

# Tech Talks LIVE Schedule – Presentation will begin shortly

## Silicon Labs LIVE:

### Wireless Connectivity Tech Talks Summer Series



Topic	Date
Building a Proper Mesh Test Environment: How This Was Solved in Boston	Thursday, July 2
Come to your Senses with our Magnetic Sensor	Thursday, July 9
Exploring features of the BLE Security Manager	Thursday, July 23
New Bluetooth Mesh Light & Sensor Models	Thursday, July 30
<b>Simplicity Studio v5 Introduction</b>	<b>Thursday, August 6</b>
Long Range Connectivity using Proprietary RF Solution	Thursday, August 13
Wake Bluetooth from Deep Sleep using an RF Signal	Thursday, August 20



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a BG22 Thunderboard!



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<https://www.silabs.com/support/training>



# WELCOME

**Silicon Labs LIVE:**  
Wireless Connectivity Tech Talks  
Summer Series





# Introduction to Simplicity Studio 5

August 6<sup>th</sup>, 2020



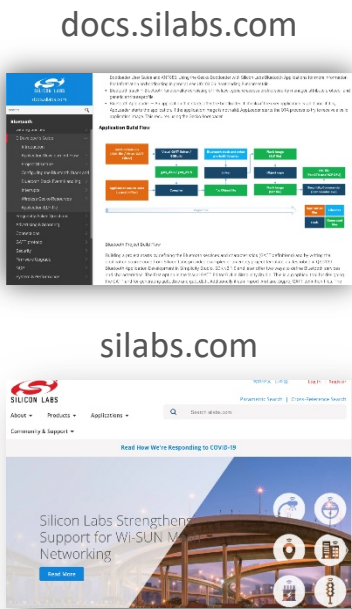
<https://www.silabs.com/products/development-tools/software/simplicity-studio/simplicity-studio-5>

# What is Simplicity Studio 5?



- **Free Eclipse Based Development Environment**
  - Designed to support Silicon Labs IoT Portfolio
- **Provides Access to Target Device-Specified Web & SDK Resources**
- **Software & Hardware Configuration Tools**
- **Integrated Development Environment (IDE)**
  - Eclipse based, C/C++ IDE
  - GNU ARM Toolchain
- **Advanced Value Add Tools**
  - Network Analysis, Code Correlated Energy Profiling, Configuration Tools, etc.

# The Data Driving Simplicity Studio 5?



Dev Guides, Tutorials  
API RMs  
Ref Manuals, Datasheets, Errata



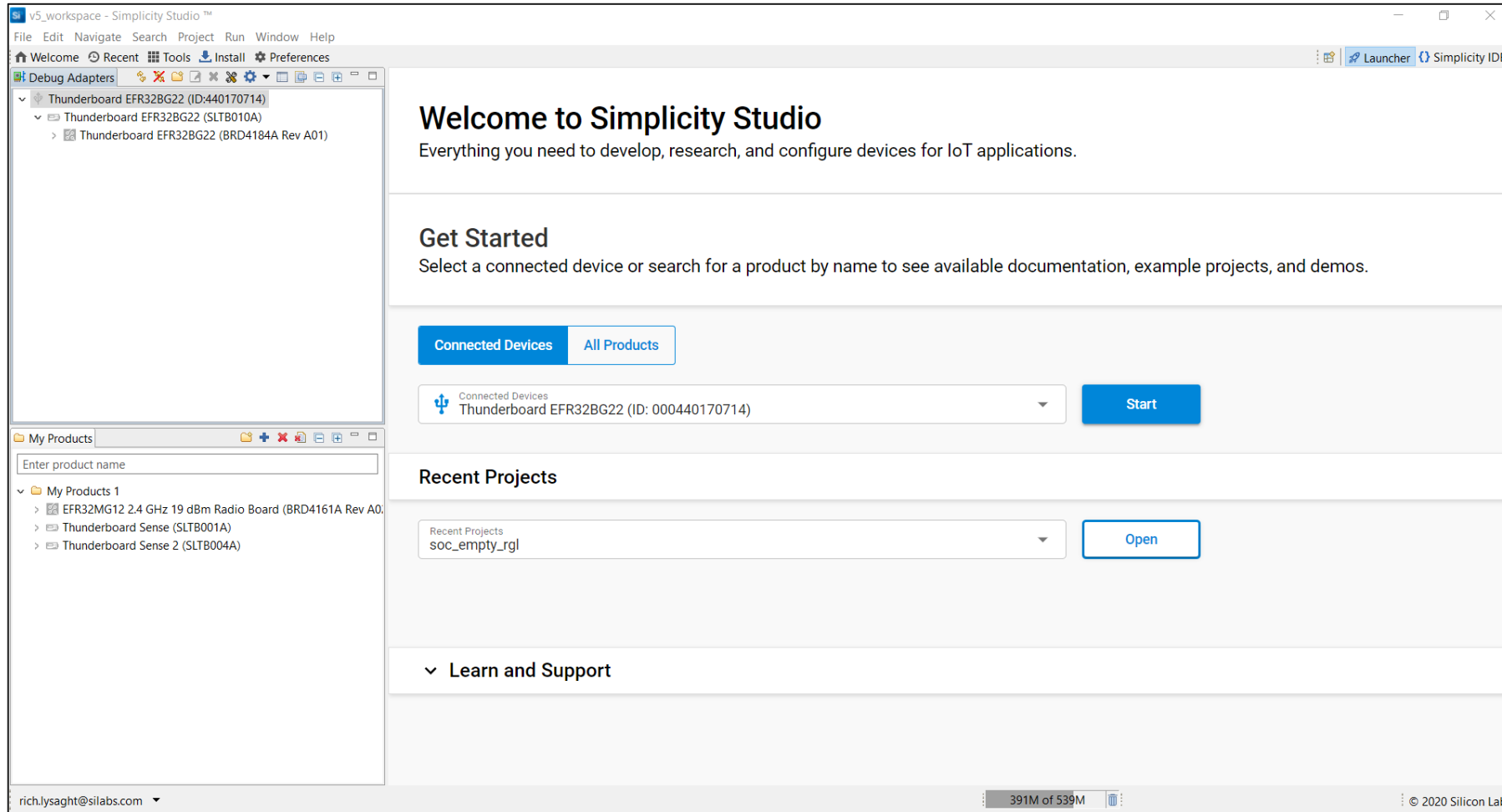
Stacks, Gecko Platform, Examples, Demos, metadata  
Board ID



## Simplicity Studio 5 - Launcher

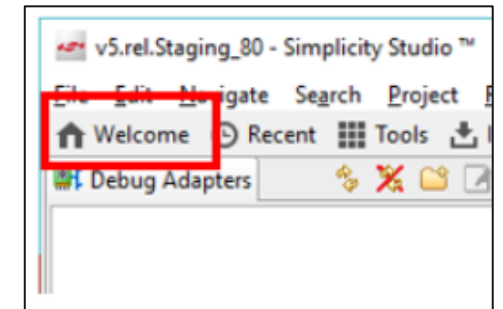


# Launcher Perspective - Welcome Page



## On the Welcome Page You Can

- Select Target Device
- Start a New Project
- Access Support Resources and Educational



Pressing 'Welcome' on the tool bar will return to Welcome page at any time.

# Launcher Perspective - Welcome Page

The screenshot shows the Simplicity Studio Launcher Perspective. The interface is divided into several sections:

- 1. Welcome & Target Selection:** The main content area features a "Welcome to Simplicity Studio" message, a "Get Started" section with a search bar for connected devices, and a "Start" button. A dropdown menu shows "Thunderboard EFR32BG22 (ID: 000440170714)".
- 2. Debug Adapters:** A sidebar on the left shows a tree view of connected debug adapters, including "Thunderboard EFR32BG22 (ID:440170714)" and its sub-items.
- 3. My Products:** A sidebar on the left shows a tree view of products, including "My Products 1" and "Thunderboard Sense 2 (SLTB004A)".
- 4. Menu:** The top of the window features a menu bar with options like "File", "Edit", "Navigate", "Search", "Project", "Run", "Window", and "Help".

Additional elements include a "Recent Projects" section with a dropdown showing "soc\_empty\_rgl" and an "Open" button, and a "Learn and Support" section at the bottom. The status bar at the bottom indicates "rich.lysgaht@silabs.com", "391M of 539M", and "© 2020 Silicon Labs".

## 1. Welcome & Target Selection

This is a “get started” section to help with device or board selection

## 2. Debug Adapters

Area shows connected debug adapters including Silicon Lab kits, Segger, J-Link, etc...

## 3. My Products

Editable list of products you may wish to use as target devices

## 4. Menu

Menu & Tool bar provide access to a number of functions and shortcuts



# Launcher Perspective - Overview

The screenshot shows the Simplicity Studio Launcher Perspective Overview page for a Thunderboard EFR32BG22 (ID: 000440170714). The page is divided into four main sections, each highlighted with a red circle and a number:

- 1. General Information:** This section displays the connection status (Connected Via: J-Link Silicon Labs), debug mode (Onboard Device (MCU)), adapter firmware version (0v8p0b44), and secure firmware status (Unknown). It also shows the preferred SDK (Gecko SDK Suite v3.0.0) and a link to manage SDKs.
- 2. Recommended Quick Start Guides:** This section lists recommended quick start guides for the board, including AN1255, QSG168, QSG169, and QSG170. There is a button for "All Quick Start Guides".
- 3. Board:** This section shows an image of the Thunderboard EFR32BG22 (BRD4184A Rev A01) and a "View Documents" button.
- 4. Target Part:** This section shows an image of the EFR32BG22C224F512IM40 target part and a "View Documents" button.

**1. General Information**  
GI card shows debugger, debugger mode, firmware versions for adapter and security, SDK

**2. Recommended QSGs**  
Quick links to recommended quick start guides for selected product.

**3. Board**  
Board shows which evaluation board is being used and provides easy access to its documentation.

**4. Target Part**  
Target part shows full part number and also provides easy access to its documentation

# Launcher Perspective – Example Projects

The screenshot shows the Simplicity Studio Launcher Perspective for a Thunderboard EFR32BG22 (ID: 000440170714). The interface is divided into several sections:

- Left Sidebar:** Contains a 'My Products' tree with a search box and a list of products including BGM210PA32JIA, EFR32MG12 2.4 GHz 19 dBm Radio Board (BRD4161A Rev), Thunderboard Sense (SLTB001A), and Thunderboard Sense 2 (SLTB004A).
- Top Navigation:** Includes tabs for OVERVIEW, EXAMPLE PROJECTS (highlighted with a blue arrow), DOCUMENTATION, DEMOS, and COMPATIBLE TOOLS.
- Search Area:** Features a 'Filter on keywords' box and a 'Technology Type' filter with checkboxes for Bluetooth (9), Bootloader (6), Platform (6), and Proprietary (8).
- Resource List:** Displays 29 resources found, including:
  - BGAPI UART DFU Bootloader:** Standalone Bootloader using the BGAPI protocol over UART DFU. This is the recommended UART bootloader for the BLE protocol stack. (Highlighted with a red circle '2')
  - EZSP SPI Bootloader:** Standalone Bootloader using the EZSP protocol over SPI. This is the recommended SPI bootloader for the EmberZNet and Connect protocol stacks.
  - Internal Storage Bootloader (single image on 512kB device):** Application Bootloader for all EFR32 and EFM32 devices with 512kB or larger flash, using the internal flash memory to store upgrade images received by the application in an application specific way, such as OTA, USB, Ethernet, etc. This sample configuration supports storing a single firmware update image at a time, and is plug-and-play compatible with the "Local Storage Bootloader" configuration of Silicon Labs EmberZNet, Bluetooth and Connect sample applications on 512 kB EFR32xG13 devices. The layout of the storage...
  - SPI Flash Storage Bootloader (multiple images):** Application Bootloader for all EFR32 and EFM32 devices with external flash, using an external SPI flash to store upgrade images received by the application over the air in an application specific way. This sample configuration supports storing multiple firmware update images simultaneously by configuring multiple storage slots.

**1. Technology Filter**  
Keyword Filter box and Technology Type check boxes let you dial into the example you are looking for.

**2. Resource List**  
Resource list will show corresponding example projects that are intended for your selected technology and target device.

# Launcher Perspective – Documentation

The screenshot shows the Simplicity Studio Launcher Perspective for the Thunderboard EFR32BG22 (ID:440170714). The 'DOCUMENTATION' tab is selected, and a blue arrow points to it. The page displays a list of 169 resources found. Three items are circled in red and numbered 1, 2, and 3:

- 1. Resource Type filter: A red circle highlights the 'Resource Type' filter section, which includes checkboxes for Application Notes (58), Data Sheets, Errata (1), Quick Start Guides, Reference Designs (3), Reference Manuals (1), Release Notes (4), User's Guides (65), White Papers (7), and Other (21).
- 2. Technology Type filter: A red circle highlights the 'Technology Type' filter section, which includes checkboxes for Bluetooth (34), Bootloader (1), and Operating Systems.
- 3. Resource list: A red circle highlights the first three items in the resource list: AN1254: Transitioning from the v2.x to the v3.x Proprietary Flex SDK, AN1255: Transitioning from the v2.x to the v3.x Bluetooth SDK, and Flex SDK Release Notes.

**1. Resource Filter**  
Keyword Filter box and Resource Type check boxes let you dial into the resource you are looking for (Data Sheet, App Note, Errata, QSG, etc...).

**2. Technology Type**  
Technology check boxes narrow your search based on a give technology (Bluetooth, Bootloaders, Thread, Zigbee, etc...).

**3. Resources**  
List of resources that will narrow as you select filters (Data Sheet, App Note, Errata, QSG, etc...).

# Launcher Perspective – Demos

The screenshot shows the Simplicity Studio interface for a Thunderboard EFR32BG22 (ID: 0004...70714). The 'DEMOS' tab is selected, displaying a list of 4 resources found. A red circle labeled '1' highlights the 'My Products' sidebar on the left, and a red circle labeled '2' highlights the 'Bluetooth - NCP Empty' demo card. A blue arrow points to the 'DEMOS' tab.

**1**

Thunderboard EFR32BG22 (ID: 0004...70714)

OVERVIEW EXAMPLE PROJECTS DOCUMENTATION **DEMOS** COMPATIBLE TOOLS

Run a pre-compiled demo to test on your device

Filter on keywords

4 resources found

**Bluetooth - NCP Empty**  
Bluetooth NCP (Network Co-Processor) target application with a GATT database, that makes it possible to access the Bluetooth stack from a UART. It provides access to the host layer via BGAPI and not to the link layer.

**Bluetooth - SoC Thermometer**  
Implements a GATT Server with the Health Thermometer Profile, which enables a Client device to connect and get temperature data. Temperature is read from the Si7021 digital relative humidity and temperature sensor of the WSTK or of the Thunderboard.

**Bluetooth - SoC Thunderboard EFR32BG22**  
Demonstrates the features of the Thunderboard EFR32BG22 Kit. This can be tested with the Thunderboard mobile app.

**Bluetooth - SoC iBeacon**  
An iBeacon device implementation that sends non-connectable advertisements in iBeacon format. The iBeacon Service gives Bluetooth accessories a simple and convenient way to send iBeacons to smartphones. This example can be tested together with the EFR Connect mobile app.

## 1. Demo Filter

Demo Filter allows you to narrow your search of demos for your selected device.

## 2. Demos

List of Pre-compiled demos that are ready to be programmed into your selected device.

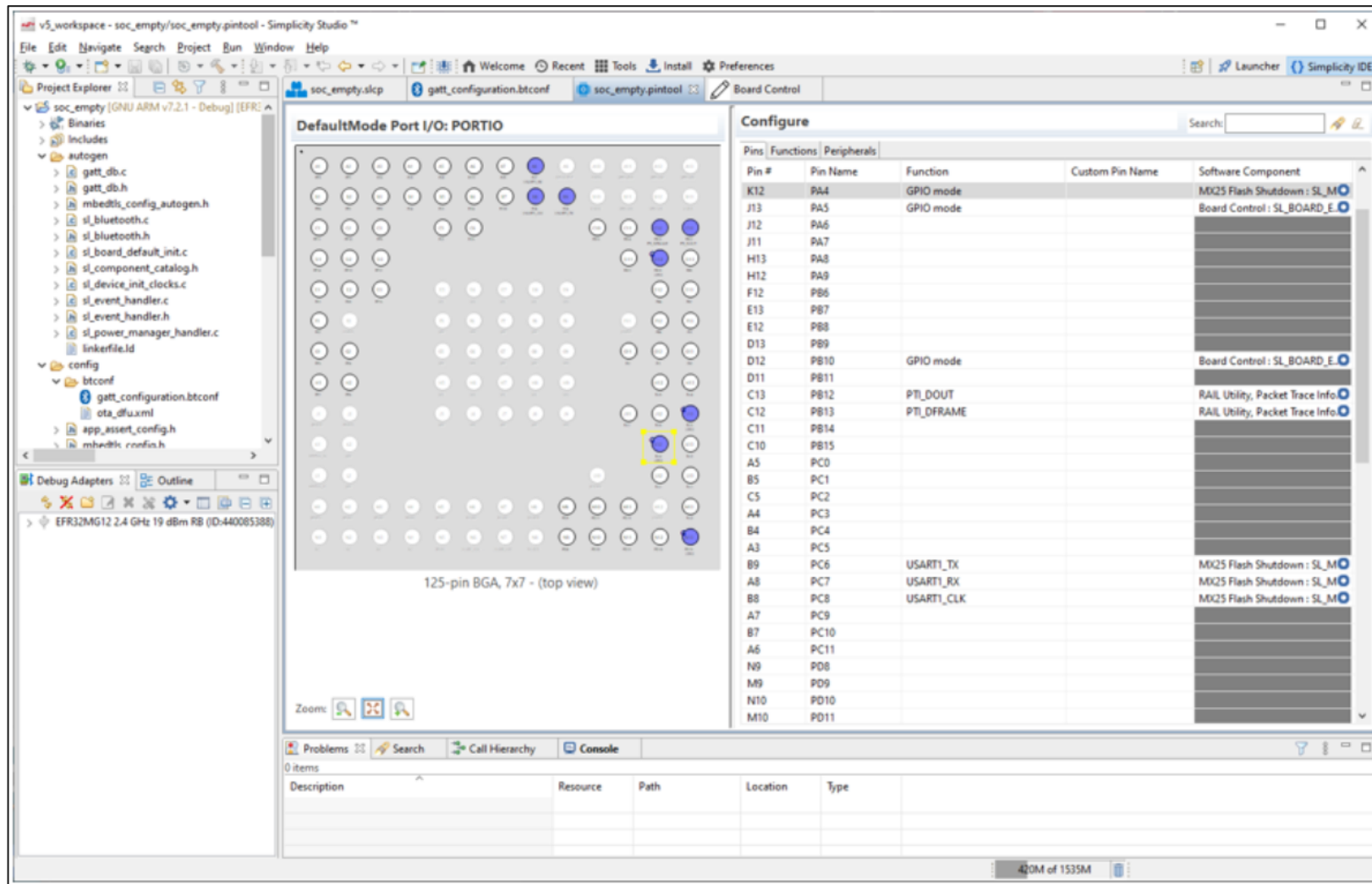
# Launcher Perspective – Compatible Tools

The screenshot shows the Simplicity Studio interface for a Thunderboard EFR32BG22 (ID: 000440170714). The 'COMPATIBLE TOOLS' tab is active, displaying a grid of tools with 'LAUNCH' buttons. A blue arrow points to the 'COMPATIBLE TOOLS' tab, and a red circle with the number '1' highlights the 'LAUNCH' button for the 'Device Console' tool.

Tool Name	Description	Launch Button
Simplicity Commander	Graphical and command-line utility to manage flash and security of EFM and EFR devices in development and production environments	LAUNCH
Simplicity IDE	Eclipse-based integrated development environment featuring industry-standard code editor, compiler and debugger	LAUNCH
Device Console	Development kit serial and admin command-line console utility	LAUNCH
Network Analyzer	Wireless packet capture and analysis tools	LAUNCH
Application Builder	Embedded software framework application builder for Zigbee and Gecko Bootloader	LAUNCH
Migrate Projects	Migrate projects from version 4 workspace to version 5 workspace	LAUNCH
Capacitive Sense Profiler	Capacitive sensor data analyzer	LAUNCH
BG Tool	Interactive tool for sending BGAPI commands to a Bluetooth device	LAUNCH
Energy Profiler	Capture and analyze energy data from a single device or multiple nodes on a network	LAUNCH
Flash Programmer	Non-volatile flash memory programmer	LAUNCH

**1. Compatible Tools**  
Launching pad for tools such as Hardware Configurator, Network Analyzer, Device Console, Energy Profiler, etc...

# Launcher Perspective –Tools – Pin Configuration Tool



**Pin Configuration Tool**  
Simplicity Studio 5 offers a Pin Configuration Tool that allows the user to easily configure new peripherals or change the properties of existing ones. The graphical view will differ based on the chip being used.

## Simplicity Studio 5 - IDE

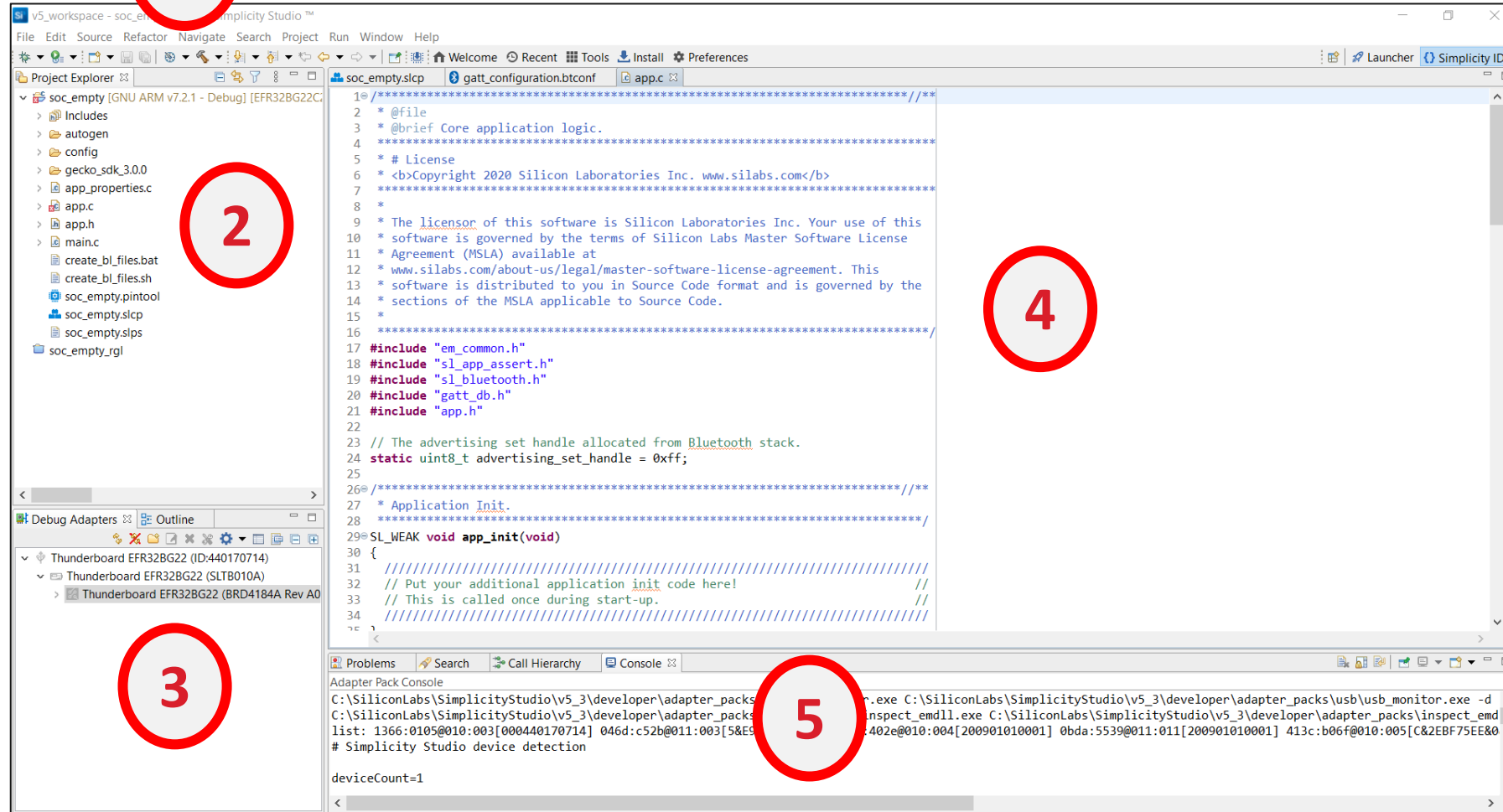


# IDE – Overview

1

2

3



**1. Tool Bar & Menu**  
Launching pad for tools

**2. Project Explorer**  
Directory structure and all files associate with the project.

**3. Debug Adapters**  
Shows connected debuggers and EVKs

**4. Editor & Configurators**  
Code editing windows and configurators for project/technologies.

**5. Additional Windows**  
Problems, Search, Call Hierarchy, Console



# IDE – Project Configurator Overview

The screenshot displays the Simplicity Studio IDE interface for project configuration. The main window is titled "v5\_workspace - soc\_empty/soc\_empty.slcp - Simplicity Studio™". The interface is divided into three main sections: "Target and SDK Selection", "Project Details", and "Project Generators".

- Target and SDK Selection:** This section shows a hardware board image (Thunderboard EFR32BG22) and a "Change Target/SDK" button. A red circle with the number "1" is placed below the board image.
- Project Details:** This section displays project information for "soc\_empty", including the category "Bluetooth Examples" (circled with a red "2"), the preferred SDK (Gecko SDK Suite), and the import mode (Link sdk and copy project sources). A "Force Generation" button is located at the bottom.
- Project Generators:** This section shows a description of the project and an "Edit" button. A red circle with the number "3" is placed next to the description.

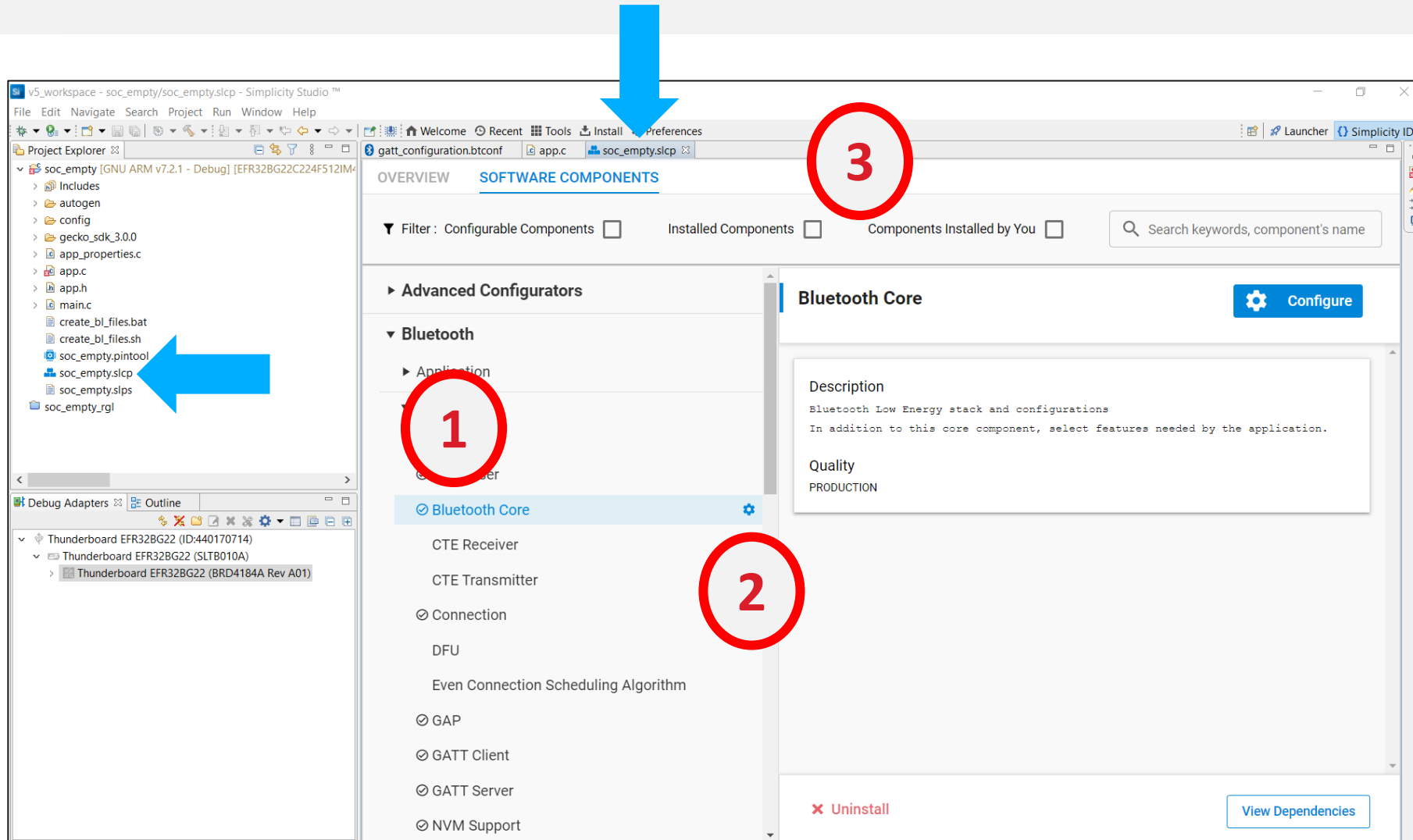
On the left side, the Project Explorer shows the project structure, with "soc\_empty.slcp" selected. A blue arrow points to this selection. Another blue arrow points to the "OVERVIEW" tab at the top of the configurator. The bottom of the interface shows a list of debug adapters and a selected hardware board: "Thunderboard EFR32BG22 (BRD4184A Rev A01)".

**1. Target & SDK**  
Allows user to change development target and SDK.

**2. Project Details**  
Can change import mode & force generation.

**3. Project Generators**  
Allows user to modify what files are being generated by project

# IDE – Project Configurator Software Components

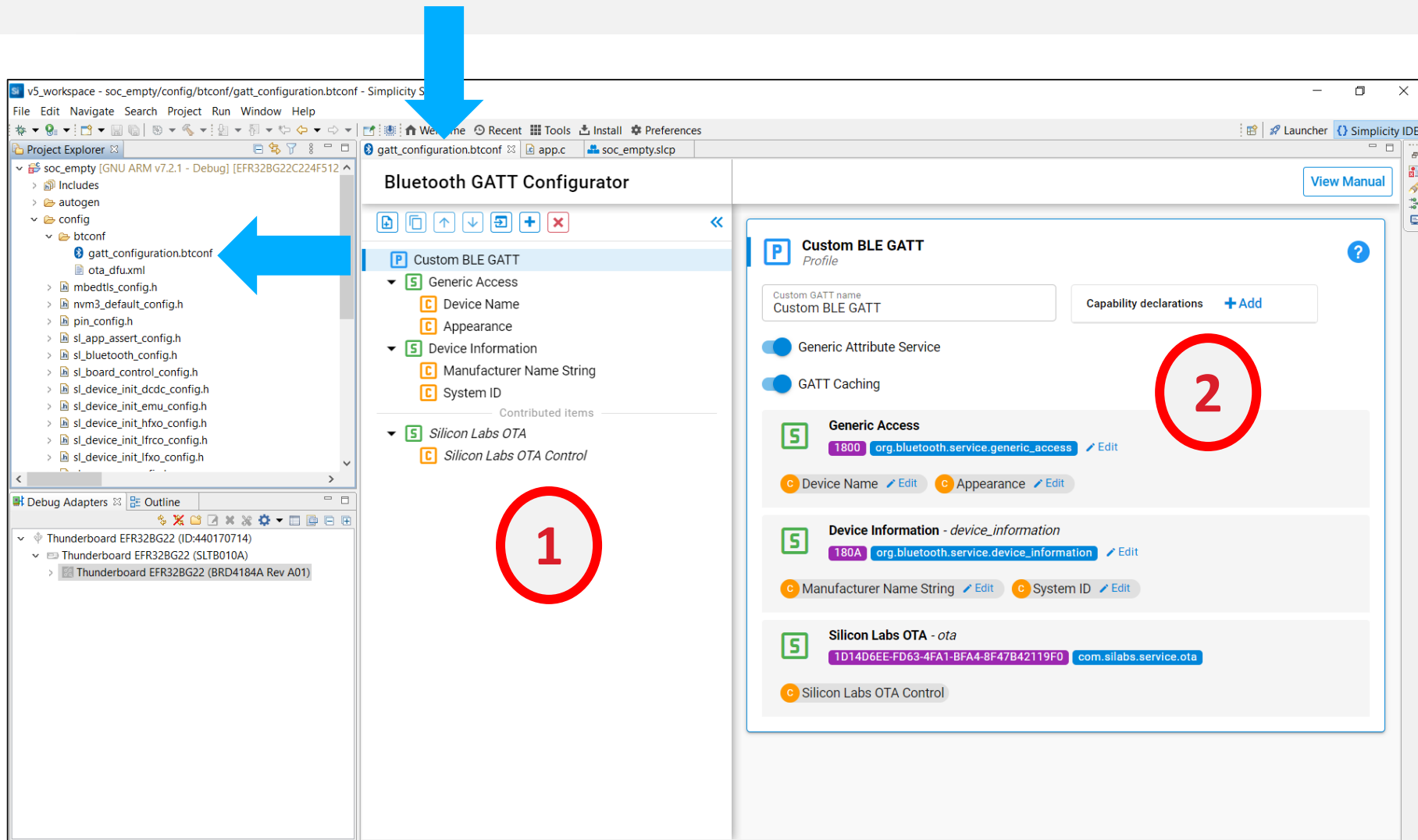


**1. Component**  
Expand components to see categories and sub-categories.

**2. Selected Component**  
View details of a given component. Gear indicates a configurable component. Check marks show installed components.

**3. Filters & Keywords**  
Help you to search various component categories

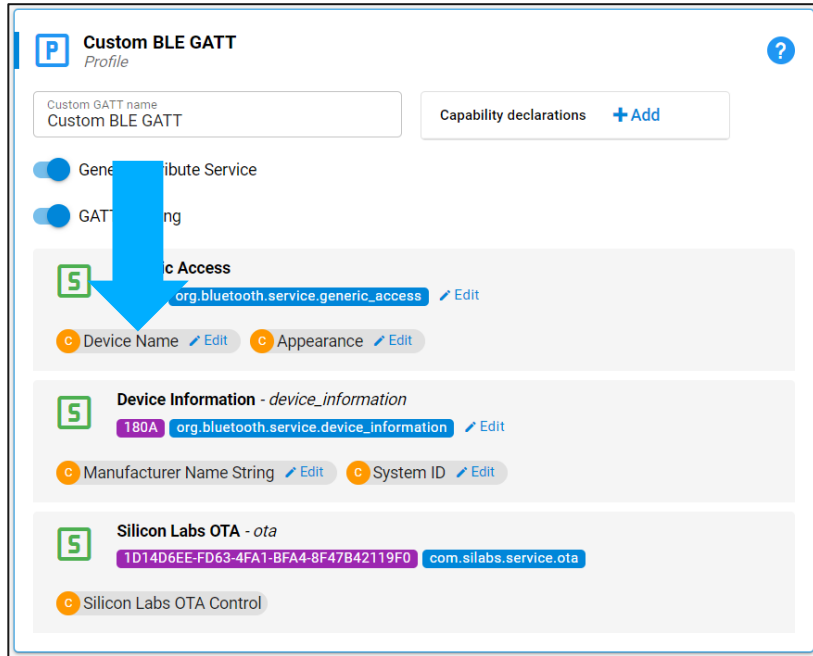
# IDE – Configurators (GATT)



**1. GATT Configurator**  
View, Add, Remove GATT Profiles, Services, Characteristics, and Descriptors

**2. GATT Editor**  
Allows user to view & modify settings in the Profiles, Services, Characteristics and Descriptors within the GATT.

# IDE – Configurators (Editing the GATT)

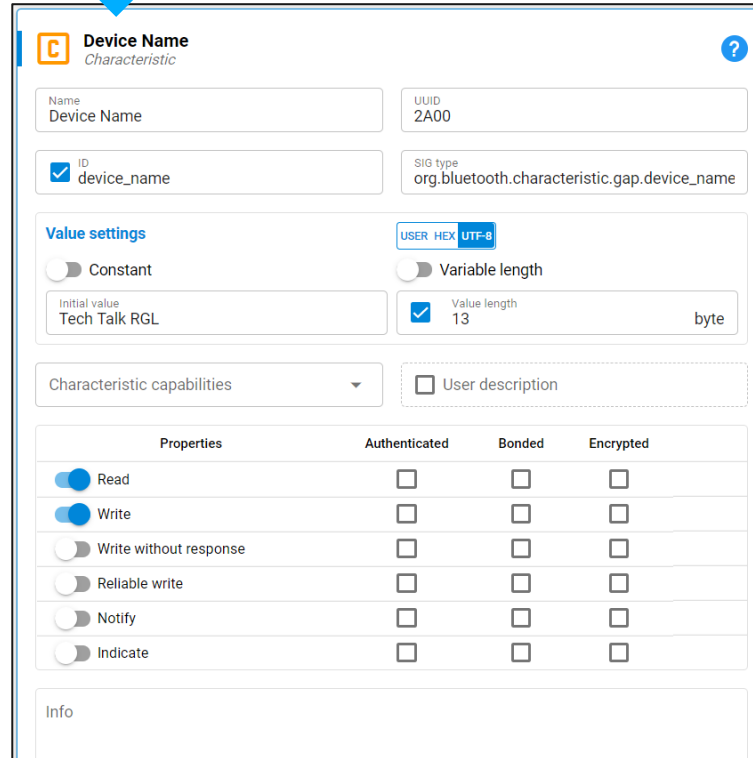


**Custom BLE GATT**  
Profile

Custom GATT name: Custom BLE GATT

Capability declarations [+Add](#)

- General Attribute Service
- GATT
- Generic Access
  - [org.bluetooth.service.generic\\_access](#) [Edit](#)
  - [Device Name](#) [Edit](#)
  - [Appearance](#) [Edit](#)
- Device Information - *device\_information*
  - [180A](#) [org.bluetooth.service.device\\_information](#) [Edit](#)
  - [Manufacturer Name String](#) [Edit](#)
  - [System ID](#) [Edit](#)
- Silicon Labs OTA - *ota*
  - [1D14D6EE-FD63-4FA1-BFA4-8F47B42119F0](#) [com.silabs.service.ota](#)
  - [Silicon Labs OTA Control](#)



**Device Name**  
Characteristic

Name: Device Name

UUID: 2A00

ID: device\_name

SIG type: org.bluetooth.characteristic.gap.device\_name

**Value settings**

Constant  Variable length

Initial value: Tech Talk RGL

Value length: 13 byte

Characteristic capabilities:  User description

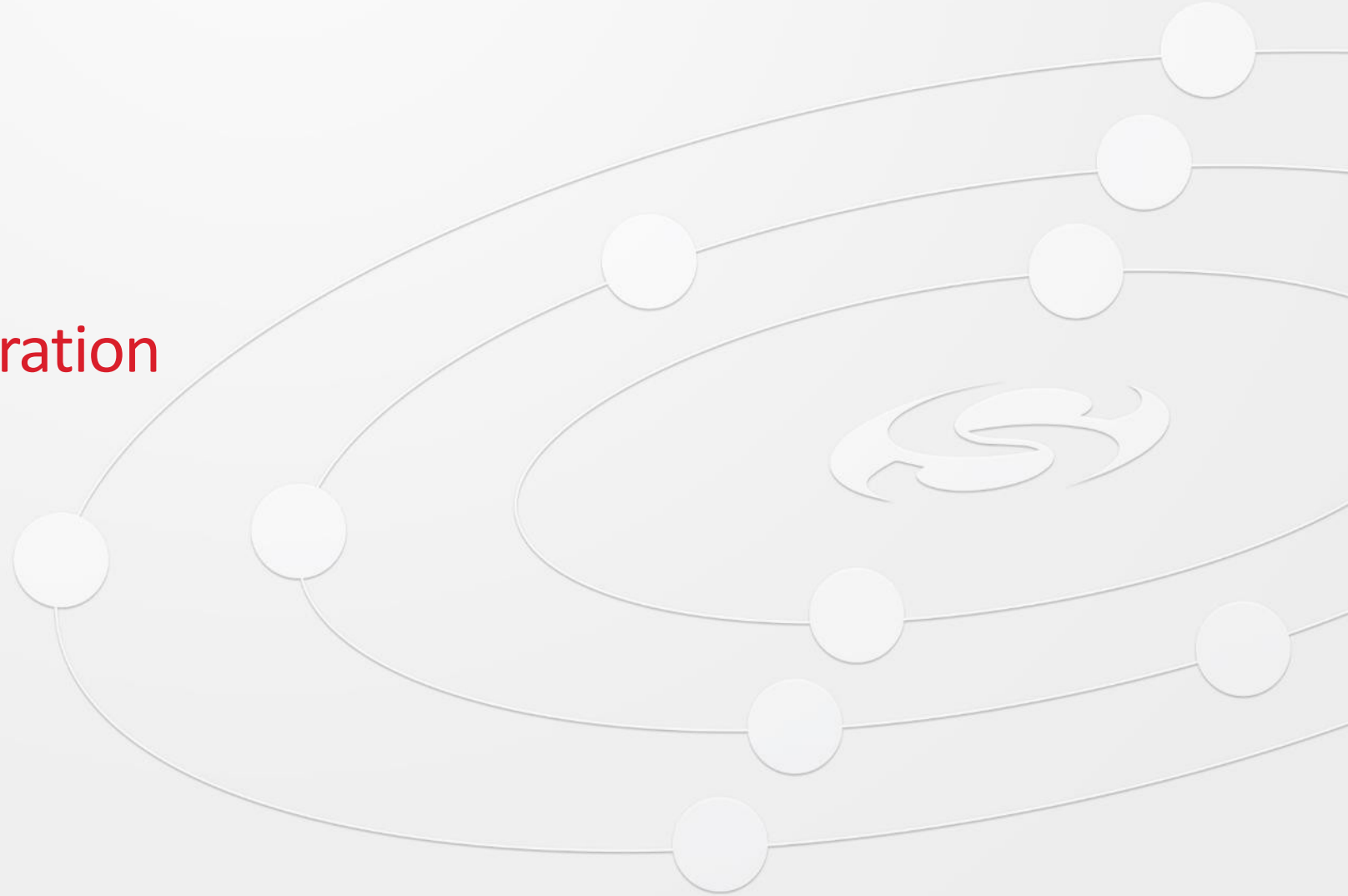
Properties	Authenticated	Bonded	Encrypted
<input checked="" type="checkbox"/> Read	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Write without response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Reliable write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Notify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Indicate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Info

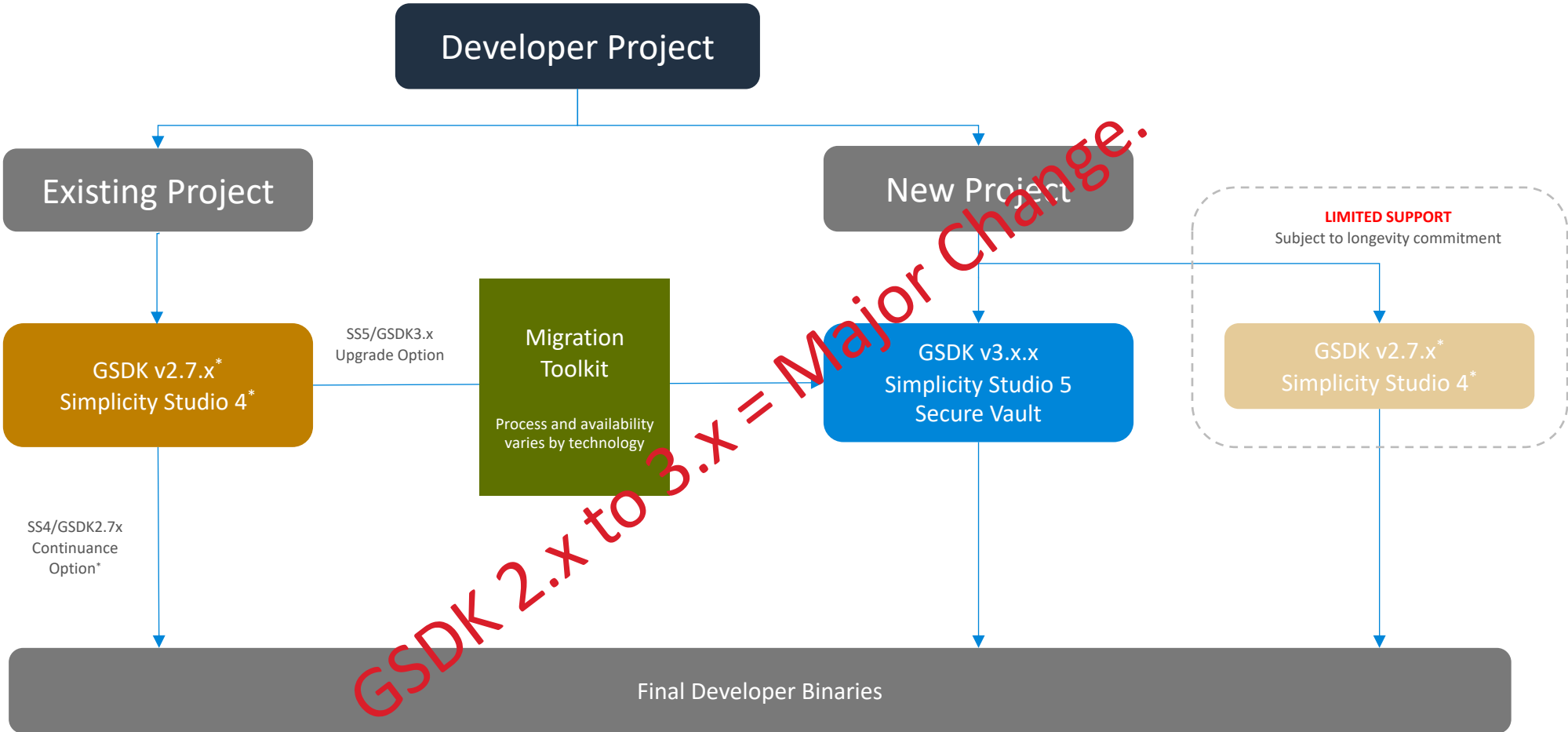
## EDIT (Device Name)

From GATT Configurator clicking on an editable item such as device name will open up a new window allowing the user to see content that can be edited and several options for that content that can be selected/de-selected.

## Simplicity Studio 5 - Migration



# Simplicity Studio - Developer Options



\*Bugfixes provided per software longevity commitment (<https://www.silabs.com/products/software/longevity-commitment>)

# Simplicity Studio – Project Structure

## Bluetooth SDK v2.x Project Structure

<b>/app</b>	Application specific files
<b>/hardware</b>	Development board configuration files and drivers for external peripherals
<b>/platform</b>	Device configuration files and drivers for the MCU peripherals
<b>/protocol</b>	Bluetooth stack files
<b>/util</b>	Utilities

## Bluetooth SDK v3.x Project Structure

<b>/autogen</b>	Automatically generated files based on the installed software components
<b>/config</b>	Editable configuration files for the software components
<b>/gecko_sdk_3.0.0</b>	
<b>/app</b>	Application specific files
<b>/hardware</b>	Development board configuration files and drivers for external peripherals
<b>/platform</b>	Device configuration files and drivers for the MCU peripherals
<b>/protocol</b>	Bluetooth stack files
<b>/util</b>	Utilities

### Project Structure

There is a change in project structure from GSDK v2.x to GSDK v3.x.

It's now much easier to see which file can be modified by the generator and it's easier to find/identify the configuration files

This is important because with GSDKv3.x many more files are generated by the addition of software components.

# Simplicity Studio – BGAPI Commands

## BGAPI Command

### Command functions in v2.x

```
/* Function */
struct gecko_msg_gatt_server_read_attribute_value_rsp_t*
gecko_cmd_gatt_server_read_attribute_value(uint16 attribute, uint16 offset);

/* Response structure */
struct gecko_msg_gatt_server_read_attribute_value_rsp_t
{
    uint16 result,
    uint8array value
}
```

### Command functions in v3.0

```
sl_status_t sl_bt_gatt_server_read_attribute_value(uint16 attribute, uint16 offset, size_t
max_value_size, size_t *value_len, void *value);
```

**BGAPI Commands**  
BGAPI Commands change both their name and their structure to make the error checking and handling of return values simpler.



# Simplicity Studio – Changes to BGAPI Commands

API 2.x	API 3.0	Notes
gecko_cmd_le_gap_enable_whitelisting	sl_bt_gap_enable_whitelisting	le_gap class renamed to gap
gecko_cmd_le_gap_set_data_channel_classification	sl_bt_gap_set_data_channel_classification	
gecko_cmd_le_gap_set_privacy_mode	sl_bt_gap_set_privacy_mode	
-	sl_bt_advertiser_create_set	New API for creating an advertising set. <b>Call this command to create an advertising set before any advertising operations on an advertising set. The returned handle of the created advertising can then be used in other commands for advertising operations. A created advertising set can be released by command sl_bt_advertiser_delete_set.</b>
-	sl_bt_advertiser_delete_set	New API for deleting an advertising set.
gecko_cmd_le_gap_bt5_set_adv_parameters	sl_bt_advertiser_set_timing sl_bt_advertiser_set_channel_map sl_bt_advertiser_set_report_scan_request	

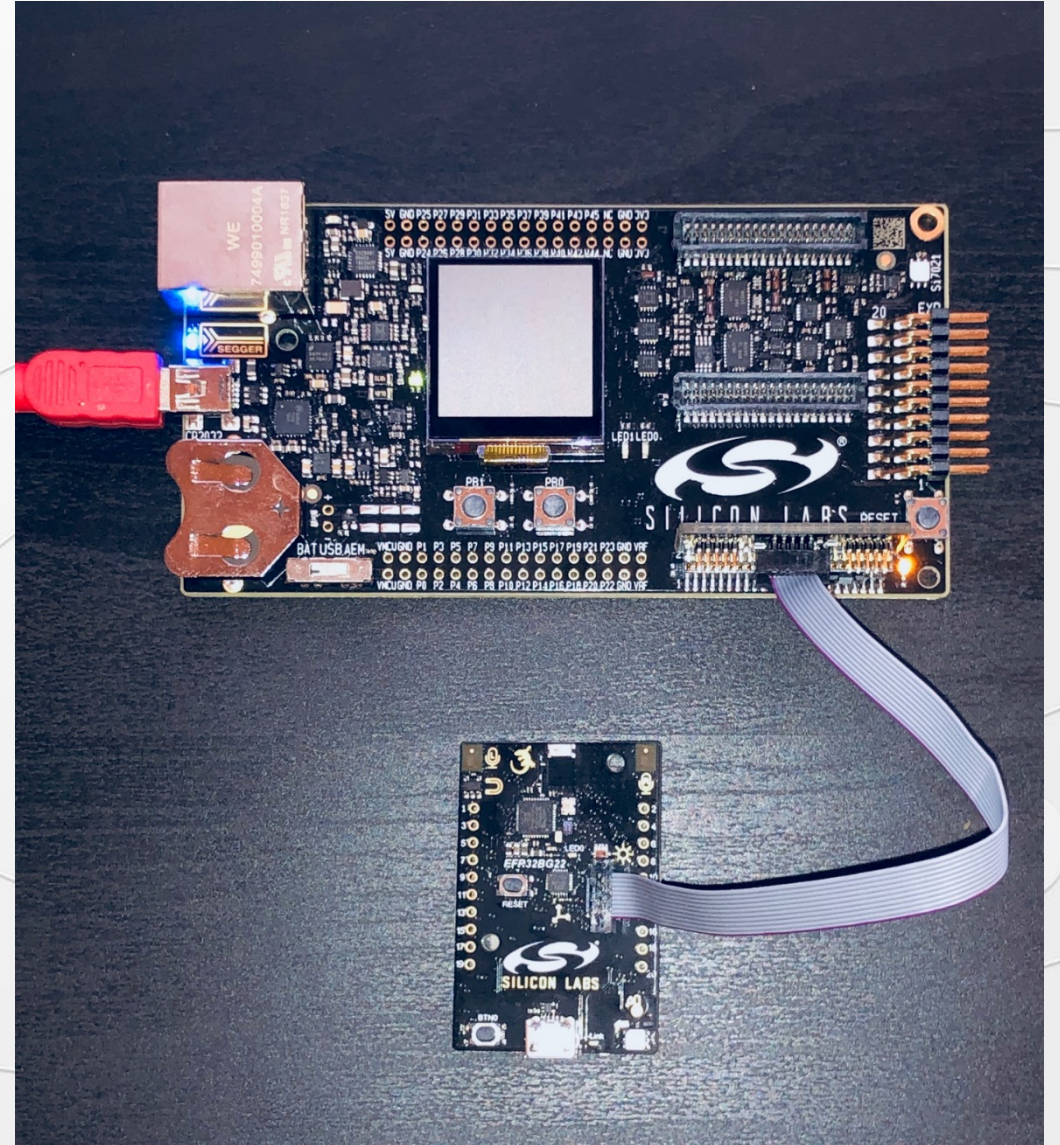
## Changes to BGAPI Commands

With many commands, renaming means only changing gecko\_cmd\_ to sl\_bt\_.

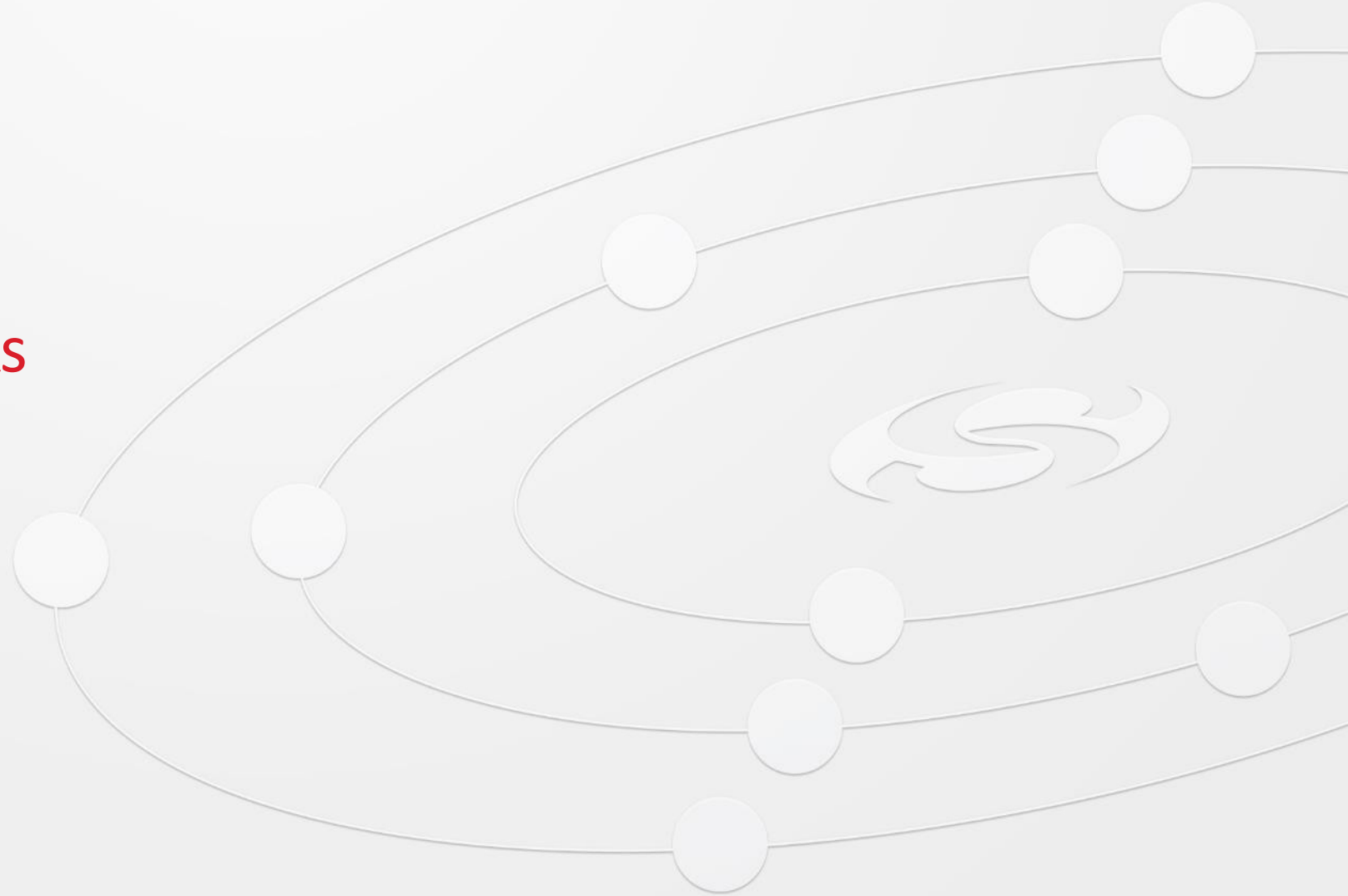
Other functions have been renamed due to changes in functionality, changed API class, or simply to make the functions more logical.

Some API functions have been split into multiple ones while others have been merged.

# Simplicity Studio 5 - Demo



## Simplicity Studio 5 - Links



# Simplicity Studio – Useful Links

## **Simplicity Studio 5**

<https://www.silabs.com/products/development-tools/software/simplicity-studio/simplicity-studio-5>

## **Simplicity Studio 5 User Guide**

<https://docs.silabs.com/simplicity-studio-5-users-guide/latest/index>

## **Quick Start Guide Bluetooth SDK v3.x**

<https://www.silabs.com/documents/public/quick-start-guides/qsg169-bluetooth-sdk-v3x-quick-start-guide.pdf>

## **Transitioning from Bluetooth SDK v2.x to v3.x**

<https://www.silabs.com/documents/public/application-notes/an1255-transitioning-from-bluetooth-sdk-v2-to-v3.pdf>

## **Bluetooth SDK 3.0.0.2 Release Notes**

<https://www.silabs.com/documents/public/release-notes/bt-software-release-notes-3.0.0.2.pdf>



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Thank you.....Questions?

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