

Bluetooth[®] mesh

Product Brief v1.0

Overview

Bluetooth mesh enables Bluetooth devices to be used as a true mesh networking topology. It allows moving away from the typical personal area network which Bluetooth is known for, and extending both the range and number of devices a Bluetooth network can have. A smart home is a great example and use case for Bluetooth mesh as it can easily have 30-50 devices that are not necessarily in the direct range of each other. With Bluetooth mesh, you can connect all these devices into a single Bluetooth network that covers the entire home. Bluetooth mesh nodes can still support the existing Bluetooth LE topologies and use cases like point-to-point connectivity and Bluetooth beaconing. This allows smart phones to be connected to the Bluetooth mesh networks to control and monitor the Bluetooth mesh nodes as well other use cases such as indoor positioning and asset tracking.

Bluetooth mesh Nodes

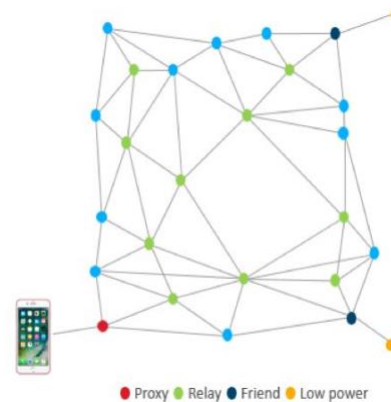
A Bluetooth mesh network can consist of different types of nodes:

Relay: Capable of relaying messages from other nodes - essential in increasing the scale and range of a Bluetooth mesh network.

Proxy: Can act as proxy between Bluetooth mesh nodes and network and a device that only implements the GATT bearer (Smart Phones).

Low power: Spend most of their lifetime in a low power sleep mode, only wake up and participate in communications once every four (4) days. LPN need a node with a friend feature.

Friend: Cache messages for the nodes with low power feature until low power nodes wake up and fetch the messages. Can also acknowledge messages on behalf of low power nodes. Nodes with friend features



Key Features of Bluetooth mesh

Feature	Benefit
Mesh Node Types	All the node types specified for Bluetooth mesh are supported on Silicon Labs stack: <i>Relay, Proxy, Friend, and Low Power Node (LPN)</i>
Provisioning Protocols	For new nodes on mesh network, the provisioner and provisioned node can communicate over either PB-ADV or PB-GATT bearers, ensuring compatibility for smartphones with Bluetooth LE and GATT support
GATT Services	Both GATT services are supported in Silicon Labs Bluetooth mesh – Proxy and Provisioning
Wi-Fi Coexistence	Allows the Bluetooth mesh device to coordinate transmitting and receiving with the collocated Wi-Fi device with reduced interference, and increased reliability
Certificate Based Provisioning (CBP)	Use certificates to authenticate devices before provisioning, thus saving cost and time. Also, prevents counterfeit devices from being provisioned into the network
Remote Provisioning (RPR)	Easy way to provision even when the nodes are not in direct radio range of the provisioner, thereby reducing installation cost and time
Private Beacons	Does not allow for static information in beacons to be shared outside of the network
Proprietary Extension	Allows extended advertising on all 40 channels - increasing throughput by 10x
Simultaneous DFU Upgrade	Standardize way to do simultaneous DFU for homogenous devices, reducing cost and time

Silicon Labs' Bluetooth mesh HW support

	DFU			RPR	CBP	PB ²
	Initiat or	Distributor	Node to be updated			
xG21 - 512k,96k - 768k,96k - 1M,96k	✓ ✓ ✓	✗ ✗ ✓	✓ ¹ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
xG22 - 352k,32k - 512k,32k	✗ ✗	✗ ✗	✗ ✓ ¹	✗ ✓	✗ ✓	✗ ✓
xG24 - 1536k,256k	✓	✓	✓	✓	✓	✓
xG27 - 768k,64k	✗	✗	✓	✓	✓	✓

¹Needs external flash
²Private Beacons

Silicon Labs' Bluetooth mesh Development Kits

Silicon Labs' Bluetooth development kits are divided into three categories based on your development need:

- Kits for experimenting
- Prototyping
- Developing your production product

For more information on the portfolio, check the link:

<https://www.silabs.com/bluetooth-kits>

Technical Resources

[Bluetooth mesh xG24 Technical Library](#)

Data Sheets, App Notes, and more

[Bluetooth mesh xG22 Technical Library](#)

Data Sheets, App Notes, and more

[Bluetooth mesh API Documentation](#)

Bluetooth mesh API documentation

Bluetooth mesh Target Applications

- Smart Home Lighting
- Commercial Lighting
- Switches
- Sensors
- Plugs
- Hubs/Panels
- HVAC
- Building Automation
- Amazon Alexa applications
- Echo devices

Bluetooth mesh Software / Stack / Tools

Silicon Labs Bluetooth mesh SDK helps you build reliable and secure wireless mesh applications for industrial and commercial IoT segments.

Software features

- SDK support for Mesh 1.0, and Mesh 1.1
- Simplicity Studio IDE
- Both GATT Services
- Bluetooth mesh Sample Applications
- Wi-Fi Coexistence
- Tool Chain – GCC and IAR
- Support for all mesh node types

Links: [Bluetooth mesh SDK](#)

Learning Center

[Whitepaper: Enable IoT connectivity](#)

Enable IoT connectivity with BT-mesh

[Silicon Labs Secure Vault accreditations](#)

Product security certifications

[Extending Bluetooth with mesh Networking](#)

Webinar

[Bluetooth SoC and Module Selector Guide](#)

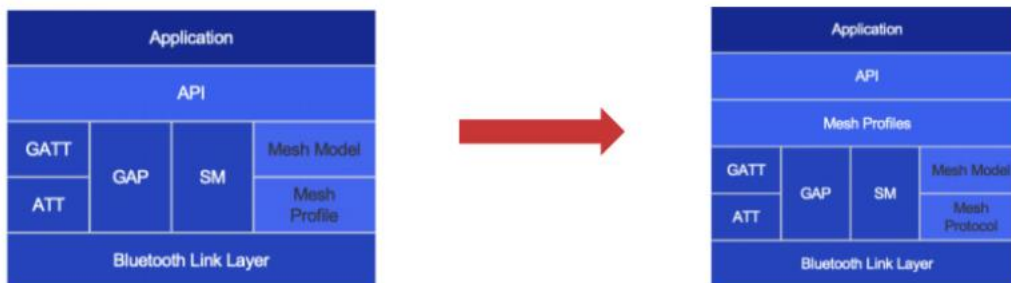
Bluetooth mesh Selector Guide

[Bluetooth mesh Learning Center](#)

Mesh Networking Learning Center

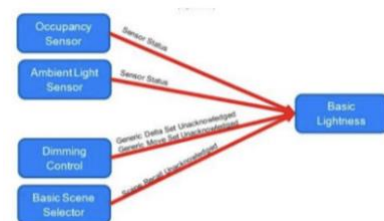
Bluetooth Network Lighting Control (NLC)

NLC is an intelligent network-based lighting control system that helps automate lighting management across a property and leverages connectivity to improve energy efficiency, occupant experience, and building operations. It offers controls like occupancy sensing, daylight harvesting, and continuous dimming and is also the first profile in the new mesh protocol architecture as defined by the new mesh standard. The difference between the old mesh architecture (mesh profile) and the new mesh protocol that allows for NLC has been showcased in the diagram below. As depicted in the updated diagram on the right, the new mesh profiles sit on top of the network stack below the API and define standardized profiles based on different use cases.



Implementing NLC can prove to be beneficial in the following ways:

- It can significantly improve energy efficiency and savings. Adding automated and dynamic controls to LED systems, and using sensors to manage lighting control and operation can help monitor occupancy and natural lighting levels in real time. This enables more efficient energy consumption by ensuring lights are only activated when and as required.
- It enhances occupant comfort/safety, improves overall occupant experience, and helps improve building operations. NLC enables more flexible workspace configuration, as it can easily adapt to the property owner's or occupant's demands. Its ability to monitor lighting systems in real-time can also provide insights on space usage.
- It promotes interoperability by allowing different profiles to seamlessly co-exist and operate in a network while being in compliance with SIG guidelines.



There are 6 lighting profiles that falls under NLC:

- 1) Occupancy Sensor Mesh Profile 1.0
- 2) Ambient Light Sensor Mesh Profile 1.0
- 3) Energy Monitor Mesh Profile 1.0
- 4) Dimming Control Mesh Profile 1.0
- 5) Basic Scene Selector Mesh Profile 1.0
- 6) Basic Lightness Controller Mesh Profile 1.0

As of 23Q4, Silicon Labs plans to support all the lighting profiles, except Energy Monitor, which will come in later.

Smart. Connected. Energy-Friendly.



IoT Portfolio

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Quality

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