MAT-103

Matter: Technology and Adoption from a User's Perspective

Matt Maupin
Senior Marketing Manager

SILICON LABS

Agenda

01 What is Matter

02 Matter Technology Adoption

03 Let’s Set the Stage

04 Matter Device Coverage and Gaps

05 Matter User’s Experience

06 Summary and Future Expectations

What is Matter?

Smart Home Dilemma

Smart Home Dilemma

- Multiple wireless technologies available
- Devices often tie to one Ecosystem
- Requires different products, apps and hubs

Manufacturers

- Manufacturers are forced to pick ecosystem(s)
- Need to ship multiple SKUs for connectivity standards
- Need to learn different IoT technologies and ecosystems

Retailers

- Leads to duplicate products on the shelf
- Difficult to provide expert advice to consumer questions
- High return rates due to interoperability or incompatibility

Consumers

- Purchasing confusion
- Difficult to change Ecosystems
- Hard to mix and match the products they want

Matter’s Vision

Developers

- Reduce “Ecosystem specific” products
  - Lower development & operational cost
  - Develop once / deploy everywhere
- 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

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

How does Matter connect devices?

Universal wireless networking technology connecting many devices in the home today.

- Enables seamless connectivity
- High Bandwidth for streaming video and audio
- Line powered smart home categories like cameras, light bulbs and thermostats
- Support battery powered devices with higher capacity primary cell batteries (i.e. alkaline batteries)

An energy-efficient wireless mesh network that enables smart home devices such as door locks, lighting, and sensors to securely, reliably, and simply integrate into the smart home.

- Based off of 802.15.4 (same technology used by Zigbee)
- Mesh networking for reliable communication throughput the home
- Low data rate and low latency for command and control
- Low power for long battery life on coin cell batteries for devices like sensors and switches

Ubiquitous wireless technology used in mobile phones.

- Used for commissioning of Matter devices securely onto the network

Matter Technology Adoption

Wireless Specification Evolution

Wi-Fi - 1997 1 Mbps

- Wi-Fi 1 1999
- Wi-Fi 2 1999
- Wi-Fi 3 2003
- Wi-Fi 4 2008
- Wi-Fi 5 2014
- Wi-Fi 6 2019
- Wi-Fi 6E 2020
- Wi-Fi 7 2024

Bluetooth – 1999

- Bluetooth 1.1 2001
- Bluetooth 1.2 2003
- Bluetooth 2.0 2004
- Bluetooth 2.1 2007
- Bluetooth 3 2009
- Bluetooth 4 2010
- Bluetooth 4.1 2013
- Bluetooth 4.2 2014
- Bluetooth 5 2016
- Bluetooth 5.1 2019
- Bluetooth 5.2 2020
- Bluetooth 5.3 2021
- Bluetooth 5.4 2023

Zigbee – 2004

- Zigbee 2006 (r06) 2006
  - r07, r13, r14, r15
- Zigbee 2007 (Zigbee Pro - r16) 2007
  - r17, r18, r19, r20, r21
- Zigbee 3.0 (r21) 2015
  - r22, r23

Thread – 2014

- 1.1 2015
- 1.2 2019
- 1.3 2022
- 1.4 2024

Matter – 2022

- 1.1 2023
- 1.2 2023
- 1.3 2024
- 1.4 2024

Matter & The Ecosystems – Past, Present, and Future

PREVIOUSLY

DEVICE TRANSITION

2023 AND BEYOND

Fragmentation → **Unification**

amazon	works with alexa, works with ring, Wi Fi, Bluetooth, zigbee, amazon sidewalk	works with alexa, works with Google Home, Works with Apple Home, Powered by tuya, works with ring, Works with SmartThings, works with XFINITY Home
Apple	Works with Apple HomeKit, Wi Fi, Bluetooth	
Google	works with nest, Bluetooth, WEAVE, 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	

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

THREAD, Wi Fi, Bluetooth

Ecosystem Supported Devices

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

- 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

- 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)

- 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 Device Type (May 2024)

Controllers, Bridges, Routers, AP

- Bridges

Media Devices

- Casting Media Players (TV)
- Video Players
- Speaker
- Remote Control

Closures

- Door lock / controller
- Window covering / controller

Energy Management

- Electric Vehicle Supply Equipment
- Electric Vehicle Charger (EVSE)

Robot Devices

- Robot vacuum

HVAC Control

- Thermostat
- Fan
- Room air conditioners

White Goods (Appliances)

- Refrigerators / Freezers
- Washing machines
- Dryers
- Dishwashers
- Microwave Ovens
- Ovens
- Cooktops
- Extractor Hoods
- Laundry Dryers

Lighting and Electrical

- LED Bulbs (On/Off, Dimming, Temperature, Color)
- On/Off Plug
- Dimmable Plug
- Pump

Switches

- Light switches (On/Off, Dimming, Color)
- Generic Switch
- Pump Controller

Smoke and CO Detection

- Smoke and CO alarms

Sensing

- Light Sensor
- Temperature Sensor
- Pressure Sensor
- Flow Sensor
- Humidity Sensor
- On/Off Sensor

Water Management Sensors

- Leak detectors
- Frost detectors
- Rin sensors
- Valve Control

Air Quality Control

- Air purifiers
- Air quality sensors

Safety and Security

- Contact Sensor
- Occupancy Sensor

Matter Products available – The Verge

Introduction:
Let’s Set the Stage

Disclaimer: The experiences referenced in this presentation are my own and may not represent other’s experiences with the technologies.

My Smart Home Network (pre-Matter)

I am not a power user, I am a volume user

- This is about convenience and automating everyday task
- It must be easy enough for everyone living in the home as well as guest

The core of my network is Alexa voice control

- Alexa was a game changer

Device Types	Quantity	Vendor	Technology	Network/Hub	Amazon Ecosystem Integration	Main App Support
LED Lights	42	Hue	Zigbee	Hue	Skills	Hue
Hub	1	Hue	Zigbee	Hue	Skills	Hue
Hub	1	Samsung	SmartThings	SmartThings	Skills	SmartThings
Switches (Battery)	10	Hue	Zigbee	Hue	N/A	Hue
Motion Sensors	4	Hue		Hue	N/A	Hue
Dimmers (Line)	3	Enbrighten	Zigbee	SmartThings	Skills	SmartThings
Switches (Line)	1	Enbrighten	Z-Wave	SmartThings	Skills	SmartThings
Smart Plugs	9	Innr	Zigbee	SmartThings	Skills	SmartThings
Outdoor Smart Plugs	3	Jasco, Evalogik	Z-Wave	SmartThings	Skills	SmartThings
Smart Plugs	1	Samsung	Wi-Fi	SmartThings	Skills	SmartThings
Locks	1	Schlage	Z-Wave	SmartThings	Skills	SmartThings
Smart Speaker	10	Amazon	Wi-Fi, Bluetooth, Zigbee/Thread	Amazon	Native	Alexa
Thermostats	2	Ecobee	Wi-Fi	Wi-Fi	Skills	Ecobee
Temp Sensor	5	Ecobee	Proprietary	Proprietary	N/A	Ecobee
Garage Door	1	myQ	Wi-Fi & Sub-GHz	Proprietary	N/A	myQ
Security System	1	DSC	Wired	Ethernet	N/A	Proprietary
Security Cameras	4	Swann	Wi-Fi	Proprietary Wi-Fi	N/A	Swann
Ring Cameras	2	Ring	Wi-Fi	Wi-Fi	Skills	Ring
Other Cameras	3	Various	Wi-Fi	Wi-Fi	Skills (Limited)	Proprietary
Smart TVs	1	JVC	Wi-Fi	Wi-Fi	Native (Limited)	Roku
Appliances	2	Samsung	Wi-Fi	SmartThings	Skills	SmartThings
Firesticks	6	Amazon	Wi-Fi	Amazon	Native	Alexa
Total Devices	113					

My pre-Matter Experiences

Overall, my experience is very positive - now

- Took a while to get there
- Experience is ever evolving and improving

Required multiple hubs/ecosystems to support devices I wanted

- Hue, Samsung, Echo(s)

There are too many phone apps

- Currently 10 different apps to control my Smart Home
- Some advanced features require you to use their app

Amazon Echo (Alexa) does a very good job of tying most devices together

- Voice control was really the game changer for my home
  - Integration and voice control of most of my devices
  - However, some key devices and functions are not supported

Growing pains on most technologies

- Early days of Z-Wave was poor
  - Issues with commissioning and removing devices turned me off to the technology
  - They are resolved now in latest spec and devices
- Wi-Fi experience for IoT devices is generally poor
  - Difficulty commissioning, range and devices dropping off networks
- Zigbee has been the most reliable and easy to use, but required multiple hubs early in deployment
  - Advanced features may be limited to a specific hub and/or app (Hue)

My Matter Expectations

Better integration of the whole Smart Home

- Including security and cameras

Better commissioning experience

- Especially Wi-Fi

Better Ecosystem Support

- Fewer hubs/Ecosystems (long term)
- Better direct integration through Voice Assistants

Fewer apps

- Including advanced features
- One app to rule them all - almost

Easier and more flexible purchasing experience

- I want my preferred vendor/device to just work in my smart home

Growing pains

- Expect issues and reduced capabilities with early products
  - Devices need to easily join the network and need to work
- Firmware updates should allow products to evolve

Matter Device and Specification Gaps

User’s Legacy Device Compared to Matter

Device Types	Existing Wireless Support	Existing Ecosystem Support	Matter Support	Comments
LED Lights	Zigbee, Bluetooth, Wi-Fi	Skills	Yes	
Hub	Zigbee, Bluetooth, Z-Wave, Proprietary, Wi-Fi	Native / Skills	Yes	Bridging for non-Matter Hubs
Switches (Battery)	Zigbee, Z-Wave, Proprietary	Skills	Limited	Limited support for bindings
Motion Sensors	Zigbee, Z-Wave, Proprietary	Skills	Limited	Limited product availability
Switches/Dimmers (Line)	Zigbee, Bluetooth, Z-Wave, Proprietary, Wi-Fi	Skills	Yes	Limited support for bindings
Smart Plugs	Zigbee, Bluetooth, Z-Wave, Wi-Fi	Skills	Yes	
Locks	Zigbee, Bluetooth, Z-Wave, Wi-Fi	Skills	Yes	Limited product availability
Smart Speakers	Zigbee, Bluetooth, Z-Wave, Proprietary, Wi-Fi	Native	Yes	Ecosystem specific
Thermostat	Wi-Fi	Skills	Yes	Limited product availability
Temp Sensor	Zigbee, Z-Wave, Proprietary	Skills	Yes	
Security System	Zigbee, Z-Wave, Proprietary	No	No	
Security Cameras	Wi-Fi	No	No	
Ring Cameras	Wi-Fi	Skills	No	
Other Cameras	Wi-Fi	Limited	No	
Garage Door Opener	Wi-Fi	No	No	
Smart TVs	Wi-Fi	No	Yes	
Appliances	Wi-Fi	Skills	Yes	Limited to no product or Ecosystem support
Firestick	Wi-Fi	Native	No	Ecosystem specific

Matter Specification Gaps

Ecosystem support of Matter device types

- Limited support from Ecosystems today Matter device types (switches, sensor, appliances)

Extended sleep times for long battery life

- Future Matter release will improve support for longer sleep times

Security Systems

- Proprietary and Z-Wave support UL requirements for professional security systems

Sub-GHz support

- Certain applications require the propagation and range offered by sub-GHz
  - Sidewalk, Z-Wave and Wi-Sun address these today

Bridges will help address technology gaps

- Vendors are adding bridging capabilities now

Matter User’s Experience
The Good
The Bad
The Ugly

Disclaimer: The experiences referenced in this presentation are my own and may not represent other’s experiences with the technologies. Testing was done between November 2023 and January 2024 and updated in September 2024

My Matter Home Network

Used a single network for Matter

- Testing was done on a single Ecosystem
- Limited multi-admin testing

Matter device tested

- Ecosystems (tested on Amazon, Apple, Google)
- 9x Nanoleaf LED bulbs (Matter over Thread)
- 6x mujoy LED bulbs (Matter over Thread)
- 6x Linkind LED bulbs (Matter over Wi-Fi)
- 1x TUO battery powered switch (Matter over Thread)
- 1x Eve Motion battery powered motion sensor (Matter over Thread)
- 1x TUO battery powered contact sensor (Matter over Thread)
- 1x Orvibo line powered light switch replacement (Matter over Wi-Fi)
- 2x Kasa smart plug (Matter over Wi-Fi)
- 7x Silicon Labs MG24 development boards running the Matter over Thread lighting application
- 1x Hue Zigbee to Matter Bridge (Zigbee devices are seen on the Matter network)

This User’s Matter Experience – The Good

Commissioning

- Overall commissioning has been good and easy using phone/tablet and QR codes
  - Same flow regardless of network protocol (Thread or Wi-Fi)
  - Wi-Fi commissioning worked well (eliminated my issues pre-Matter)
    - Does not require you to connect via Wi-Fi, provide SSID, etc.
  - Some devices required multiple attempts or a reset
- Devices purchased from Amazon were linked to the Amazon account
  - Automatically came up on the network, eliminating commissioning
- Some issues/confusion around commissioning with multiple devices powered at once
  - The device identified during initial commissioning may not be the one with the QR code used

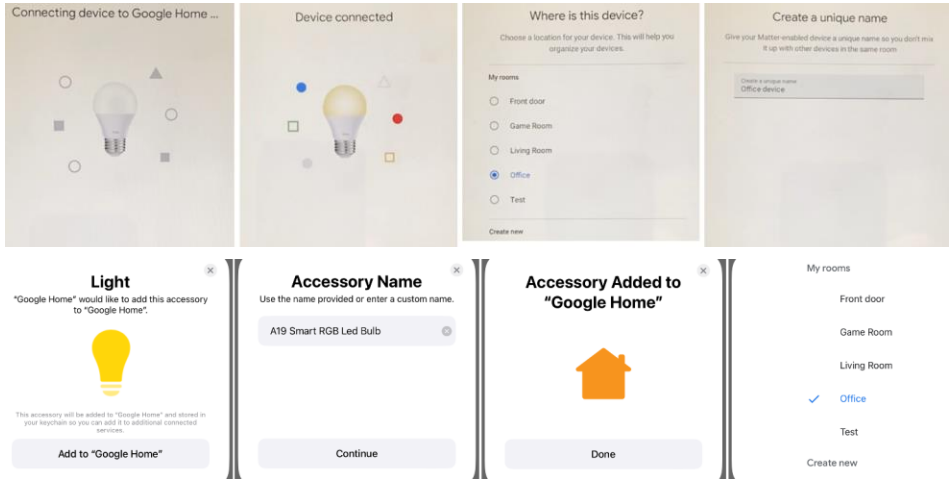
Matter Bridging

- Existing Zigbee hub offering Matter bridging
- From a user perspective, what does Bridging offer that “skills” or “actions” do not?

This User’s Matter Experience – The Bad

Experience varied based on platform and ecosystem

- Different flow based on Ecosystem
- Was not consistent even on the same ecosystem
  - For example, iPhone vs/ Android on Google Home
- Need to incorporate best practices or further define spec

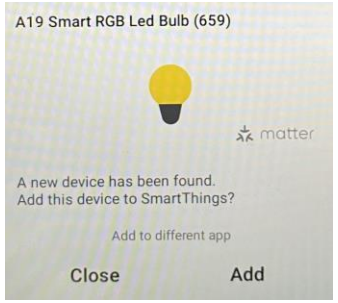


Reduced functionality without vendor app

- May need product vendor app for advanced features
- OTA updates were not supported by Ecosystem app

Is Multi-admin really a benefit?

- Difficult to setup
- Will multiple ecosystems be used in the home
  - Amazon, Apple, Google
- What about devices that come standard with Matter hub/controllers
  - Samsung has numerous devices with Matter over Thread OTBRs



This User's Matter Experience – The Bad

Why the Works With branding?

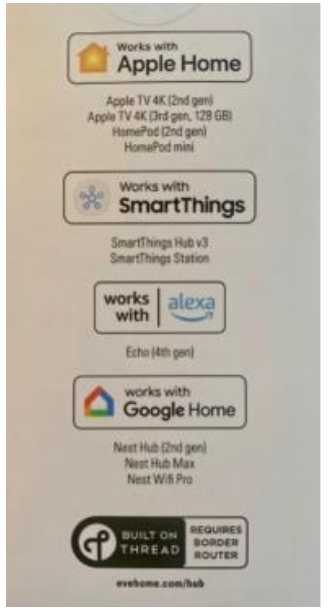
- "Works with" branding can be confusing
- Matter needs to become the brand
- Ecosystems will still want to differentiate
  - Requires developers to implement Ecosystem features

Battery Life need to be improved

- Needs to be improved for Matter vs existing low power technologies
  - Zigbee and Z-Wave
- Contact sensor battery died after a few weeks
- Switch was down to 80% after a month

Offline Control was limited

- No local control when internet is down on 2 of the 3 Ecosystems
- Z-Wave and Zigbee hubs have local control



Motion Sensor

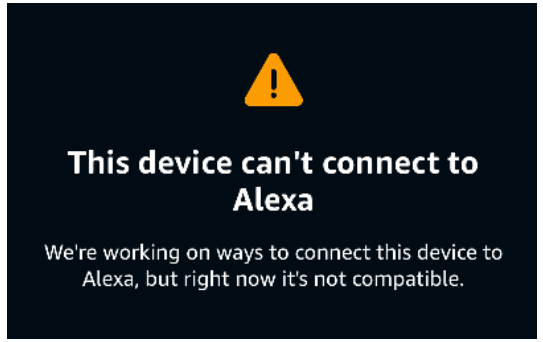
Contact Sensor

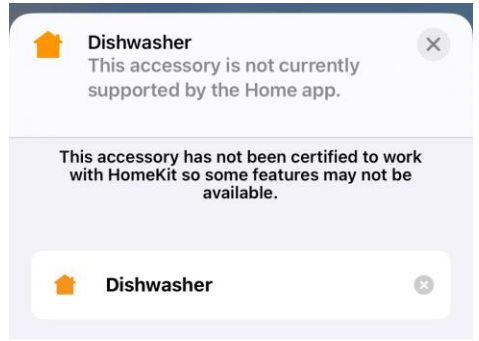
Switch

This User’s Matter Experience – The Ugly

Device Support

- Issues getting some devices commissioned
  - mujoy bulbs
  - Contact sensor
- Some devices were not supported (switches, contact sensor, etc.)





Stability

- Had issues with devices dropping off network
  - Power cycle would get it back on the network, or it would eventually come back online
- Some OTBRs had to be power cycled (would loose all Matter control and/or issues commissioning)
- Matter over Wi-Fi lights had significant latency/popcorn effect and varied depending on Ecosystems

Manufactures need to implement upgrades

- Stability issues hard to pinpoint in some cases (device or Ecosystem)

Summary

Summary

Developers need to improve testing

- Need to do testing beyond certification
  - Run pilots and internal betas with larger number of devices
- Field updates are a must
  - Product firmware and rollout field updates

Matter Bridging can bridge the gap

- Enables existing technologies onto Matter network
- Can simplify participation in Ecosystems vs Skills

Silicon Labs is working to improve experience

- Leader in 802.15.4
- Contributed more code than any other Semiconductor
- Significant Q&A to deliver robust hardware and software
- Connectivity Lab to focus on the User Experience

Matter has lots of promise and backing

- Supported by key Ecosystems
- Fast adoption my product manufactures

User experience must be improved

- Risk of turning users off to Matter
- More focus on user experience vs just spec adherence

Ecosystems are critical to the user experience

- This is what touches the user
- Full device support is required
- Experience needs to become more consistent

Migration to Matter will not be without issues

- Impacts manufacturers, ecosystems and users
- No new standard is without issues
  - Ambiguity in spec, bugs in implementation, etc.
- Expect updates in specification
- Existing non-Matter devices may work better short term

Thank You

Demo Video