Wi-SUN SDK 1.9.0.0 GA
Gecko SDK Suite 4.4
February 14, 2024

Wireless Smart Ubiquitous Network (Wi-SUN) is the leading IPv6 sub-GHz mesh technology for smart city and smart utility applications. Wi-SUN brings Smart Ubiquitous Networks to service providers, utilities, municipalities/local government, and other enterprises, by enabling interoperable, multi-service, and secure wireless mesh networks. Wi-SUN can be used for large-scale outdoor IoT wireless communication networks in a wide range of applications covering both line-powered and battery-powered nodes.

Silicon Labs’ Wi-SUN hardware is certified by the Wi-SUN Alliance, a global industry association devoted to seamless LPWAN connectivity. Wi-SUN builds upon open standard internet protocols (IP) and APIs, enabling developers to extend existing infrastructure platforms to add new capabilities. Built to scale with long-range capabilities, high-data throughput and IPv6 support, Wi-SUN simplifies wireless infrastructure for industrial applications and the evolution of smart cities.

These release notes cover SDK versions:
1.9.0.0 released February 14, 2024.
1.8.0.0 released December 13, 2023.

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/wi-sun-protocol-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 Wi-SUN SDK, Using This Release.

Compatible Compilers:
IAR Embedded Workbench for ARM (IAR-EWARM) version 9.40.1
- 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 12.2.1, provided with Simplicity Studio.

KEY FEATURES

Wi-SUN Stack
- Added support for LFN multicast reception
- Added support for non-standard PHY configurations
- Added support for blocking sockets

Wi-SUN Applications
- Wi-SUN – SoC Network Measurement improvements
- Wi-SUN – SoC (CoAP) Meter and Wi-SUN – SoC (CoAP) Collector improvements
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1 Wi-SUN Stack

This release of the Gecko SDK (GSDK) will be the last with combined support for all EFM and EFR devices, except for patches to this version as needed. Starting in mid-2024 we will introduce separate SDKs:

- The existing Gecko SDK will continue with support for Series 0 and 1 devices.
- A new SDK will cater specifically to Series 2 and 3 devices.

The Gecko SDK will continue to support all Series 0 and 1 devices with no change to the long-term support, maintenance, quality, and responsiveness provided under our software policy.

The new SDK will branch from Gecko SDK and begin to offer new features that help developers take advantage of the advanced capabilities of our Series 2 and 3 products.

This decision aligns with customer feedback, reflecting our commitment to elevate quality, ensure stability, and enhance performance for an exceptional user experience across our software SDKs.

1.1 New Items

**Added in release 1.9.0.0**

- Added support for ETSI Adaptive Power Control. It is required to comply with Indian regional regulations.
- Improved LFNs clock drift compensation. It reduces the power consumption and the connection stability.
- Dropped the high-reliability transmission mechanism. Its use was not recommended, and it was causing a significant increase of all communications latency.

**Added in release 1.8.0.0**

- Added a new API `sl_wisun_get_stack_version()` that returns the stack version.
- Updated `sl_wisun_join()` to support the customization of PHY configurations. Extended `sl_wisun_phy_config_type_t` and `sl_wisun_phy_config_t` to allow the customization of OFDM, FSK and O-QPSK entries.
- Added support for LFN Timing Offset (LTO). Avoid LFN broadcast and unicast overlaps.
- Added support for LFN multicast reception.
- Added support for SUN DSSS-OQPSK.
- Added support for blocking sockets.
- Added support for the new Indian PHY configurations.

1.2 Improvements

**Changed in release 1.8.0.0**

- Refactored the socket API. The POSIX socket API used to call Silicon Labs socket API. The logic is now reversed. Silicon Labs socket API became a wrapper around the POSIX socket API that is now exposed by the stack.
- Removed the RTOS dependencies from the libraries.

1.3 Fixed Issues

**Fixed in release 1.9.0.0**

<table>
<thead>
<tr>
<th>ID #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1218436</td>
<td>Fixed an error causing UDP sockets to be closed when receiving packets with an empty payload.</td>
</tr>
<tr>
<td>1225947</td>
<td>Fixed an error causing the frequency hopping to be blocked on rare occasions.</td>
</tr>
</tbody>
</table>
### ID # Description

<table>
<thead>
<tr>
<th>ID</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1234624</td>
<td>Fixed an error causing LLC messaging allocation to fail. It was caused by an invalid logic in the mac TX queue.</td>
</tr>
<tr>
<td>1252174</td>
<td>Fixed an error causing LFNs to use an invalid broadcast schedule after a reconnection.</td>
</tr>
<tr>
<td>1246610</td>
<td>Fixed an error causing LFNs reconnection to a router to fail.</td>
</tr>
<tr>
<td>1234620</td>
<td>Fixed an error preventing LFNs to send NS(EARO) and thus to reconnect after a given number of non-consecutive unsuccessful connection attempts.</td>
</tr>
<tr>
<td>1244154</td>
<td>Fixed an error causing an invalid memory access in dense topologies.</td>
</tr>
<tr>
<td>1235265</td>
<td>LUS-IE were sent in all LFN data frames, even when the Listen Interval did not change.</td>
</tr>
<tr>
<td>1252134</td>
<td>Fixed an error preventing LFNs to send NS(EARO) and thus to reconnect after a given number of non-consecutive unsuccessful connection attempts.</td>
</tr>
<tr>
<td>1235277</td>
<td>Improved the overall stability when disconnecting LFNs.</td>
</tr>
</tbody>
</table>

**Fixed in release 1.8.0.0**

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<thead>
<tr>
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<tbody>
<tr>
<td>1212101</td>
<td>Fixed an error causing an assert when a device connects to network and then later re-join with a different device type.</td>
</tr>
<tr>
<td>1220872</td>
<td>Fixed an error causing an LFN parent to hard fault on an LFN disconnection.</td>
</tr>
<tr>
<td>1213289</td>
<td>Fixed an invalid variable initialization that could cause a device frame counter to be set to 0 when using IAR.</td>
</tr>
<tr>
<td>1205266</td>
<td>Fixed an invalid configuration preventing LFN to connect when using the Balanced or Eco modes.</td>
</tr>
<tr>
<td>1204471</td>
<td>Fixed an invalid initialization in MPL that was causing a multicast packet to be considered as old after a router reconnection.</td>
</tr>
<tr>
<td>1194355</td>
<td>Fixed an invalid time synchronization between an LFN and his FFN parent. It was causing significant drifts making downstream communications instable after a while.</td>
</tr>
<tr>
<td>1187012</td>
<td>The Join Metric IE was not forwarded when the join state 1 was skipped.</td>
</tr>
<tr>
<td>1168410</td>
<td>Fixed an error causing a LFN to be out-of-sync when no packet is exchanged for more than 1h10 (uint32 max us)</td>
</tr>
<tr>
<td>1132165</td>
<td>Fixed an error causing MAC retries to be skipped on rare occasions.</td>
</tr>
<tr>
<td>1014210</td>
<td>Fixed an error causing routers to stay on the wrong channel after performing asynchronous transmissions.</td>
</tr>
<tr>
<td>1104667</td>
<td>LFN are now send a Neighbor Solicitation with an EARO with a zero lifetime when disconnecting.</td>
</tr>
<tr>
<td>1182578</td>
<td>Wi-SUN OUI was coded with the wrong byte ordering.</td>
</tr>
<tr>
<td>1199108</td>
<td>Maintained and restored the DHCP Identity Association ID (IAID) across reboots.</td>
</tr>
<tr>
<td>1205932</td>
<td>That stack performed a CSMA/CA on asynchronous frame transmissions. This behavior is specifically forbidden in the FAN TPS.</td>
</tr>
<tr>
<td>1223417</td>
<td>The stack occasionally tried to send a Neighbor Advertisement (NA) as a reply to a received Neighbor Solicitation (NS) used for Neighbor Unreachability Detection (NUD). This behavior is specifically forbidden in the FAN TPS.</td>
</tr>
</tbody>
</table>

#### 1.4 Known Issues in the Current Release

Issues in bold were added since the previous release.

<table>
<thead>
<tr>
<th>ID #</th>
<th>Description</th>
<th>Workaround</th>
</tr>
</thead>
<tbody>
<tr>
<td>1119464</td>
<td>Packets sent when FSK FEC is enabled can infringe ARIB regulation.</td>
<td>Until this problem has been addressed correctly, the stack will refuse to start if both ARIB enforcement and FEC are enabled.</td>
</tr>
<tr>
<td>1067978</td>
<td>Packets sent using a PHY with a bandwidth larger than the base PHY’s bandwidth can infringe ARIB regulation.</td>
<td>Limit the communications when using mode switch with ARIB enforcement enabled.</td>
</tr>
<tr>
<td>ID #</td>
<td>Description</td>
<td>Workaround</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1176014</td>
<td>FG25 asserts with a RAIL_ASSERT_FAILED_RTCC_SYNC_STALE_DATA error code when entering EM2.</td>
<td>Do not allow the power manager to go to EM2 by adding a requirement on EM1 in the application.</td>
</tr>
</tbody>
</table>

### 1.5 Deprecated Items

None

### 1.6 Removed Items

None
2 Wi-SUN Applications

2.1 New Items

**Added in release 1.9.0.0**

**Wi-SUN – RCP**
- Released RCP v2.0: Must be used in pair with wsbrd v1.9 and more recent. It significantly reduces the memory footprint. The memory required to run the application no longer depends on the number of routers connected to the border router.

**Wi-SUN – SoC CoAP Meter and Collector**
- LFN Power Optimization: Application level actions (measure, print, RX/TX) are scheduled for the LFN wake-up events exclusively, without delay.

**Added in release 1.8.0.0**

**Wi-SUN SoC CLI:**
- The default values are now coming from the Wi-SUN Configurator
- FAN1.1 PHY nomenclature is now used by default.

**Wi-SUN – SoC Network Measurement**
- More robust iPerf client algorithm
- iPerf statistics improvement

**Wi-SUN – SoC (CoAP) Meter and Wi-SUN – SoC (CoAP) Collector**
- Meters now automatically send their measurements to the Collector. In the previous implantation, the Collector was polling the information on a regular basis.
  - Meters advanced request modes
    - Registration and remove request: set the destination of the meter measurements.
  - LFN Profile based measurement/report schedule.

**Wi-SUN – SoC TCP Server**
- The application is now using blocking sockets.

**CoAP Notification Service**
- App Status Component provides statistic notification about the application.

**OTA DFU:**
- Added a component option to enable or disable the automatic installation of the new firmware.

**Configurable LFN Support for all the applications**
- An application can be either LFN or FFN
- Documented the process to configure applications to be able to enter EM2 energy mode.

**EFR32xG28 Explorer Kit Support**

2.2 Fixed Issues

**Fixed in release 1.9.0.0**

<table>
<thead>
<tr>
<th>ID #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1231539</td>
<td>Border Router RCP: Fixed an error causing an hard fault after failing to decode a broadcast packet.</td>
</tr>
</tbody>
</table>

**Fixed in release 1.8.0.0**

<table>
<thead>
<tr>
<th>ID #</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1199459</td>
<td>Border Router RCP: Fixed an error causing an invalid memory access. It was leading to a border router reboot and a collapse of the whole network.</td>
</tr>
<tr>
<td>ID #</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1225118</td>
<td>Border Router SoC: Fixed an error preventing the BR to stop when started was an invalid PHY configuration.</td>
</tr>
<tr>
<td>1210967</td>
<td>Border Router SoC: Fixed an error causing a hard fault when connecting more than 22 routers directly to the border router SoC.</td>
</tr>
<tr>
<td>1212392</td>
<td>LFN Sample Applications can't enter into EM2.</td>
</tr>
<tr>
<td>1078443</td>
<td>iperf: Fixed an issue causing the throughput to collapse when targeting a UDP bandwidth greater than the theoretical maximum.</td>
</tr>
</tbody>
</table>

### 2.3 Known Issues in the Current Release

Issues in bold were added since the previous release.

<table>
<thead>
<tr>
<th>ID #</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1067236</td>
<td>The border router RCP SPI interface is unstable when used with a throughput higher than 1 Mbytes/s</td>
<td>The use of border router RCP SPI interface is not recommended for the time being.</td>
</tr>
</tbody>
</table>
| 1255197 | After a lost ping response no new ping requests can be issued since recvfrom() blocks until a ping response is received. For all applications except:  
  - Wi-SUN - CLI example  
  - Wi-SUN - LFN CLI example  
  - Wi-SUN - RCP                                                                                   | Update the socket for non-blocking (SOCK_RAW | SOCK_NONBLOCK) in _ping_task_fnc()                                                                |
|        | Simplicity Studio – Network Analyzer: Wi-SUN Encrypted Packets are not supported  
  Undecoded frames (only after Ack) according to PTI issues on Series 2                            |                                                                                                                                                           |

### 2.4 Deprecated Items

None

### 2.5 Removed Items

None
3 Using This Release

This release contains the following:

- Wi-SUN stack library
- Wi-SUN sample applications
- Wi-SUN border router pre-compiled demos
- Documentation

If you are a first time user, see https://docs.silabs.com/wisun/latest/wisun-getting-started-overview/

3.1 Installation and Use

The Wi-SUN 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.

3.2 Security Information

Secure Vault Integration

This version of the stack does not integrate Secure Vault Key Management.
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.

3.3 Support

Development Kit customers are eligible for training and technical support. Contact Silicon Laboratories support at http://www.silabs.com/support.
Simplicity Studio

One-click access to MCU and wireless tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!