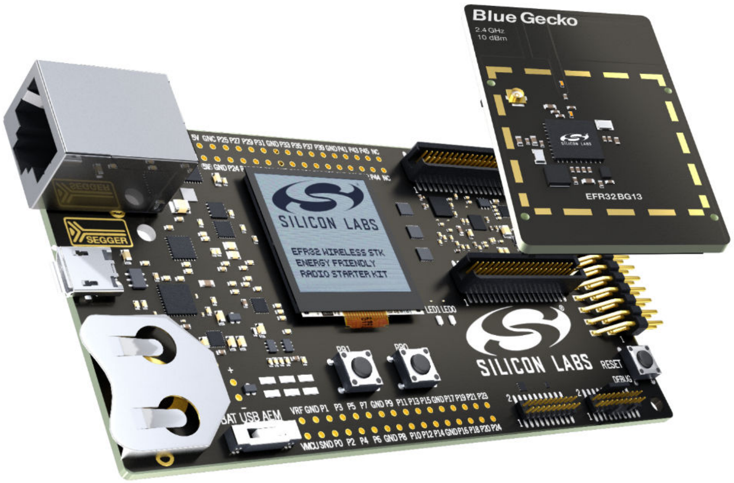
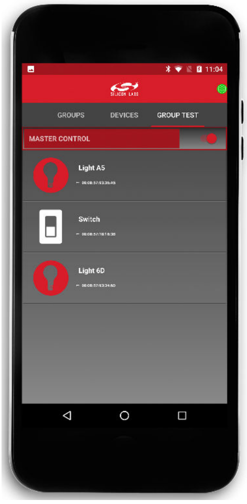
QSG148: Getting Started with the Silicon Labs Bluetooth ® Mesh Lighting Demonstration

This document provides step-by-step instructions to demonstrate a basic Bluetooth mesh network. In this demo, three Wireless Starter Kit (WSTK)-based devices are provisioned as two Lights and one Switch. The mobile application allows the control of either the group of Lights or an individual Light. By pressing buttons on the Switch device, you can control the ON/OFF states and brightness for all lights in the same group. The demo is open-sourced and provides a good demonstration of a basic Bluetooth mesh network.

KEY POINTS

- Prerequisite for the demo
- Hardware set-up of WTSKs
- Bluetooth mesh SDK installation in Simplicity Studio
- Demo firmware installation
- Instructions for provisioning, configuring, and controlling network nodes using the Android smartphone application





1. Prerequisites

The Silicon Labs Bluetooth mesh lighting demonstration is designed to illustrate Bluetooth mesh operation without any need to configure or compile software. To get started with Bluetooth mesh demo, obtain the following.

1.1 Order Development Kits

The Blue Gecko Bluetooth SoC Wireless Starter Kit is the easiest and fastest way to start the evaluation and development of your own Bluetooth mesh applications. To get started with Bluetooth mesh demo, you need to have **three (3)** EFR32™ Blue Gecko Bluetooth® Low Energy Wireless SoC Starter Kits (**PN: SLWSTK6020B**).

Go to http://www.silabs.com/products/development-tools/wireless/bluetooth/blue-gecko-bluetooth-low-energy-soc-starter-kit to order the kits from Silicon Labs' authorized distributors.

This demo requires either **EFR32BG13** or **EFR32BG12** radio boards. If you already have the WSTK Main Boards, you can purchase the required radio boards here.

1.2 Download Simplicity Studio

Go to: http://www.silabs.com/simplicity-studio to download the latest Simplicity Studio version compatible with your computer's operating system.

1.3 Download Silicon Labs' Bluetooth Mesh App for Android Smartphone in Google Play

Download the **Bluetooth Mesh** Android application by Silicon Labs from Google Play.

Note: The minimum requirement for the smartphone is Android 6 (API23).

Alternativeley you can download Silicon Labs' Bluetooth mesh App for iOS from iTunes.

1.4 Obtaining Support

You can access the Silicon Labs support portal at https://www.silabs.com/support through Simplicity Studio Resources. Click the "Email-Support" link and log in with your self-registered credentials. Use the support portal to contact Customer Support for any questions you might have about the demonstration.

2. Getting Started

2.1 Preparing the WSTK

The layout of the Wireless Starter Kit (WSTK) Main Board with attached EFR32BG13 radio board is shown in the following figure:

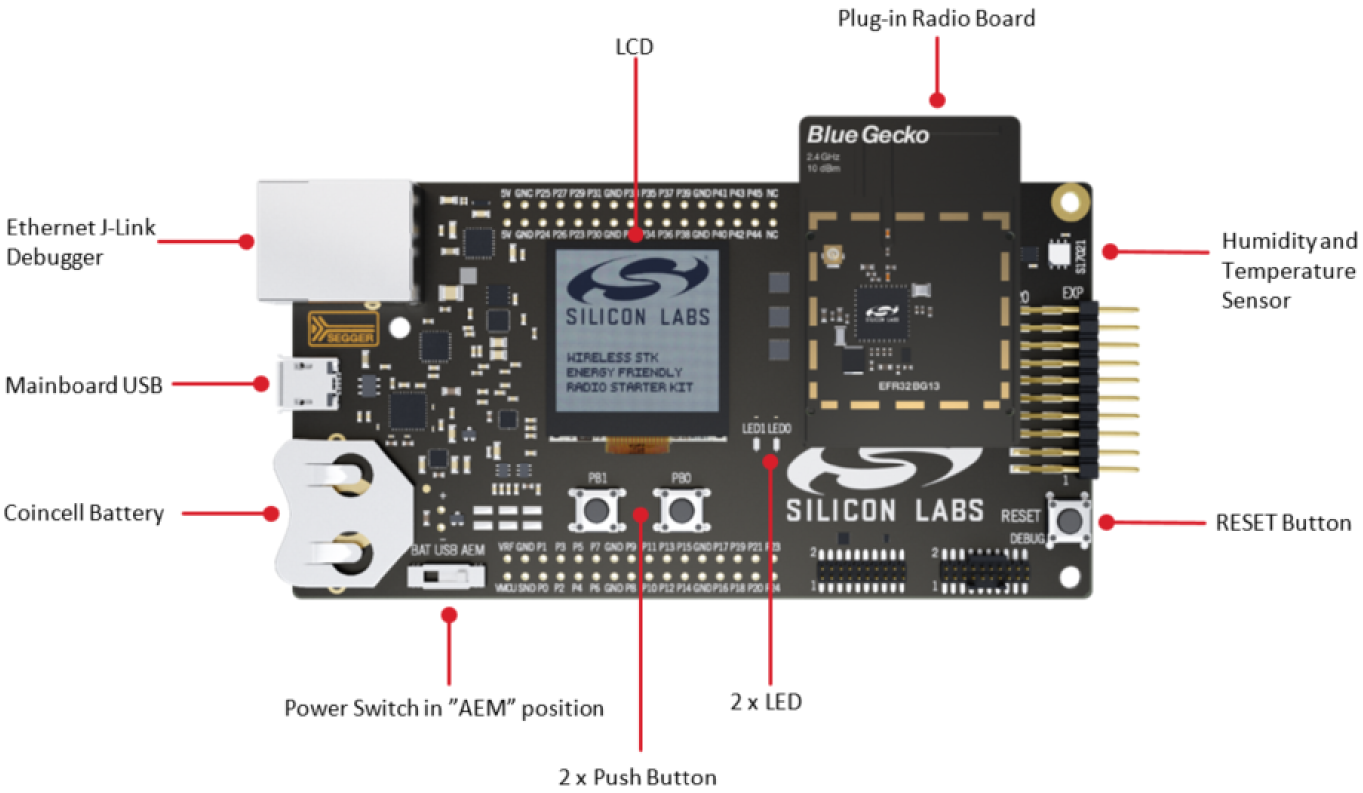


Figure 2.1. WSTK Main Board with Radio Board Attached

1. Connect a Blue Gecko Radio Board to the WSTK Main Board.

   Use radio board SLWRB4104A **EFR32BG13** 2.4 GHz (+10 dBm) for this demo experience.
2. Connect the WSTK to a PC using the "J-Link USB" connector and the cable provided with the starter kit.
3. If not already set, turn the Power switch to "**AEM**" position.
4. Repeat the above steps for other two kits so all three kits are connected to your computer.

Verifying the Setup:

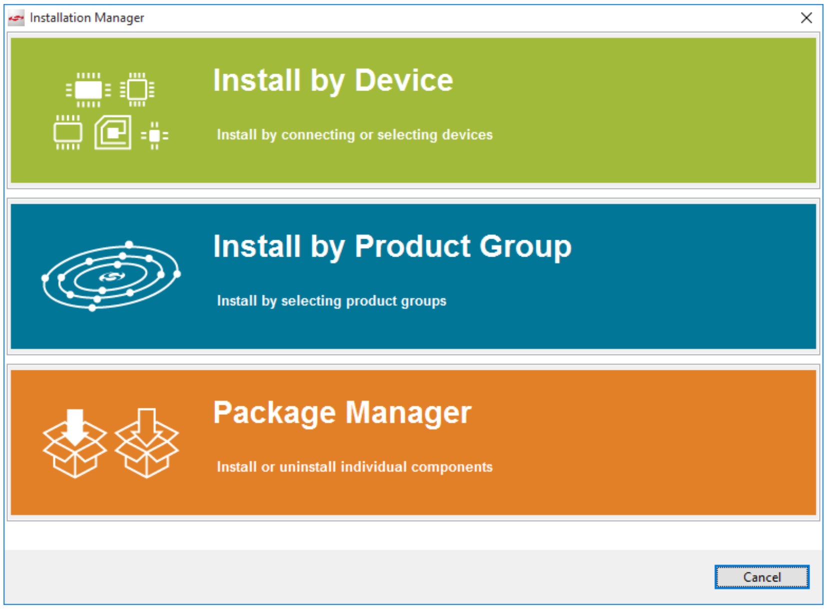
1. Check that the blue "USB Connection Indicator" LED (next to “J-Link USB”) turns on or starts blinking.
2. Check that the Main Board LCD display turns on and displays a Silicon Labs logo.

For more detailed information regarding the Starter Kit, refer to UG279: EFR32BG13 Blue Gecko Bluetooth Starter Kit User's Guide.

2.2 Open Simplicity Studio and Install Bluetooth mesh SDK

Bluetooth mesh SDK is installed using the Simplicity Studio package manager.

1. Open Simplicity Studio and log in using your Silicon Labs account.
2. Click the Download Update icon (red/green down arrow under the menu bars), and click Package Manager.



Installation Manager

Install by Device

Install by connecting or selecting devices

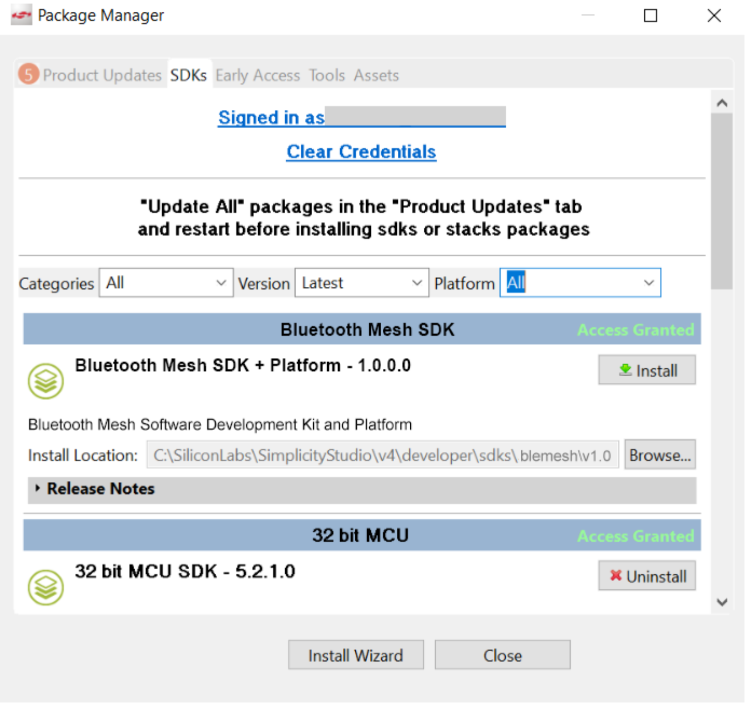
Install by Product Group

Install by selecting product groups

Package Manager

Install or uninstall individual components

3. Go to the SDKs tab to install Bluetooth mesh SDK.



Package Manager

Signed in as [redacted]

Clear Credentials

"Update All" packages in the "Product Updates" tab
and restart before installing sdks or stacks packages

Categories: All Version: Latest Platform: All

Bluetooth Mesh SDK Access Granted

Bluetooth Mesh SDK + Platform - 1.0.0.0

Bluetooth Mesh Software Development Kit and Platform

Install Location: C:\SiliconLabs\SimplicityStudio\v4\developer\sdks\blemesh\v1.0

32 bit MCU Access Granted

32 bit MCU SDK - 5.2.1.0

4. In the Launcher screen, check if the preferred SDK is “Bluetooth mesh SDK + Platform”. If not, click the link provided to change the preferred SDK to “Bluetooth mesh SDK + Platform”.

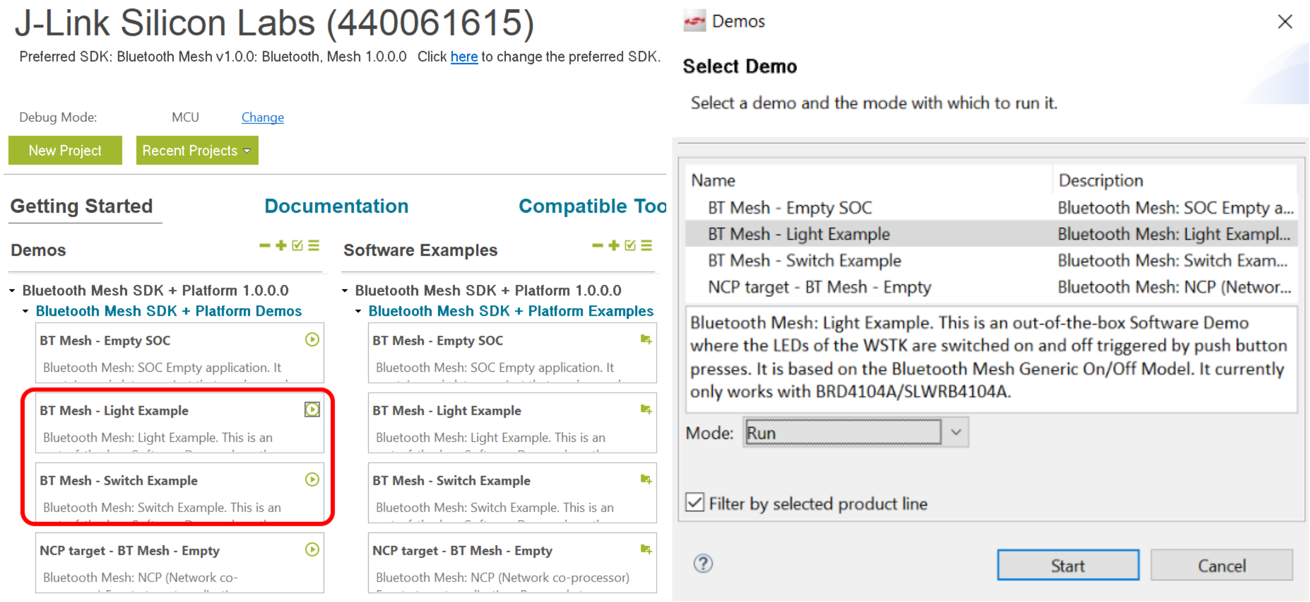
You can find more detailed instructions for Simplicity Studio in QSG139: Bluetooth Development with Simplicity Studio.

2.3 Install the Demonstration Firmware

When the devices are connected to your PC with a USB cable, you can see three devices listed in the **Device** window in Simplicity Studio. Select the J-link for a device to display demonstrations, examples, and documentation associated with the Bluetooth Mesh SDK.

For this demo, you need to flash two devices with **BT Mesh – Light Example** and one device with **BT Mesh – Switch Example**.

To install the firmware, click the demo. In the **Mode** drop-down in the next dialog, select **Run**. Click [**Start**].



J-Link Silicon Labs (440061615)

Preferred SDK: Bluetooth Mesh v1.0.0: Bluetooth, Mesh 1.0.0.0 Click here to change the preferred SDK.

Debug Mode: MCU Change

New Project
Recent Projects
Getting Started
Documentation
Compatible Too
Demos
Software Examples
Bluetooth Mesh SDK + Platform 1.0.0.0
Bluetooth Mesh SDK + Platform Demos
Bluetooth Mesh SDK + Platform 1.0.0.0
Bluetooth Mesh SDK + Platform Examples

BT Mesh - Empty SOC
Bluetooth Mesh: SOC Empty application. It

BT Mesh - Light Example
Bluetooth Mesh: Light Example. This is an

BT Mesh - Switch Example
Bluetooth Mesh: Switch Example. This is an

NCP target - BT Mesh - Empty
Bluetooth Mesh: NCP (Network co-

BT Mesh - Empty SOC
Bluetooth Mesh: SOC Empty application. It

BT Mesh - Light Example
Bluetooth Mesh: Light Example. This is an

BT Mesh - Switch Example
Bluetooth Mesh: Switch Example. This is an

NCP target - BT Mesh - Empty
Bluetooth Mesh: NCP (Network co-processor)

Demos

Select Demo

Select a demo and the mode with which to run it.

Name	Description
BT Mesh - Empty SOC	Bluetooth Mesh: SOC Empty a...
BT Mesh - Light Example	Bluetooth Mesh: Light Exampl...
BT Mesh - Switch Example	Bluetooth Mesh: Switch Exam...
NCP target - BT Mesh - Empty	Bluetooth Mesh: NCP (Networ...

Bluetooth Mesh: Light Example. This is an out-of-the-box Software Demo where the LEDs of the WSTK are switched on and off triggered by push button presses. It is based on the Bluetooth Mesh Generic On/Off Model. It currently only works with BRD4104A/SLWRB4104A.

Mode: Run

☑ Filter by selected product line

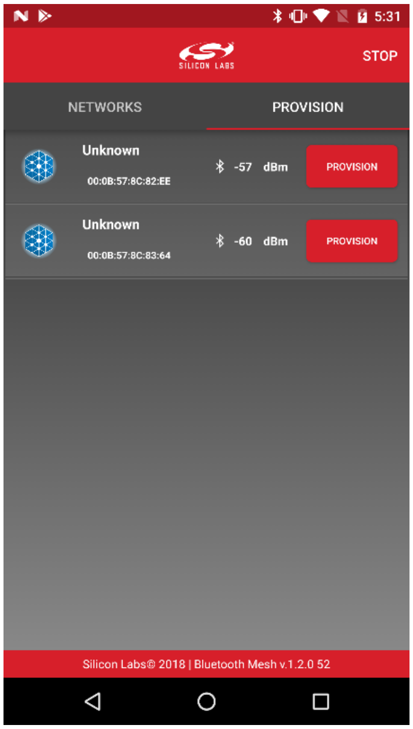
2.4 Use the Demo with an Android Smartphone

Make sure that all three devices have the status of “**unprovisioned”** on the device LCD screen before starting with the application.

Open the **Bluetooth Mesh** App by Silicon Labs on your Android phone.

Follow the procedures below to set up and use the demonstration.

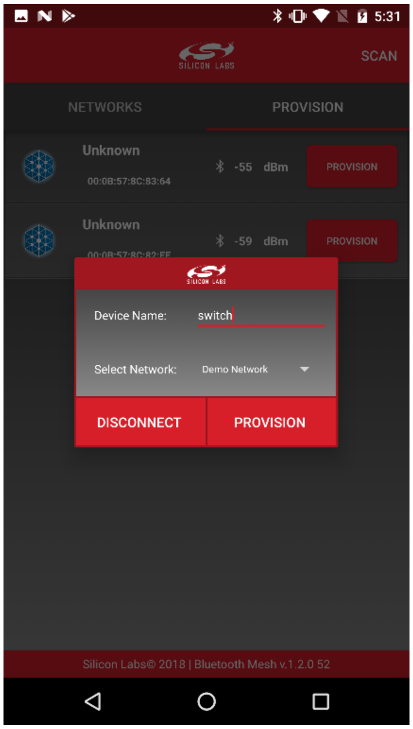
1. Go to provisioning view and search for unprovisioned devices.
2. Select the Bluetooth mesh device you want to provision and configure.
3. Enter the descriptive name for the device and the network you want to add it to.



Unknown 00:0B:57:8C:82:EE -57 dBm

Unknown 00:0B:57:8C:83:64 -60 dBm

Silicon Labs© 2018 | Bluetooth Mesh v.1.2.0 52



Unknown 00:0B:57:8C:83:64 -55 dBm

Unknown 00:0B:57:8C:82:EE -59 dBm

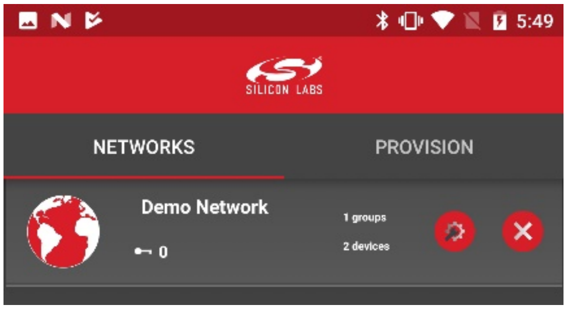
Device Name: switch

Select Network: Demo Network

Silicon Labs© 2018 | Bluetooth Mesh v.1.2.0 52

Note: The Android application has a pre-generated network and group, but you can add more groups to the application if you like.

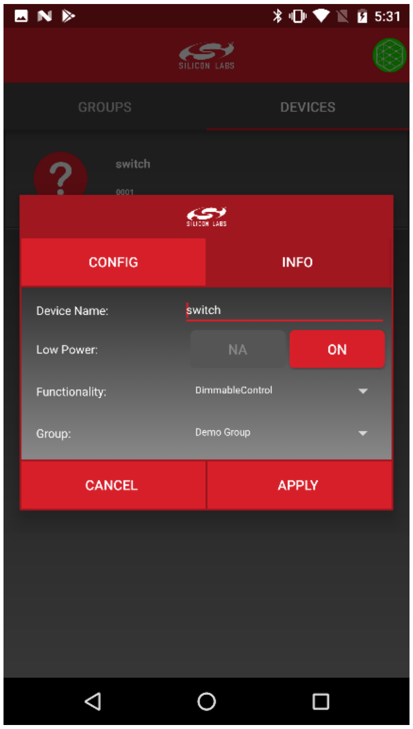
The network and node database can be erased by long-pressing the network in the main view and by pressing the X icon.



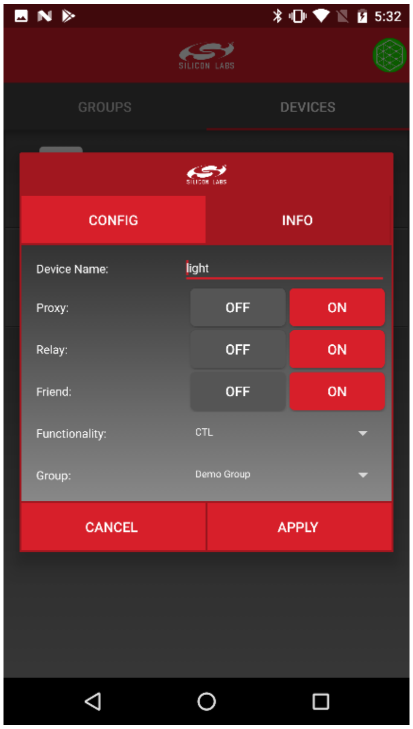
Demo Network 0 1 groups 2 devices

To configure the newly provisioned Bluetooth mesh:

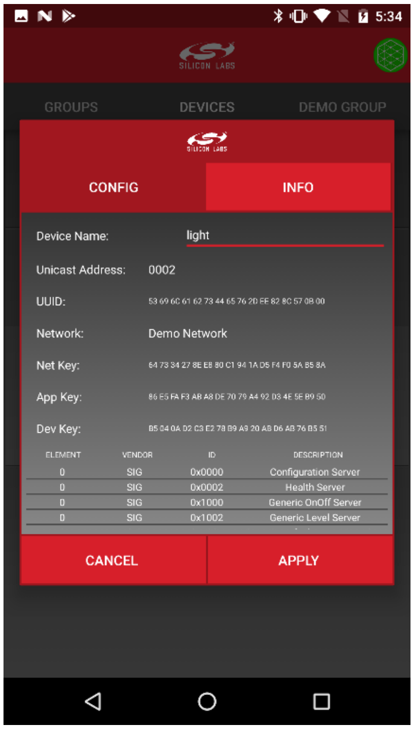
1. Right after provisioning the Android application connects the proxy service on the node.
2. During configuration select the Bluetooth mesh features (proxy, relay, low power, and friend) that you want to enable.
   a. Notice that if you disable proxy, the node can no longer be directly accessed over GATT.
3. Select the functionality (mesh model) that you want to enable.
4. Select the group you want to add the device to.



Device Name: switch
Low Power: NA ON
Functionality: DimmableControl
Group: Demo Group



Device Name: light
Proxy: OFF ON
Relay: OFF ON
Friend: OFF ON
Functionality: CTL
Group: Demo Group



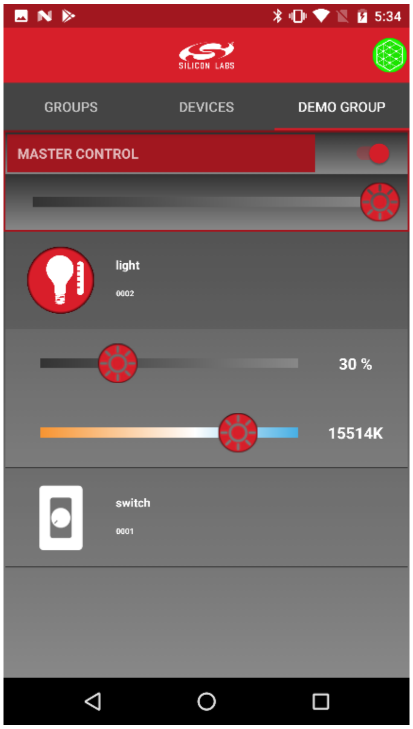
Device Name: light
Unicast Address: 0002
UUID: 53 69 6C 61 62 73 44 65 76 2D EE 82 8C 57 0B 00
Network: Demo Network
Net Key: 64 73 34 27 8E E8 80 C1 94 1A D5 F4 F0 5A B5 8A
App Key: 86 E5 FA F3 AB A8 DE 70 79 A4 92 D3 4E 5E B9 50
Dev Key: B5 04 0A D2 C3 E2 78 B9 A9 20 AB D6 AB 76 B5 51

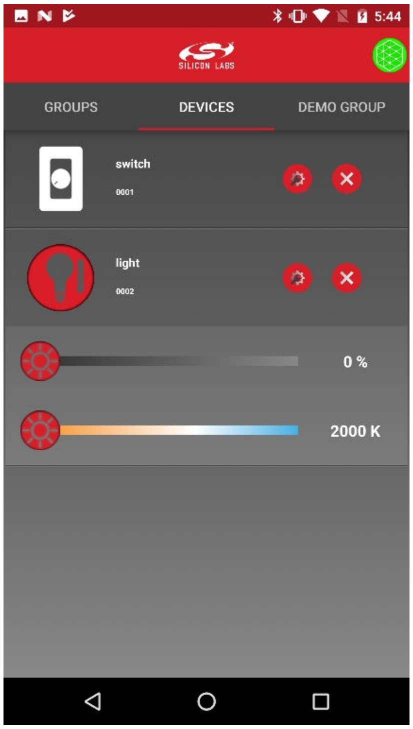
ELEMENT	VENDOR	ID	DESCRIPTION
0	SIG	0x0000	Configuration Server
0	SIG	0x0002	Health Server
0	SIG	0x1000	Generic OnOff Server
0	SIG	0x1002	Generic Level Server

Note: The information view shows the Bluetooth mesh node features, such as Unicast address, UUID, and security keys as well as the supported mesh models. It can be used for debug purposes.

To control a Bluetooth mesh node with the Android application:

1. Select the network and group you want to control .
2. The application will show the available nodes in that group.
3. You can control the light:
   a. Pressing the light bulb icon will send an On/Off message.
   b. Moving the upper slider will send Light Lightness (dimming) messages.
   c. Moving the lower slider will send CTL (temperature) messages.
4. By going to devices view and long-pressing a node you can either reconfigure the node by pressing the wrench icon or remove the node from the network by pressing the X icon.





Once the Android application has been used to provision a light bulb and a light switch to a network and group, the light switch (WSTK) can also be used to control the light bulb (WSTK) with the PB0 and PB1 buttons.

PB0 button:

- Short press: Decrease Light Lightness by 10%
- Medium press: Decrease CTL (temperature) value
- Long press: Send Off message

PB1 button:

- Short press: Increase Light Lightness by 10%
- Medium press:Increase CTL (temperature) value
- Long press: Send On message

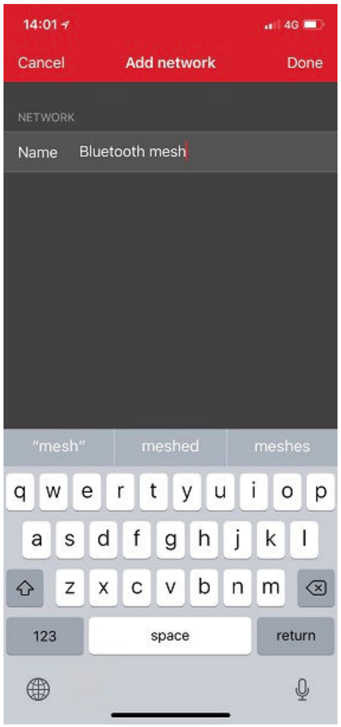
2.5 Use the Demo with an iOS Smartphone

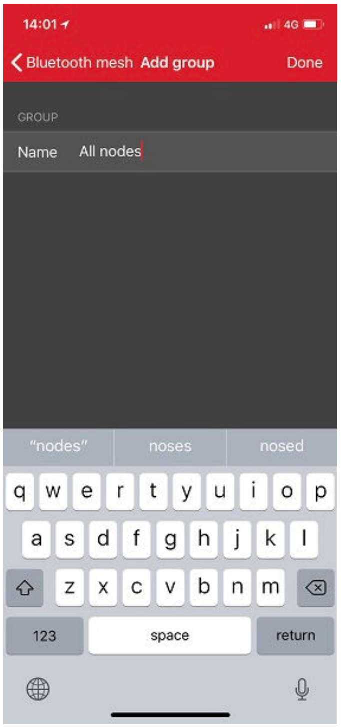
Make sure that all three devices have the status of **“unprovisioned”** on the device LCD screen before starting with the Mobile App.

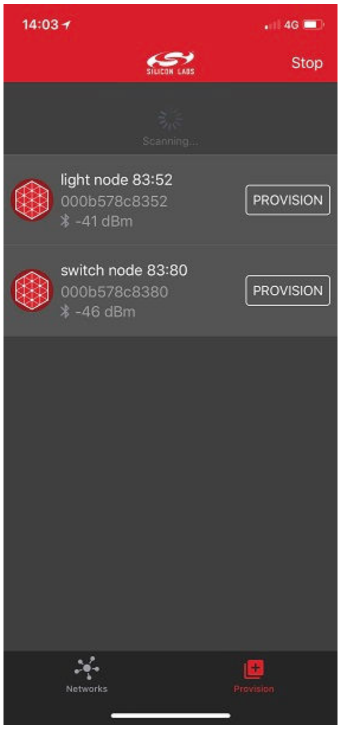
Open the **Bluetooth Mesh** App by Silicon Labs on your iOS phone.

Follow the procedures below to set up and use the demonstration.

1. Create a Bluetooth mesh network.
2. Select the network and create a group.
3. Go to the provisioning view and search for unprovisioned devices.
4. Select the Bluetooth mesh device you want to provision and configure.

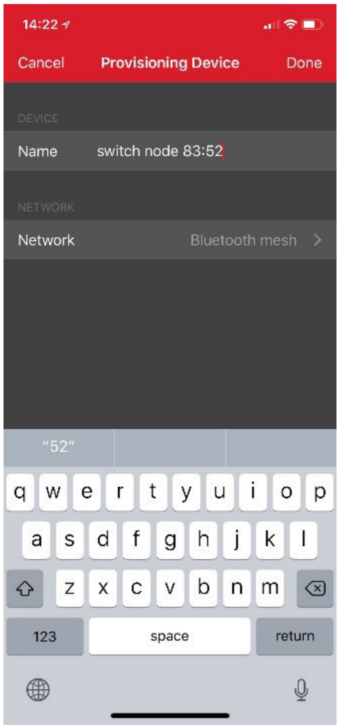






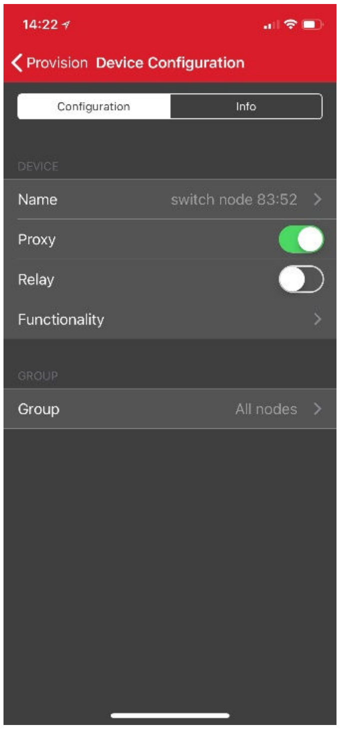
To provision a Bluetooth mesh device and configure the node:

1. During provisioning select the network you want to add the device to.
2. During configuration select the Bluetooth mesh features (proxy, relay, low power and friend) that you want to enable.
    a. Notice that if you disable proxy, the node no longer be directly accessed over GATT.
3. Select the group you want to add the device to.
4. Finally select the functionality (mesh model) that you want to enable.



Name switch node 83:52

Network Bluetooth mesh



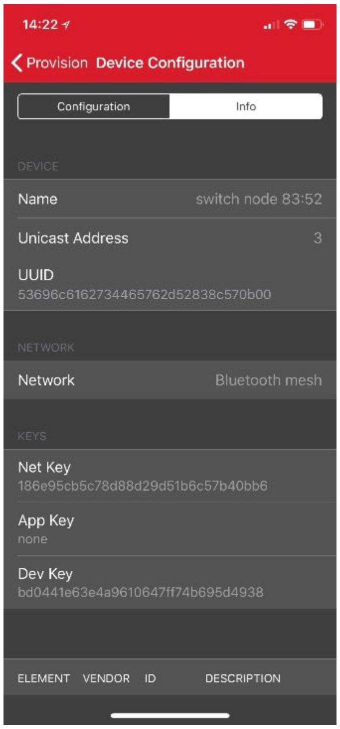
Name switch node 83:52

Proxy ●

Relay ○

Functionality

Group All nodes



Name switch node 83:52

Unicast Address 3

UUID 53696c6162734465762d52838c570b00

Network Bluetooth mesh

Net Key 186e95cb5c78d88d29d51b6c57b40bb6

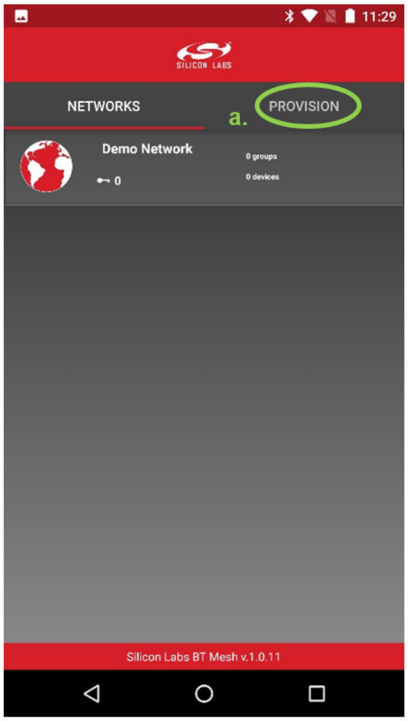
App Key none

Dev Key bd0441e63e4a9610647ff74b695d4938

Note: The information view shows the Bluetooth mesh node features, such as Unicast address, UUID, and security keys as well as the supported mesh models. It can be used for debug purposes.

To control a Bluetooth mesh node with the iOS application:

1. Select the network and group you want to control.
2. The application will show the available nodes in that group.
3. You can either control the light or the switch.
   a. Pressing the light bulb icon will send an On/Off message.
   b. Moving the slider will send Light Lightness (dimming) messages.
   c. Pressing the light switch icon will send On/Off messages.

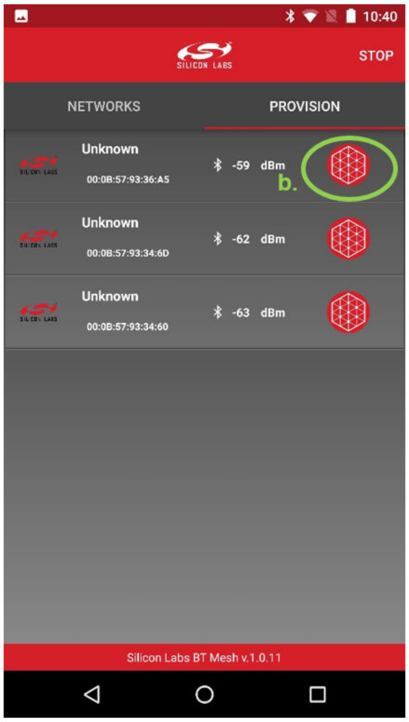


Demo Network

0

0 groups

0 devices



Unknown 00:0B:57:93:36:A5 -59 dBm

Unknown 00:0B:57:93:34:6D -62 dBm

Unknown 00:0B:57:93:34:60 -63 dBm

Once the iOS application has been used to provision a light bulb and a light switch to a network and group, the light switch (WSTK) can also be used to control the light bulb (WSTK) with the PB0 and PB1 buttons.

PB0 button:

- Short press: Decrease Light Lightness by 10%
- Medium press: Decrease CTL (temperature) value
- Long press: Send Off message

PB1 button:

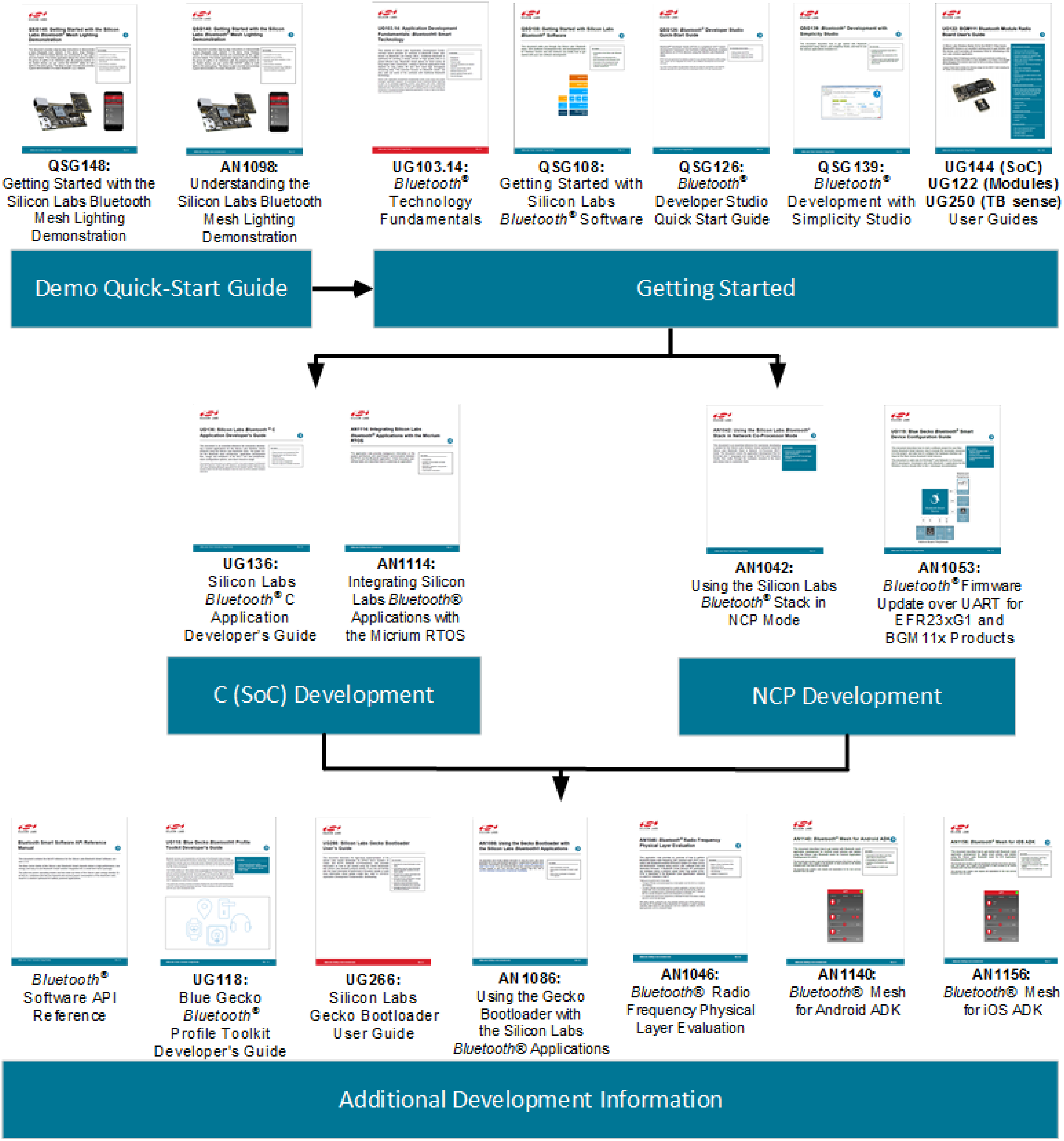
- Short press: Increase Light Lightness by 10%
- Medium press:Increase CTL (temperature) value
- Long press: Send On message

Note: The first version of the iOS application does not support CTL configuration or CTL control.

3. Next Steps

To understand how the demo works, see *AN1098: Understanding the Silicon Labs Bluetooth Mesh Lighting Demonstration*.

Explore the other documentation provided by Silicon Labs to get started with customizing your own Bluetooth mesh applications. SDK-specific documentation is provided under Documents on the Getting Started tab of the Launcher perspective.



QSG148: Getting Started with the Silicon Labs Bluetooth Mesh Lighting Demonstration

AN1098: Understanding the Silicon Labs Bluetooth Mesh Lighting Demonstration

Demo Quick-Start Guide

UG103.14: *Bluetooth®* Technology Fundamentals

QSG108: Getting Started with Silicon Labs *Bluetooth®* Software

QSG126: *Bluetooth®* Developer Studio Quick Start Guide

QSG139: *Bluetooth®* Development with Simplicity Studio

UG144 (SoC) UG122 (Modules) UG250 (TB sense) User Guides

Getting Started

UG136: Silicon Labs *Bluetooth®* C Application Developer's Guide

AN1114: Integrating Silicon Labs *Bluetooth®* Applications with the Micrium RTOS

C (SoC) Development

AN1042: Using the Silicon Labs *Bluetooth®* Stack in NCP Mode

AN1053: *Bluetooth®* Firmware Update over UART for EFR23xG1 and BGM11x Products

NCP Development

Bluetooth® Software API Reference

UG118: Blue Gecko *Bluetooth®* Profile Toolkit Developer's Guide

UG266: Silicon Labs Gecko Bootloader User Guide

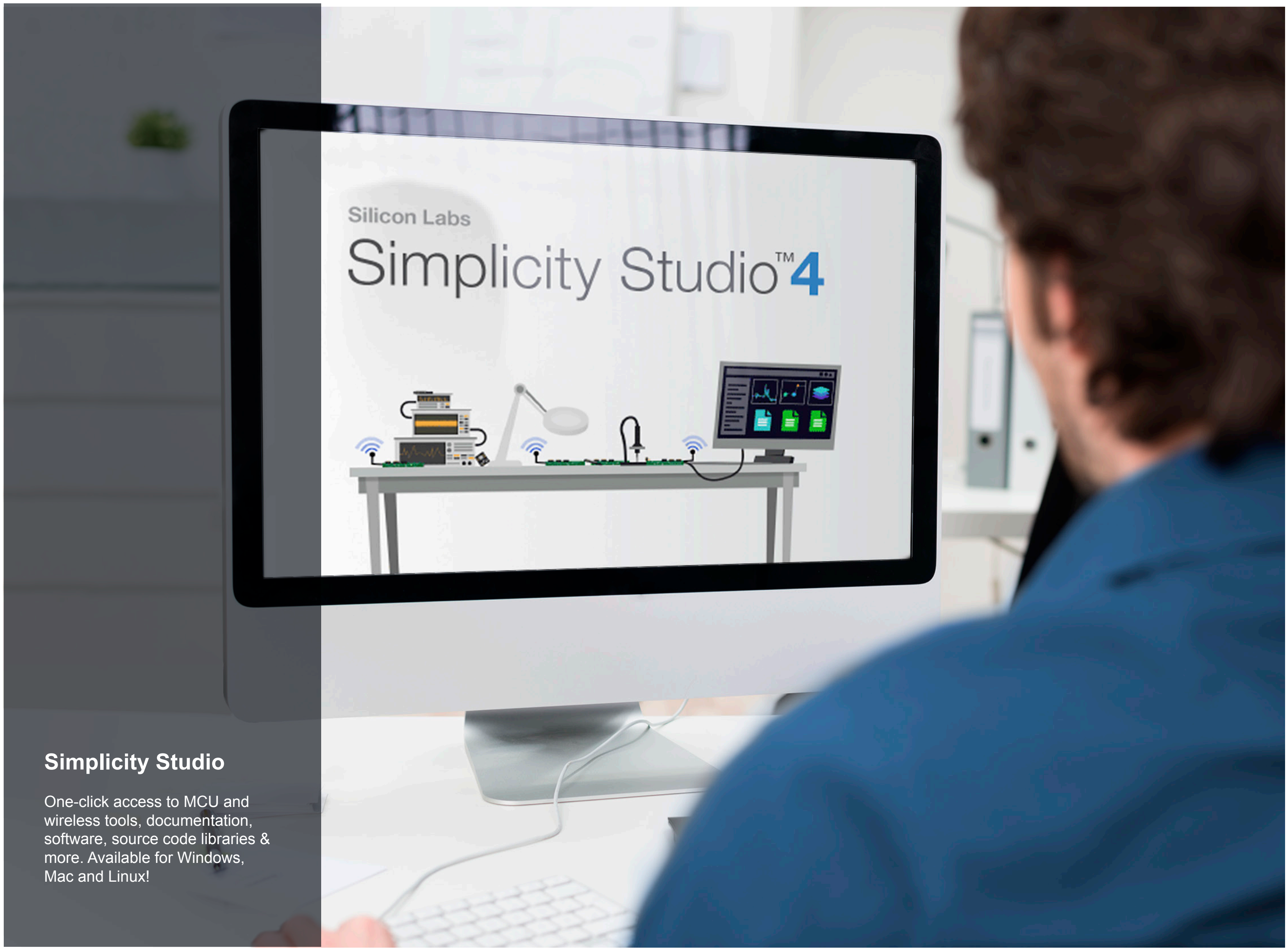
AN1086: Using the Gecko Bootloader with the Silicon Labs *Bluetooth®* Applications

AN1046: *Bluetooth®* Radio Frequency Physical Layer Evaluation

AN1140: *Bluetooth®* Mesh for Android ADK

AN1156: *Bluetooth®* Mesh for iOS ADK

Additional Development Information



Simplicity Studio

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

IoT Portfolio
www.silabs.com/IoT

SW/HW
www.silabs.com/simplicity

Quality
www.silabs.com/quality

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