SILICON LABS | tech talks

Welcome

Developing with matter over Wi-Fi on the RS9116

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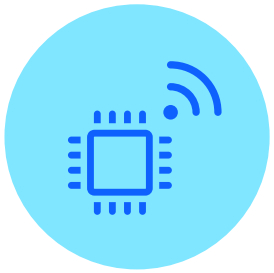
Agenda

MATTER OVERVIEW

- Current IoT problems and status
- How does matter address the current problems?
- Matter architecture and topology
- Benefits of Matter
- Matter target applications
- Where is Matter today?

MATTER OVER WI-FI

- Fabrics
- Bridges
- Security
- Multi-Admin



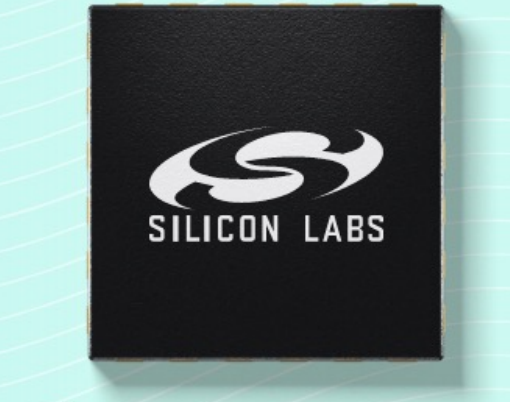
WI-FI DEMO

- MG12 and RS9116 Matter over Wi-Fi Demo

MATTER SUMMARY

- Silabs Matter Solution Overview
- Silabs Router Interoperability
- Silabs Matter Portfolio
- Silabs Matter Roadmap
- Matter over Wi-Fi Summary

Matter Overview



matter

Why (does it) Matter?

- **Current state:**
  - IoT home is made up of large number of devices
  - Devices come from different manufacturers
  - Devices use different technologies
- **This brings the following problems:**
- **For consumers:**
  - Hard to mix and match products from different manufacturers
  - Must use a number of different apps to manage their devices.
  - Hard to switch device manufacturers
- **For manufacturers:**
  - Forced to pick ecosystem integrations to support
  - Must ship multiple SKUs for different connectivity standards
  - Must learn different competing IoT technologies & ecosystems
- **For retailers:**
  - Difficult to provide expert advice for consumer questions.
  - High product return rates due to interoperability issues.

Matter strives to solve all of the above issues.

How Does Matter Intend to Address These Issues?

For Consumers

- It will provide a more consistent set up experience
- It will enable Multi–Admin capabilities that will work across & with multiple ecosystems

For Developers

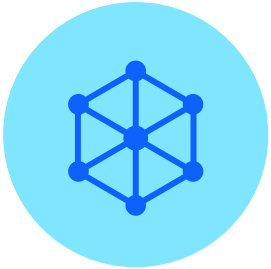
- It will allow them to develop once and deploy everywhere
- It will provide a unified community of support

For Retailers

- It will enable a simplified purchasing experience
- It will minimize product returns

Simplicity

Easy to purchase and use



Interoperability

Devices from multiple brands work natively together

Reliability

Consistent and responsive local connectivity

Security

Robust and streamlined for developers and users

Matter brings us together

- **Project CHIP is rebranded to Matter:**
  - Driven by Apple, Google, Amazon, SmartThings and many others…
  - Solves interoperability between a large number of ecosystems
  - Reduces IoT complexities for product developers
  - Simplifies the user experience during setup and throughout lifetime control
  - As it leverages Zigbee application definitions, it provides a large device support offering.
  - Allows connectivity to any local or cloud-based IP device through native IP support

- **It is backed by more than 140 CSA member companies**

matter

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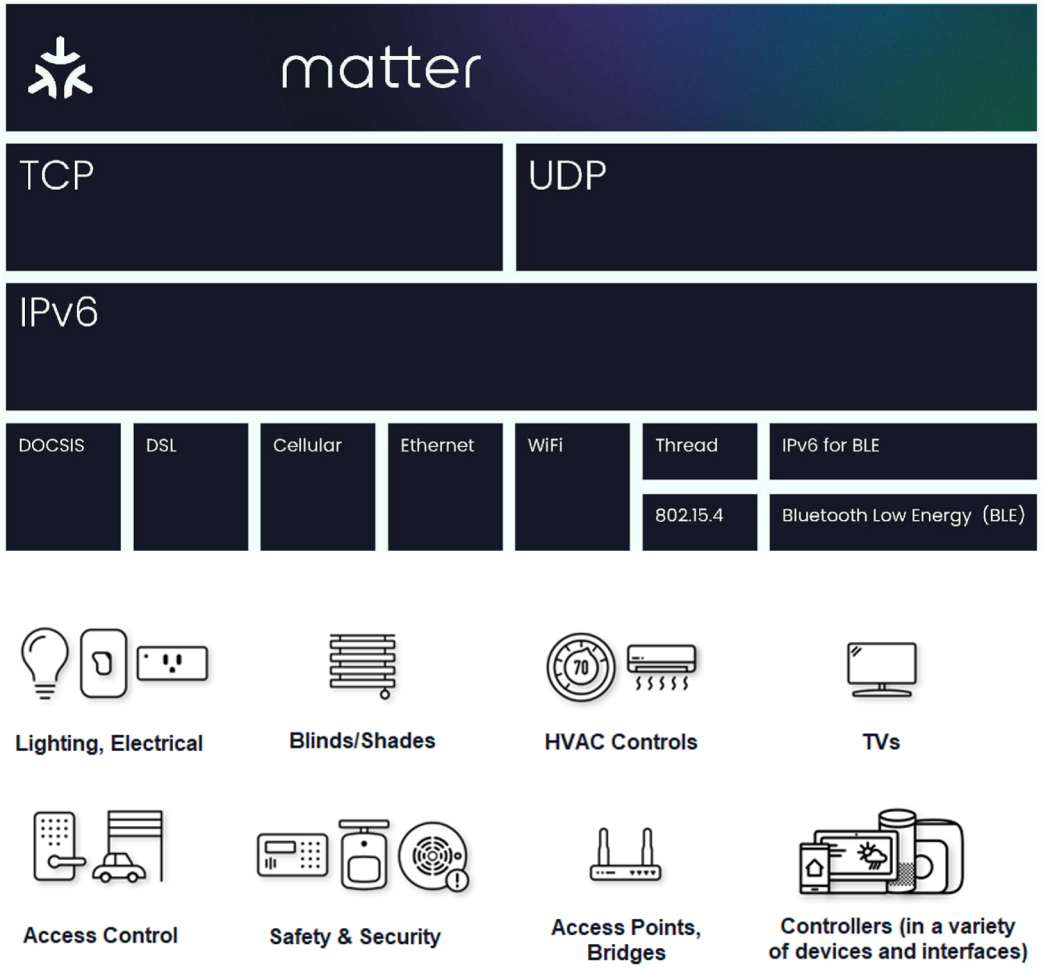
How Matter Stacks Up



Common application layer + data model
Interoperability, simplified setup & control

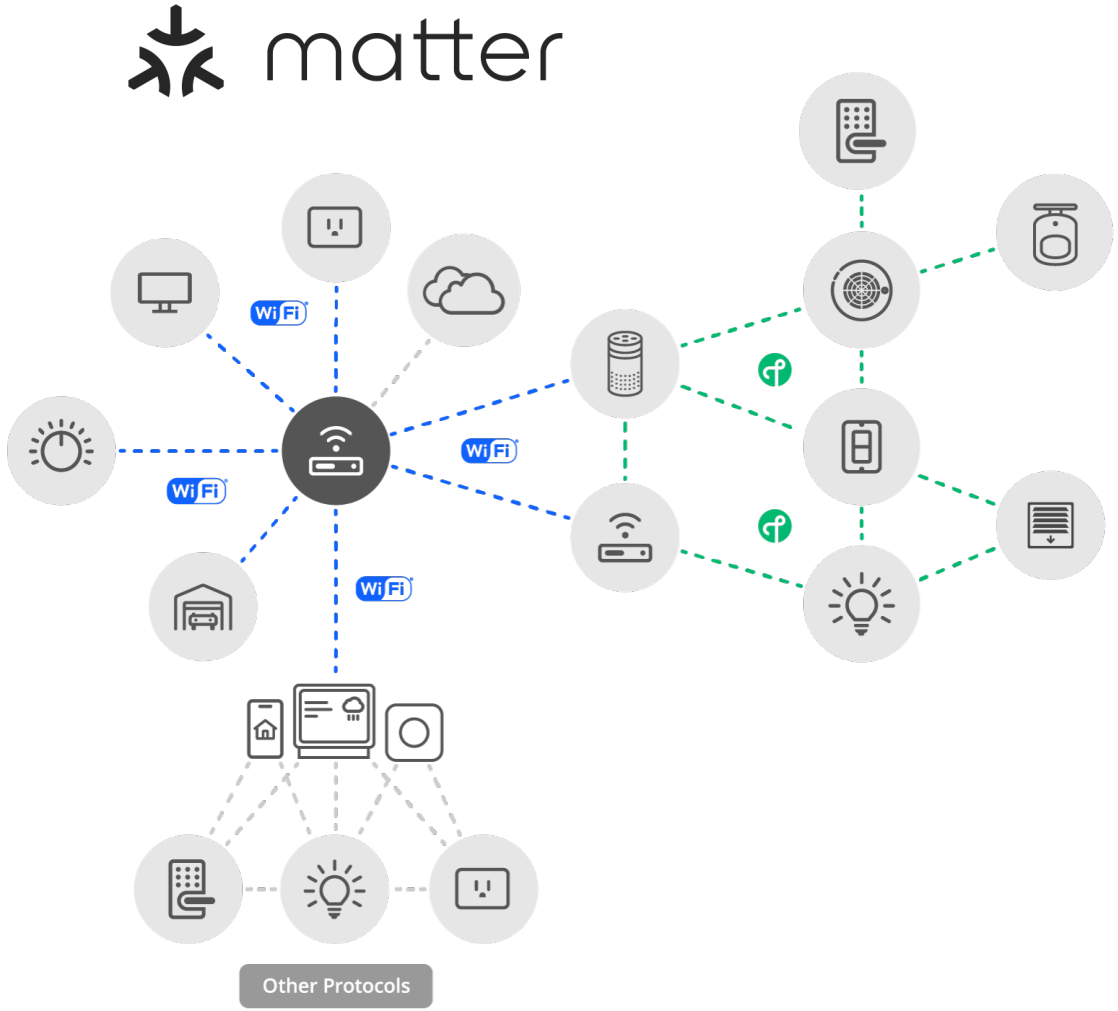
IP-based
Convergence layer across all compatible networks

Secure
AES-128-CCM encryption with 128-bit AES-CBC

Open-source development approach
Based on market-proven technologies

Common protocol across device and mobile
Extendable to cloud

Matter network topology



- Focus on Ethernet, Wi-Fi, Thread
- The first specification release of the Matter protocol will run on Wi-Fi and Thread network layers and use BLE for provisioning.
- Thread devices connect to other IP networks through border routers
- Bridges can link to other protocols like Zigbee and Z-Wave

Benefits of Matter

Matter improves on the following areas:

Baseline Setup:
- Provides a more consistent setup experience through methods like QR codes and BLE provisioning.

Interoperability:
- Enables users to interoperate easily and securely with the ecosystem of their choice.
- As it is built upon IP technology, its traffic flows seamlessly across various kinds of networks.
- Its use of a common application layer and data model provides easy interoperability across devices.

Reliability and Security:
- Based on IPv6
- Provides proven device definitions
- AES-128-CCM encryption with 128-bit AES-CBC
- Based on the best available security practices, such as “security by design” and “zero trust”.
- Among the used security practices are certificate-based device attestation and PAKE-based pairing algorithms.

Open Source:
- Software based on market-proven technologies makes deployment quicker and more robust.

Matter target applications

Lighting, Electrical

HVAC Controls

Safety & Security

Access Control

TVs

Blinds/Shades

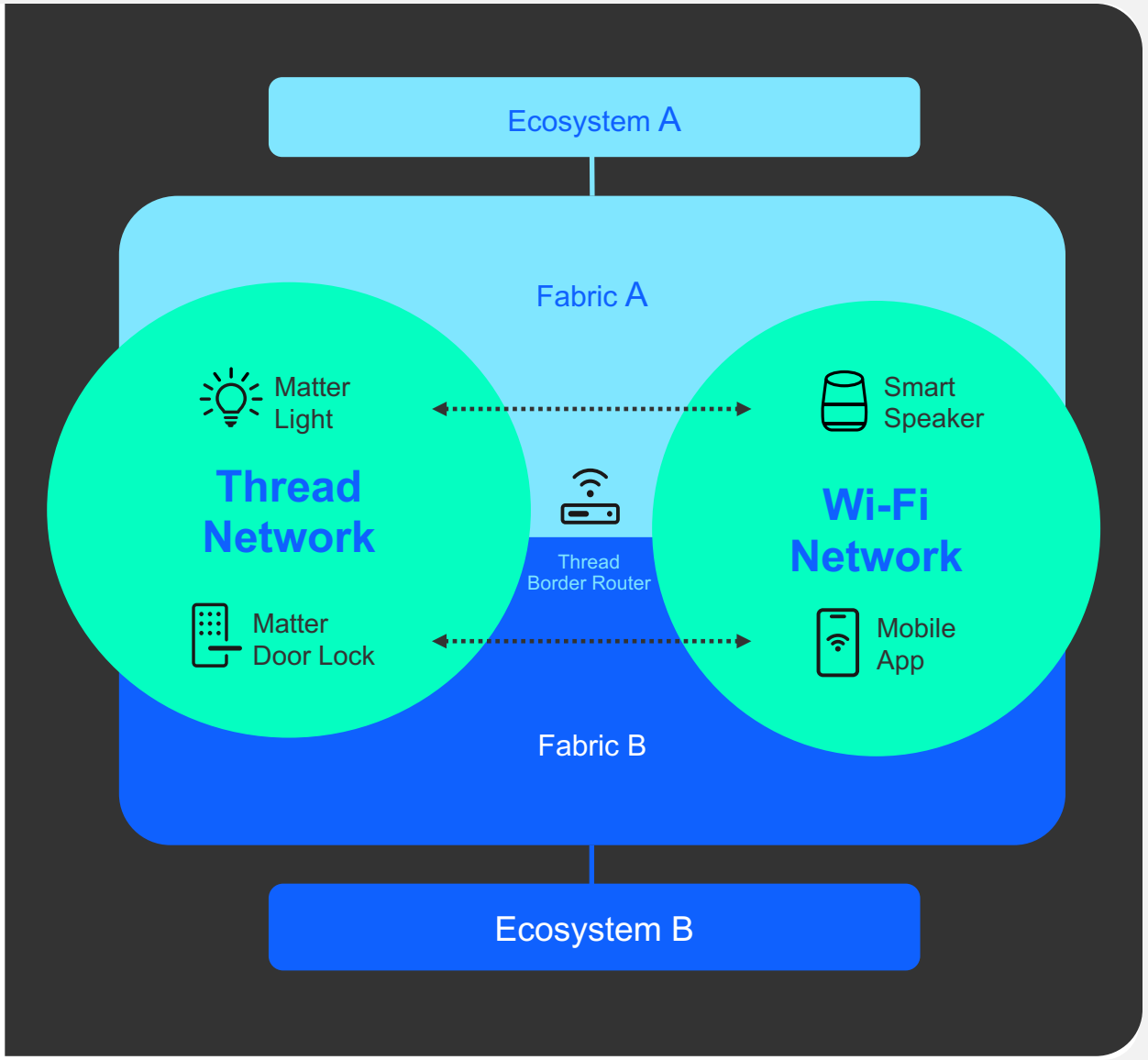
Access Points, Bridges

Scoping exercises for additional device types and use cases underway and continual.


Matter over Wi-Fi
for IoT Products

Matter over Wi-Fi for IoT Products - Fabrics

- Matter creates virtual networks named Fabrics
- Fabrics allow Wi-Fi devices to operate with products of other technologies (Zigbee, Z-Wave for example)
- Fabrics are identified by a fabric ID which is a 64-bit number
- Fabrics are composed of nodes, which are identified by node IDs which are also 64-bit numbers.



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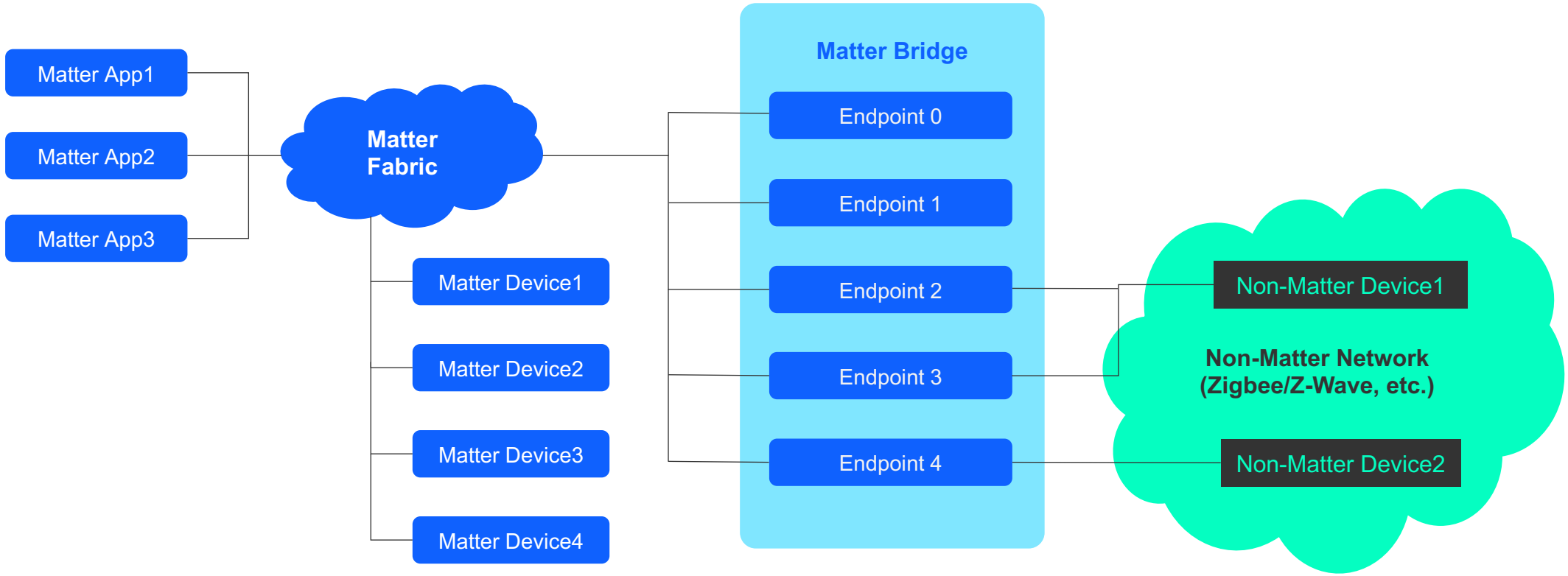
Matter over Wi-Fi for IoT Products - Bridges for Non-Matter Devices



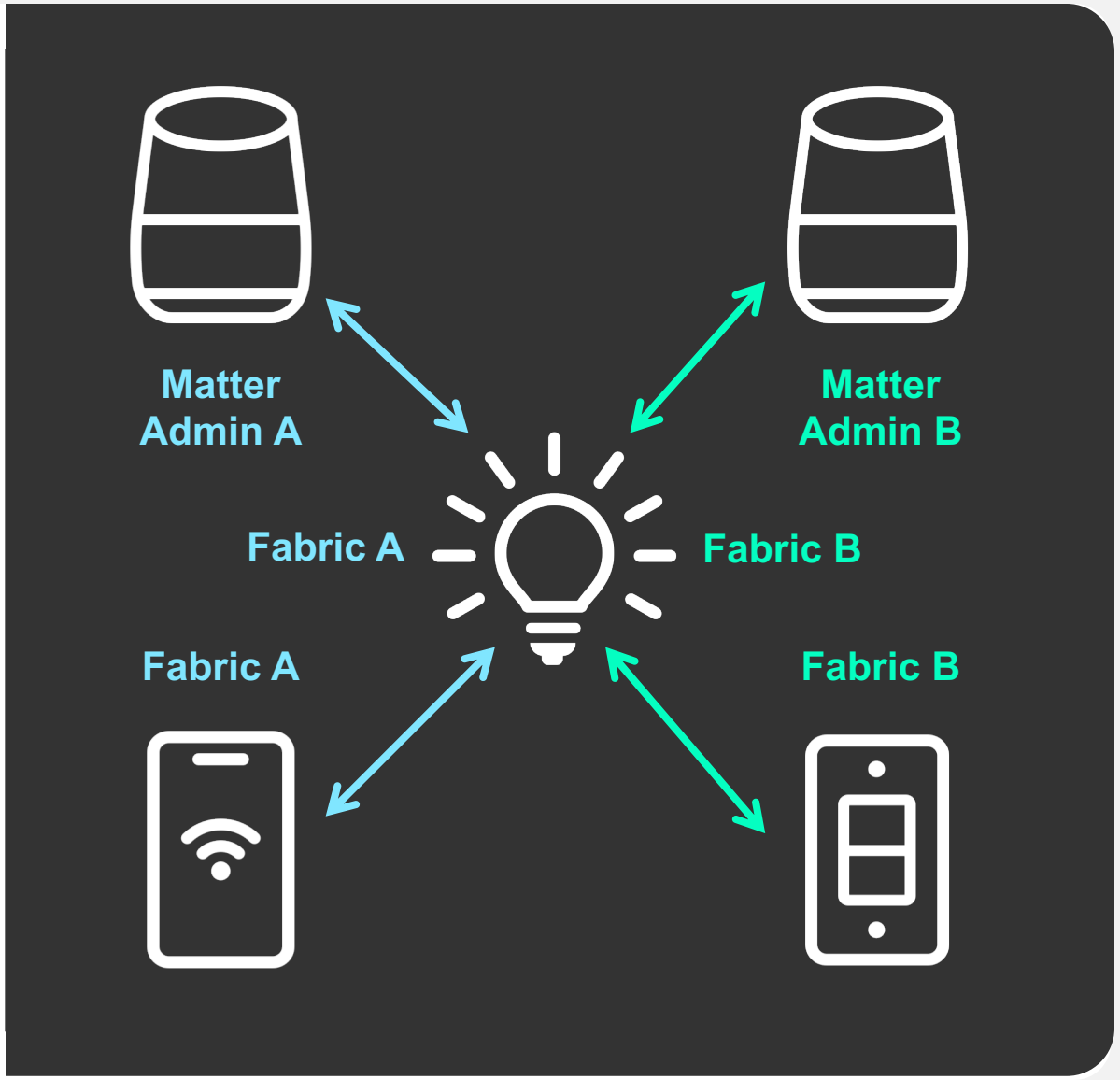
In order to allow communication to non-Matter devices, Matter allows for the use of bridges.

Matter over Wi-Fi for IoT Products - Security

- **Matter provides a higher degree of security to Wi-Fi IoT products, due to the following:**
  - All Matter products are identified by a unique signed device certificate validated by their manufacturers to ensure secure device attestation.
  - Devices MUST provide that identifier before being given network information (SSID/password).
  - All Matter communication is encrypted at the application layer. Matter's application layer security adds to the already existing Wi-Fi layer security (WPA2)
  - Matter is open source; thus, its code is open to third parties validating its security.
  - Matter provides a secure administration addition process

Matter over Wi-Fi for IoT Products - Multi-Admin capabilities

- Matter allows Wi-Fi IoT products from different manufacturers to be managed by a single common management entity, thus avoiding having a myriad of different apps for users to manage all the IoT devices in their homes.
- This also allows the management of Multiple matter fabrics.
- Matter admins dictate the access control lists for their Matter fabrics and thus, who can access devices within them.
- For example, in the diagram in this page:
  - Matter Admin A can grant control privileges to Smart Phone on Fabric A
  - Matter Admin B can grant control privileges to Smart Switch on Fabric B



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Hands-On Matter over Wi-Fi Demo

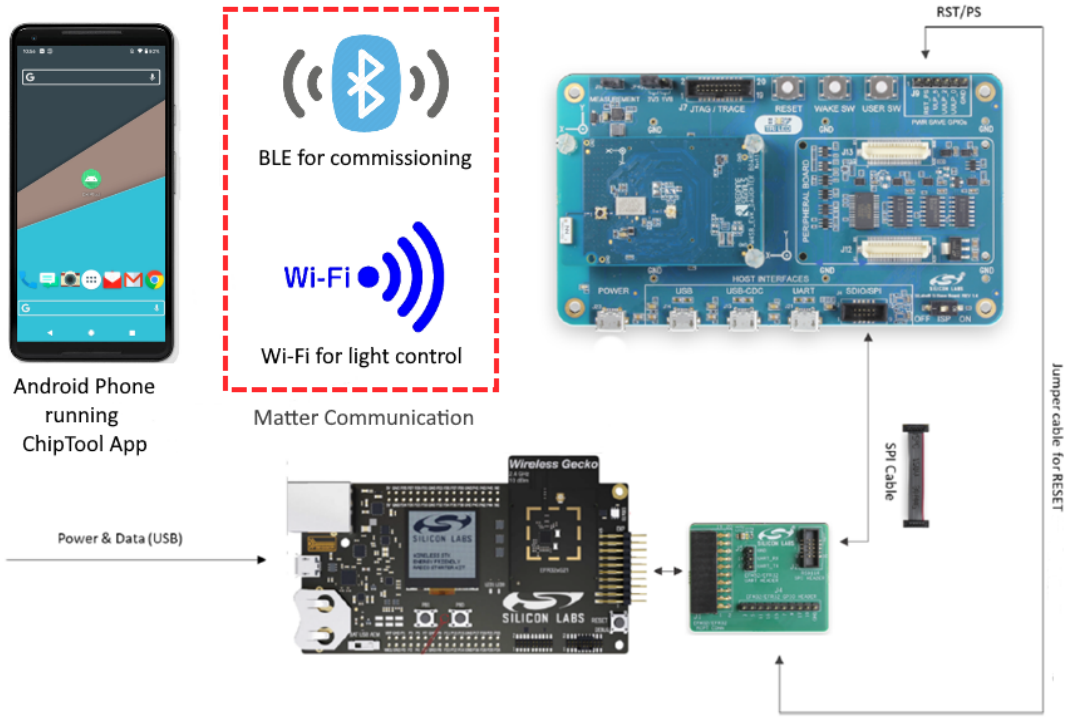
Materials Needed to Run Demo

HARDWARE

- A: Silicon Labs RS9116X-SB-EVK1 EVK
- B: Silicon Labs RS9116 to WSTK Interconnect board (EFX32-CON-BRD)
- C: Silicon Labs Wireless Starter Kit Mainboard (SLWSTK6000B)
- D: Silicon Labs MG12 BRD4161A board (SLWRB4161A)
- E: Computer running Ubuntu 20.04 LTS
- F: SPI cable for EFX32-CON-BRD
- G: Jumper wires
- H: Android phone
- Items A,B, F and G above are included with RS9116X-SB-EVK1 EVKs

SOFTWARE

- Lighting code supporting matter (both via BLE and Wi-Fi) will run on the MG12
- 2.5 version firmware will run in the RS9116
- The ChipTool App will run in the Android phone

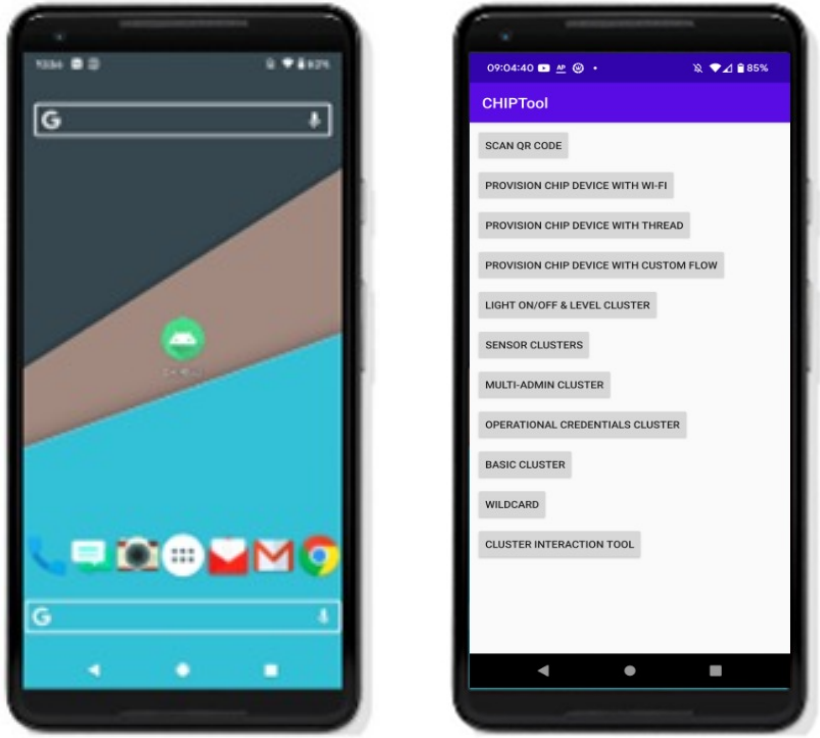


Please note that, while the demo presented today uses RS9116 hardware, It is also available for WF200.

Materials needed to run demo (Continued)

About the ChipTool App

- Is a software tool provided by the Connectivity Standards Alliance (CSA) meant to be the golden reference for the Matter protocol
- A test of interoperability for any Matter implementation is the ability to accurately receive and execute commands coming from the ChipTool.
- This is unlike earlier paradigms of interoperability where devices from multiple vendors were brought together to a ‘plug fest’ to ascertain that they all implement the standard as required.
- The ChipTool app is offered as an Android application.



Demo Flow

1 Perform Matter commissioning via BLE

2 SiLabs hardware joins commissioned Wi-Fi network

3 Lights controlled via Matter over Wi-Fi

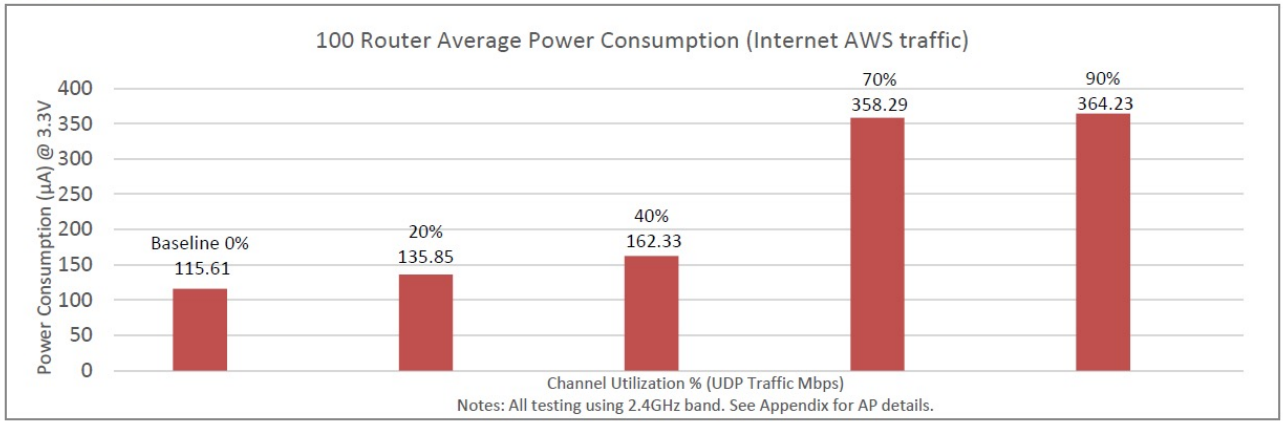
Silicon Labs Matter Product Overview

Silicon Labs Matter Over Wi-Fi Solution Overview

Ultra-Low Power and Fully Integrated Matter over Wi-Fi Solution

- **Wide portfolio of combo Wi-Fi + BT/BLE & Thread SoCs and Modules**
  - Reduced supply chain complexity
- **Industry leader in Ultra Low power Wi-Fi + BT/BLE 5**
  - 55uA stand-by associated current at DTIM10
- **Integrated core wireless and full networking stacks, robust Wi-Fi/Cloud connectivity and security**
  - Seamless wireless co-existence, minimize host load and system complexity
- **Integrated Matter Solution with MG12/MG24 and WFx200/RS9116**
  - Integrated Matter over Wi-Fi 6 solution in roadmap

Ultra-Low Power and Robust Interoperability with Routers Worldwide



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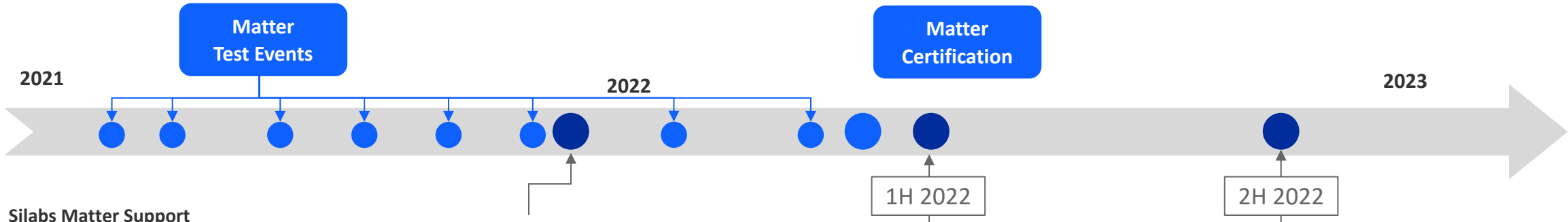
- **Robust secure connectivity and interoperability observed during the whole test for all 100 routers with:**
  - Zero Wi-Fi disconnects
  - Zero TCP disconnects
  - 100% reception of application messages sent once every 55 seconds during the test.
- **Ultra-Low power consumption**
  - With clean channel, average of only 116uA across all 100 routers
  - With 'close to saturation' channel utilization of 90% the average power consumption increases to only 364 µA averaged across all 100 routers
- **Measurements with MQTT based cloud connectivity**

Silicon Labs Matter Portfolio

	MG12	Series 2 (MG21)	Series 2 (MG24)	WF200/WFM200	RS9116
Product Focus	Gateway	Gateway	End Device or Gateway	Gateway	End Device or Gateway
Target Applications	Line or battery-powered	Line-powered	Line or battery-powered	Line or battery-powered	Line or battery-powered
Protocols	Bluetooth, Zigbee, OpenThread, Proprietary, Dynamic Multiprotocol	Bluetooth, OpenThread, Zigbee, Dynamic Multiprotocol	Bluetooth, Zigbee, OpenThread, Proprietary, Dynamic Multiprotocol	Wi-Fi	Wi-Fi, Bluetooth, BLE 5
Application MCU	Yes	Yes	Yes	Requires external host	Requires external host
Freq. Bands	2.4 GHz, Sub-GHz, Dual Band	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz, 5 GHz
Core	Cortex-M4 (38.4 MHz)	Cortex-M33 (80 MHz)	Cortex-M33 (80 MHz)	-	Cortex-M4F(180 MHz), ThreadArch(160MHz)
Max TX Power	+20 dBm	+20 dBm	+20 dBm	+17 dBM	+20 dBm
RX Sensitivity (802.15.4)	-102.7 dBm	-104.5 dBm	-104.5 dBm	-96.7dBM (Wi-Fi)	-98dBm (Wi-Fi)
RX Sensitivity (BLE 125 kbps)	N/A	-105 dBm	-105 dBm	N/A	-106dBm
RX Sensitivity (BLE 1 Mbps)	-94.8 dBm	-97.5 dBm	-97.5 dBm	N/A	-95dBm
TX Current	9.5 mA (@ 0 dBm)	9.3 mA (@ 0 dBm)	5.1 mA (@ 0 dBm)	153 mA (Wi-Fi@10dBm)	130 mA (Wi-Fi @10dBm),200 mA (Wi-Fi @17dBm)
RX Current (802.15.4)	12.5 mA	9.4 mA	5.1 mA	41.6mA (Wi-Fi @1 Mbps)	20mA (Wi-Fi @ 1Mbps)
RX Current (1M, GFSK)	10.9 mA	8.8 mA	4.4 mA	41.6mA	48mA (Wi-Fi @ 6 Mbps)

Silicon Labs Matter Over Wi-Fi Roadmap



Silabs Matter Support

- WiFi NCP: MG12/24 + WF200
- WiFi NCP: MG12/24 + RS9116
- Door Lock, Light Bulb, Window Shades, Switch

Release 4.0.0

- RS9116 & WF200 Wi-Fi Alpha (GitHub)

Release 4.1.0

- Matter GitHub 1.0

Release 4.2.0

- RS911x Wi-Fi GA

Matter @ Silicon Labs

- Silabs will make Matter over Wi-Fi code available through GitHub in 2H 2022.
- For further matter information, please refer to the following webpage:
- https://www.silabs.com/wireless/matter

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THREAD CERTIFIED COMPONENT

Silicon Labs Matter over Wi-Fi Summary

Silicon Labs Matter Over Wi-Fi Summary

- **Wi-Fi is the world's most deployed wireless networking technology,**
  - Matter over Wi-Fi ideal for IoT products
- **Wide portfolio of SoC/Modules, including Wi-Fi only or combo Wi-Fi + BT/BLE IoT devices**
- **Industry leader in Ultra Low power Wi-Fi + BT/BLE 5**
- **Integrated Matter Solution with MG12/MG24 and WFx200/RS9116**

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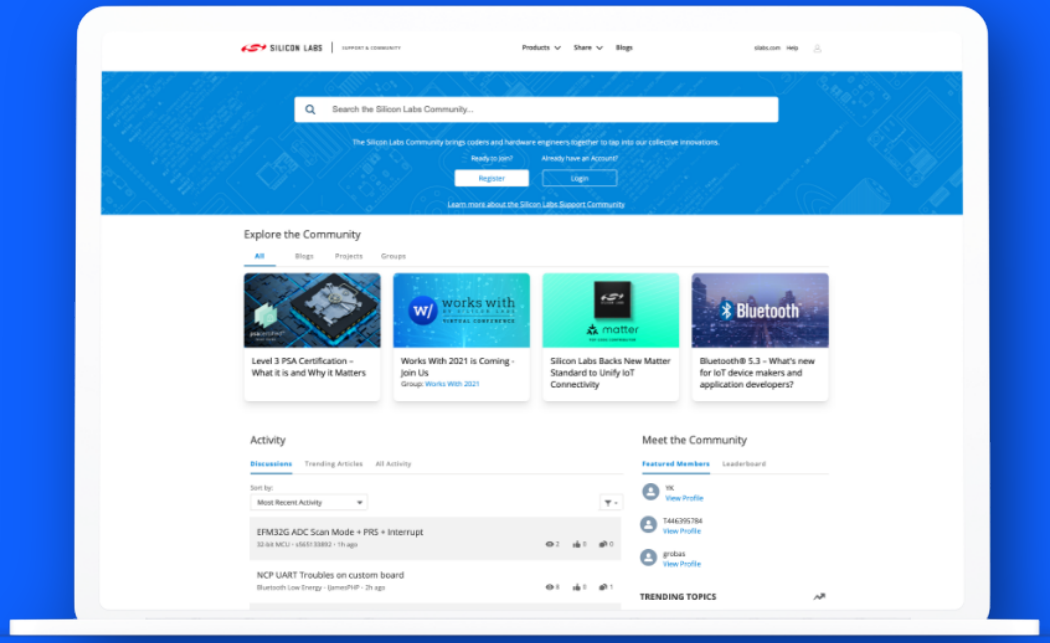
Continue Discussion in Our Community!



How to Navigate:

- “Products” to troubleshooting forums
- “Applications” to discuss IoT
- “Share” to view example projects and existing groups
- “Blogs” to view and discuss thoughts from our specialists

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WEBINAR

Z-Wave: Unboxing the New 800 Series

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