



MAT-202: How to use Matter/OpenThread for End Device Applications



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Introductions



SEAN SCANNELL

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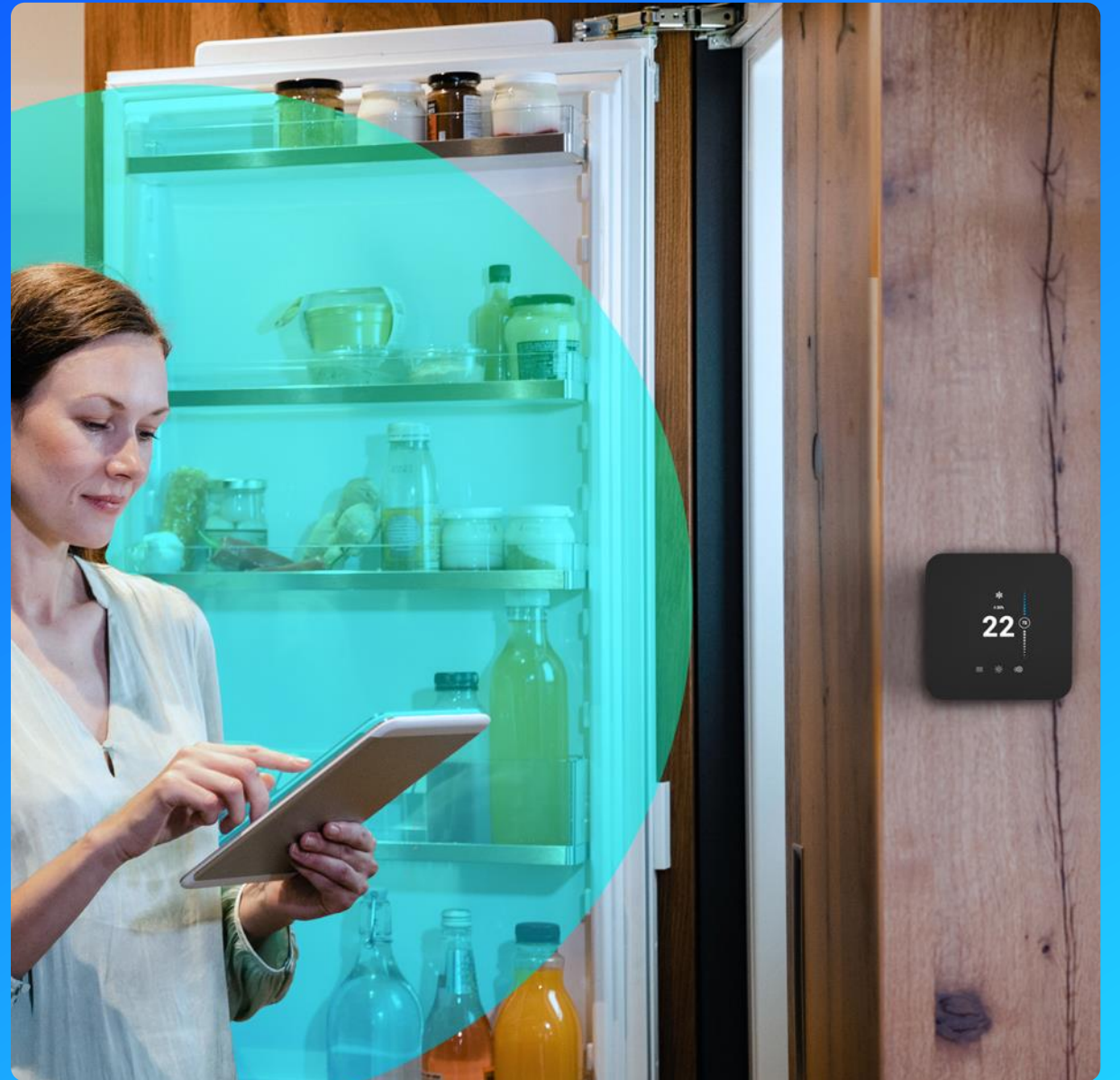
Systems & Connectivity
Solutions Director



Agenda

- **Matter Expanded**
 - Transition from Mat-101
 - Topology
 - Architecture
- **Resources Available today from Connectivity Standards Alliance and Silicon Labs**
 - Github Repository
 - Example Applications
 - Border Router
- **Customer Showcase**
 - Customer Q&A session
 - Customer Video
- **Closing Remarks**

Matter Expanded



Transition from MAT 101



Craig Babcock

Ecosystem Development Manager



Simplifying IoT Connectivity



CONSUMERS

Increased choice
& compatibility
Simplified setup & control



DEVELOPERS

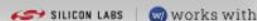
Single SKU
Lower development
& operational cost
More time for innovation



BUSINESS

Minimized returns
Simplified purchasing experience

10



What is Matter?

- Rebranded from Project CHIP
- A standard driven by major IoT players to simplify the IoT industry for all

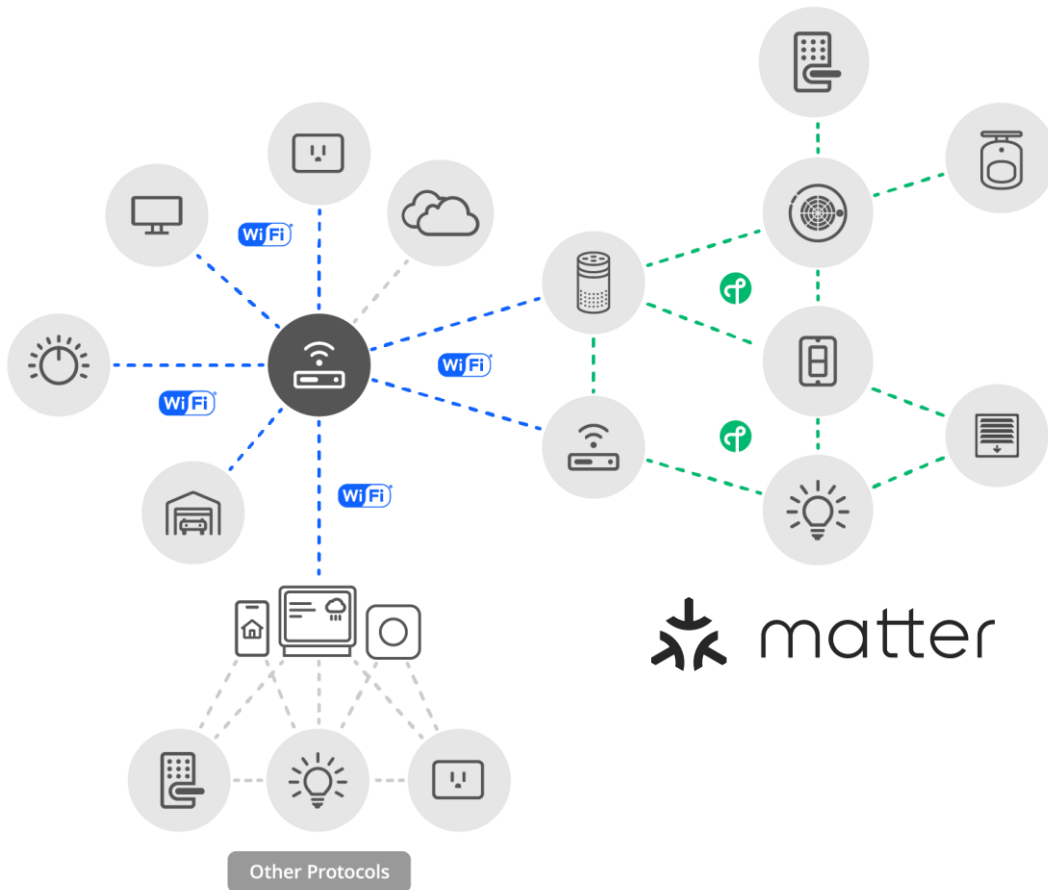
How does it work?

- IPv6 app layer on 15.4 or Wi-Fi
- Commissions via Bluetooth

What is different about Matter?

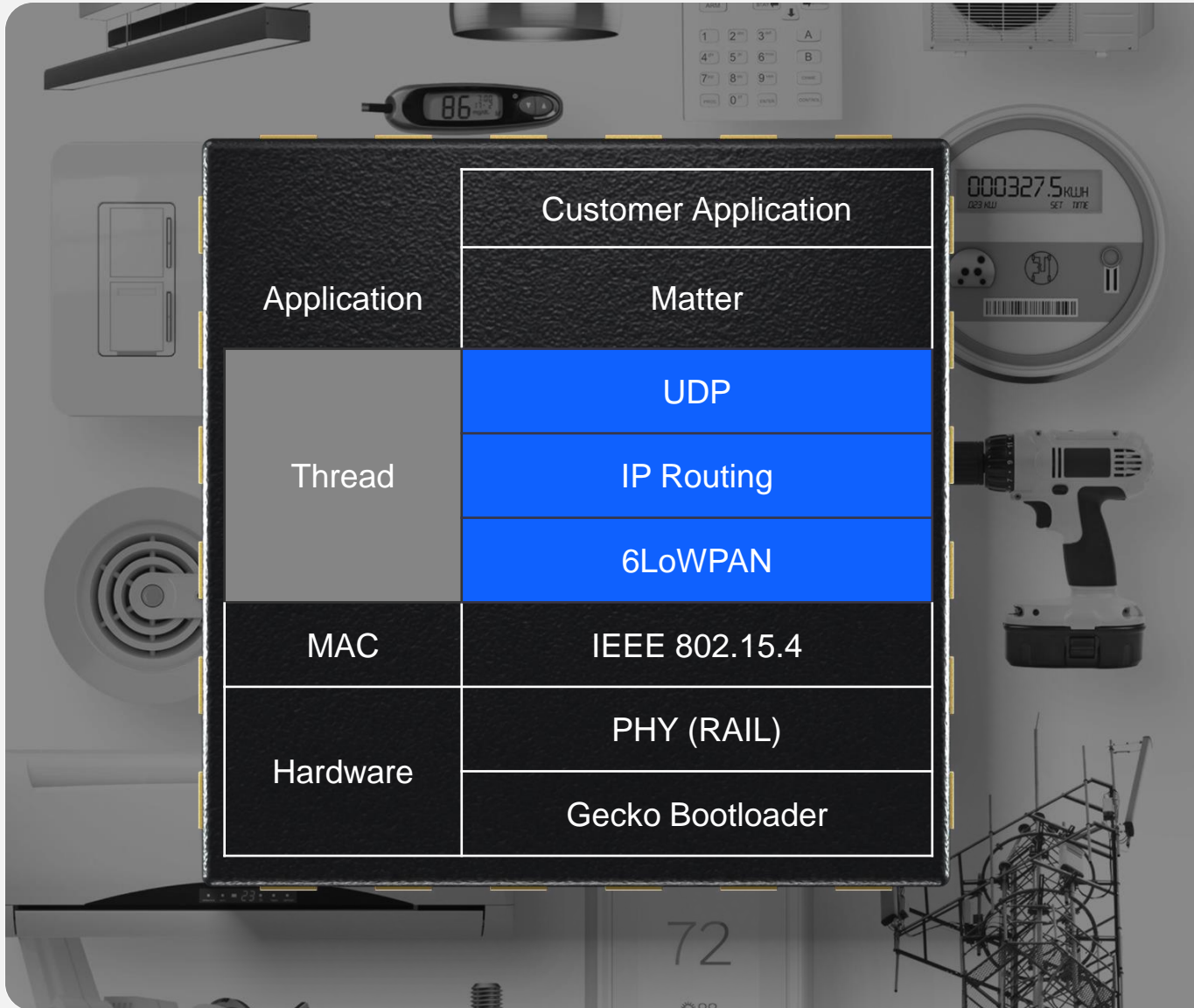
- Open-source solution for all IoT stakeholders
- Collaborative effort by ecosystem providers, device makers and semiconductor companies
- Built with security at its core

Network Topology



- Devices are commissioned onto a Matter network via Bluetooth
- Matter devices connect to the network over Wi-Fi or Thread
- Thread devices connect to other IP networks through border routers
- Bridges can link to other protocols like Zigbee and Z-Wave

Thread Software Architecture



■ Integrated Stack

- Supports IPv6 addresses and simple IP bridging
- Thread 1.1 certified

■ OpenThread Support

- GitHub: [EFR32MG12](#), [EFR32MG13](#), and [WF200](#)
- Gecko SDK & Simplicity Studio integration

■ Border Router Support

- Raspberry Pi host
- EFR32 Radio Co-Processor (RCP)

Resources Available Today

From the CSA and Silicon Labs



Getting Started with Matter

Magnetism and Proximity

Hall effect Sensor
Silicon Labs Si7210

Computation and Communication

ARM Cortex-M4 multi-protocol radio
SoC
Silicon Labs Wireless Gecko
EFR32MG12
1MB Flash, 256 KB RAM

Air Quality

Air pollution, air quality and breath
analysis
Cambridge CMOS CCS811

Pressure

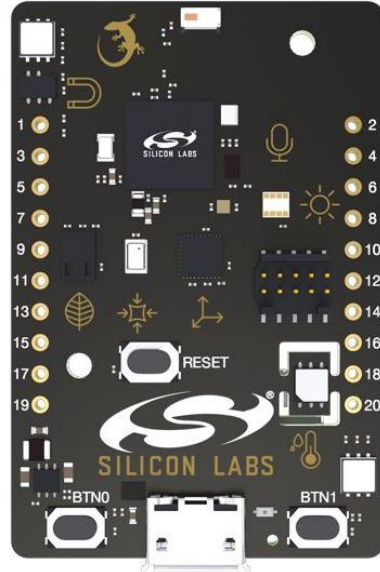
Absolute Barometric Pressure Sensor
Bosch BMP280

Motion Tracking

6-axis gyroscope + accelerometer
TDK InvenSense ICM-20648

USB Program and Debugger

Segger J-Link and bed MSD
Silicon Labs EFM32GG



Audio Sensing

I2S Digital microphone
TDK InvenSense ICS-43434

UV and Light

UV index, ambient light and
proximity sensing

Environment Sensors

Precision temperature and relative
humidity
Silicon Labs Si7021

User Input and Feedback

2 push buttons and 4 high-power
RGB LEDs

Large Memory

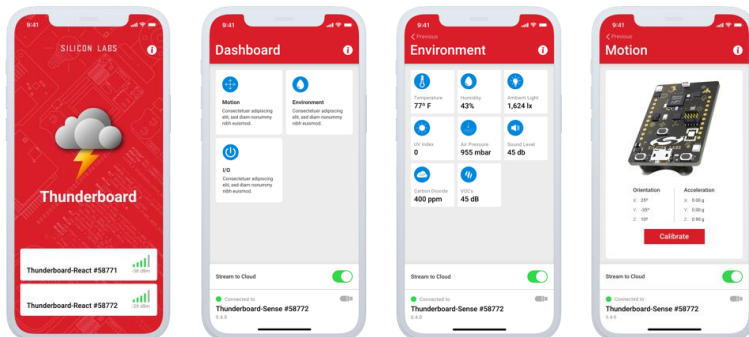
8 Megabit low power flash memory
Macronix MX25R8035F

Data Acquisition and Analytics

Open-Source iOS/Android apps &
cloud demos
Github.com/siliconlabs

Thunderboard Sense 2

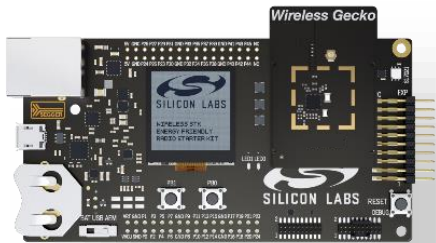
- Adds EFR32xG12 SoC with 256kB RAM & 1M Flash
- Supports Thread and Bluetooth
- Great platform for Matter development
- Build in sensors
 - ▶ 6-axis inertia
 - ▶ Relative temperature and humidity
 - ▶ Air Quality & pressure
 - ▶ Light level
- Digital PDM microphone
- [Magnetic Hall effect sensor](#)
- RGB LEDs & buttons
- USB for programming
- Reference smart phone application with cloud integration
- **EFR Connect phone application available on IOS and Android for development purposes**



Wireless Starter Kits – EFR32 SoCs and WF200

Simplified Development Kit for Better User Experience

EFR 32



One Kit Simplifies Development

Radio boards and kits support Zigbee, Thread and Bluetooth

User targets device in Simplicity Studio

Kit consist of the following:

- 3 x WSTK main boards
- 3 x Wireless Gecko + 10 dBm radio boards
- 3 x Wireless Gecko +20 dBm radio boards

Out-of-Box Application

Radio boards are pre-programmed

Demonstrating dynamic multiprotocol setup & wireless range test

Configure & control your device with a Bluetooth LE phone connection

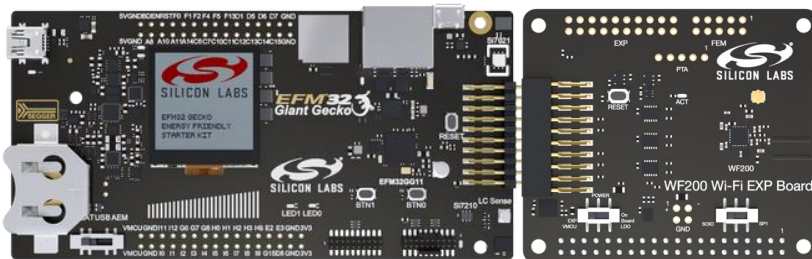
Available as part of the EFR Connect mobile app

Order Part Number

Description

SLWSTK6000G	EFR32xG12 Wireless Mesh Starter Kit
SLWRB4161A	EFR32xG12 2.4 GHz +19 dBm Radio Board

WF200



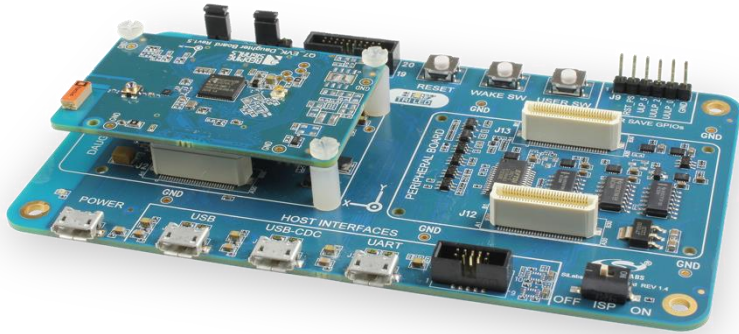
WF200 Wi-Fi Expansion board with Giant Gecko Starter Kit

- Hardware Features
 - Raspberry Pi header
 - EXP header - support for Silicon Labs' MCUs (GG11) and Wireless MCUs (MG12) starter kits
 - WF200S Wi-Fi transceiver
 - μ .FL connector for conducted measurements and adding in an external antenna
- Software tools and support
 - Open-Source drivers for Linux and RTOS
 - Example demo applications

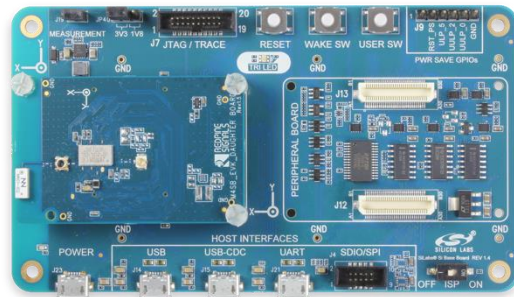
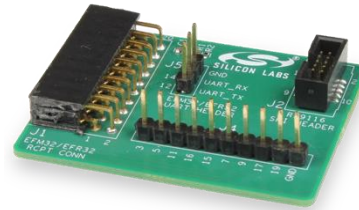


SLEXP8022A
WF200 Wi-Fi Expansion Kit

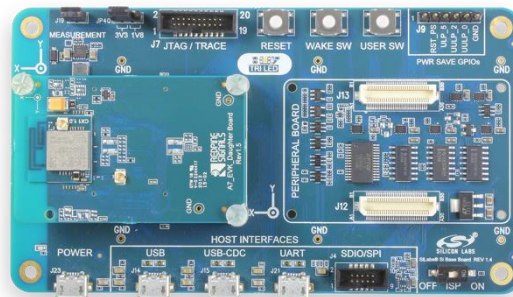
Development Kits – RS9116



RS9116X-SB-EVK1
Single Band (QMS)



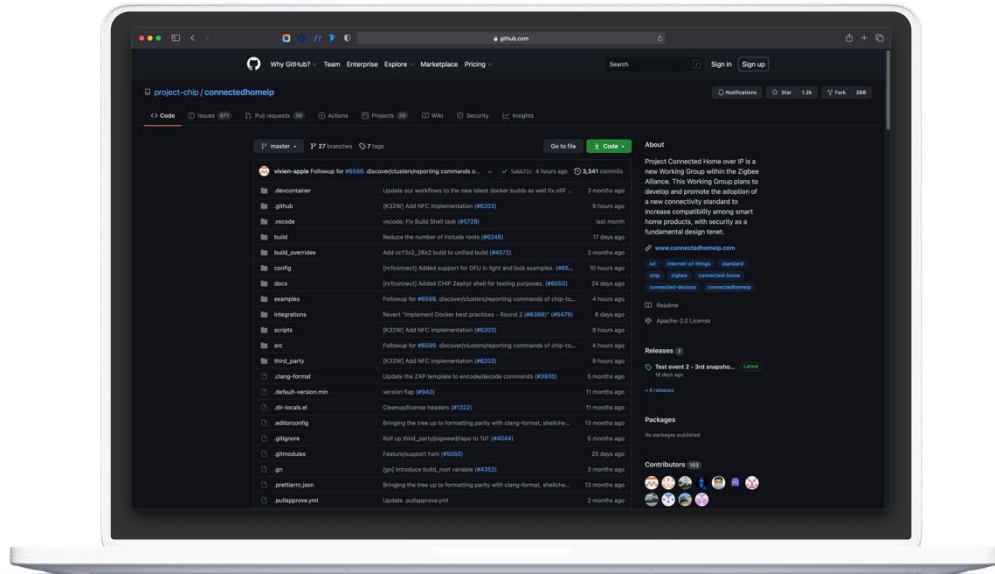
RS9116X-SB-EVK2
Single Band (B00)



RS9116X-DB-EVK1
Dual Band (CC1)

- Same EVK for Transceiver and Full NCP
- All accessories and software included
 - Sample examples for reference
- Interface card for EFR & EFM boards

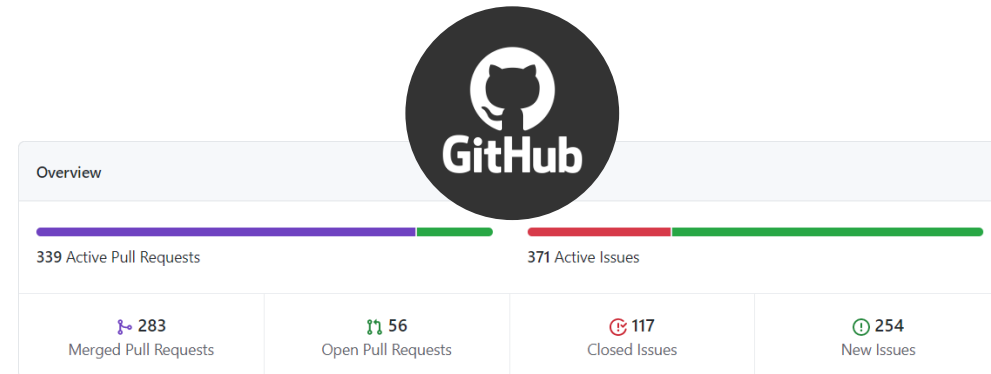
Matter Solution Available on GitHub



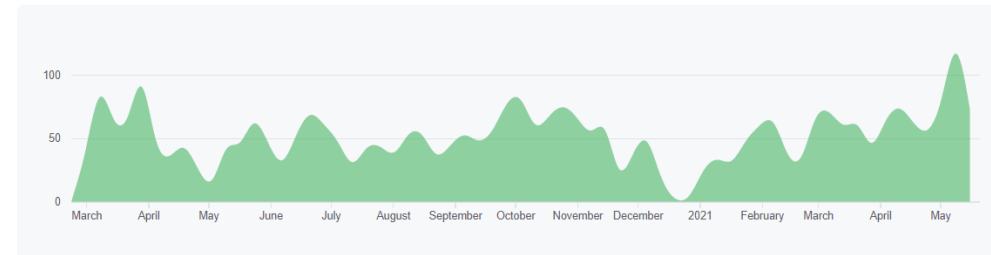
- **Clone Matter repo from GitHub**
 - github.com/project-chip/connectedhomeip
 - Tested on macOS 10.15, Debian 10, Ubuntu 20.04 LTS
- **Install Tools**
 - Simplicity Commander
 - ARM GCC Toolchain
- **Follow the developer guide on silabs.com to get started**
 - silabs.com/wireless/matter#start
 - CLI based build system
 - Makefile target provided to build and flash device
 - MG12 and WF200 part support

Matter – Open Source

- **Matter open-source project:**
 - github.com/project-chip/connectedhomeip
- **Documentation**
 - Readme to explain the overall project with in-depth explanations of underlying concepts
 - Building and development guides
 - Project flow documentation
- **Software**
 - Files to build Matter projects
 - Matter source code
 - Third party integrations with Matter
- **License**
 - Detailed layout of what is permitted and limited under the current version of Matter
- **Code examples**
 - Provide a step-by-step guide to get you to the point of successfully running code on your Matter network



Contributions to master, excluding merge commits and bot accounts



[Light Bulb](#)

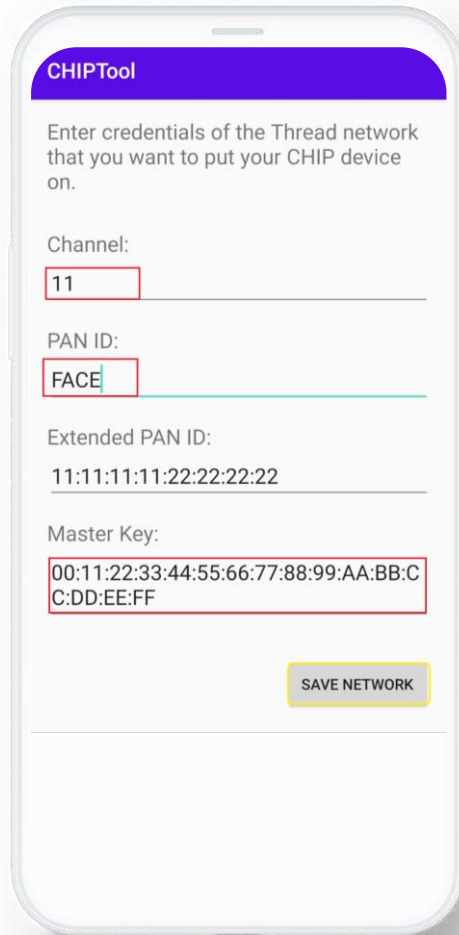


[Door Lock](#)



[Window Covering](#)

Android Matter Tool



The screenshot shows the CHIPTool application interface on an Android phone. The title bar is purple with the text 'CHIPTool'. Below the title bar, there is a text prompt: 'Enter credentials of the Thread network that you want to put your CHIP device on.' The interface contains four input fields: 'Channel:' with the value '11', 'PAN ID:' with the value 'FACE', 'Extended PAN ID:' with the value '11:11:11:11:22:22:22:22', and 'Master Key:' with the value '00:11:22:33:44:55:66:77:88:99:AA:BB:CC:DD:EE:FF'. A yellow 'SAVE NETWORK' button is located at the bottom right of the form.

- **An Android based application for commissioning and controlling Matter Devices**
- **Build with Android Studio**
- **Features:**
 - Scan a QR code and display payload information to the user
 - Read the NFC tag containing onboarding information
 - Commission a device
 - Send echo requests to the echo server
 - Send on/off cluster requests to a device

Light Bulb Example Application

- **Description:**

- The lighting example provides a baseline demonstration of a light control device
- Built using Matter and the Silicon Labs Gecko SDK
- It can be controlled by a Matter device controller over OpenThread network

- **Features**

- Commissioned over Bluetooth Low Energy
- Matter controller and device exchange security information with the Rendezvous Protocol
- Has On/Off functionality and remote control

- **Other Details**

- As the most basic device type, the lighting example is intended to serve as a template for other devices



Door Lock Example Application



- **Description:**

- The lock example provides a baseline demonstration of a smart door lock, for access control to a residence

- **Features**

- Deadbolt status and control represented by LED lights
- States includes deadbolt closed, deadbolt open, and deadbolt in motion

- **Other Details**

- Includes step-by-step walkthrough on building the device, flashing the application, and logging output and running the complete example

Window Covering Example Application

- **Description:**

- The window example provides a baseline demonstration of a window covering
- Can be used for either vertical or horizontal examples
- WSTK LED's are used to indicate the status of the shade covering
- Push buttons offer input options

- **Features**

- Includes an automatic fully open and fully closed control
- Includes partial coverings by increments of 10%
- Can cycle between different window covering types

- **Other Details**

- Features included in the lightbulb and lock examples
- Example includes a factory reset option for the device



Boarder Router Example Application



- **Description**

- Step by step guide to build a Thread boarder router to connect a Thread network to other IP-based networks, such as Wi-Fi or Ethernet

- **Requirements**

- Raspberry Pi 3b or newer
- OpenThread Platform (such as Silicon Labs products) for network connectivity
- MicroSD card and MicroSD card reader

- **Other Details**

- Link: <https://openthread.io/guides/border-router/raspberry-pi>
- Link: <https://openthread.io/codelabs/silabs-openthread-hardware#6>

**Customer Showcase:
Somfy**



Place Holder for Customer Discussion



Place Holder for Customer Video



Closing Remarks

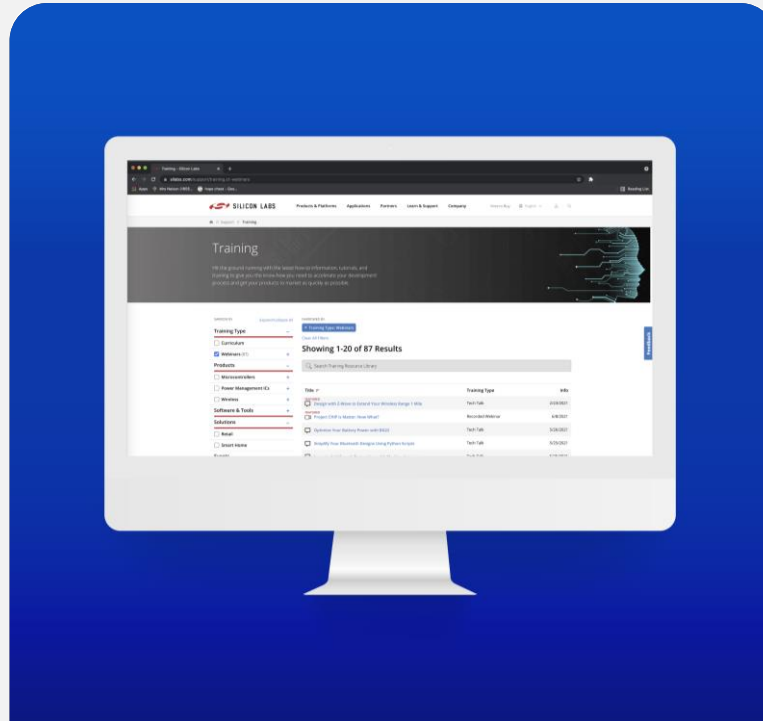


Other Tools Available



ADDITIONAL EXAMPLES ON GITHUB

Thermostat, Bridge, Pump-app, and TV App plus direction to other informational material and step-by-step labs



SILICON LABS EDUCATION PORTAL

Available on Silicon Labs website, offers a variety of in-depth courses on everything from protocol basics to advanced labs



MAT-201 AND MAT-301 SESSION

The MAT-201 session shows Matter development with Google
The MAT-301 session will show developing and debugging the Smart Home with Google and Matter

Claim your Thunderboard Sense 2 today

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Silicon Labs Si7210

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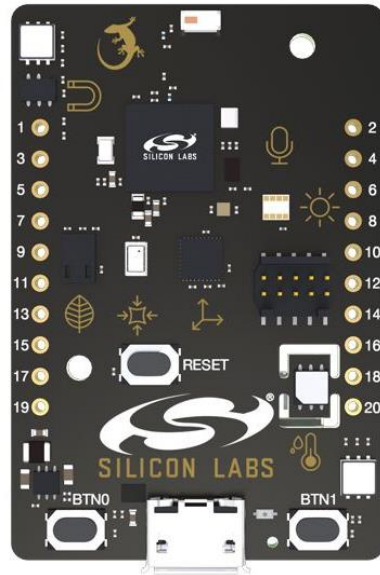
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Silicon Labs Si7021

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Macronix MX25R8035F

Data Acquisition and Analytics

Open-Source iOS/Android apps &
cloud demos
[Github.com/siliconlabs](https://github.com/siliconlabs)

- With your registration, you are eligible for a free Thunderboard Sense 2, click the link in chat to claim yours
- With this tool, you can have the hardware required to start development today



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