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MAT-101

Matter Specification and Market Updates

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Agenda

01 Smart Home Market Overview

02 What is Matter?

03 How Do Ecosystems Fit In?

04 Matter Specification

05 What's Next in Matter?

06 Silicon Labs Matter Solutions

07 Summary and Q&A

Smart Home Market

- **Smart Home continues to be fragmented**
  - Wi-Fi, Bluetooth, Zigbee, Thread, Z-Wave, Proprietary and Matter
  - One size does not fit all – driven by different requirements in area like bandwidth, range and power consumption
- **Significant growth in Wi-Fi and 802.15.4**
  - Wi-Fi for the Smart Home is forecasted to grow from 216 million devices in 2025 to 700 million in 2030
  - 802.15.4 for the Smart Home is forecasted to grow from 500 million devices in 2025 to 1.25 billion by 2030
- **Matters vision it to help standardize the Smart Home**
  - Matter over Thread and Matter over Wi-Fi can cover the majority of home use cases
- **Matter infrastructure continues to grow driven by key Ecosystems**
  - Key Smart Home Ecosystems have an estimated 2B users
    - Large global footprint including Samsung and Tuya
  - Estimated close to 1B Smart Speakers will have been sold by the end of 2025
    - Most of these support Matter over Wi-Fi (Apple, Amazon, Google)
    - However, close to 50% of Smart Speakers are North America
    - Global Market penetration is estimated to be only about 10% of homes
  - Adoption of Matter by ISPs is increasing

Matter's Vision

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

Developers

- Reduce "Ecosystem specific" products
  - Lower development & operational cost
  - Develop once / deploy everywhere
- Community of support
- Allow more time for innovation

Retailers

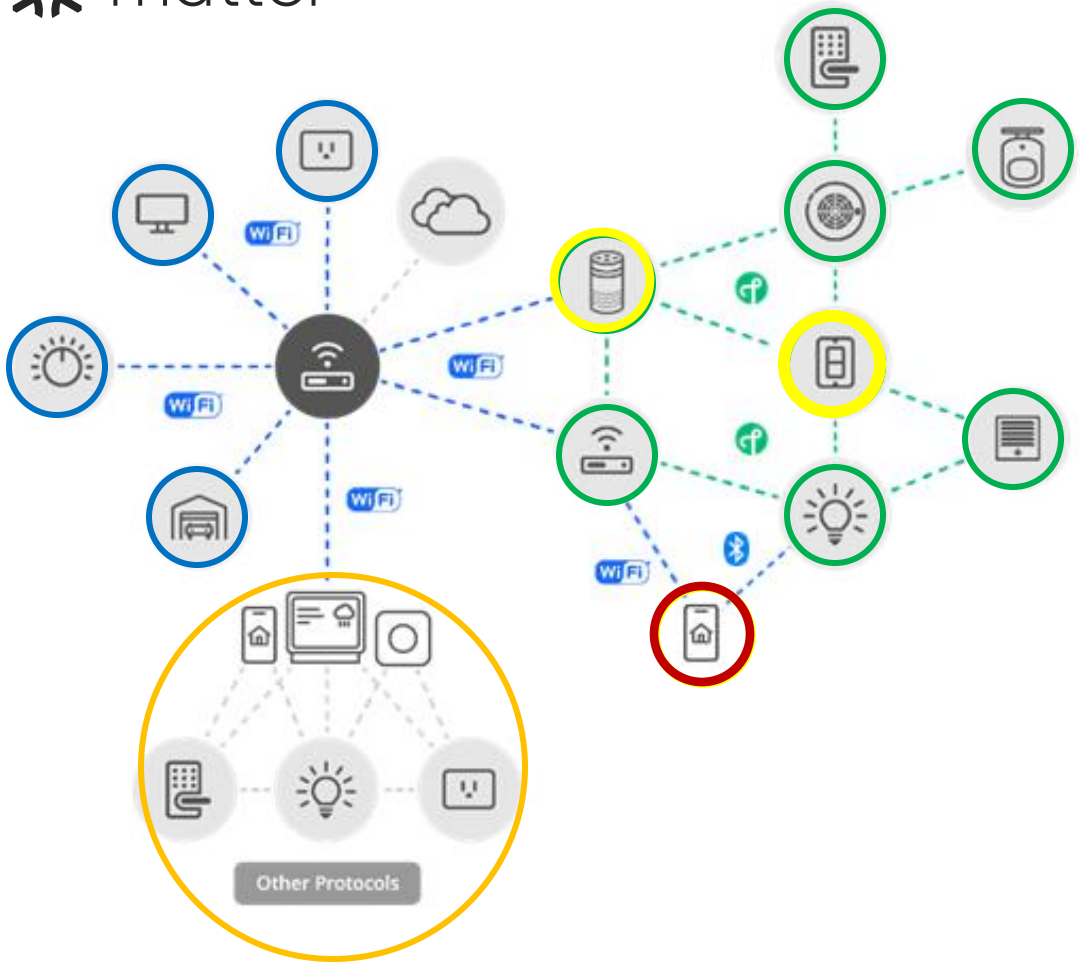
- Reduces inventory complexity
  - Lowers inventory cost
  - Requires less shelf space
- Minimize returns

Consumers

- Simplify purchasing experience
- Simplify setup & control
  - Provide more consistent set up experience

Network Protocols, Topologies and Roles

matter



- **Fabric**
  - Access Points, Hubs, OTBR, Devices, etc
  - Based on IP (TCP, UDP)
- **Devices**
  - Wi-Fi
  - Thread
    - Boarder Router
  - Bluetooth - Commissioning
- **Controllers**
- **Commissioners**
- **Bridges**
  - Enables other networks to connect to Matter Fabric
    - Zigbee, Z-Wave, etc

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Wi-Fi and Thread Comparison for Matter Devices

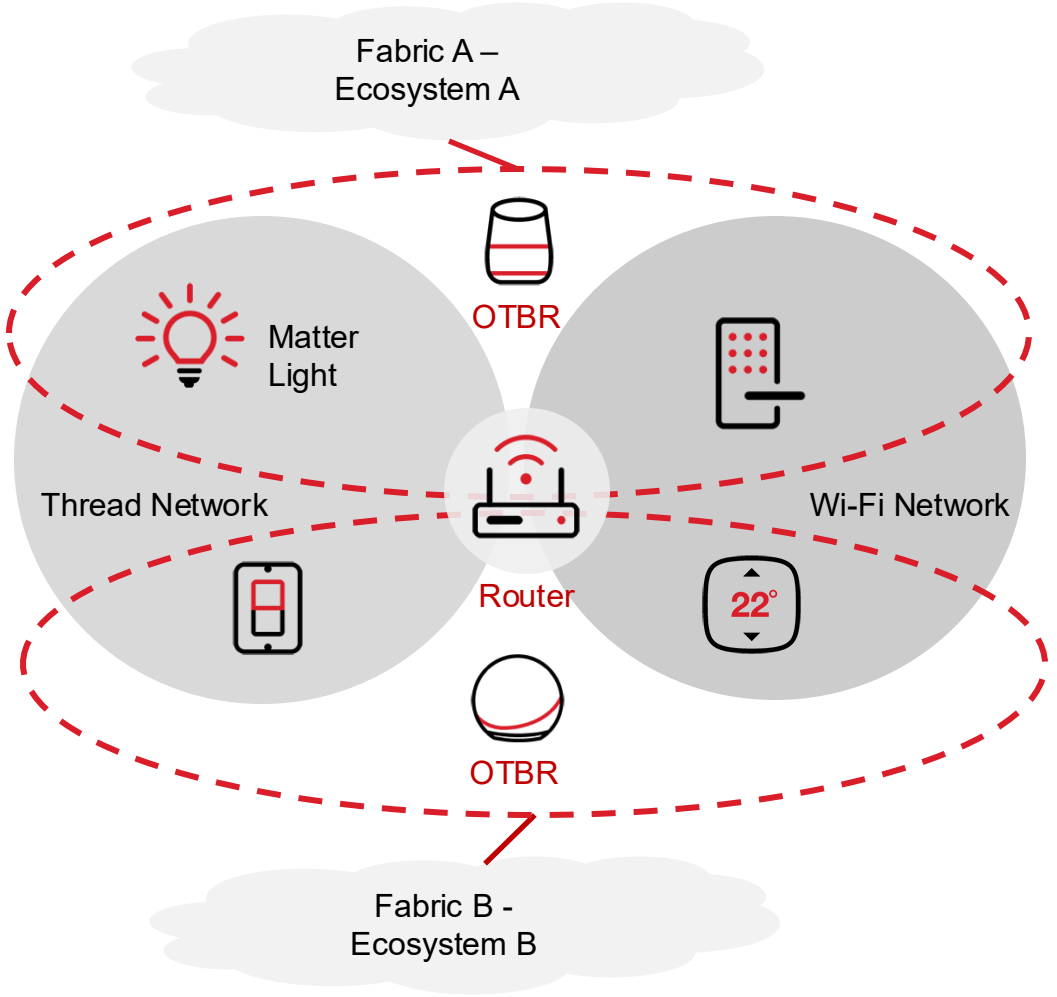
Universal wireless networking technology connecting many devices in the home today including high bandwidth & real-time applications like streaming video and audio, as well as line powered devices like light bulbs and thermostats.

An energy-efficient wireless mesh network that enables smart home devices such as lighting as well as battery operating devices including door locks, sensors and switches.

Category	Wi-Fi	Thread
Existing Infrastructure	**Ubiquitous**	**Growing Adoption**
Internet Support	**Native**	**Requires a border router**
IP Support	Both IPv4 and IPv6	IPv6 only
Mesh Networking	**Infrastructure/AP**	**Yes**
Bandwidth	**Very High (600 Mbps+)**	**Low (250 Kbps)**
Battery Type	**Rechargeable, Multiple Alkaline (i.e. AA)**	**Alkaline (i.e. AA), Coin cell**
Broadcast Support	Limited	Optimized for broadcasts

Matter Fabric

- **Fabric**
  - A collection of Matter devices sharing a trusted root
  - A fabric is identified by a **fabric ID** which is a **64-bit number**
- **Multiple transports**
  - Matter can work on top of multiple wireless or wired technologies to transport the IP packets
  - A bridge can be part of a of a Fabric
- **Node**
  - In a Matter fabric, each physical device is called a node
  - Each node is identified by a **node ID** which is a **64-bit number**
- **Multi-Admin**
  - There can be multiple Fabrics in the home
  - Multi-Admin allows easy cross fabric communication



Matter Device Types (Nov 2024)

- **Controllers and Network Infrastructure**
  - Bridges
  - Network Infrastructure Manager
  - Thread Border Router
- **Media Devices**
  - Casting Media Players (TV)
  - Video Players
  - Speaker
  - Remote Control
- **Energy Management**
  - Electric Vehicle Supply Equipment
  - Electric Vehicle Charger (EVSE)
  - Solar Power (Newly Added in Matter 1.4)
  - Battery Storage (Newly Added in Matter 1.4)
  - Water Heaters ((Newly Added in Matter 1.4)
  - Heat Pumps (Newly Added in Matter 1.4)
- **Robot Devices**
  - Robot vacuum
- **HVAC Control**
  - Thermostat
  - Fan
  - Room air conditioners
- **White Goods (Appliances)**
  - Refrigerators / Freezers
  - Laundry Washer
  - Laundry Dryers
  - Dishwashers
  - Microwave Ovens
  - Ovens
  - Cooktops
  - Extractor Hoods
- **Lighting and Electrical**
  - Lights (On/Off, Dimming, Temperature, Color)
  - Load Control (On/Off, Dimming)
  - On/Off Plug
  - Dimmable Plug
  - Pump
- **Switches**
  - Light switches (On/Off, Dimming, Color)
  - Generic Switch
  - Pump Controller
  - Control Bridge
- **Closures**
  - Door lock / controller
  - Window covering / controller
- **Sensors**
  - Contact
  - Light Sensor
  - Occupancy
  - Temperature Sensor
  - Pressure Sensor
  - Flow Sensor
  - Humidity Sensor
  - On/Off Sensor
- **Water Management Sensors**
  - Leak detectors
  - Water Freeze detectors
  - Rain sensors
  - Valve Control
- **Smoke and CO Detection**
  - Smoke and CO alarms
- **Air Quality Control**
  - Air purifiers
  - Air quality sensors
- **Safety and Security**
  - Contact Sensor
  - Occupancy Sensor

Matter Commissioner vs. Controller

Commissioners

- The Matter Commissioner is a role in the fabric that grants privileges to other devices
  - It permits new devices to join the network
  - Permits existing devices to talk to one another

Controllers

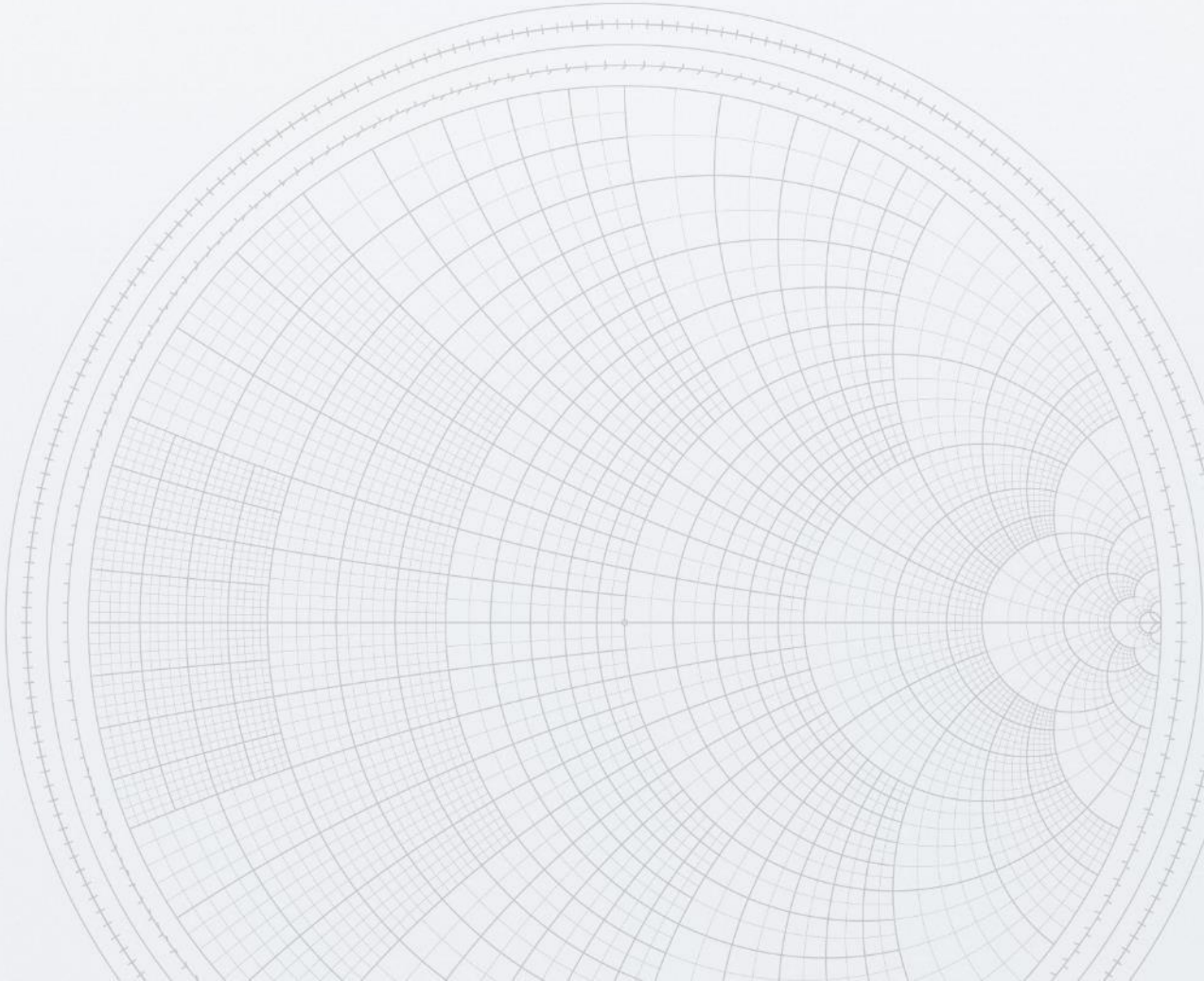
- Devices that send commands to other devices to change or query their state
  - i.e. Turn on the light
- Devices can be a commission and controller

Simple Commissioning via QR Code and Bluetooth or NFC

- **Bluetooth commissioning**
  - Typically done via phone or tablet
  - Same flow regardless of network protocol (Thread or Wi-Fi)
  - Does not require you to connect via Wi-Fi, provide SSID, etc.
  - Uses QR code to obtain device info, passkey, etc
  - Uses phone or tablet to scan QR code
    - User does not need to enter info manually
    - Can enter passkey manually if commissioner does not have camera
  - Commissioner exchanges credentials, authenticates the device and exchanges keys
    - Verifies the device against the DCL to verify it is certified device

- **NFC commissioning**
  - The user simply taps their NFC-enabled smartphone to the Matter device
    - Does requires access to device, but not the QR code
  - The NFC tag provides the device info, passkey, etc.
  - Commissioner exchanges credentials, authenticates the device and exchanges keys
    - Verifies the device against the DCL to verify it is certified device

Ecosystems



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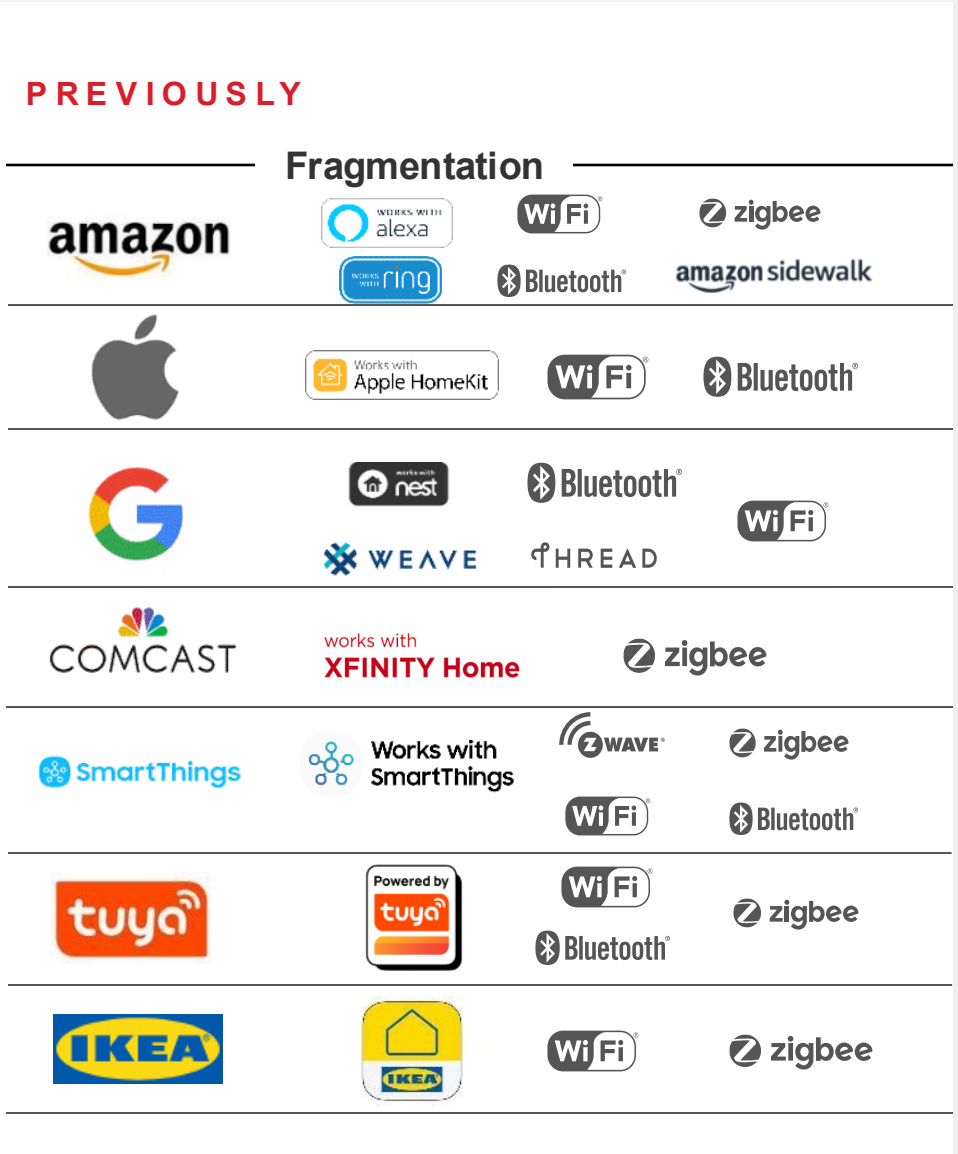
Matter and the Ecosystems – Past, Present, and Future



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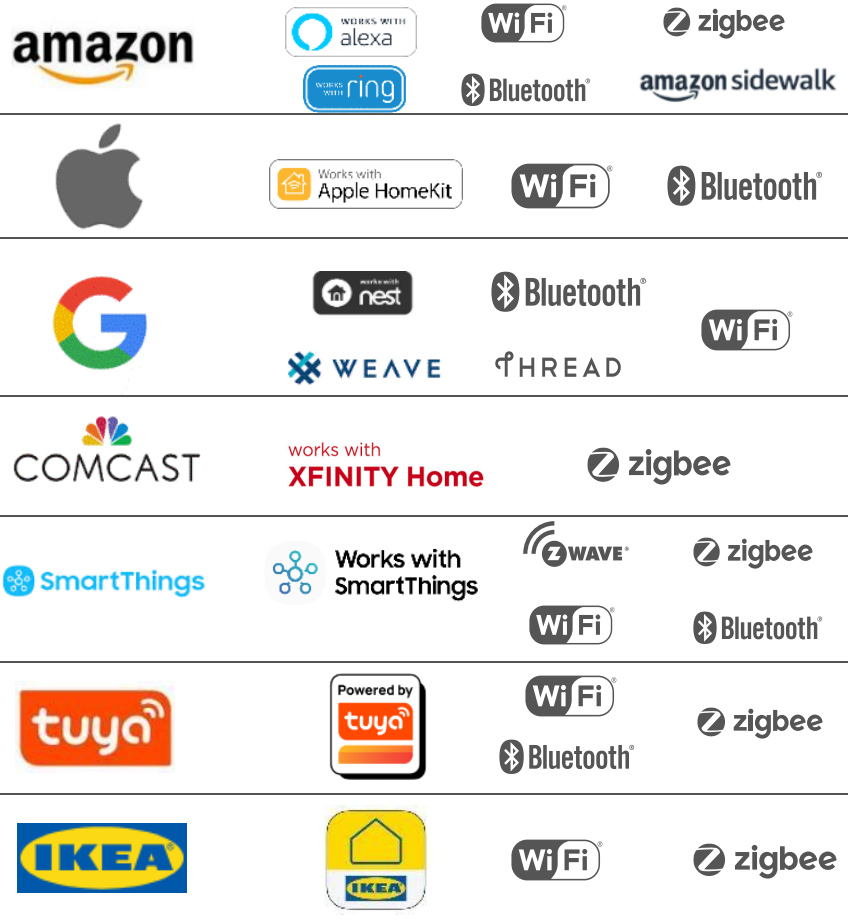
Matter and the Ecosystems – Past, Present, and Future

PREVIOUSLY

Fragmentation



DEVICE TRANSITION

Software updates to devices in millions of homes, let people use Matter with many devices they already have. **Hundreds of devices have been certified!**

Other devices won't get left behind —
Matter supports bridging to technologies like Zigbee and Z-Wave, and major ecosystems will support existing integrations.

Matter and the Ecosystems – Past, Present, and Future

PREVIOUSLY

Fragmentation

- amazon — Works with alexa, Works with ring, Wi Fi, Bluetooth, zigbee, amazon sidewalk
- Apple — Works with Apple HomeKit, Wi Fi, Bluetooth
- Google — nest, WEAVE, Bluetooth, THREAD, Wi Fi
- COMCAST — works with XFINITY Home, zigbee
- SmartThings — Works with SmartThings, Z-WAVE, zigbee, Wi Fi, Bluetooth
- tuya — Powered by tuya, Wi Fi, Bluetooth, zigbee
- IKEA — IKEA, Wi Fi, zigbee

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PRESENT

Unification

- works with alexa
- works with Google Home
- Works with Apple Home
- Powered by tuya
- Works with ring
- Works with SmartThings
- works with XFINITY Home
- IKEA

matter

THREAD
Wi Fi
Bluetooth

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Ecosystem Supported Devices

APPLE

- Apple HomePod (2nd gen)
- Apple HomePod Mini
- Apple TV 4K
- Apple HomePod (1st gen)

GOOGLE

- Nest Hub (2nd gen)
- Nest Hub Max
- Google Nest Wi-Fi Pro
- Google Nest Wi-Fi Router
- Nest Audio
- Nest Mini
- Nest Hub (1st gen)
- Google Home
- Home Mini

AMAZON

- Echo Hub
- Echo (4th gen)
- Eero Pro 6
- Echo Show (3rd gen)
- Eero Max 7
- Echo smart speakers
- Echo Pop
- Echo Dot
- Echo Studio
- Echo Show 5, 6 (2nd gen)
- Echo Show 10 (3rd gen)

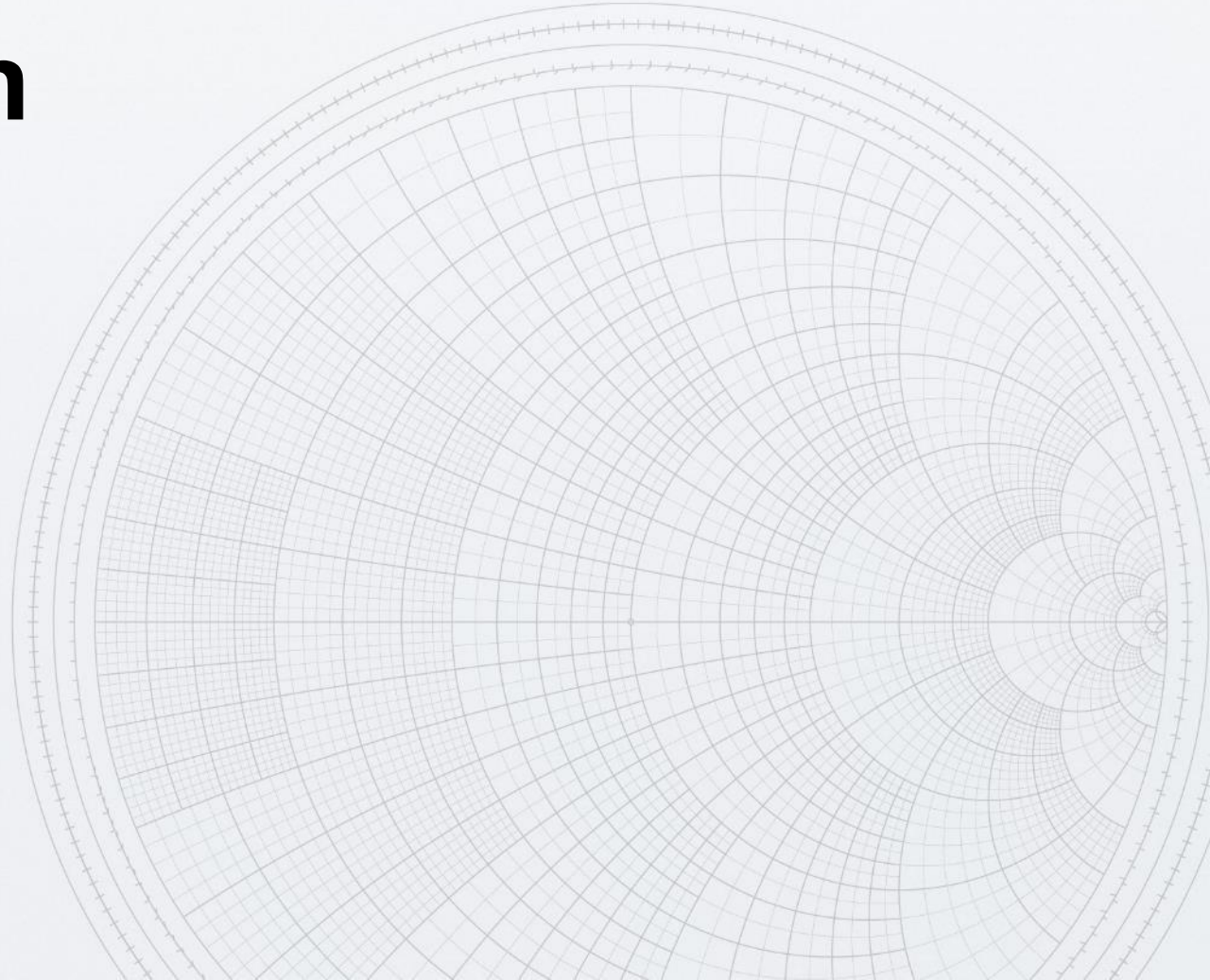
SMARTTHINGS

- Aeotec Smart Home Hub
- SmartThings Station
- SmartThings Hub Dongle
- SmartThings Hub v3
- Smart TVs (select models)
- Smart Monitors (select models)
- Smart Soundbar (select models)
- SmartThings Hub v2
- Family Hub Fridge
- Smart Monitors (2022)
- Smart TVs (2022)

OTHER PLATFORMS

- Aqara Hub M3
- Home Assistant Yellow
- Home Assistant Green
- Comcast xFi Gateway
- Habitat Elevation
- Homey Pro Hub
- HOOBS Pro
- LG smart TVs (webOS)

Matter Specification



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Matter Specification Updates

MATTER 1.0

Launched: Nov 2022

Device Types: 34

Major Features:

- Standardized BLE Based Commissioning
- Wi-Fi and Thread support
- Manufacturer Authentication
- Compatibility with major home ecosystems
- Integration of many Zigbee Device Types

Matter Specification Updates

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Launched: May 2023

Device Types: 34

Major Features:

- General Improvements for Battery Powered Devices
- Testing Automation for Pre-qualification

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MATTER 1.2

Launched: Oct 2023

Device Types: 43

Major Features:

- Appliances
- Improved Battery life for actuators (short idle time)
- Robot Vacuums
- Device Appearance Description
- Generic Operating States (Start / Stop / Pause)

Matter Specification Updates

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MATTER 1.3

Launched: May 2024

Device Types: 54

Major Features:

- More Appliances
- Energy Management Devices
- Enhanced Entertainment Controls for Media Players
- Scenes

Matter Specification Updates

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MATTER 1.3

Launched: May 2024

Device Types: 54

Major Features:

- More Appliances
- Energy Management Devices
- Enhanced Entertainment Controls for Media Players
- Scenes

MATTER 1.4.X

Launched: Nov 2024: 1.4
May 2025: 1.4.1
Aug 2025: 1.4.2

Device Types: 60

Major Features:

- Energy Management Devices
- Load Control Devices
- Enhancements to existing devices
- Added long idle time for sensors and switches
- Improvements to Ecosystems and Infrastructure
- Improved commissioning

Matter 1.4 Improved Infrastructure

- **Matter certifiable Home Routers and Access Points**
  - Certified devices that support both Matter over Wi-Fi and Matter over Thread
  - Supports storing and sharing Thread network credentials to support multiple OTBRs
- **Multi-Admin improvements**
  - Enhanced multi-admin enables devices on multiple ecosystems with a single user consent
    - Eliminates the need to enable each device individually
  - Existing Matter Ecosystems can share all devices it manages with another ecosystem with a single user interaction
- **Interoperability Lab by the Connectivity Standards Alliance**
  - All Major ecosystems and many devices are present in a single location know as the Alliance Interop Lab
  - Have ability to run and report on a device's real-world interoperability before launch or a new software update
  - Provided as a free service to all Alliance members
  - Used to provide feedback to the standard

Matter 1.4 New / Updated Devices

- **Mounted On/Off and Dimmable Load Control**
  - New device type for on/off devices
  - Previously seen mainly as "lights" and that could confuse users or limit controller interactions

- **Enhancements to Occupancy Sensing**
  - Radar, vision and ambient sensing
  - Customized Sensitivity Settings
  - History reporting through event-based updates

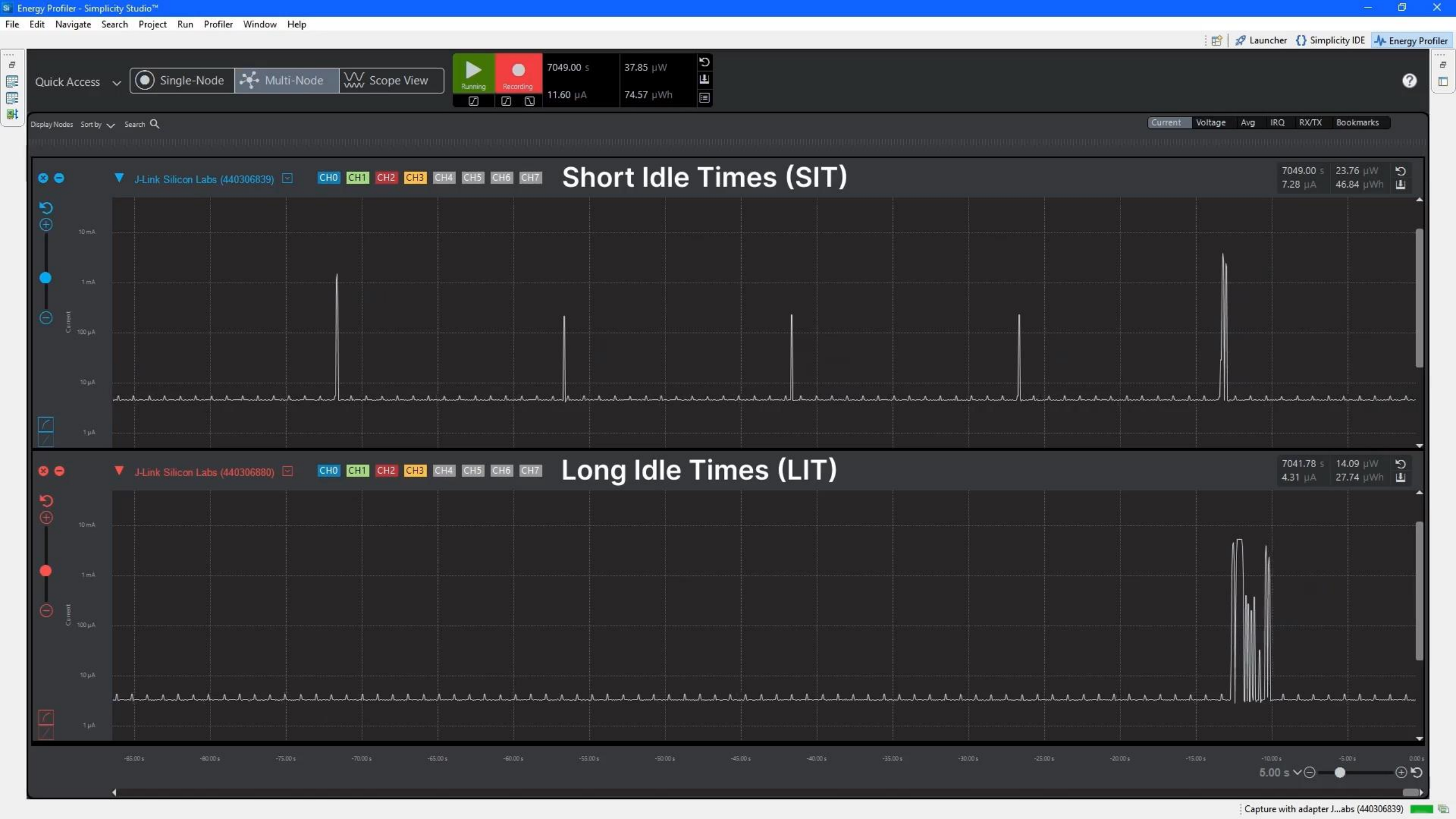
- **Enhancements to Battery Powered Devices**
  - Support for Long Idle Time (LIT)
  - Devices can now sleep up to 18-hours, whereas Short Idle Time (SIT) could only support up to 15 seconds.
  - Quieter Reporting reduces traffics and extends battery life by reducing how often a device has to report changes

Matter Low Power Support: Battery Powered Actuators and Sensors

- **Battery powered devices**
  - Need to sleep to conserve battery life while maintaining a reliable connection to the network
  - Losing a connection to the network delays wakeup time which may be critical for an event and increases current consumption

- **Actuators are battery powered devices that sleep for short durations (seconds)**
  - They wake up frequently to look for data or commands
    - Locks and shades are great examples as they wake up every 3-5 seconds to look for a command
  - Short Idle Time (SIT) addresses these devices types
    - Introduced in version 1.2
    - Enables devices to sleep for up to 15 seconds while maintaining a reliable connection to the network

- **Switches and sensors are battery powered devices that sleep for long durations (minutes to hours)**
  - They wakeup on an event (like a button push or a door opening) and transmit date to parent
  - They wakeup on a set interval to provide a status (temperature) or heartbeat
  - Long Idle Time (LIT) addresses these devices
    - Introduced in version 1.4
    - Enables devices to sleep to up to 18 hours while maintaining a reliable connection to the network


Energy Profiler - Simplicity Studio™
File Edit Navigate Search Project Run Profiler Window Help
Launcher Simplicity IDE Energy Profiler
Quick Access
Single-Node
Multi-Node
Scope View
Running
Recording
7049.00 s
37.85 µW
11.60 µA
74.57 µWh
Display Nodes
Sort by
Search
Current
Voltage
Avg
IRQ
RX/TX
Bookmarks
J-Link Silicon Labs (440306839)
CH0 CH1 CH2 CH3 CH4 CH5 CH6 CH7
Short Idle Times (SIT)
7049.00 s
23.76 µW
7.28 µA
46.84 µWh
10 mA
1 mA
100 µA
10 µA
1 µA
Current
J-Link Silicon Labs (440306880)
CH0 CH1 CH2 CH3 CH4 CH5 CH6 CH7
Long Idle Times (LIT)
7041.78 s
14.09 µW
4.31 µA
27.74 µWh
5.00 s
Capture with adapter J...abs (440306839)

Matter 1.4.x Updates

Matter 1.4.1

- **Enhanced Setup Flow (ESF)**
  - Supports the display of a manufacturer's terms and conditions (T&Cs) directly in the commissioner app
    - For device makers, this means T&Cs can now be shown on interfaces beyond the manufacturer's app
- **Multi-Device Setup QR Code**
  - Users will be able to scan a single QR code to set up multiple devices at once
    - Use can could be a number of LED bulbs in a fixture
- **Onboarding Info in NFC Tag**
  - Feature allows manufacturers to embed the same information found in Matter QR codes into NFC tags
  - Ideal for devices difficult whose QR codes might be hidden once installed
    - Users can simply tap their cell phone to the device for commissioning

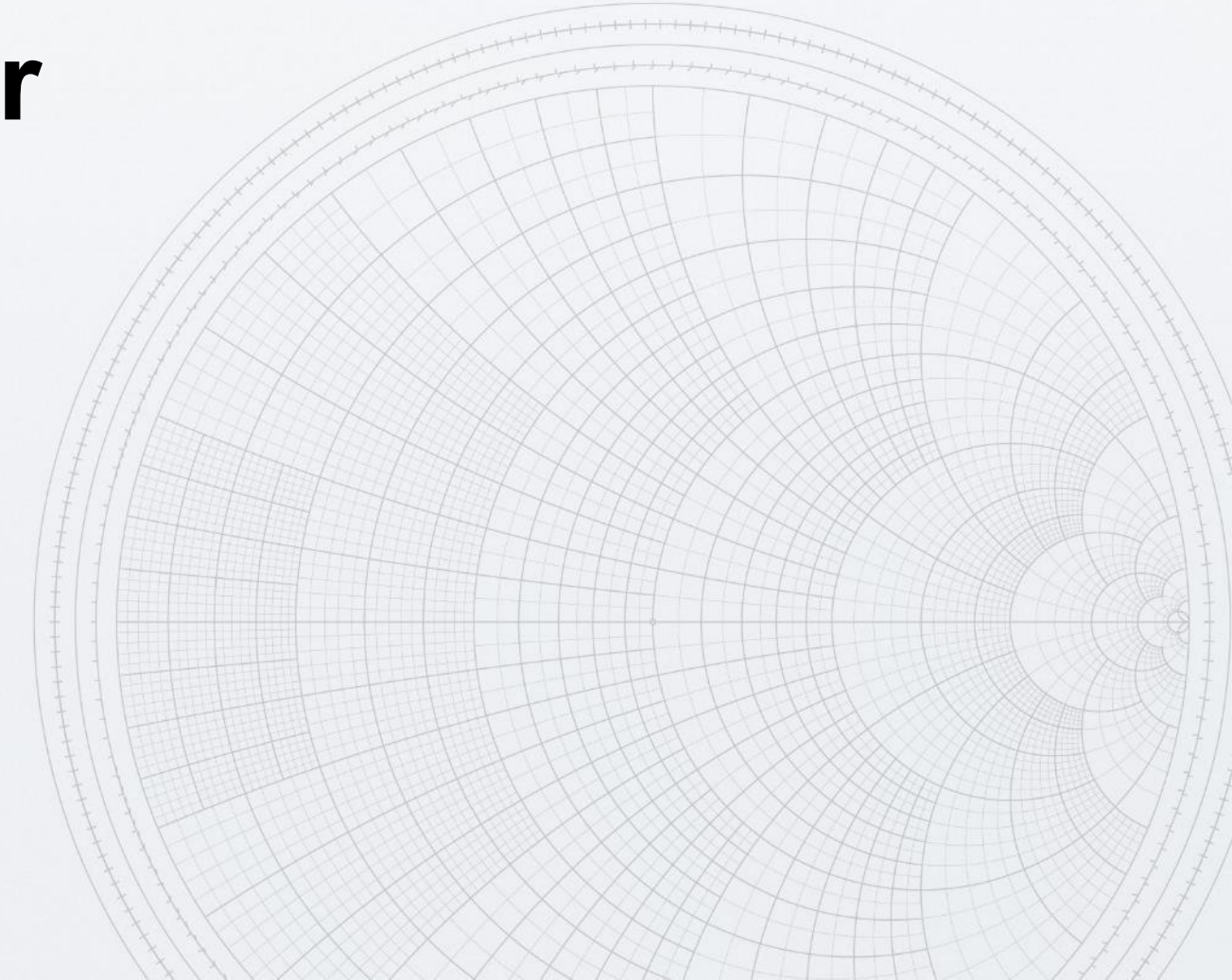
Matter 1.4.2

- **Wi-Fi only Commissioning**
  - Onboarded to Matter ecosystems over Wi-Fi without requiring Bluetooth Low Energy (LE)
  - Uses Wi-Fi USD for direct-to-direct communication
- **Security Enhancements to validate, restrict and revoke devices**
  - Vendor ID Verification, Access Restriction Lists and Certification Revocation List
- **Quieter Reporting**
  - Expanded Quieter Reporting introduced in 1.4 to include more devices and attributes

What's Next for Matter?

- **Specification and Gaps**
  - Device coverage
    - Cameras, Security, Energy Management, etc
  - Full support by Ecosystems
    - All device types and features (Appliance, Energy Management, OTA updates, etc)
  - Full coverage of Matter over Thread/Wi-Fi
    - HRAP should help to resolve as well as ISP support
  - Sub-GHz
    - Range – beyond the door, beyond the fence

Silicon Labs' Matter Solutions



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Silicon Labs' Product Portfolio Designed for Matter

matter

Cost Effective RCP for Gateways and Hubs

- SoCs and Modules
- Thread + BLE
- 2.4 GHz co-existence
- PSA Level 3

Mainstream, Low Power SoC for End Devices

- SoCs and Modules
- Thread + BLE
- Lowest power
- Optimized Flash/RAM
- AI/ML accelerator
- PSA Level 3

Feature Rich Low Power SoC for End Devices

- SoCs and Modules
- Zigbee+Thread + BLE
- Large Flash/RAM
- Low power
- High GPIO count
- Robust peripheral set
- AI/ML accelerator
- PSA Level 3

Highest Performance SoC for Mains Powered End Devices

- SoCs
- Zigbee+Thread +BLE
- Large Flash and RAM
- Optimized for Lighting
- PSA Level 4

Low Power Wi-Fi 6 SoC for Battery Powered End Devices

- SoCs
- Wi-Fi 6 + BLE
- Large Flash/RAM
- High GPIO count
- Co-existence
- Low power
- PSA Level 2

High Performance Wi-Fi 6 Modules for Battery Powered End Devices

- Modules
- Large Flash/RAM
- Wi-Fi 6 + BLE
- Faster Time to Revenue
- Low power
- PSA Level 2

Matter Selector Guide

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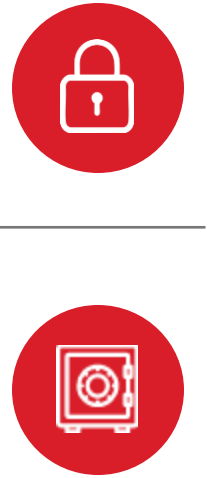
Secure Vault™ - Robust Matter-compliant Security

Mid	High	Feature
✓	✓	True Random Number Generator
✓	✓	Crypto Engine
✓	✓	Secure Application Boot
VSE / HSE	HSE	Secure Engine
✓	✓	Secure Boot with RTSL
✓	✓	Secure Debug with Lock/Unlock
✓ (HSE) Optional (VSE)	✓	DPA Countermeasures
—	✓	Anti-Tamper
—	✓	Secure Attestation
—	✓	Secure Key Management
—	✓	Advanced Crypto

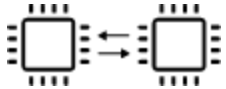


Manufacturing

Matter devices must be injected with a unique DAC certificate/ private key, Onboarding Payload (QR code delivered), Certification Declaration (CD), and other static/ dynamic data during manufacturing

Commissioning

DAC with VID/PID must be checked against the DCL and CD verified to ensure only authentic and certified Matter devices are commissioned.



Device Communication

Communication between Matter devices must be secured and encrypted using cryptographic keys and PBKDF.

Authentication and Encryption

Authentication and encryption keys must be generated by a “Deterministic Random Bit Generator” Seeded by NIST 800-90B TRNG

Comprehensive Development Tools

Explorer Kit

- Lowest-cost wireless and MCU development platform
- Compact, scalable, and easy to use
- Minimal on-board features
- FW App Development
- 3rd party hardware support

Dev Kit

- Wireless SoC evaluation board with sensors
- On-board sensors
- Quick prototyping
- Out-of-the-box demos
- 3rd party hardware support

Pro Kit

- Full-featured wireless and MCU development platform
- Radio board + mainboard
- Modular design for radio boards
- Energy profiling
- Advanced debug & test
- RF measurements
- Network analysis

Radio Board

- Wireless SoC and module development
- Primary RF reference design
- Requires mainboard
- Modular design
- Scalable across portfolio

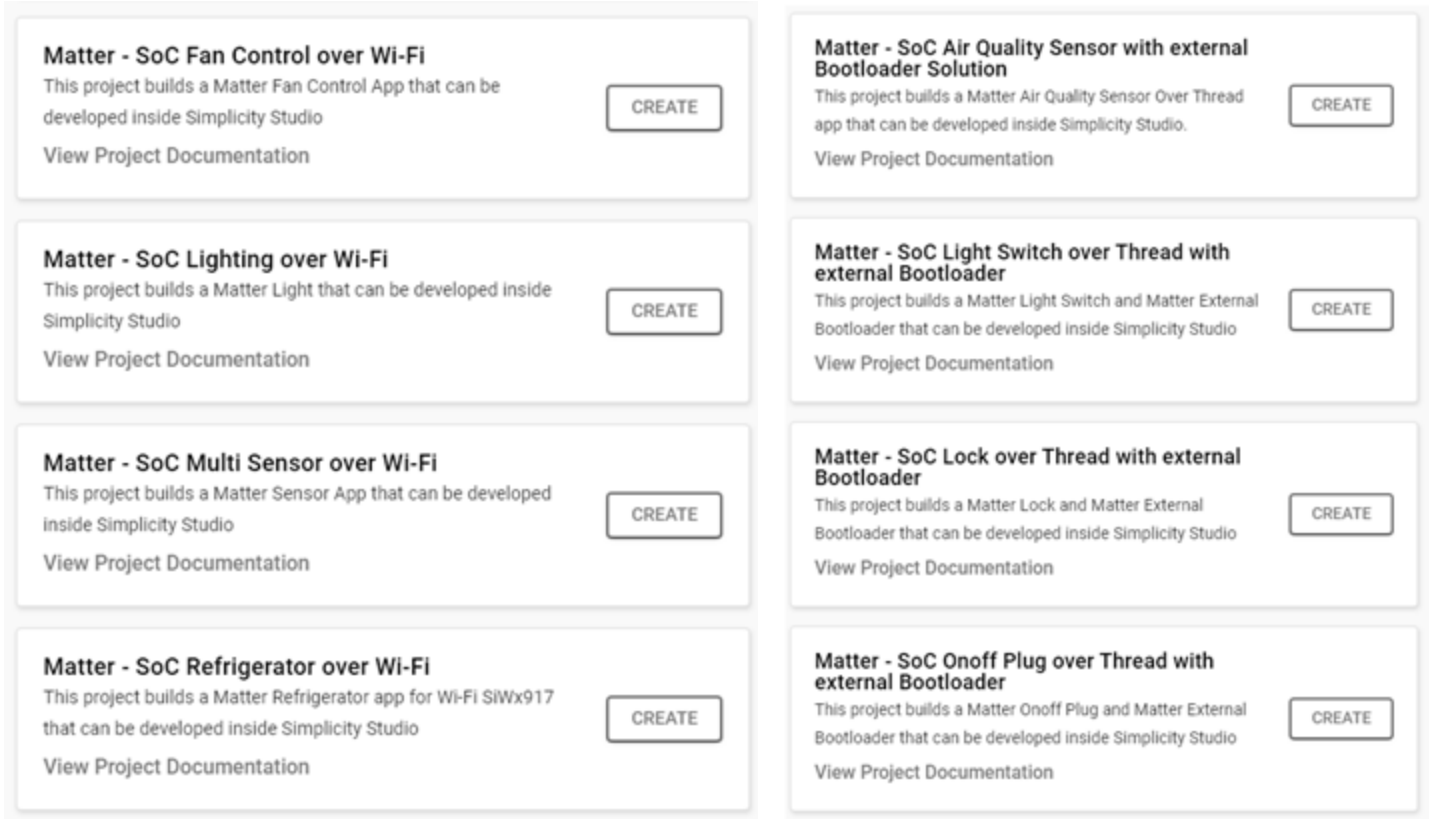
Expansion Board

- Wireless co-processor development platform
- Requires Host Platform (EFR or 3rd Party MCU/MPU)
- For NCP and RCP app development

Matter SDK Support

Matter Extension v2.4 or Greater

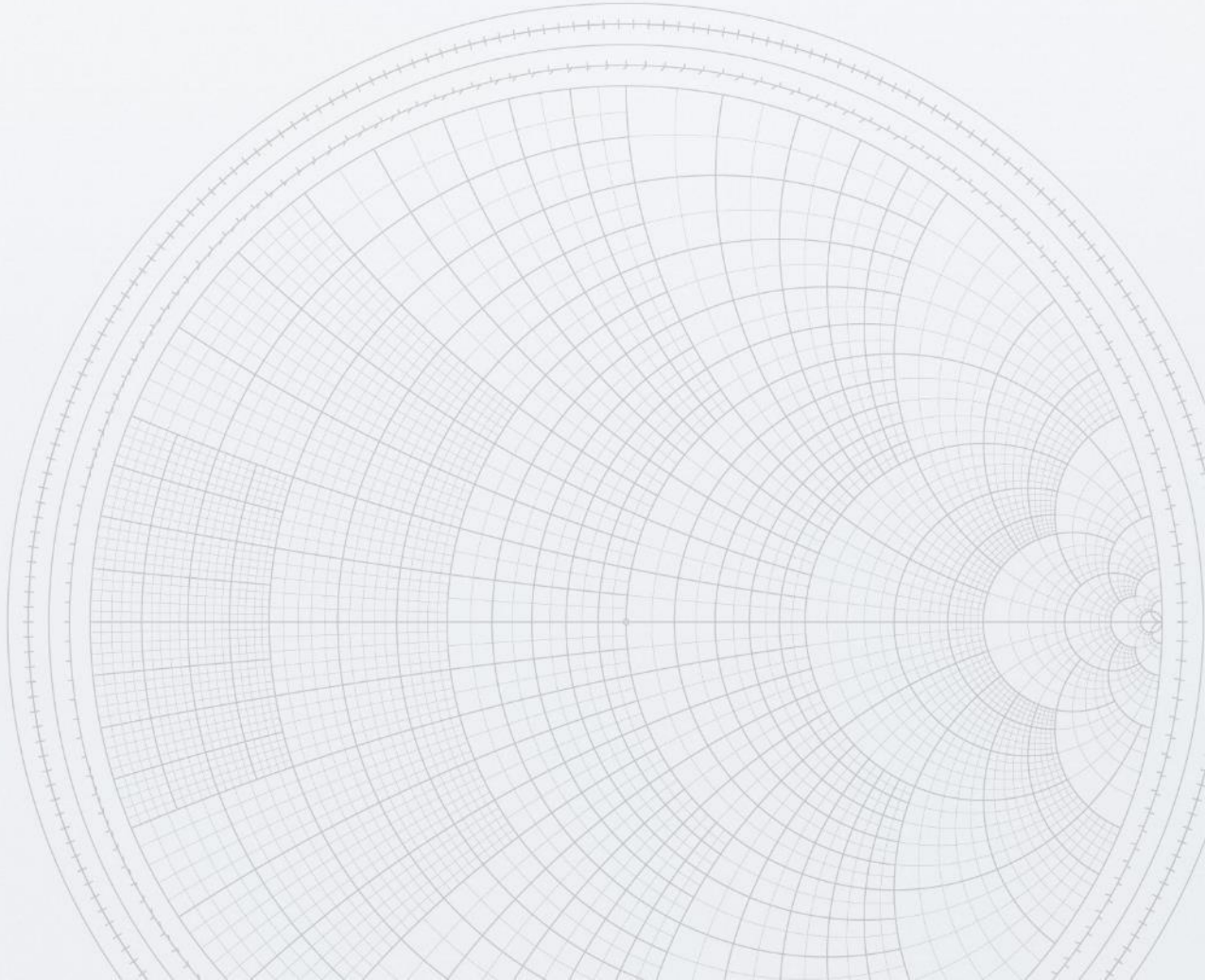
- Matter Sample Applications
  - Thread – Air Quality Sensor, Dishwasher, Light Switch, Light, Lock, Multi-Sensor, On/Off Plug, Refrigerator, Thermostat, Window Covering
  - Wi-Fi - Air Quality Sensor, Dishwasher, Light Switch, Light, Lock, Multi-Sensor, On/Off Plug, Refrigerator, Thermostat, Window Covering, Fan Control
  - ZCL ZAP Support for other
- LIT sample app support
  - Sensor Apps enabled with Long Idle Time Support (LIT)



Summary

- **Matter addresses the challenges faced by consumers, manufacturers, and retailers**
  - Reduce purchasing confusion and returns
  - Improve interoperability and user experience
- **Matter aims to bring simplicity, interoperability, reliability, and security to smart home devices**
  - Enables devices from multiple brands to work natively together on multiple ecosystems
- **Silicon Labs' provides lowest power Matter over Thread and Matter over Wi-Fi solutions**
  - Designed to address a broad range of applications for Matter
- **Silicon Labs' end-to-end Matter developer journey**
  - Simplifies Matter development, testing, and manufacturing
- **Silicon Labs is committed to the success of Matter**
  - Strong portfolio of both Matter over Wi-Fi and Matter over Thread
  - Continued development and support in CSA for new features and device types
  - Largest Matter code contributor among Semiconductor companies

Q&A



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Abstract

- **More than two years after the first Matter specification was released, we are now seeing stabilization in the specification and improved interoperability. With nearly 50 different device types defined across a wide range of applications, hundreds of products available on the market, and hundreds of millions of homes equipped with Matter, the technology has achieved an unprecedented rate of adoption.**

  In this session, we'll look at the Matter specification, key features, and enhancements for both Matter-over-Wi-Fi and Matter-over-Thread. We'll discuss the rollout of Matter support in both ecosystems and ISPs and how this has advanced the adoption from both a manufacturing and consumer perspective. Finally, we will examine what the future might hold from a specification and adoption perspective.