

# Light Up Your Campsite with Bluetooth LE

Ben Gavin

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# Who is Core BTS?

An award-winning technology consulting firm and managed services provider dedicated to problem solving.

Core BTS is proud Azure Expert MSP and Managed Gold NLS Partner. Together with Microsoft, we deliver holistic solutions that accelerate digital transformation.



Gold

Microsoft Partner  
Azure Expert MSP



Top Teams Partner

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The logo features a circular icon with a stylized 'N' shape in white against an orange background. To the right of the icon, the word 'nvisia' is written in a lowercase sans-serif font, with the tagline 'connect. build. enable.' in smaller text below it.

The logo consists of a black circle containing a white 'C' shape, followed by the word 'ionic' in a bold, lowercase sans-serif font.

The logo features a stylized 'G' icon composed of three dots, followed by the word 'GrapeCity' in a lowercase sans-serif font.

The logo consists of a purple circle with four radiating lines, followed by the word 'symplr' in a lowercase sans-serif font.

The logo features the Google Cloud logo, which includes the word 'Google' in its signature colors (blue, red, yellow, green) followed by the word 'Cloud' in a smaller, grey sans-serif font.

The logo consists of the word 'TREK' in a bold, red, sans-serif font.

The logo consists of the word 'Algorand' in a black, sans-serif font, with a stylized 'A' icon where the top bar has three vertical dots.

The logo consists of the word 'twilio' in a red, sans-serif font, with a circular icon containing six dots above the letter 't'.

# **What are we doing?**

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- Welcome and Intro (★ you are here!)
- Bluetooth LE Basics
- Hardware
- Development Story
- Today's project
- Next Steps...
- Q & A

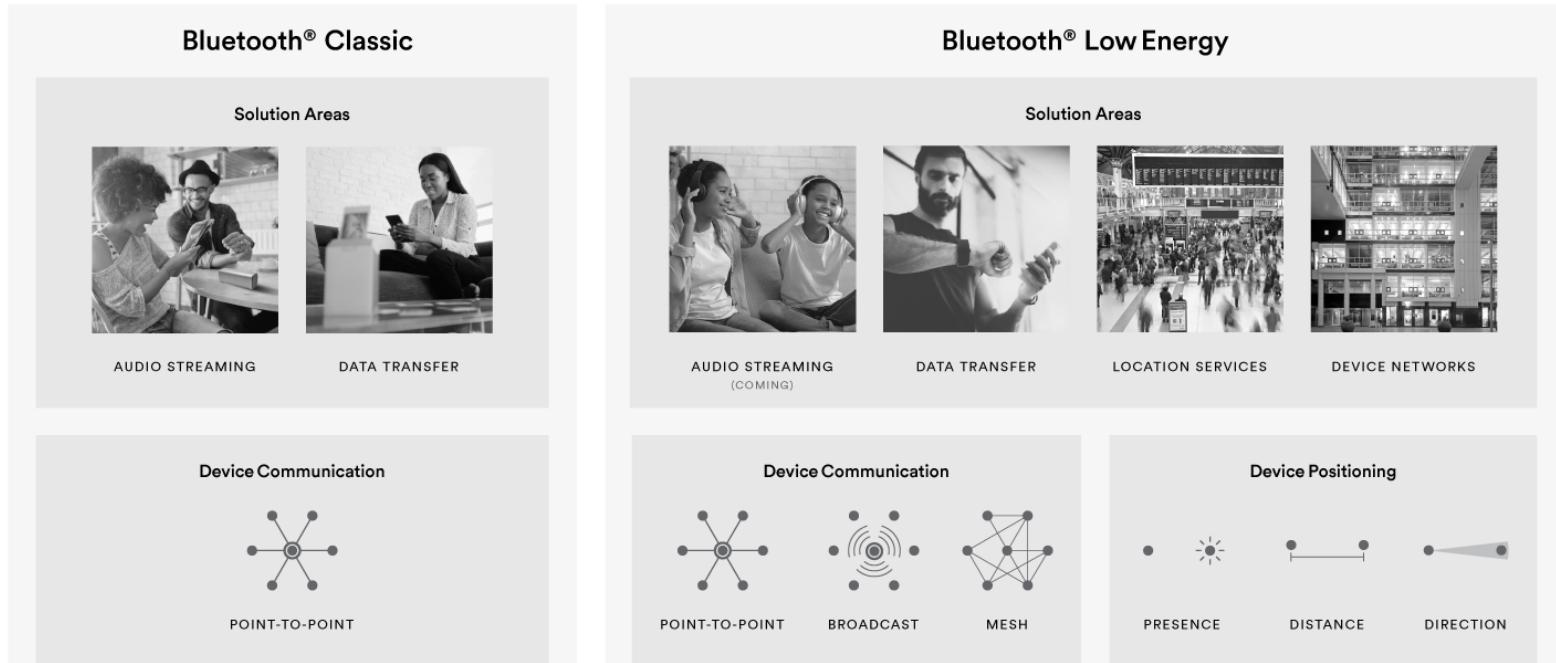


memegenerator.net

... let's get started!

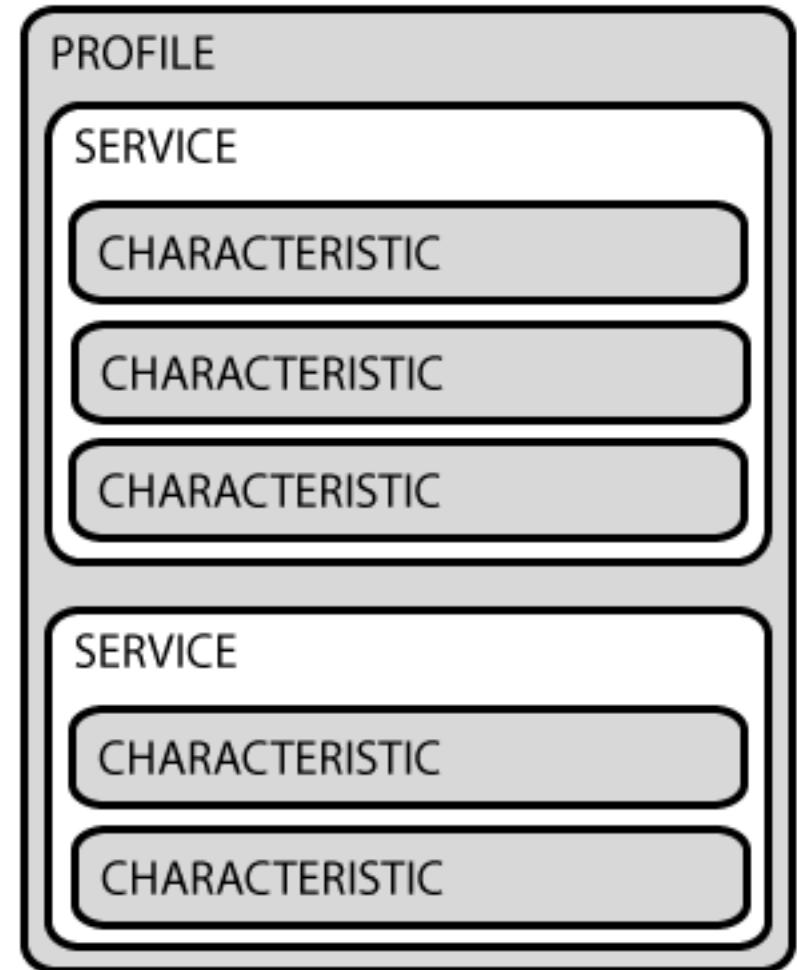
# Bluetooth LE Basics

- LE = Low Energy
- LE vs 'Classic'
- Bluetooth SIG
  - [bluetooth.com](http://bluetooth.com)
  - Working Groups
  - Standards
  - Membership
    - Chipset / Module Manufacturers
    - Device Makers
    - Application Developers
    - Required to create commercial products



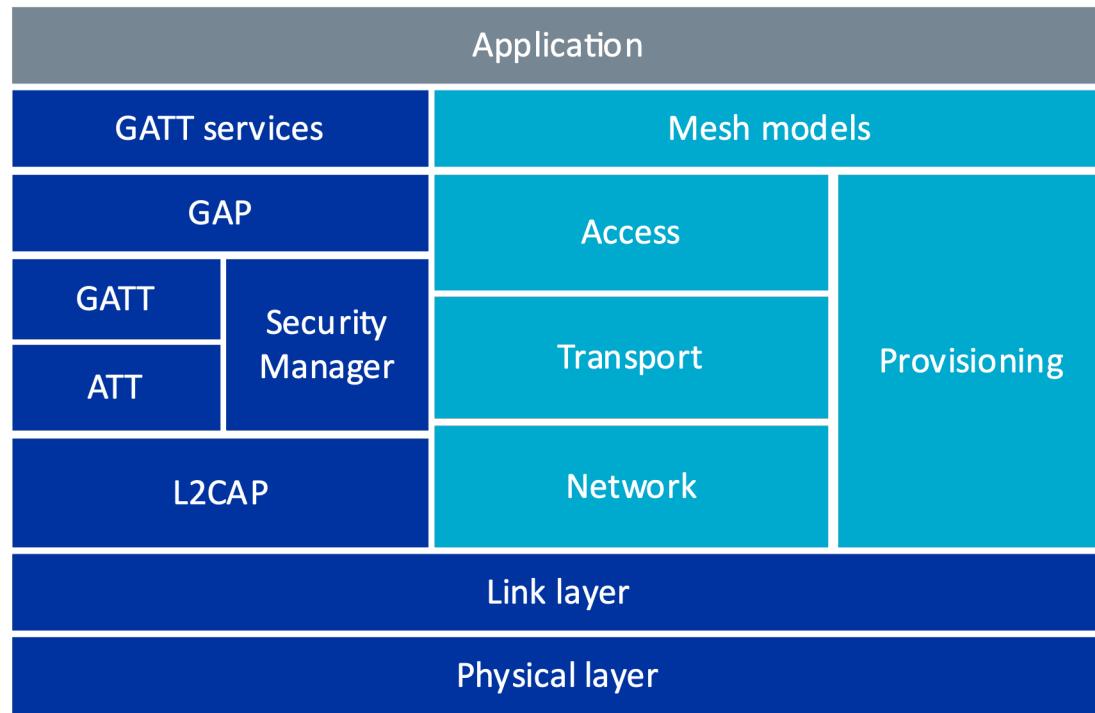
# BLE Advertising, GATT & Services

- Advertisements (Beacons)
- GATT – Generic ATTribute
  - Central vs. Peripheral
  - Generally one-at-a-time connections
- Services
  - Have Characteristics
    - Read / Write / Notify
  - Client (Central) vs. Server (Peripheral)
  - Connection Based
- Profiles



# BLE Mesh

- Protocol and application layers
- Models / Elements
- Client / Server / Setup
- Specified Interactions
- Pub / Sub Message 'flooding'



# What's out there (chipsets vs modules)

- Few major chipset makers
  - Nordic Semi
  - Dialog Semi
  - Texas Instruments
  - STMicro
  - NXP
  - Qualcomm (CSR)
  - Silicon Labs
  - Infineon (Cypress)
- Many module makers
  - Often pre-certified
  - Can include things like antennas, onboard storage, etc
  - U-Blox, Laird, Raytac, Taiyo Yuden, etc
- Thousands of board makers
  - Adafruit, Particle, Seeed, Nordic
  - Includes development kits for particular modules/chipsets

## Bluetooth Low Energy flagship

nRF5340 SoC  
Dual-core Bluetooth 5.3 SoC supporting Bluetooth Low Energy, Bluetooth mesh, NFC, Thread and Zigbee  
128 MHz Arm Cortex-M33 CPU with 1 MB Flash + 512 KB RAM  
64 MHz Arm Cortex-M33 CPU with 256 KB Flash + 64 KB RAM  
Bluetooth Low Energy  
Bluetooth Direction Finding  
Bluetooth mesh  
Thread, Zigbee  
NFC  
Advanced security  
USB, QSPI, HS-SPI  
105 °C extended operating temperature  
1.7-5.5 V supply voltage range

[Read more](#)



## Bluetooth 5.2 SoCs

nRF52 Series



nRF52840 SoC

Bluetooth 5.3 SoC supporting Bluetooth Low Energy, Bluetooth mesh, NFC, Thread and Zigbee  
Arm® Mali™-T860 GPU with EDL I

nRF52833 SoC

Bluetooth 5.3 SoC supporting Bluetooth Low Energy, Bluetooth mesh, Bluetooth Direction Finding, NFC, Thread and Zigbee  
Arm® Mali™-T860 GPU with EDL I

nRF52832 SoC

Versatile Bluetooth 5.3 SoC supporting Bluetooth Low Energy, Bluetooth mesh and NFC  
Arm® Mali™-T860 GPU with EDL I

## Bluetooth Development Kits

### BLE Kit Portfolio Overview

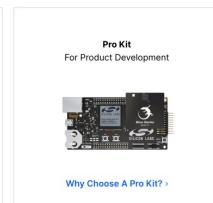
Silicon Labs' Bluetooth development kits are divided into three categories based on your development need, with kits for experimenting, prototyping, or developing your production product, our portfolio has the right solution for you.



[Why Choose An Explorer Kit? >](#)



[Why Choose A Dev Kit? >](#)



[Why Choose A Pro Kit? >](#)

## BLE Mobile App

**EFR Connect**, the Bluetooth Low Energy mobile app helps you to develop and test smooth smartphone connectivity and Over-the-Air (OTA) update capability for your applications. It works with all Silicon Labs Bluetooth development kits and you can download it for iOS and Android.

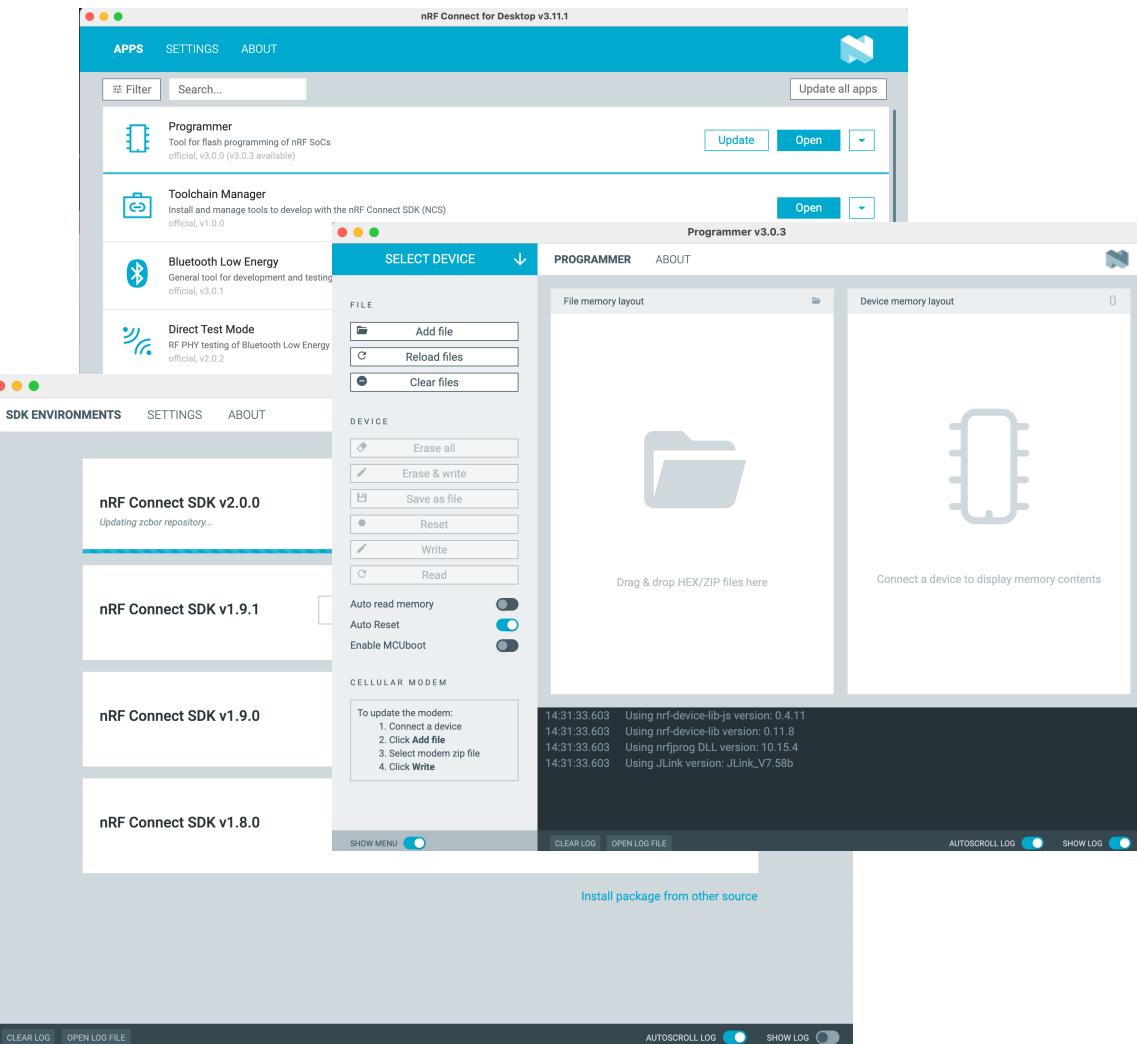
# Development Environment

- Language: C / C++
- IDE: Visual Studio Code
  - nRF Connect Extension Pack
- One of the Nordic Dev Boards
  - ... or equivalent J-Link compatible hardware
  - ... or use a board / module that has USB / UF2 / OTA DFU support



# Software Development Kit(s)

- nRF Connect Desktop
  - Toolchain Manager
  - Programmer
  - Bluetooth Low Energy
- nRF Connect SDK
- nrfjprog



... but where is the demo?

# Next Steps

- Alternative environments
  - *Segger Embedded Studio (SES)*
  - *... or command line!*
  - Arduino Studio
  - CircuitPython
  - NodeJS (noble - central / bleno - peripheral)
- Device Certifications
  - (IANAL)
  - FCC
  - Thread / Matter / Zigbee / etc.



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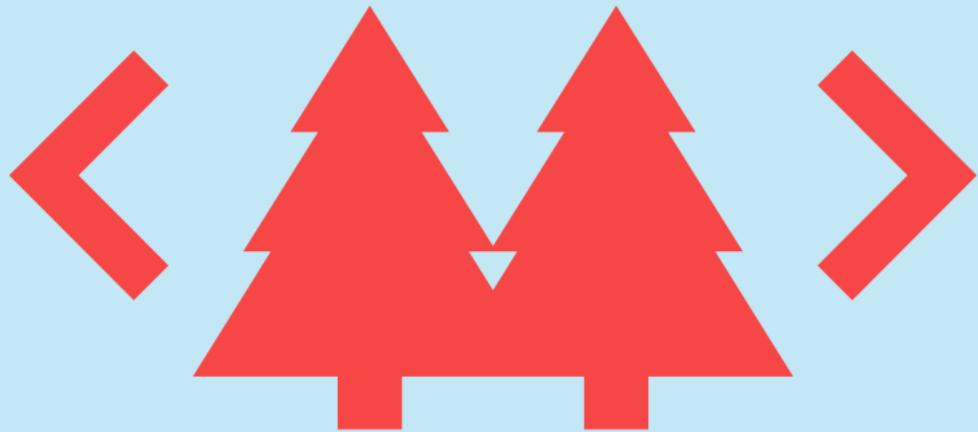
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## CONFERENCE

**SEE YOU NEXT YEAR! JULY 2023**

**CALL FOR SPEAKERS STARTS JANUARY 1, 2023**

# Q & A

# Thank You!

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