



Bluetooth[®] mesh SDK 2.1.4.0 GA

Gecko SDK Suite 3.2

October 13, 2021

Bluetooth mesh is a new topology available for Bluetooth Low Energy (LE) devices that enables many-to-many (m:m) communication. It's optimized for creating large-scale device networks, and is ideally suited for building automation, sensor networks, and asset tracking. Our software and SDK for Bluetooth development supports Bluetooth Mesh and Bluetooth 5.2 functionality. Developers can add mesh networking communication to LE devices such as connected lights, home automation, and asset tracking systems. The software also supports Bluetooth beaconing, beacon scanning, and GATT connections so Bluetooth mesh can connect to smart phones, tablets, and other Bluetooth LE devices.

These release notes cover SDK versions:

- 2.1.4.0 released October 13, 2021
- 2.1.3.0 released September 24, 2021 (underlying Bluetooth changes only)
- 2.1.2.0 released September 8, 2021
- 2.1.1.0 released July 21, 2021
- 2.1.0.0 released June 16, 2021



KEY FEATURES

- Integration with Secure Vault
- Addition of HSL models
- Support for dynamic GATT database
- Support for updated compiler versions

Compatibility and Use Notices

For more information about security updates and notices, see the Security chapter of the Gecko Platform Release notes installed with this SDK or on the [Silicon Labs Release Notes page](#). 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 Bluetooth mesh SDK, see [Using This Release](#).

Compatible Compilers:

IAR Embedded Workbench for ARM (IAR-EWARM) version 8.50.9

- 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 10.2.0, provided with Simplicity Studio.

Link-time optimization feature of GCC has been disabled, resulting in slight increase of image size

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1 New Items

1.1 New Features

Added in release 2.1.0.0

Secure Vault Integration

Beginning with release 2.1.0.0, the Bluetooth Mesh SDK uses the Secure Vault Key Management functionality for storing mesh cryptographic keys when Secure Vault High devices are used.

The Secure Vault integration is visible to the customer in a number of ways on Series 2 devices:

- The layout of NVM3 data for cryptographic keys and their related metadata changes. Key migration functionality is provided for projects that have been created using SDK versions 2.0 or earlier. A one-time key migration needs to be done when the firmware on a device is updated.
- Key data visibility is intentionally limited on regular mesh nodes. An application on a regular mesh node is not permitted to view application or device key data using the `sl_btmesh_node_get_key()` BGAPI command, while an application on an embedded Provisioner node is allowed to do so.

For further information on key storage in Secure Vault please refer to [AN1271: Secure Key Storage](#).

Compiler Support

Supported compilers have been updated to GCC version 10.2.0 and IAR version 8.50.9.

New Example Applications

HSL Lighting example (**Bluetooth Mesh - SoC HSL Light**) was added to demonstrate a light node that is controllable over HSL server models.

IOP demos (**Bluetooth Mesh - IOP Test - ***) were added for the Radio boards in the Pro Development Kits (SLWRB4104A, SLWRB4181A, SLWRB4181B, SLWRB4182A). The demos allow testing interoperability with mobile phones. The test requires four examples, each example representing one of the Mesh features: proxy, relay, friend, and LPN.

New Components

- HSL Server Component was added.
- Support for dynamic GATT database (a Bluetooth LE feature) was added.

1.2 New APIs

Added in release 2.1.4.0

Explicit Time Status message sending function `sl_btmesh_time_server_status()` and the corresponding explicit publishing function `sl_btmesh_time_server_publish()` were added to the Time Server model API.

Added in release 2.1.2.0

By default a normal Mesh device that is not a Provisioner is not able to export security key data over the BGAPI. If key export is needed on such a device it should use a new BGAPI command, `sl_btmesh_node_set_exportable_keys()`, before any keys are created on the node. This includes keys created during provisioning of the device.

A diagnostic event notifying the application of a scheduled scene change, `sl_btmesh_scheduler_server_scene_changed()`, has been added.

Added in release 2.1.1.0

To optimize buffer usage with Scene models, an optional API to enable compacted scene recall events has been added (ref. issue ID 706555). It is recommended to use the new API when a node has a large amount of models, or the amount of network traffic the node is expected to hear is high.

To activate the new API, use the BGAPI command `sl_btmesh_scene_server_enable_compact_recall_events()`. Afterwards, `sl_btmesh_evt_scene_server_compact_recall_events` will signal scene recall requests. To retrieve the cached model states after a scene recall request, use the command `sl_btmesh_generic_server_get_cached_state()`.

Added in release 2.1.0.0

Because of Secure Vault integration, the details of storing encryption keys and their related metadata has changed on Series 2 devices. A new BGAPI class for migrating encryption keys and the embedded Provisioner's device database after a firmware update on Series 2 devices has therefore been added. It has the following commands:

- `sl_btmesh_migration_migrate_keys`
- `sl_btmesh_migration_migrate_ddb`

2 Improvements

2.1 Changed APIs

Changed in release 2.1.2.0

The timezone parameter in `sl_btmesh_time_server_get_datetime()` has been corrected to be a signed 16-bit integer.

Clock accuracy parameter, `sl_btmesh_lpn_clock_accuracy`, has been added to LPN configuration. This parameter can be used to tune LPN sleep behavior when the clock drift on the device would otherwise cause LPN to miss its poll timeout.

Changed in release 2.1.1.0

The event `sl_btmesh_evt_friend_friendship_terminated` will now be generated when a Configuration Client disables the node's Friend feature when a friendship is active. Previously the termination of the friendship in this situation was implicitly signalled by the `sl_btmesh_evt_node_config_set` event. (Ref. issue iD 627811)

Changed in release 2.1.0.0

The following BGAPI commands in the prov class now return after parameter validation, and the actual requested operation takes place after a BGAPI response is given. The completion of the requested operation is signalled by a corresponding BGAPI event:

- `sl_btmesh_prov_add_ddb_entry()` – completion of addition is signalled by `sl_btmesh_evt_prov_add_ddb_entry_complete`
- `sl_btmesh_prov_delete_ddb_entry()` – completion of deletion is signalled by `sl_btmesh_evt_prov_delete_ddb_entry_complete`

The following BGAPI command in the prov class has an additional event that may be generated after it is called:

`sl_btmesh_prov_init` – in addition to `sl_btmesh_evt_prov_initialized`, `sl_btmesh_evt_prov_initialization_failed` may be generated.

A BGAPI command has been added to the generic client model BGAPI:

`mesh_generic_client_init_hsl()`

A BGAPI command has been added to the generic server model BGAPI:

`mesh_generic_server_init_hsl()`

3 Fixed Issues

Fixed in release 2.1.4.0

| ID # | Description |
|--------|---|
| 729116 | Fixed issue with unintentional Time Server model multiplication when adding new elements to a project |
| 735569 | Fixed handling of segmented multicast messages that a friend node is delivering to a low power node |

Fixed in release 2.1.2.0

| ID # | Description |
|--------|---|
| 627811 | Generate a friendship terminated event when termination is locally requested |
| 676798 | Take clock inaccuracy into account with LPN poll wakeup timing |
| 683518 | Generate friendship termination event immediately at the time of receiving a Friend Clear message |
| 703974 | Fixed a qualification test issue with heartbeats |
| 709948 | Provided an API to control exportability of security keys on a mesh node |
| 724511 | Fixed an issue with registering vendor opcodes over 0x1F |
| 730273 | Fixed an issue with negative time zone offset handling |
| 731713 | Fixed a potential memory leak with sending segmented messages when the device is low on memory |
| 734034 | Fixed friend-to-LPN communication when TTL is zero |
| 734858 | Corrected a potential stack variable issue with PSA structure handling |
| 736054 | Fixed a qualification test issue with model-application key binding |

Fixed in release 2.1.1.0

| ID # | Description |
|--------|--|
| 692961 | Fixed the node becoming unresponsive when relay retransmissions were enabled when under heavy load |
| 713152 | Fixed a problem where limited precision of calculation caused rounding errors in the binding between Light Lightness Actual and Light Lightness Linear |

Fixed in release 2.1.0.0

| ID # | Description |
|--------|---|
| 3878 | Application should ignore GATT events for Mesh characteristics |
| 342521 | Math library does not grow the size of the image unnecessarily |
| 358019 | Corrected result code given when model publication with friendship credentials is requested but friendship is not supported |
| 404070 | Corrected result code given when provisioner command to create a network key is called on a non-provisioner device |
| 454332 | The LE GAP API should be used for device local name advertising |
| 464907 | Removed unnecessary 'heartbeat started' BGAPI event when configuration client disables heartbeat on a node |
| 653405 | Out-of-the-box switch sample application current consumption is now at the expected level |
| 654477 | DCD correctly decoded by Network Analyzer |
| 660048 | Button Press UC component doesn't require IO Stream component unnecessarily |
| 687105 | BT Mesh Commands work with NCP Target example and NCP Commander |
| 690803 | Fixed duplicate vendor model IDs in code generator |
| 690862 | SoC empty example now starts beaconing on xG22 hardware |
| 707497 | Corrected PSA cryptographic context allocation |
| 707524 | Fixed a regression with IV recovery guard timer, not allowing another recovery too soon |

| ID # | Description |
|--------|--|
| 710381 | Fixed lighting default state handling when a non-default range for the corresponding model was set |
| 711359 | Fixed parameter checking for provisioning session creation BGAPI call |

4 Known Issues in the Current Release

Issues in bold were added since the previous release.

| ID # | Description | Workaround |
|--------|--|---|
| 401550 | No BGAPI event for segmented message handling failure | Application needs to deduce failure from timeout / lack of application layer response |
| 418636 | Issues with mesh_test local configuration state API (node identity, relay, network retransmission) | |
| 454059 | A large number of key refresh state change events are generated at the end of KR process, and that may flood NCP queue | Increase NCP queue length in the project |
| 454061 | Slight performance degradation compared to 1.5 in round-trip latency tests was observed | |
| 624514 | Issue with re-establishing connectable advertising if all connections have been active and GATT proxy is in use | Allocate one more connection than is needed |
| 650825 | Issue with retransmissions when a model is publishing periodically | Set up retransmissions in the model state and trigger periodic publishing by an application timer |

5 Deprecated Items

The following BGAPI command in the node class has been deprecated:

`sl_btmesh_node_erase_mesh_nvnm()` – use `sl_btmesh_node_reset()` instead.

6 Removed Items

None

7 Using This Release

This release contains the following

- Silicon Labs Bluetooth mesh stack library
- Bluetooth sample applications

If you are a first time user, see *QSG176: Silicon Labs Bluetooth Mesh SDK v2.x Quick-Start Guide*.

7.1 Installation and Use

A registered account at Silicon Labs is required in order to download the Silicon Labs Bluetooth SDK. You can register at https://siliconlabs.force.com/apex/SL_CommunitiesSelfReg?form=short.

Stack installation instruction are covered in *QSG176: Silicon Labs Bluetooth Mesh SDK v2.x Quick-Start Guide*.

Use the Bluetooth mesh SDK with the Silicon Labs Simplicity Studio V4 development platform. Simplicity Studio ensures that most software and tool compatibilities are managed correctly. Install software and board firmware updates promptly when you are notified.

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/>.

7.2 Security Information

Secure Vault Integration

This version of the stack is integrated with Secure Vault Key Management. When deployed to Secure Vault High devices, mesh encryption keys are protected using the Secure Vault Key Management functionality. The table below shows the protected keys and their storage protection characteristics.

| Key | Exportability on a node | Exportability on Provisioner | Notes |
|-----------------|-------------------------|------------------------------|---|
| Network key | Exportable | Exportable | Derivations of the network key exist only in RAM while network keys are stored on flash |
| Application key | Non-exportable | Exportable | |
| Device key | Non-exportable | Exportable | In Provisioner's case, applied to Provisioner's own device key as well as other devices' keys |

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

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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7.3 Support

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

Contact Silicon Laboratories support at <http://www.silabs.com/support>.

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Silicon Laboratories Inc.
400 West Cesar Chavez
Austin, TX 78701
USA

www.silabs.com