function declarations from rail_features.h to rail.h to avoid a convoluted include dependency order.
844325	Fixed RAIL_SetTxFifo() to properly return 0 (error) rather than 4096 for an undersized FIFO.
844936	Fixed an issue where using RAIL_SetNextTxRepeat() could cause a brownout reset on EFR32xG23.
853714	Fixed an issue with xGM240 modules causing them to assert during initialization.
988518	Fixed an issue where the radio sequencer would leave portions of the chip enabled after AoX CTE packet reception, preventing the device from going into EM2 sleep and potentially causing missed packet receive events.

Fixed in release 3.4.0.0

ID #	Description
376658	Fixed an issue with the Bluetooth LE coded PHY on EFR32xG21 where a packet received with a corrupt coding indicator would result in an invalid start-of-packet timestamp.
759793	Fixed an issue with Bluetooth LE long-range reception on EFR32xG21 that corrupted packet data and tripped RAIL_ASSERT_FAILED_UNEXPECTED_STATE_RX_FIFO.
772769	Fixed an issue when running IR Calibration on the EFR32xG23 using RAIL_CalibrateIraIt where we could compute an invalid IRCAL value for certain PHYs and chips.
777427	Fixed support for using the signal identifier CCA modes simultaneously with a user-enabled signal identifier trigger event.
819644	Fixed an issue with frame-type decoding PHYs running at more than 500 kbps on EFR32xG22 and later.
825083	Fixed an issue on EFR32xG23 and EFR32xG24 where PTI could merge multiple receive packets into the same transaction when interrupt latency is significant.
829499	Fixed an issue where RAIL_GetRadioStateDetail would not report the correct state information when frame detection was disabled or during an LBT operation.
830214	Ensure that the RAIL_RadioConfigChangedCallback_t is called for all RAIL handles in a dynamic multiprotocol application where multiple handles use the same underlying PHY configuration.
835299	Fixed an issue with dynamic handling of whitening and FCS in FSK when only RAIL_IEEE802154_E_OPTION_GB868 was enabled.
844600	Fixed an issue of not being able to receive packets during a RAIL_ScheduleRx configured with a zero relative start time when Power Manager sleep is enabled and configured with an EM2 or lower energy requirement.

4.4 Known Issues in the Current Release

Issues in bold were added since the previous release.

ID #	Description	Workaround
	Using direct mode (or IQ) functionality on EFR32xG23 requires a specifically set radio configuration that is not yet supported by the radio configurator. For these requirements, reach out to technical support who could provide that configuration based on your specification	
641705	Infinite receive operations where the frame's fixed length is set to 0 are not working correctly on the EFR32xG23 series chips.	
732659	On EFR32xG23: <ul style="list-style-type: none"> • Wi-SUN FSK mode 1a exhibits a PER floor with frequency offsets around ± 8 to 10 KHz • Wi-SUN FSK mode 1b exhibits a PER floor with frequency offsets around ± 18 to 20 KHz 	
1019590	When using the "RAIL Utility, Coexistence" component with Bluetooth LE the <code>sl_bt_system_get_counters()</code> function will always return 0 for GRANT denied counts.	Contact support for a patch to coexistence-ble.c to fix this issue.

4.5 Deprecated Items

None

4.6 Removed Items

None

5 Using This Release

This release contains the following

- Radio Abstraction Interface Layer (RAIL) stack library
- Connect Stack Library
- RAIL and Connect Sample Applications
- RAIL and Connect Components and Application Framework

This SDK depends on Gecko Platform. The Gecko Platform code provides functionality that supports protocol plugins and APIs in the form of drivers and other lower layer features that interact directly with Silicon Labs chips and modules. Gecko Platform components include EMLIB, EMDRV, RAIL Library, NVM3, and mbedTLS. Gecko Platform release notes are available through Simplicity Studio's Documentation tab.

For more information about the Flex SDK v3.x see [UG103.13: RAIL Fundamentals](#) and [UG103.12: Silicon Labs Connect Fundamentals](#). If you are a first time user, see [QSG168: Proprietary Flex SDK v3.x Quick Start Guide](#).

5.1 Installation and Use

The Proprietary Flex SDK is provided as part of the Gecko SDK (GSDK), the suite of Silicon Labs SDKs. To quickly get started with the GSDK, install [Simplicity Studio 5](#), which will set up your development environment and walk you through GSDK installation. Simplicity Studio 5 includes everything needed for IoT product development with Silicon Labs devices, including a resource and project launcher, software configuration tools, full IDE with GNU toolchain, and analysis tools. Installation instructions are provided in the online [Simplicity Studio 5 User's Guide](#).

Alternatively, Gecko SDK may be installed manually by downloading or cloning the latest from GitHub. See https://github.com/SiliconLabs/gecko_sdk for more information.

Simplicity Studio installs the GSDK by default in:

- (Windows): C:\Users\<<NAME>\SimplicityStudio\SDKs\gecko_sdk
- (MacOS): /Users/<NAME>/SimplicityStudio/SDKs/gecko_sdk

Documentation specific to the SDK version is installed with the SDK. Additional information can often be found in the [knowledge base articles \(KBAs\)](#). API references and other information about this and earlier releases is available on <https://docs.silabs.com/>.

5.2 Security Information

Secure Vault Integration

When deployed to Secure Vault High devices, sensitive keys are protected using the Secure Vault Key Management functionality. The following table shows the protected keys and their storage protection characteristics.

Wrapped Key	Exportable / Non-Exportable	Notes
Thread Master Key	Exportable	Must be exportable to form the TLVs
PSKc	Exportable	Must be exportable to form the TLVs
Key Encryption Key	Exportable	Must be exportable to form the TLVs
MLE Key	Non-Exportable	
Temporary MLE Key	Non-Exportable	
MAC Previous Key	Non-Exportable	
MAC Current Key	Non-Exportable	
MAC Next Key	Non-Exportable	

Wrapped keys that are marked as "Non-Exportable" can be used but cannot be viewed or shared at runtime.

Wrapped keys that are marked as "Exportable" can be used or shared at runtime but remain encrypted while stored in flash.

For more information on Secure Vault Key Management functionality, see [AN1271: Secure Key Storage](#).

Security Advisories

To subscribe to Security Advisories, log in to the Silicon Labs customer portal, then select **Account Home**. Click **HOME** to go to the portal home page and then click the **Manage Notifications** tile. Make sure that 'Software/Security Advisory Notices & Product Change Notices (PCNs)' is checked, and that you are subscribed at minimum for your platform and protocol. Click **Save** to save any changes.

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5.3 Support

Development Kit customers are eligible for training and technical support. Use the [Silicon Labs Flex web page](#) to obtain information about all Silicon Labs Thread products and services, and to sign up for product support.

You can contact Silicon Laboratories support at <http://www.silabs.com/support>.

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