

# Matter Webinar Series



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23<sup>rd</sup> May 2023

Introduction to Matter

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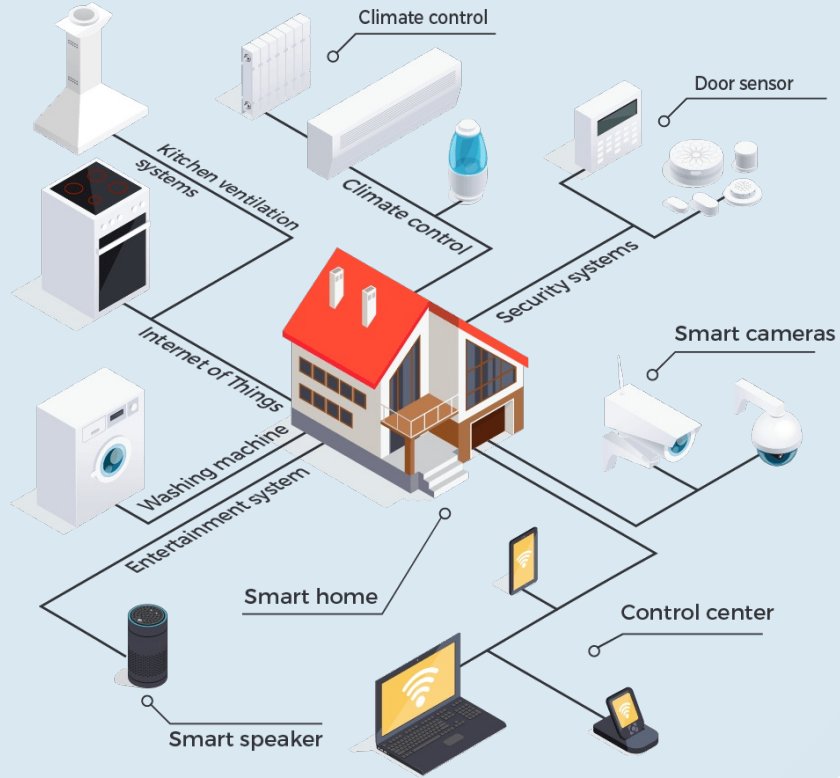
26<sup>th</sup> May 2023

Building a Matter Device

3

30<sup>th</sup> May 2023

Matter Certification and  
Device Certificates



# Introduction to Matter

Espressif Systems



# Contents



**1** | Why, What, How

**2** | Matter Network

**3** | Matter Data Model

**4** | Key Features

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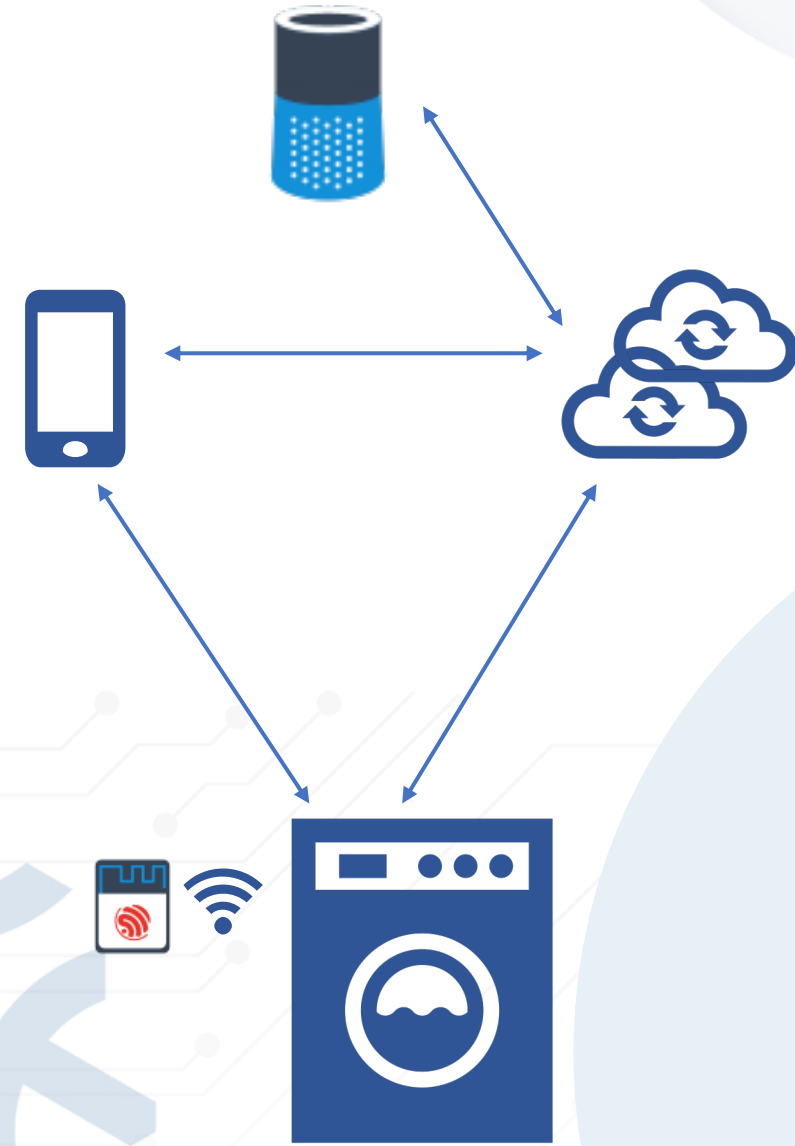
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# Why, What, How

The problems it addresses



# Challenges in current development



# Why Matter?

The existing smart home landscape is highly fragmented which leads to multiple challenges across the complete lifecycle of product.



## Consumers

- Eco-system Silos
- Purchasing Nightmare
- Non-portable



## Device Makers

- Multiple SKU
- Complex Design
- Longer Development



## Ecosystem

- Interoperability Issues
- Security concerns
- Complex Integrations

# What is Matter

- Industry-unifying standard defined by Connectivity Standards Alliance (Former Zigbee Alliance) with 300+ member companies
- **Simple** : ease-of-use for consumers, ease-of-development for manufacturers
- **Reliable** : Local Network, Certification process
- **Seamless** : Interoperable, Unified structures
- **Secure** : Authentication before joining, encrypted communication, Provisions for OTA
- **Open** : collaborative and open source methodology with an implementation-first approach
- **Standard** : Built on IPv6, supports Wi-Fi, Thread, Ethernet for communication and BLE for commissioning



# What it covers



## Specifications

Drive and define the specifications

[Matter v1.1 Spec](#)



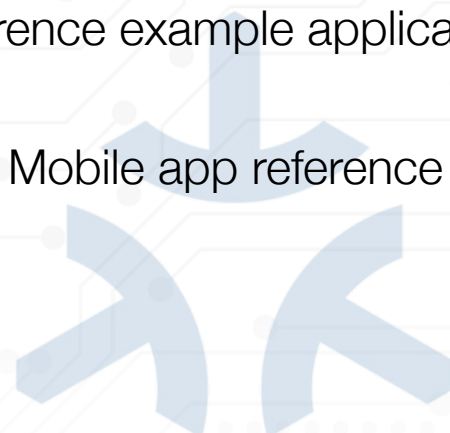
## Implementation

Open source available on [GitHub](#)

Platform independent implementation

Reference example applications

Mobile app reference



## Certification Program

Test specification

Certification framework

Certification program available via certification labs



# How it will help

Matter shall bring the following benefits to the complete Smart Home space



## Consumers

- ✓ Ease-of-use
- ✓ Automations
- ✓ Security



## Device Makers

- ✓ Ease of Deployment
- ✓ Innovation Scope
- ✓ Single Eco-system



## Eco-systems

- ✓ Interoperability
- ✓ Scalable
- ✓ Open Source

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# Matter Network

Types of devices, transport protocols



# Wireless Protocol Selection



## Wi-Fi

- Direct access to Internet
- Wide adoption and availability
- High Bandwidth
- Wall plugged devices? Hello Wi-Fi 6!!



## Thread

- Mesh Topology
- Low current consumption
- 300+ devices in a single network
- Requires a TBR to connect to cloud



# Matter Device Types



## Wi-Fi End Device

- End Node devices which connect over Wi-Fi
- Wall powered electricals, Home appliances, Media devices, Security Camera etc.



## Thread End Device

- End Node devices which connect over Thread
- Battery operated sensors, locks, switches etc.



- Device to communicate between Thread Network and Wi-Fi Network
- Smart speakers, hubs, Media Gateways etc.

## Thread Border Router

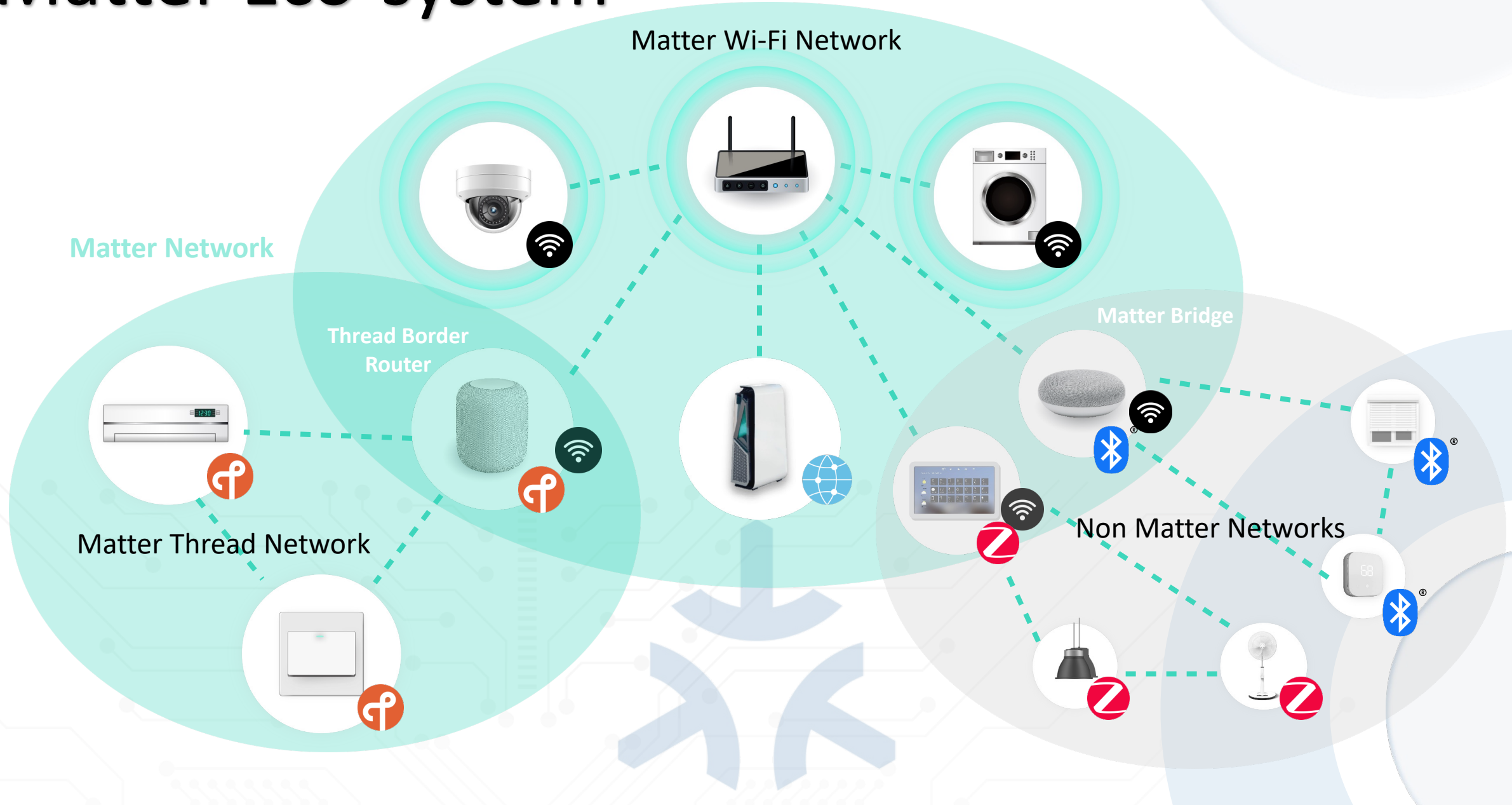


- Device for bridging existing networks like BLE-Mesh, Zigbee etc. on to Matter
- Translate to Matter Data Model

## Matter Bridge

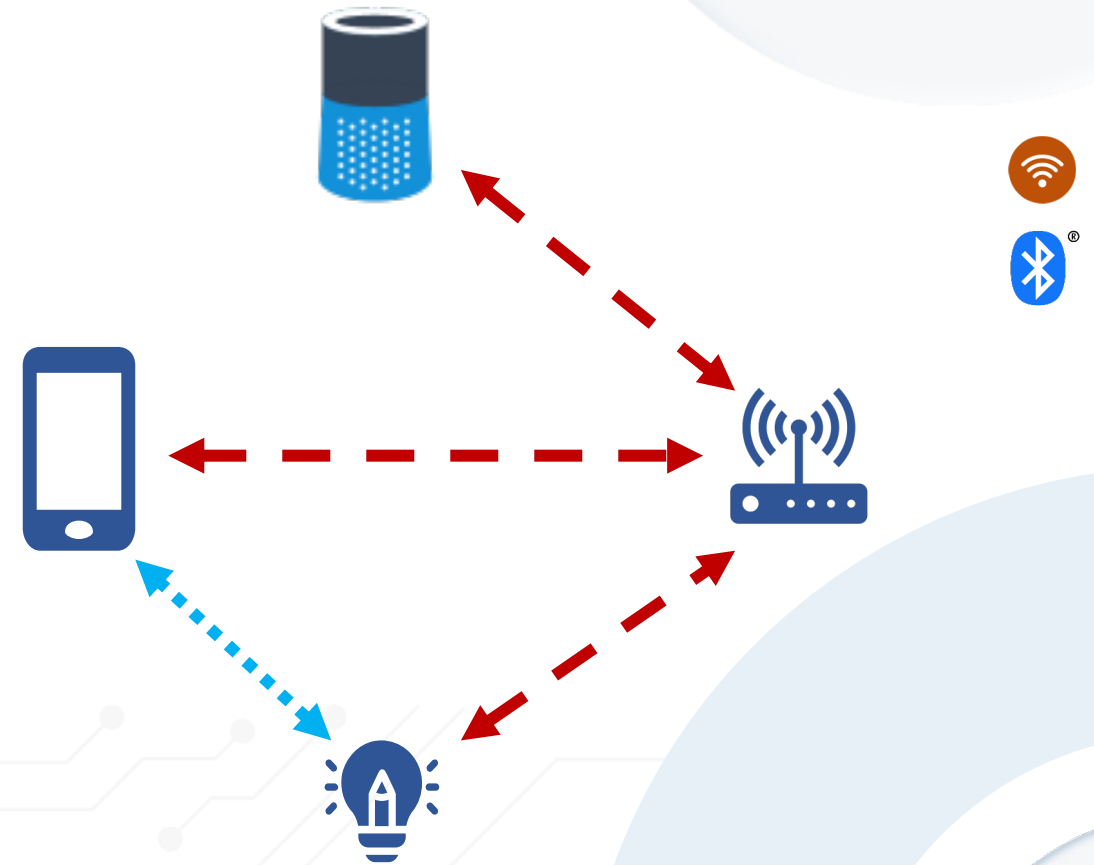


# Matter Eco-system

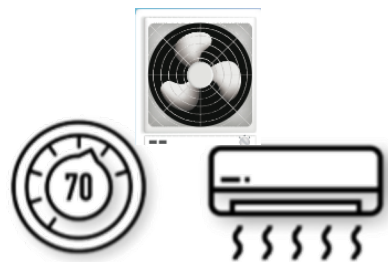


# Role of BLE

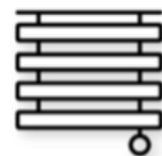
- Bluetooth LE usage primarily for device discovery and provisioning.
  - On-boarding of the device to Matter
- Bluetooth LE is used to commission a new device into the network using a Matter controller.
- Bluetooth LE is NOT used for a device-to-device communication, or a device to controller communication after commissioning is finalized



# Devices in v1.1



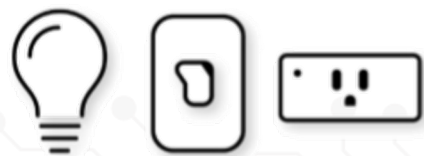
HVAC Controls



Window Coverings and Shades



Safety and Security Sensors



Lighting and Electrical



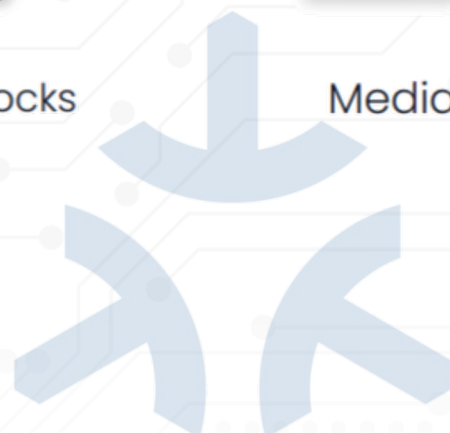
Door Locks



Media Devices



Controllers & Bridges



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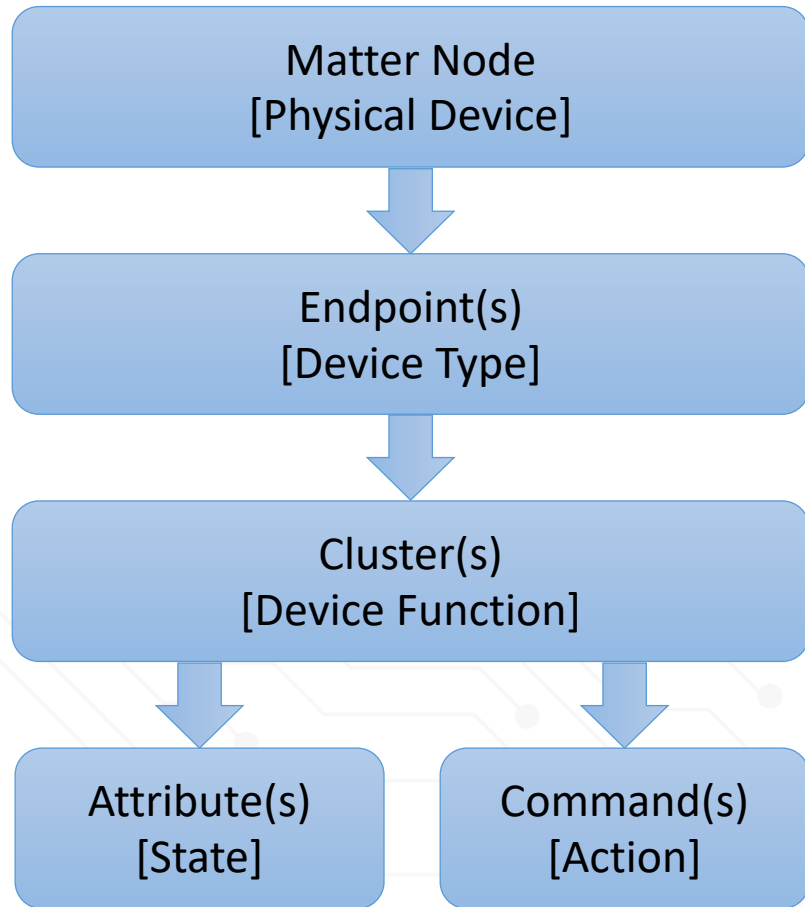
# Matter Data Model

Device Cluster Data Model

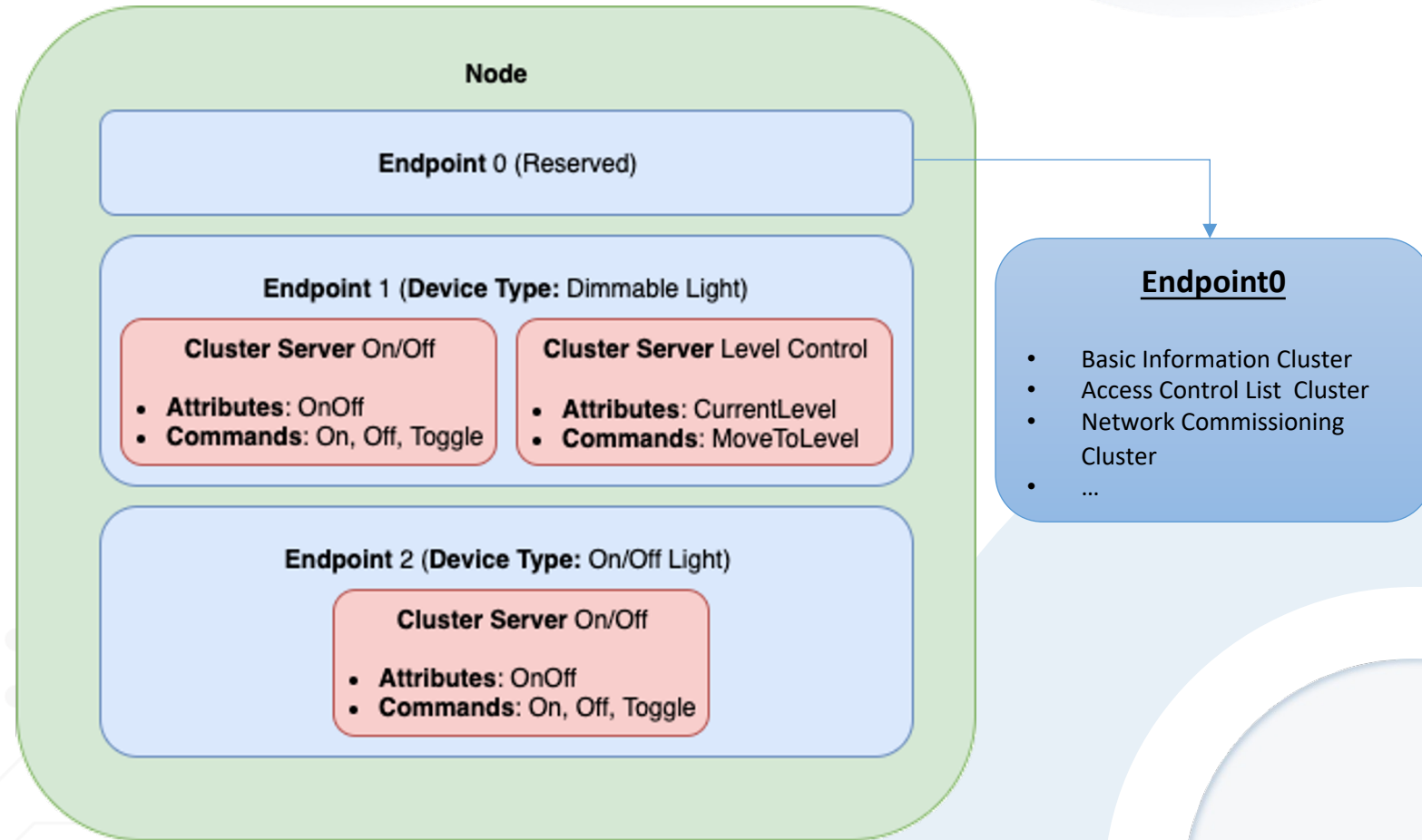




# Matter Data Model



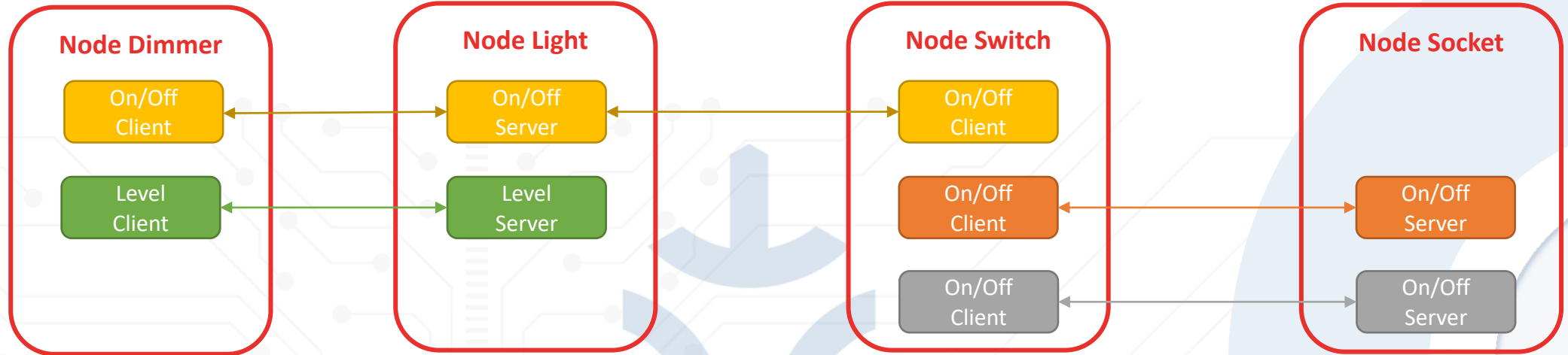
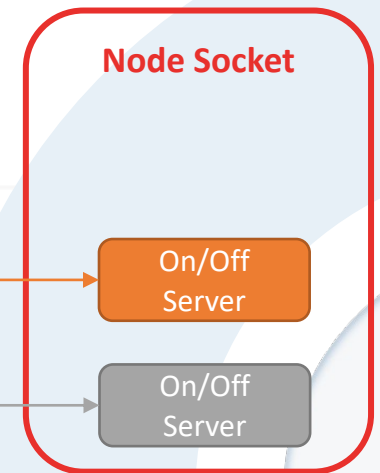
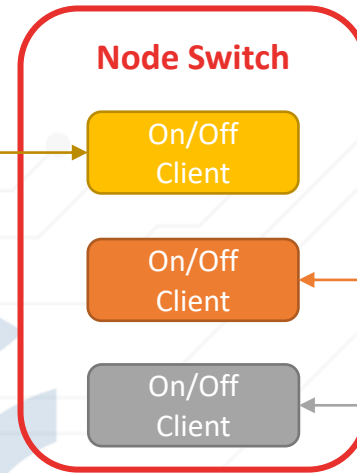
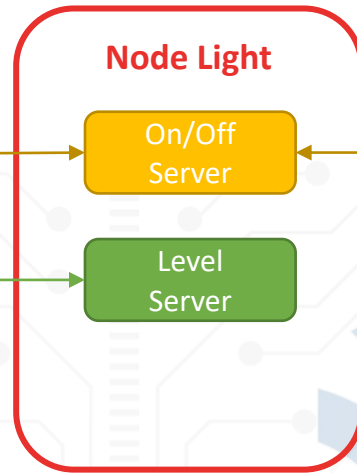
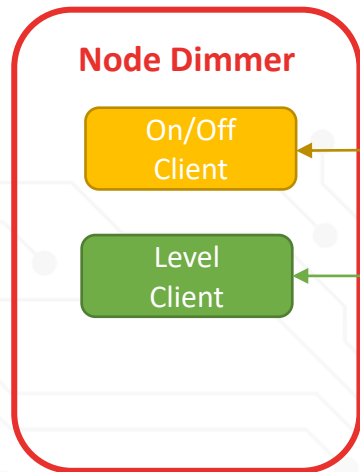
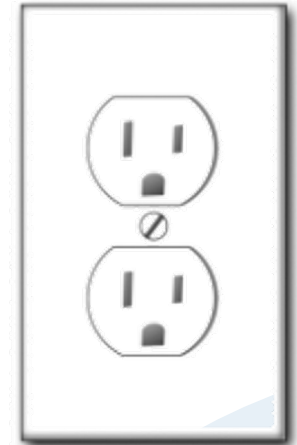
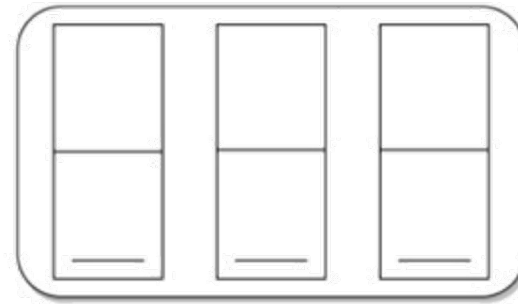
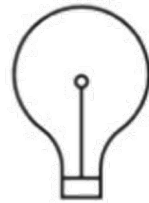
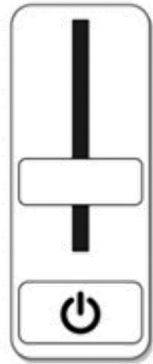
Matter Data Model



Example Model

- Endpoint0**
- Basic Information Cluster
  - Access Control List Cluster
  - Network Commissioning Cluster
  - ...

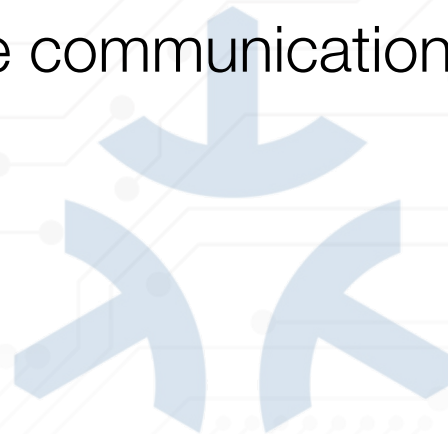
# Client-Server Clusters



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# Key Features

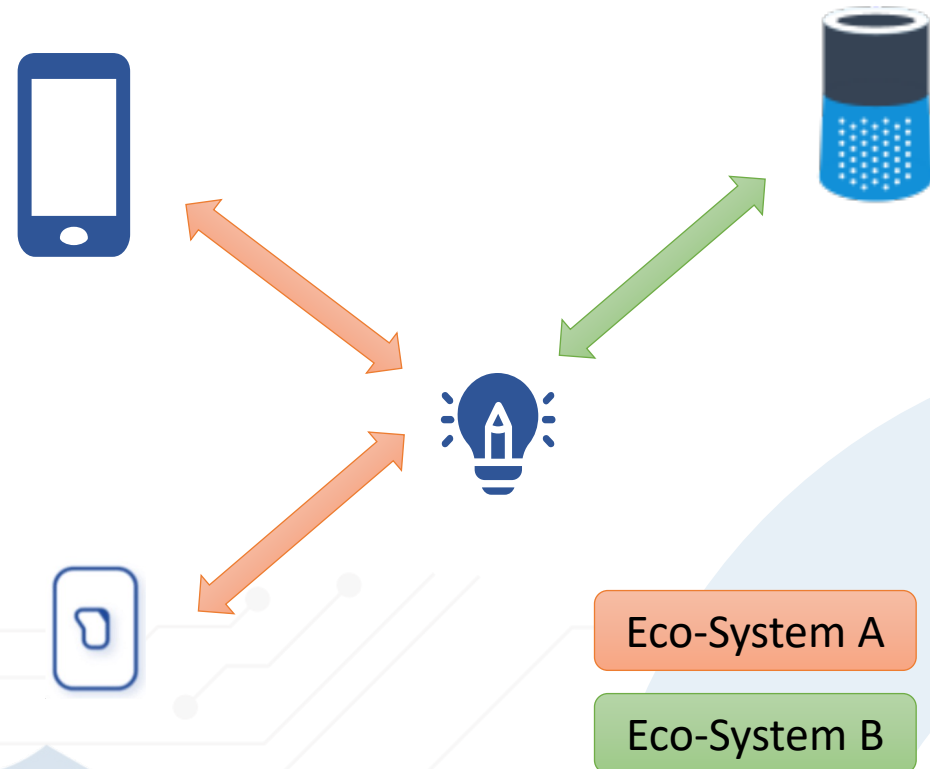
Unique and key features like Multi-Admin, Device-2-Device communication, Security



# Multi-Admin Support



- Multi-admin is a foundational feature in Matter which provides the interoperability.
- Matter devices participating in multiple ecosystems *simultaneously*.
- Users can control which devices they share with which systems on individual level, and can easily add multiple devices to a new ecosystem to try out new experiences

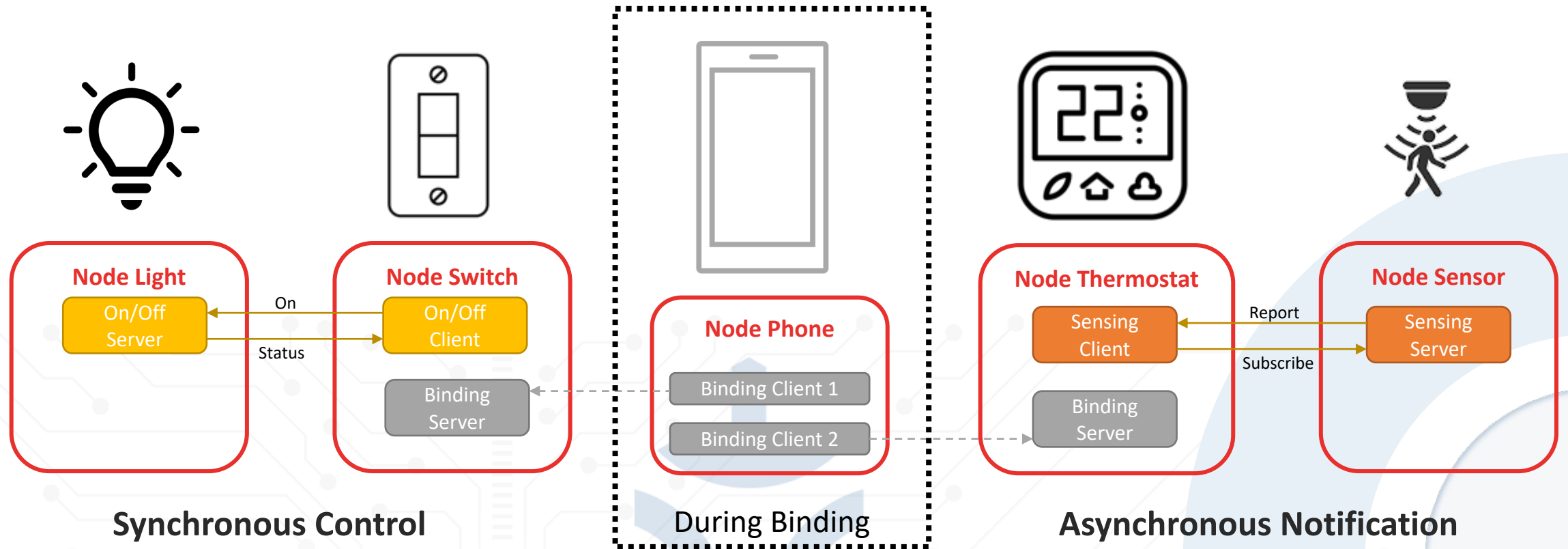


# Device to Device

✓ Device to Device communication

✓ No intermediation

✓ Direct over Local Network



# Matter Security Model



## Distributed Compliance Ledger (DCL)

- Allows Connectivity Standards Alliance (CSA) and authorized Vendors to publish information about their Matter devices



## Public Key Infrastructure (PKI)

- Uses ECDSA based certificates for signing and authentication.
- Encrypted communication over the network.



## Access Control List (ACL)

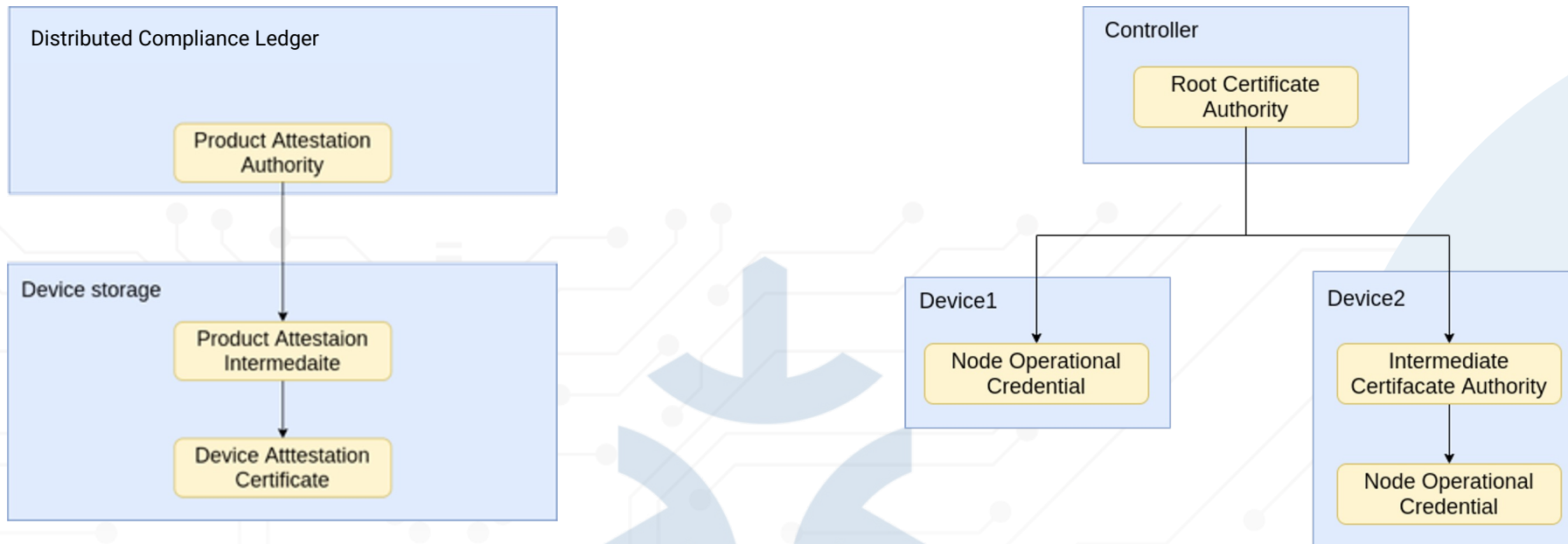
- A list which specifies who (which NOC) can do what on this Matter node.

# Matter Security Model

## Types of Certificates in Matter

- Device Attestation Certificate (DAC)
  - Device Identification

- Node Operational Credential (NOC)
  - Whom does the device talk with



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# Current Status

Matter adoption status and support on various eco-systems





# Current Status



300+ members in the [Alliance](#) actively participating



[Specification v1.1](#) released on 18 May'23 and available



GitHub [CHIP Project](#) with multiple ready examples










[Certification Labs](#) are live and actively certifying devices



**1135** new products certified by the Alliance since launch

# Current Status – Eco-System matter ESPRESSIF





Eco-System*	Matter Hub	Thread-BR	App Support	Differentiation
<p>Alexa</p> 	<p>Over 100 million Echo devices across 20 models. Almost all Echo devices 2<sup>nd</sup> Gen onwards.</p>	<p>Echo (4th Gen) Eero 5</p>	 iOS	<p>Matter Simple Setup / FFS Alexa Ambient Home Kit Alexa Connect Kit Zigbee Bridge</p>
<p>Home</p> 	<p>Google Home Google Home Mini Nest Mini &amp; Audio Nest Hub (1<sup>st</sup>, 2<sup>nd</sup> gen) Nest Hub Max Nest Wi-fi Pro (Wi-Fi 6E)</p>	<p>Nest Hub (2<sup>nd</sup> gen) Nest Hub Max Nest Wi-fi Pro (Wi-Fi 6E)</p>	 iOS	<p>Home-Away Intelligence Google Cloud Analytics Online Certification</p>
<p>HomeKit</p> 	<p>Apple HomePod (first-gen) Apple TV 4K Wi-Fi (2022) Apple HomePod (2<sup>nd</sup> Gen) Apple HomePod Mini Apple TV 4K w/Eth (2022) Apple TV 4K (2021)</p>	<p>Apple HomePod (2<sup>nd</sup> Gen) Apple HomePod Mini Apple TV 4K w/Eth (2022) Apple TV 4K (2021)</p>	<p>iOS</p>	<p>Across platform integration Legacy Product Bridge (BLE)</p>
<p>SmartThings</p> 	<p>SmartThings 2018 Hub Aeotec Smart Home Hub SmartThings 2015 Hub Samsung TVs Smart Monitor</p>	<p>SmartThings 2018 Hub Aeotec Smart Home Hub</p>	 iOS	<p>Matter Hub on Appliances Zigbee, Z-Wave Bridge Online Certification</p>

\*alphabetical order

Status as of May 2023

# Current Status - Espressif



- Multiple Customers have certified products in Market  
    and more ...
- 60+ Espressif powered devices on Certified Matter device list on [CSA website](#) for both Wi-Fi and Thread end-devices
- The only Openthread listed RTOS based [Open Thread Border Router](#)
- Espressif is CSA approved PAA to provide DAC certificates
- ESP32-H2 and ESP32-C6 are Thread 1.3 certified

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# Espressif's Matter Offerings

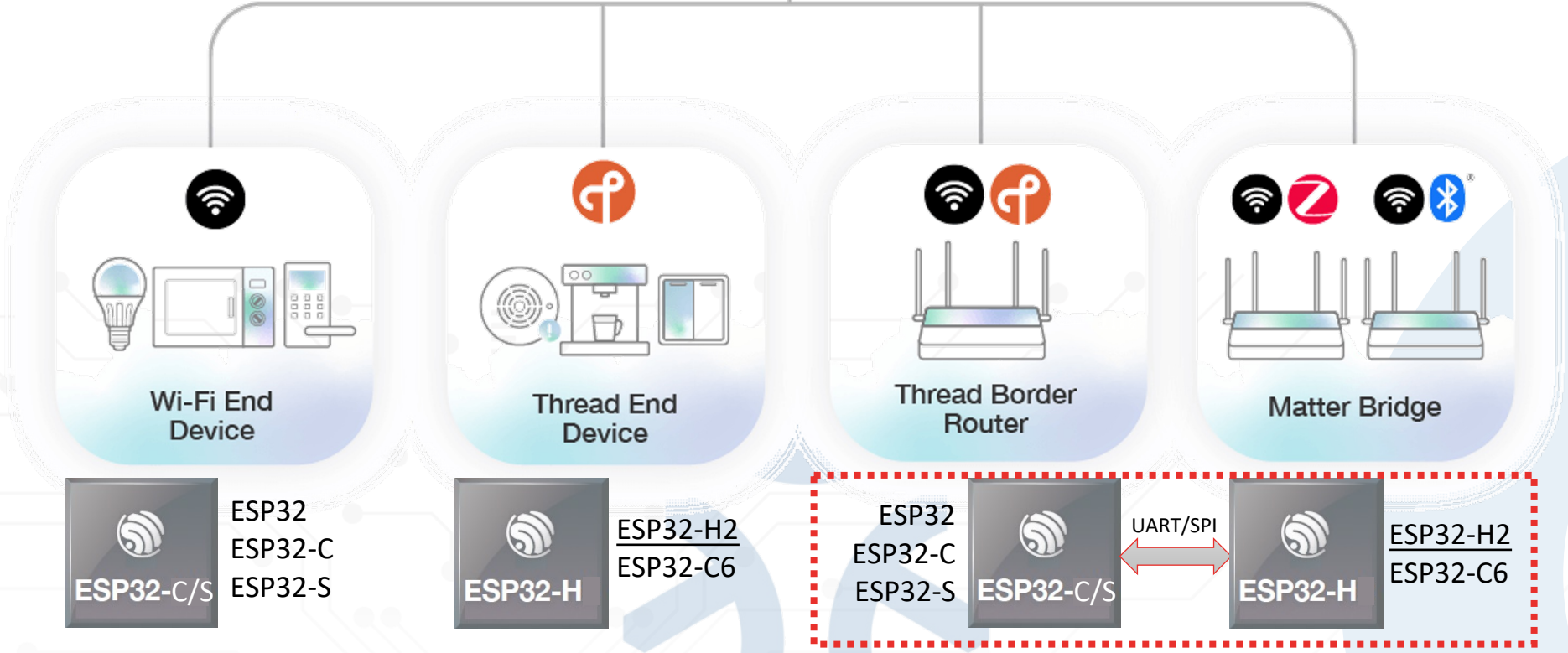
Espressif Matter supported products and solutions



# Espressif Matter Products

























## Comprehensive Matter Solutions



# Matter over Wi-Fi

















	Connectivity	Core	RAM	GPIO
 ESP32 C5	 2.4/5 GHz Wi-Fi 6  Bluetooth 5 (LE)  Thread  Zigbee	RISC-V 32-bit Single Core	400 KB	20
 ESP32 C6	 2.4 GHz Wi-Fi 6  Bluetooth 5 (LE)  Thread  Zigbee	RISC-V 32-bit Single Core	512 KB	30 or 22
 ESP32 C2	 2.4 GHz Wi-Fi 4  Bluetooth 5 (LE)	RISC-V 32-bit Single Core	272 KB	14
 ESP32 C3	 2.4 GHz Wi-Fi 4  Bluetooth 5 (LE)	RISC-V 32-bit Single Core	400 KB	22
 ESP32 S3	 2.4 GHz Wi-Fi 4  Bluetooth 5 (LE)	Xtensa® LX7 32-bit Dual Core	512 KB	45
 ESP 32	 2.4 GHz Wi-Fi 4  Bluetooth 4.2 (BR/EDR+LE)	Xtensa® LX6 32-bit Single/Dual Core	520 KB	34



# Matter over Thread



	Connectivity	Core	RAM	GPIO
 ESP32 C5	 2.4/5 GHz Wi-Fi 6  Bluetooth 5 (LE)  Thread  Zigbee	RISC-V 32-bit Single Core	400 KB	20
 ESP32 C6	 2.4 GHz Wi-Fi 6  Bluetooth 5 (LE)  Thread  Zigbee	RISC-V 32-bit Single Core	512 KB	30 or 22
 ESP32 H2	 Bluetooth 5 (LE)  Thread  Zigbee	RISC-V 32-bit Single Core	320 KB	19



# Thread Border Router Matter Bridge



ESP32-S3 + ESP32H2 board.

Any ESP32-C/S3 + ESP32-H2 SoC over UART

The only RTOS based OTBR on [openthread.io](https://openthread.io)

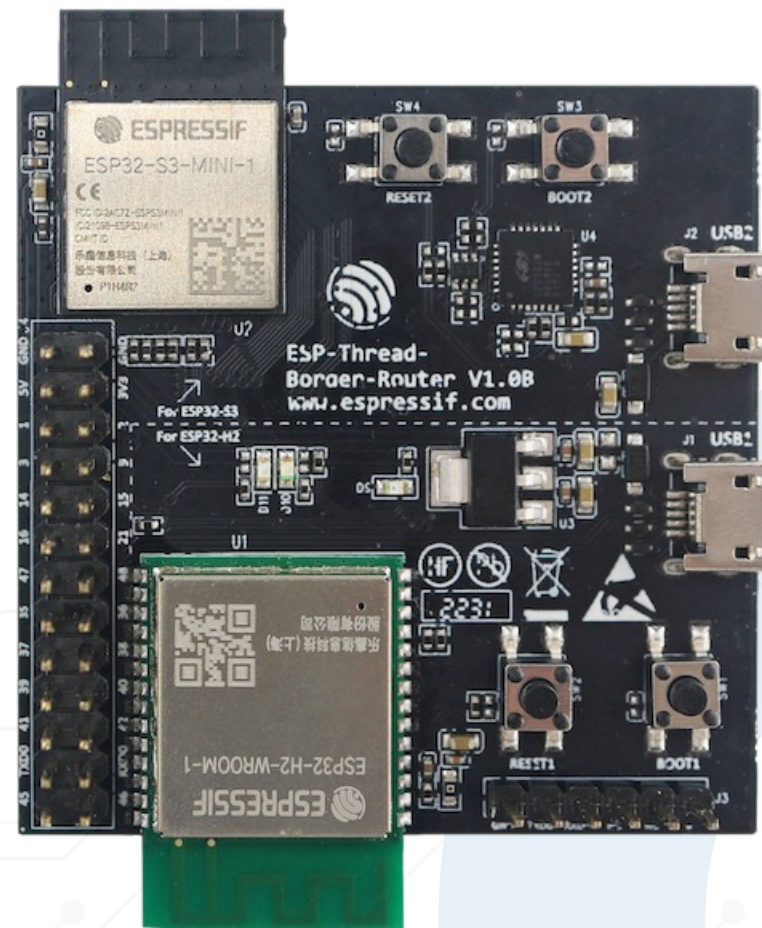
## Thread Border Router

ESP32-S3 + ESP32H2 board.

Any ESP32-C/S3 + ESP32-H2 SoC over UART

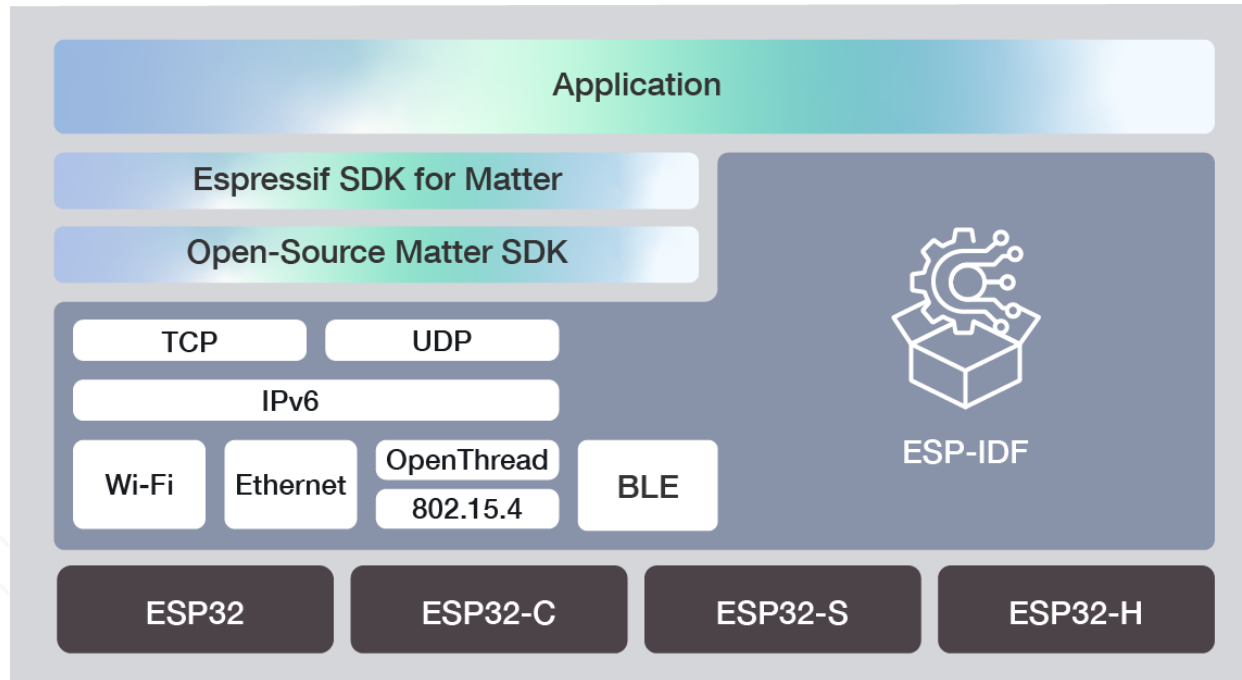
Examples for BLE-Bridge, Zigbee Bridge  
available on [GitHub](https://github.com).

## Matter Bridge





# ESP-Matter SDK

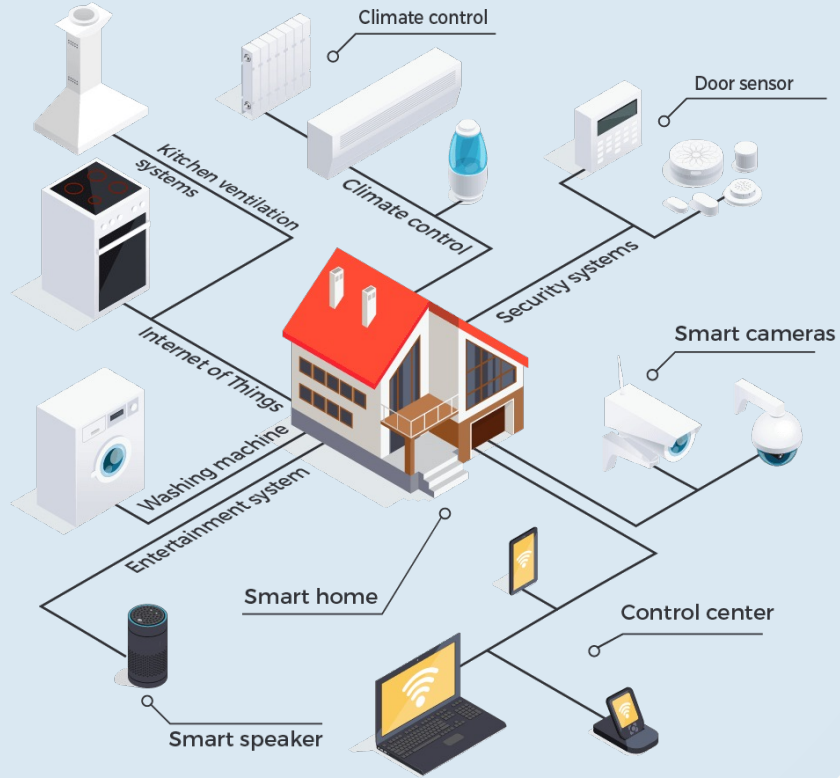


[Espressif's SDK for Matter](#)

- Simplified API
- Rich device types supported with commonly used peripherals
- Production-ready examples
- Easy extension for multi applications
- Tools and utilities for security, manufacturing and production

# Matter Solutions Overview

- ✓ Build Your Own Matter Devices with Espressif's Matter SDK
- ✓ ESP ZeroCode Modules for Matter
- ✓ Espressif's DAC Pre-provisioning Service
- ✓ Matter Certification Assistance Services



# Thank You!

## Any Questions?



# Upcoming Sessions



1

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