

Flex SDK 2.5.2.0 GA

Silicon Laboratories, Inc.

February 27, 2019

1 Release Highlights

1.1 Version 2.5.2.0 GA:

1.1.1 Connect

- Minor bug fixes.

1.2 Version 2.5.1.0 GA:

1.2.1 Connect

- Critical Security Update in Gecko Bootloader version 1.8.0.

1.3 Version 2.5.0.0 GA:

1.3.1 RAIL

- Removed PHY option selection box
- Removed Efr32 Radio Configurator support
- Removed board specific RAILTEST sample applications
- Added BRD4200A, BRD4201A, BRD4202A, BRD4180A, BRD4181A board part support for RAILTEST
- Added EFR32BG21, EFR32MG21, EFR32ZG13, EFR32ZG14 part support for RAILTEST
- Added Multi-PHY Radio Configurator support for all applications
- CTUNE frequency calibration support using Simplicity Studio Commander
- New Automatic HW RX Diversity Sub-GHz PHY
- DMP BLE + RAIL Range Test updates
- Various bug fixes

1.3.2 Connect

- Added alpha support for mbedtls
- Added ability to enable/disable sleeping via push button to the idle/sleep plugin
- Added callback to the Micrium plugin to allow the application to control entering low power modes
- Added new emberMacFormNetwork stack API
- Added NCP and Micrium IPC versions of the emberMacGetParentAddress stack API

- Added multi-PHY support
- Added new minSleepTime option to the idle/sleep plugin
- Various bug fixes

1.4 Version 2.4.0.0 GA:

1.4.1 RAIL

- Added EFR32BG21, EFR32MG21 part support for RAILTEST
- Updated EFR32MG1 sub-GHz part support list
- New Simple TRX Multi-PHY sample example
- Multi-PHY radio configurator for WMBUS applications
- IAR EWARM 8.30.1 support
- Various bug fixes

1.4.2 Connect

- Updated EFR32MG1 sub-GHz part support list
- Added MCU low power support to Micrium vNCP plugin
- Fixed Micrium vNCP command queue issue
- Faster data rates for Sub-GHz PHYs
- IAR EWARM 8.30.1 support
- Various bug fixes

1.5 Version 2.3.0.0 GA:

- Updated supported OPNs list
- RAIL - Enabled receiving 4kB frames in packet mode
- Connect - Improved FHSS support
- Connect - Micrium OS vNCP support
- IAR EWARM 7.80.4 and GCC 7.2.1 support
- Various bug fixes

1.6 Version 2.2.2.1 GA:

- Minor metadata changes, no application or stack changes

1.7 Version 2.2.2.0 GA:

1.7.1 RAIL

- Updated RAIL Light and Switch application with new network join mechanism.
- Removed non-RAIL specific generated project files.
- Added support for more EFR32FG14V parts.
- Removed redundant "phy-rtos" plugin.
- Various bug fixes.

1.7.2 Connect

- Micrium OS support for SoC mode.
- Added SimEE v2 non-volatile memory support.
- Added support for more EFR32FG14V parts.
- Various bug fixes.

1.8 Version 2.2.1.0 GA:

- Add support for QFN68 variants of EFR32xG12

2 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 Plugins and Application Framework

For more information about the Flex SDK see UG103.13 - Application Development Fundamentals: RAIL and UG103.12 - Application Development Fundamentals: Connect. If you are a first time user, see QSG138: Getting Started with the Silicon Labs Flex Software Development Kit for the Wireless Gecko (EFR32) Portfolio.

2.1 Installation:

Installation of the Flex SDK is covered in the document QSG138

2.1.1 Compatible Software:

The Flex SDK should be used in conjunction with the Silicon Labs Simplicity Studio V4 development platform.

2.2 Support:

Development Kit customers are eligible for training and technical support. You can use the Silicon Laboratories web site <http://www.silabs.com> to obtain information about all Silicon Labs Flex Gecko products and services, and to sign up for product support.

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

3 Added Items

3.1 Version 2.5.0.0 GA:

3.1.1 New Functionality:

- Multi-PHY Radio Configurator GUI - Added ability to configure multiple phy radio configurations within a single UI environment.
- Added alpha support for mbedtls in Connect: the application can now choose to use mbedtls for all crypto operations by simply enabling the mbedtls plugin.
- Added ability to enable/disable sleeping via push button to the Connect idle/sleep plugin.
- Added a new emberAfPluginMicriumRtosOkToEnterLowPowerCallback(...) callback to the Connect Micrium plugin to allow the application to control entering low power modes.
- The application can now configure the minimum sleep time in the Connect idle/sleep plugin.

3.1.2 Connect Stack APIs:

- EmberStatus emberMacFormNetwork(...) - An API for a MAC mode device to form a new PAN.
- EmberStatus emberMacGetParentAddress(...) - This API is now available also for HOST-NCP architecture and Micrium IPC.

3.2 Version 2.4.0.0 GA:

3.2.1 New Functionality:

- Micrium RTOS plugin - Added a new plugin option to support EM1 and EM2 low power MCU modes. When this option is enabled, a Connect application running within Micrium OS will enter the lowest allowed MCU power mode whenever possible.

3.2.2 New Sample Applications:

- Simple Multi-PHY TRX - This application demonstrates the usage of multiple phys selectable by channels.

3.3 Version 2.3.1.0 GA:

3.3.1 New Stack APIs:

- EmberStatus emberMacSetPanCoordinator(...) - An API that configures a MAC mode device as PAN coordinator.
- EmberStatus emberMacGetParentAddress(...) - An API for a MAC mode device to retrieve the parent address (short or long).
- void emberIncomingBeaconExtendedHandler(...) - A new stack handler that is invoked during an active scan upon receiving a beacon. It provides extended information regarding the received beacon.

3.4 Version 2.3.0.0 GA:

3.4.1 New Stack APIs:

- emberRemoveChild() Removes node (via MAC address) from the child table.

3.5 Version 2.2.2.0 GA:

3.5.1 New Application Plugins:

- **WMBus Helper:** This plugin contains all of the code associated with the Wireless M-Bus protocol. This plugin is used in the WMBus sample application.
- **Application Configuration:** This plugin contains all necessary configurations (startup files, linker configurations, and etc.) for RAIL applications.

3.5.2 New Stack APIs:

4 Changed Items

4.1 Version 2.5.0.0 GA:

5 Deprecated Items

5.1 Version 2.4.0.0 GA:

- `void emberMacSetAllocateAddressFlag(...)` - This function has been deprecated. The application can achieve the same behavior by allowing `EMBER_USE_LONG_ADDRESS` to be passed as `nodeId` to the `emberJoinNetworkExtended()` API.

5.2 Version 2.3.1.0 GA:

- `void emberIncomingBeaconHandler(...)` - This stack handler has been deprecated. The application should implement `emberIncomingBeaconExtendedHandler(...)` instead.

6 Removed Items

6.1 Version 2.5.0.0 GA:

- **PHY option selection box** - This feature has been deprecated.
- **Efr32 Radio Configurator** - This legacy configurator has been removed. Any existing applications requires manual migration of the existing parameters into the new Multi-Phy Configurator.
- **The Form And Join Connect plugin** has been removed. All functionality is now part of the Connect Stack Common plugin.
- Removed the 2K and 4K size options in the Simulated EEPROM version 1 plugin.

7 Fixed Issues

7.1 Version 2.5.1.0 GA:

- **Gecko Bootloader** has been updated to version 1.8.0 to fix a critical security issue. We strongly recommend all customers using image signing upgrade their products to this latest version which was introduced in Gecko SDK Suite 2.5.0 (Q4 2018 release in December). Customers may upgrade the bootloader without updating their protocol stack or application code to the latest SDK version.

7.2 Version 2.5.0.0 GA:

- 347731 Fixed a bug at the Connect stack that could result in the emberIncomingBeaconHandler(...) or emberIncomingBeaconExtendedHandler(...) to pass up an invalid beacon payload.
- 349524 Fixed a bug in the server side of the Connect over-the-air unicast bootloader which could result in the image distribution to stall under heavy interference.
- 350771 Fixed a Connect MAC layer issue that could result in not being able to transmit packets in presence of high interrupt latency, for instance, during a flash page erase.
- 330458 EmberStatus emberMacGetParentAddress(...) - This API is now available also for HOST-NCP architecture and Micrium IPC.
- 342464 Fixed an issue where the EFR32 serial driver state got out of sync with the actual contents of the buffer. It used to result in partial or old data being returned.
- 356233 An issue was fixed that was causing applications to attempt to set the priority for fixed-priority interrupts.
- 249836 An edge case was fixed on EFR32 that could cause resets of the watchdog timer to be lost if sleep was entered before they completed.
- 344633 The default source the the watchdog timer has been change from the ULFRCO to the LFRCO. Accordingly, the typical timeout period has dropped approximately 2.3%. Previously, the device would preemptively reset after 1.536s on average. It now does so after 1.5s.
- 338998 Updated all existing Flex SDK Sample Apps to use Multi-PHY Radio Configurator
- 349505 Enable Appbuilder to enforce EFR32MG21 specific plugin's on/off behavior when selected
- 352286 OTA bootloader broadcast plugin API documentation is missing
- 275587 Fixed an issue where generated hwconfig filename is wrong for BG module parts

7.3 Version 2.4.0.0 GA:

- 344018 Can compile RailTest for BRD4171A & BRD4176A now but when it is loaded there is no CLI
- 344016 Railtest on BRD4306B does not work if you load the crash app first the then non crashing one
- 343232 WMBus Application does not compile
- 343216 Can not compile panther RailTest 4171 if you do an import from studio
- 343177 Not able to build RailTest for BRD4176A
- 342566 Apps not building for new faster phys
- 341955 Can't build WMBUS that I could built yesterday with older SDK
- 337142 Modify Connect to support sleep through the Idle task hook
- 341831 Can not test RailTest for Panther - There is a required side package for this that has not been created yet
- 341706 WMBUS apps do not seem to compile with old .iscs and the new multiply support
- 341133 BGM4306B Please add this module to studio so that we can test Modules as a first class citizen
- 340666 Applications are not building for release/flex_2.4
- 339954 RailTest on Modules does not assert as the limited phy features says it should

- 339903 Can not find the new test apps needed for Multiphy testing in Studio
- 339703 RAIL LIB replacement keys not working for Panther / BRD4171A
- 339321 Dynamic Phy Manual testing is erroring out - Unknown command 'updateConfigurationPointer' using sdk 2.4 build 213
- 339308 [spike] get the smoke tests running again for RailTest 2.4
- 335349 Connect / Superframe fields
- 335302 Micrium plugin handles the command queue incorrectly in many places
- 335248 Incoming beacon callback returns garbage if Micrium plugin is enabled
- 334824 MAC device cannot send messages when micrium plugin is enabled
- 333445 Value line OPNs are not in the compatibility file for Flex
- 332631 Add new Panther OPNs to Flex for Alpha customers in 18Q3-GA
- 332630 Validate IAR compiler version 8.30.1 works with Flex sample apps
- 332439 RAIL apps failing to build.
- 332383 Can not build EFR32FG1V232F256GM32 with latest Flex 230 and studio 1602
- 330605 Upgrade to IAR 8.30.1
- 328737 Upgrade rules needed to support new Multi-PHY design
- 328733 Ensure Multi-PHY sample apps have CLI support to be testable by QA
- 328403 Deprecate emberMacSetAllocateAddressFlag()
- 328232 Add SDK entitlement / part support for new Panther OPNs to support Alpha customers
- 325690 Support Zigbee and Flex SDK on existing EFR32MG1 sub-GHz parts
- 325685 Add OPN Part Support for new sub-GHz Zigbee EFR32MG1x OPNs
- 322920 Upgrade rules for new multi-PHY support
- 322478 Integrate Multi-PHY WMBus Sample App into Flex SDK
- 322182 Integrate Simple Multi-PHY TRX Example App into Flex SDK
- 322181 Create Simple Multi-PHY TRX Example Application
- 322180 Create Multi-PHY WMBus Sample Application
- 322008 Integrate Multi-PHY Sample Apps
- 318326 Missing board supports
- 316600 Convert FLEX docs to new format.
- 316031 Connect upper MAC - initialize sequence number after emLowerMacInit()
- 315920 RailTest app for BG4104A compiles but when loaded on the device it has no CLI
- 315395 BRD4171A - Connect tests failing
- 313282 Auto-generate calculated defines in vNCP

- 311640 Error handling bug in OTA unicast-server plugin
- 311528 "Connect add 500kbps, 700kbps data rate Sub-GHz PHYs"
- 311500 Add option to selectively enable Rmr feature to railtest in studio
- 306450 [18Q3] Flex Bug Rollup - Internal / Technical Debt
- 300984 [18Q3] Flex Bug Rollup - Portal Watch / Customer
- 290855 rtos CLI keeps getting re-added to the ISC file every time it is opened and closed
- 265004 EMBER.CHILD.TIMEOUT_SEC should be an option of the parent support plugin
- 260625 [QA] 2.4GHz and Sub-GHz FHSS (Frequency Hopping Spread Spectrum) support
- 344212 NCP framework not compatible with modules
- 332277 The Ember bootloader is no longer released as part of Flex/Connect. Please use the Gecko bootloader instead. 335453 A minor issue exists in FLEX/Rail projects where unchecking the Hardware Configurator Serial and Virtual COM Port modules (enabled by default) will not automatically remove retargetserial.c and retargetio.c from the project. These files must be manually removed in this situation.
- 342814 IAR builds in Simplicity Studio are fully supported. However, an issue has been identified when using wine to build with the IarBuild.exe command line utility or IAR Embedded Workbench GUI on macOS or Linux. This could result in incorrect files being used due to collisions in wine's hashing algorithm for generating short file names. It is not recommended for customers on macOS or Linux to build with IAR outside of Simplicity Studio. Customers who do should carefully verify that the correct files are being used.
- 343807 A watchdog reset has been fixed in the SIMEE2 to NVM3 upgrade library when a large number of tokens are migrated.
- 334492 Stub versions of COM.InternalPowerUp/Down functions have been corrected to match the argument list of the non-stub versions.
- 313109 Reduced vector table alignments of dies such that they are now as minimum as required for IAR builds
- 343247 Fixed a bug in the sim-eprom2-1to2-upgrade-library that could result in lost token data or an infinite reset loop due to incorrectly identifying a non-existent SimEEv1. The upgrade library could read out of bound addresses or incorrectly attempt an upgrade which was impossible. EmberZNet versions affected are 6.3.1.0 and earlier. Devices using these versions should either disable the SimEE v1 to v2 upgrade library and use the stub library instead, or update to EmberZNet 6.4.0.0 or later.
- 298029 A build failure has been fixed for SPI-based xNCPs when disabling nWAKE functionality.
- 274550 Support for the infrared-led plugin has now been removed. Any app using the infrared-led plugin will need to be updated to not use it.
- 261038 A warning in COM_Unused has been fixed by changing the type of the port argument.
- 318018 EM3xx GCC applications now use the C startup routines found in platform/Device rather than those found in platform/base.

7.4 Version 2.3.0.1 GA:

- 320597 A node running in MAC mode now uses long ID source addressing for outgoing beacons if the short address is set to EMBER_USE_LONG_ADDRESS=0xFFFE.
- 329189 A node running in MAC mode is now capable of joining a coordinator node using long addressing.
- 318676 Calling RAIL_Sleep could sometimes set the wake event very far in the future.
- 314024 In multiprotocol RAIL applications a protocol switch would overwrite the txToRxSearch time set by a call to RAIL_SetStateTiming.

7.5 Version 2.3.0.0 GA:

- 313164 BRD4172A does not TX/RX on 490Mhz
- 313186 BRD4172B does not RX packets in 1 phy mode and rx only 1 packet in another
- 304709 Connect does not seed the HAL pseudo random generator
- 314985 Remove all "planned feature" from UG103-13
- 310961 Support for GCC Version 7.2.1
- 291011 Add support for new radio boards / OPNs and kit for DMP BLE + RAIL launch
- 314378 Adding missing OPNs to stack
- 300787 Connect - main plugin - auto-generate stack handlers file
- 299198 Auto-generate vNCP IPC protocol code
- 314259 RAILtest plugin does not allow 4096 byte packets
- 304852 RAIL switch demo contains wrong image
- 303522 LZMA decompression in Gecko Bootloader (SQA Only)
- 295307 The FEM control plugin is not yet supported in RAIL, which causes the FEM to not work properly on RAIL applications without modifications. To work around this, FEM specific code needs to be added to the main function of any RAIL apps that use FEM.
- 280219 Frequency hopping improvements
- 299437 remove ezr32 from Flex SDK part compatibility
- 290240 Sensor Sink test failing with 4170a
- 297470 Can't build apps for the BG
- 297809 Connect vNCP - stack API renaming
- 302831 Almost all RAIL applications inits PA incorrectly
- 292096 [18Q2] Flex Bug Rollup - Internal / Technical Debt
- 254410 Child table flags should be public
- 298828 Remove RangeTest 250k example
- 312065 [SPIKE] Duplicate definition of SysTick_Handler in base when compiling in Micrium support
- 285563 platform/base/phy/phy.h is no longer included in the stack install

- 277510 nWAKE handshake does not complete between EM35x SPI NCP and host, causing the host to assert
- 312291 The `halCommonGetIntxxMillisecondTick` functions on linux hosts currently use the `gettimeofday` function, which is not guaranteed to be monotonic. If the system time changes, it can cause issues with stack timing. The workaround is to modify these functions to use `clock_gettime` with the `CLOCK_MONOTONIC` source instead.
- 313160 Changes to UART behavior caused there to be a delay in receiving CLI commands in applications which include the idle-sleep plugin. To restore responsiveness, enable the "wake from activity on RX GPIO of application port" serial option.
- 289624 Add call to reset the flag that indicates a low-high transition on the nWake pin prior to processing the next EZSP command. This resolves the problem of a transition on nWake while the NCP was already awake placing the NCP into a state where it would never enter sleep again. This could still result in slightly elevated current (because the code is prevented from entering the IDLE state) between the low-high transition on the nWake line and the next EZSP command. If the SPI interface is idle, this elevated current could continue indefinitely.
- 299207 EFR32 applications now use the C startup routines found in `platform/Device` rather than those found in `platform/base`.
- 84437 EM3xx IAR applications now use the C startup routines found in `platform/Device` rather than those found in `platform/base`.
- 276695 `em_device.h` cannot be found

8 Open Issues

- 342814 An issue has been identified when using wine to build with the `IarBuild.exe` command line utility or IAR Embedded Workbench GUI on macOS or Linux. This could result in incorrect files being used due to collisions in wine's hashing algorithm for generating short file names. It is not recommend for customers on macOS or Linux to build with IAR outside of Simplicity Studio. Customers who do should carefully verify that the correct files are being used.
- 315661 Seeding of the random number generator on EM3xx can take 400 milliseconds.
- 362149 The size of NVM3 cache is not automatically adjusted based on the number of objects used by the application. An improperly sized cache may cause performance degradation and other undesirable effects. If you encounter problems with the default value, we recommend you change the cache size option in the NVM3 plugin such that it can hold entries for all NVM3 objects.
- 312291 The `halCommonGetIntxxMillisecondTick` functions on linux hosts currently use the `gettimeofday` function, which is not guaranteed to be monotonic. If the system time changes, it can cause issues with stack timing. The workaround is to modify these functions to use `clock_gettime` with the `CLOCK_MONOTONIC` source instead.
- 344466 Dynamically configuring the radios with RMR, the button push results in a lack of packets rx on the other side, due to the modem command setting rx to 0, until pb0 on both boards is pressed
- 249575 Flash&RAM size is incorrect in EFR32FG1VF64GM32's startup file. Program might not run correctly when powered-on
- 262589 Run CSTAT on Connect plugins
- 275141 Button code does not compile correctly for BG parts due to too many initializer values
- 275707 HwConf pin conflicts are listed as errors instead of warnings

- 251287 To achieve the lowest current during sleep on EFR32xG12, EFR32xG13, and EFR32xG14 parts, you must turn on voltage scaling. However, the radio will not operate with voltage scaling turned on, so to turn it on you must also make sure to disable it after each wake-up. Furthermore, some resets will not turn off voltage scaling, so please ensure that it is disabled before attempting to turn on the radio.
- 295307 The FEM control plugin is not yet supported in RAIL, which causes the FEM to not work properly on RAIL applications without modifications. To work around this, FEM specific code needs to be added to the main function of any RAIL app that uses FEM.
- 315799 4163A board does not work for DMP connected lighting demo
- 342464 An issue has been identified that can cause the EFR32 serial driver state to get out of sync with the actual contents of the buffer. This can result in partial or old data being returned.
- 312291 The `halCommonGetIntxxMillisecondTick` functions on linux hosts currently use the `gettimeofday` function, which is not guaranteed to be monotonic. If the system time changes, it can cause issues with stack timing. The workaround is to modify these functions to use `clock_gettime` with the `CLOCK_MONOTONIC` source instead.

9 Intended Behavior

9.1 Version 2.4.0.0 GA:

- WMBUS Meter and WMBUS Collector application have been updated. The sample applications are not backward compatible. User is expected to manually migrate the application code into the new application code.
- A minor issue exists in FLEX/Rail projects where unchecking the Hardware Configurator Serial and Virtual COM Port modules (enabled by default) will not automatically remove `retargetserial.c` and `retargetio.c` from the project. These files must be manually removed in this situation.
- RAILTEST does not support all OPN/BOARD by default in Studio. To enable RAILTEST for all parts, the following stack change is required.

```
File: connect/meta-inf/appbuilder.properties
# Update the 'architecture' field to display as follow
architecture=\
efr32+iar,\
efr32+gcc,\
```

```
# Remove the line below
boards=...
```

```
File: connect/meta-inf/appbuilder-override.properties
# Remove the line below
additionalBoards=...
```

10 Documentation Changes

11 History