

What's New in Matter: Updates and Developments

Espressif Systems

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Matter Introduction – Recap

Quick recap about Matter and its advantages as well as requirements

What is Matter

- Industry-unifying standard defined by Connectivity Standards Alliance (Former Zigbee Alliance) with member companies from device makers, to silicon vendors, to eco-systems.
- **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



How it helps

Matter brings 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

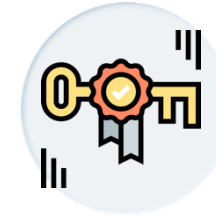
- ✓ Interoperability
- ✓ Scalable
- ✓ Open Source

Matter Requirements



Product Certification

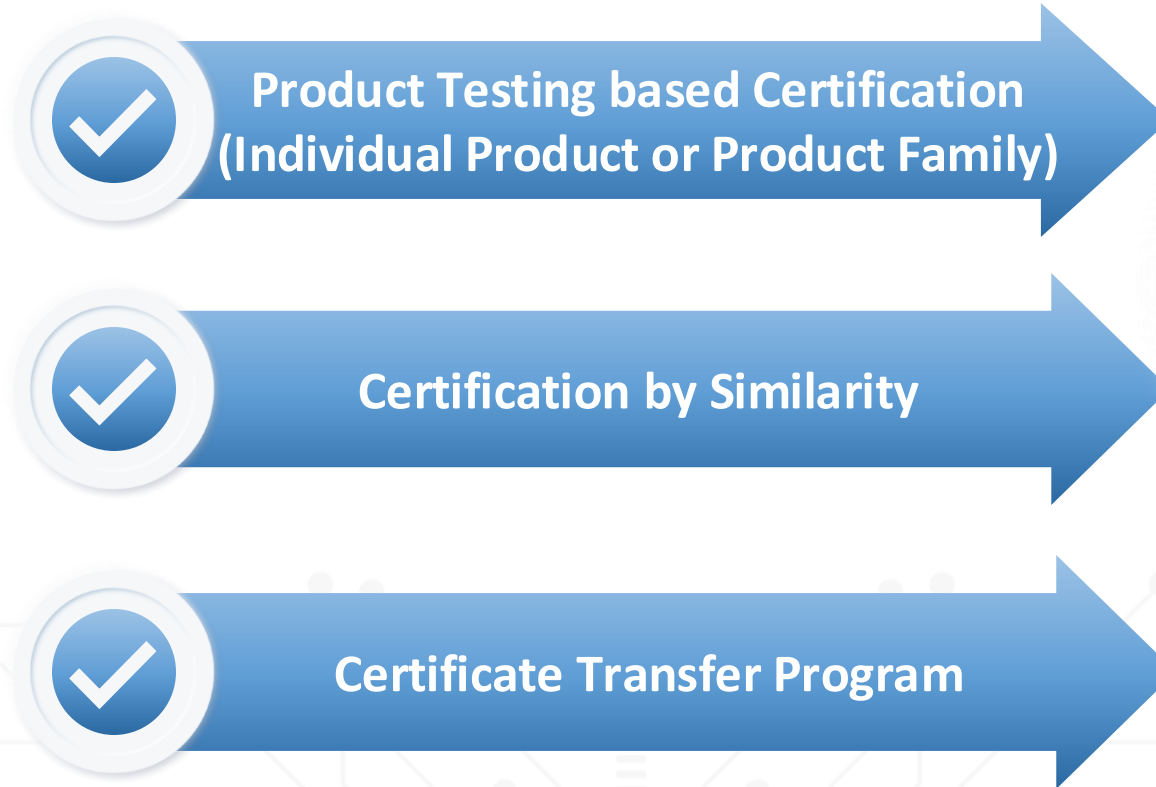
- ✓ Certification helps to ensure compliance
- ✓ Matter logo on a product provides peace of mind to consumers
- ✓ Validates Seamless Interoperability
- ❑ A rigorous testing process through certified CSA certified labs
- ❑ Each Product requires a different Certificate Declaration (CD)



Device Attestation

- ✓ DAC is signed using CSA-approved PAA
- ✓ Includes private key that acts as device identity
- ✓ Commissioner can establish trust in the device with DAC
- ❑ Each device needs to be programmed with a unique Passcode
- ❑ DAC provisioning requires infrastructure updates or equipment setups in manufacturing

Ways to Get Certification



Manufacturing Considerations

- Building your own DAC provisioning infrastructure can be complex and time consuming.
- The factory needs to be secured to be able to work with cryptographic material
- PKI as a service platform can provide DAC but require equipment setup in your manufacturing factory; requiring upfront investment and time
- Unique data programming can take more time for each device on the manufacturing line



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Matter Updates

Updates on Matter specifications for v1.3 and v1.4

New Features v1.3

Command Batching

- Batch multiple commands into a single message when communicating with Matter devices
- Minimize the delay between the execution of those commands.
- With a Matter bridge, batched commands can affect multiple devices to provide a more synchronized experience

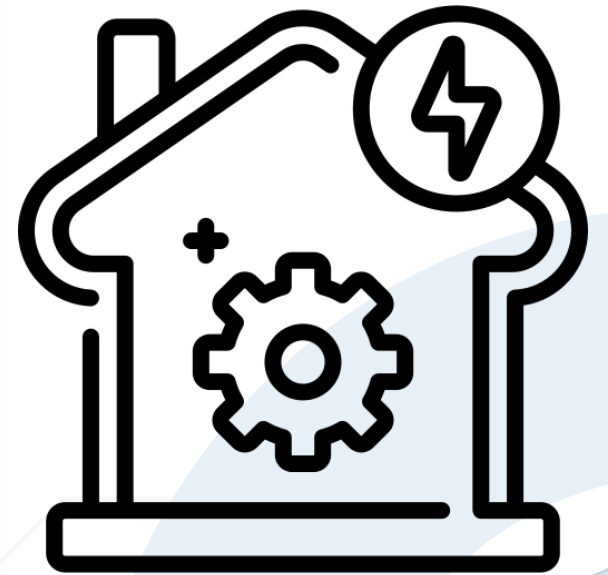
Scenes (provisional)

- Provide a method for product makers and platforms to set, read, and activate scenes on devices.
- Create a desired state for devices by combining settings that can be triggered with one command
- Reduces the number of commands to execute a scene, and improved responsiveness

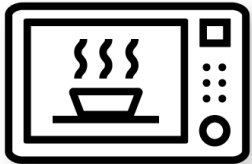
New Features v1.3

Energy Management Cluster

- ❑ Introduces new energy reporting capabilities.
- ❑ Enables any device type to include the ability to report actual and estimated measurements
 - instantaneous power,
 - voltage,
 - current, and others,
- ❑ In real-time, as well as its energy consumption or generation over time



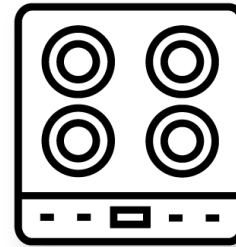
New Devices in v1.3



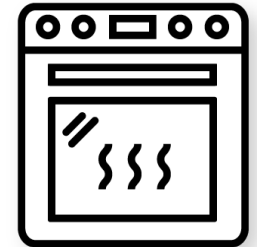
Microwave Ovens



Extractor Hoods



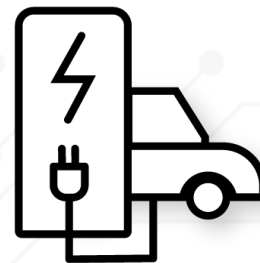
Cooktops



Ovens



Laundry Dryers



Electric Vehicle Charging



Water Management

Ecosystem-to-Ecosystem (E2E): Enhanced Multi-Admin (upcoming)

What is E2E?

- A feature simplifying device management across various smart home ecosystems.
- Enables seamless interactions between different platforms, improving user experience.

Key Features:

- **Fabric Sync:** Automates the process of making devices available in multiple ecosystems, reducing manual setup.
- **Joint Fabric and Fabric Bridge:** Methods to further streamline device sharing across ecosystems.

Benefits:

- Eases device handoff between platforms.
- Enables existing and new devices to automatically connect to multiple ecosystems.

Enhanced Infrastructure: (Upcoming) HRAP, NIM, Secondary Network



Home Routers and Access Points (HRAP):

- Devices, including routers, modems, and set-top boxes.
- Serve as the backbone of Matter-based smart homes.
- Simplify smart home networks by securely storing and sharing Thread credentials.



Network Infrastructure Manager (NIM):

- As part of HRAP, NIM improves home network management.
- Handling Thread credentials sharing and ensuring new TBRs can easily be adopted.
- allowing non-Thread controllers to commission new devices



Secondary Network Interface:

- Allows devices to use an alternative network when the primary network is unavailable, ensuring uninterrupted connectivity.
- Maintain reliable communication and functionality even in challenging network conditions.

New Devices - Upcoming



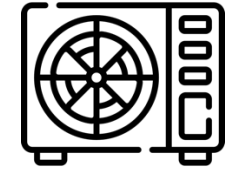
Water Heater



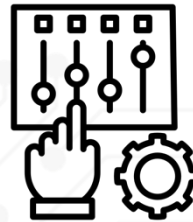
Solar Power



Battery Storage



Heat Pumps



Mounted Control

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Intermittently Connected Devices

Intermittently Connected Devices for Low Power battery operated use-cases

Intermittently Connected Devices

- ❑ Matter's Intermittently Connected Device (ICD) mode extends battery life for devices.
- ❑ The ICD manager uses subscription report synchronization and OpenThread, allowing devices to sleep while preserving Matter sessions

Active Mode

- When the device is in **Active Mode**, the ICD is set into a **Fast-Polling Interval** for maximum responsiveness.
- Once the active mode is triggered, the ICD stays in this mode for a minimum duration of **Active Mode Interval**
- When the active interval has elapsed and none of the states are active, the device will switch its operating mode to the Idle Mode.

Idle Mode

- In **idle mode**, the ICD will poll its associated router at its **Slow-Polling Interval** to see if another device has tried to communicate with it while it is sleeping.
- If no event occurs, the ICD stays in its idle mode for the entirety of the **Idle Mode Interval**.

Modes of Operation



Short Idle Time (SIT)

- Supported from v1.2
- Looks like a regular Matter device
- Longer active and idle intervals. (<15 sec)
- Client-initiated communication.
- optimizations to synchronize subscription intervals



Long Idle Time (LIT)

- Supported in upcoming releases
- Goes offline for > 15 seconds
- The new paradigm of “device checking-in” to client.
- Requires client support

Dynamic LIT/SIT

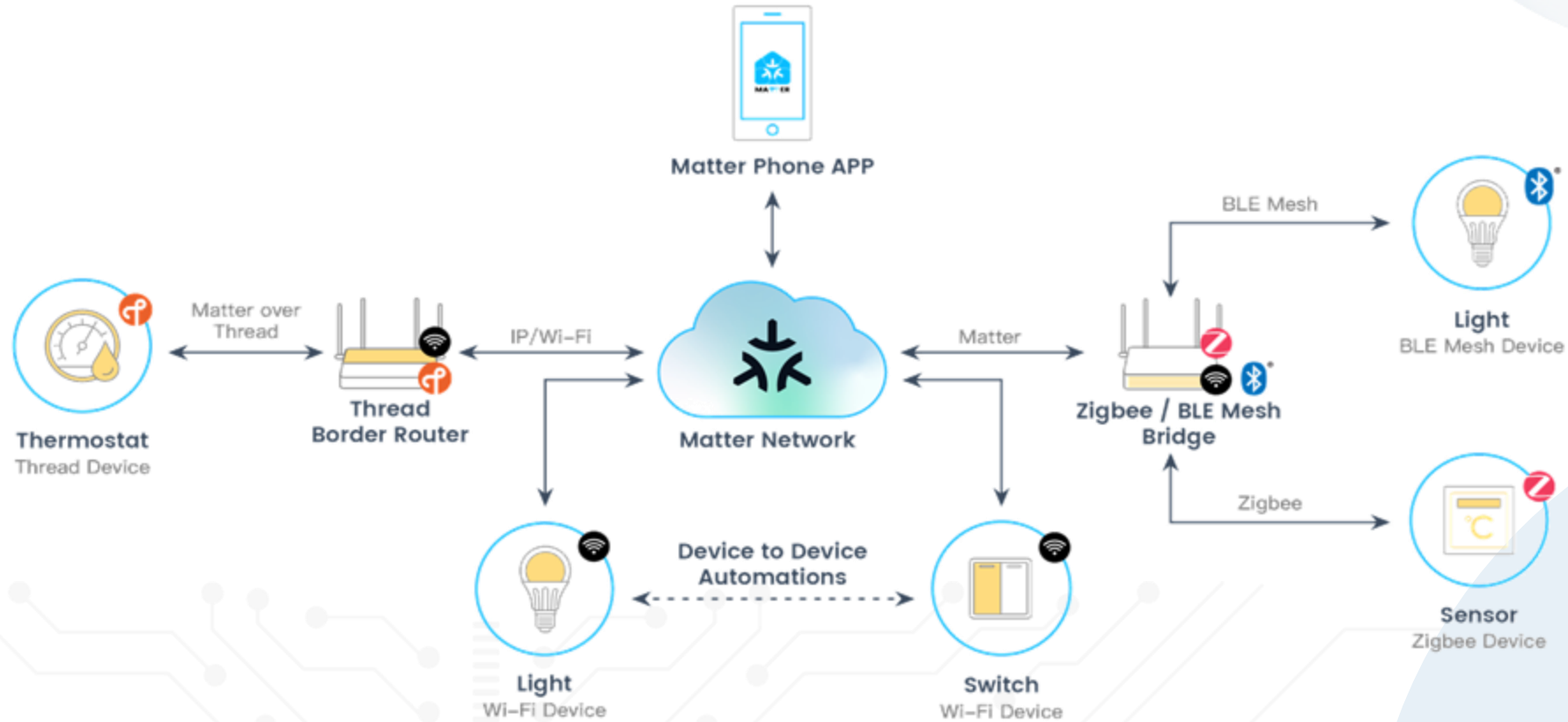
- Devices that mostly operate as LIT/SIT have option to act as SIT/LIT
- Example: smoke detectors, which may be mostly SIT, but fall back to LIT when power lost.

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Espressif's Matter Offerings

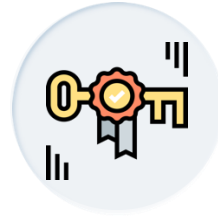
Espressif Matter supported products and solutions

Espressif Matter Platform Solutions



Espressif Hardware and Software enable building all types of Matter devices including **Matter Wi-Fi end-devices, Matter Thread end-devices, Thread Border Routers, and Matter Bridges** to bridge with other protocols

Espressif Matter Solutions



Development

Attestation

Certification & Validation



No Code Application

ESP ZeroCode

ACK Matter ZeroCode



Low Code Application

Host MCU

ESP Matter LowCode

ESP AWS IoT ExL

ESP Hosted ZeroCode



Custom Application

Fabric & Controller

ESP Thread BR

ESP Matter SDK

DAC Pre-Provisioning

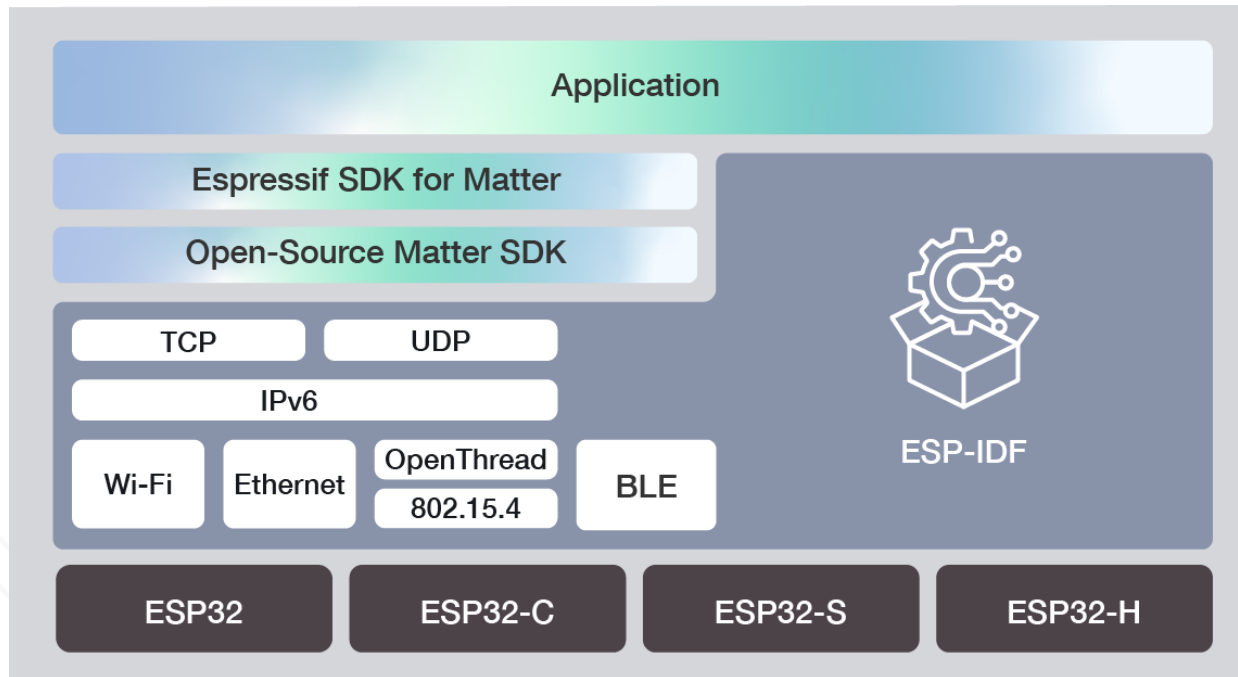
Customer Factory DAC

In-Field DAC

Certification Assistance

Matter QA-to-Go

ESP-Matter SDK

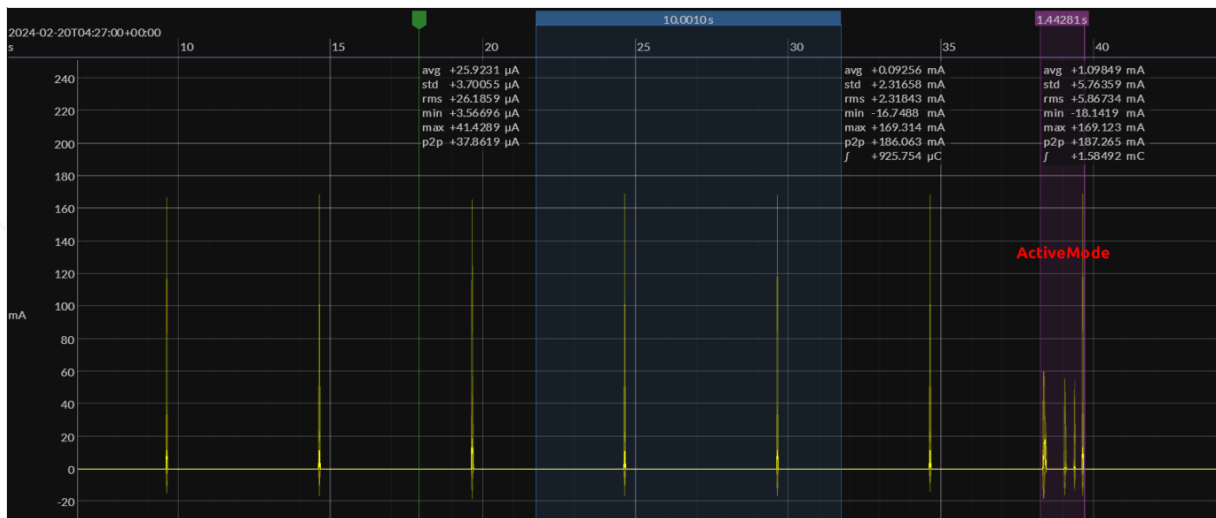


[Espressif's SDK for Matter](#)

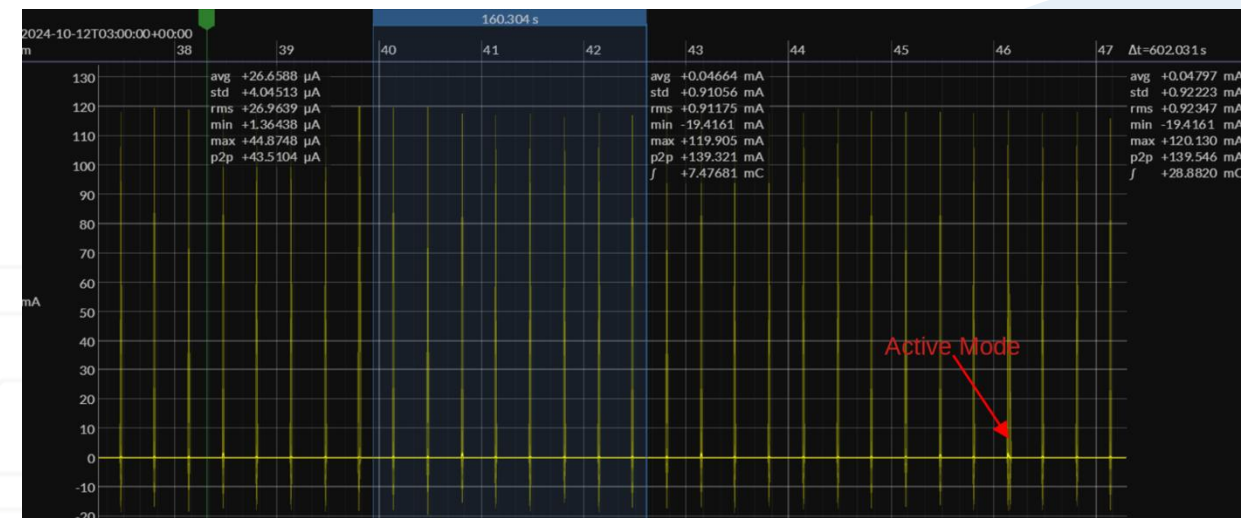
- > Simplified APIs
- > All device types supported up to v1.3
- > Production-ready examples
- > Thread BR, Matter Bridges
- > Updated to support Thread 1.4
- > Integration with ESP RainMaker

ICD Support on ESP-IDF

- Matter ICD device using the ESP Matter data model.
- Currently, it is available for ESP32-H2 and ESP32-C6 for SIT and LIT mode
- Further reductions in power consumption in ESP32-H4



SIT Mode (10s interval)



LIT Mode 20s interval)



Matter Fabric & Controller



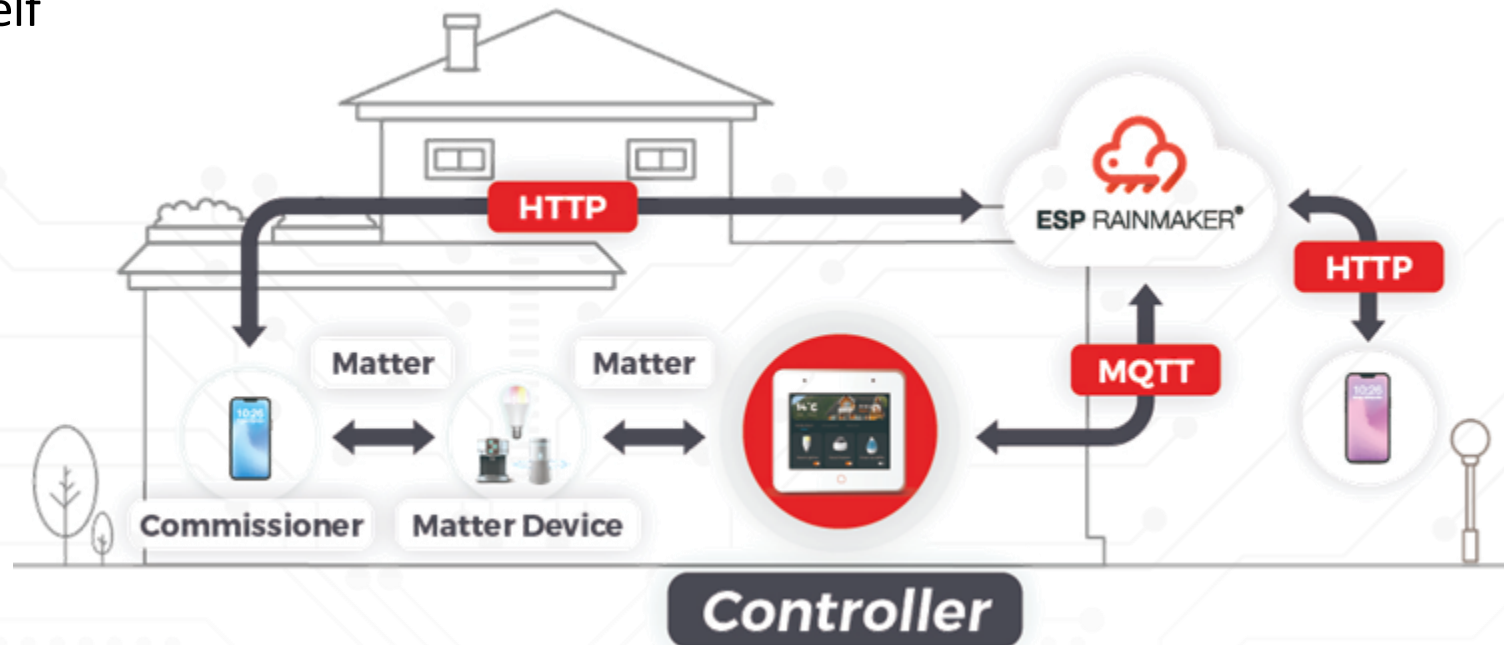
Matter Fabric

- A virtual network of Matter devices, that can communicate with each other
- All devices and phone apps (users) are part of this Fabric
- Matter Commissioners add new Matter devices to a Fabric
- Fabric in the cloud allows association of devices with users, and carry those associations across their sign-ins on any devices
- With your fabric, device manufacturers can provide a complete experience - an ecosystem to the consumer using their own and third-party Matter devices



Matter Controller

- In-home, always-on device that helps with control and management of Matter devices - Typically UI/touch-based control or voice-based control
- Facilitates local control, remote control, OTA Updates
- Optional Features (can also act as): Thread Border Router, Matter Bridge, Matter end-device itself



ESP RainMaker - Matter Fabric



- > ESP RainMaker provides full Matter fabric implementation
- > ESP RainMaker phone apps support commissioning and local control using Matter
- > Modular architecture facilitates integration in custom private cloud



Phone Apps with commissioning and control



PKI Infrastructure for NOC Signing



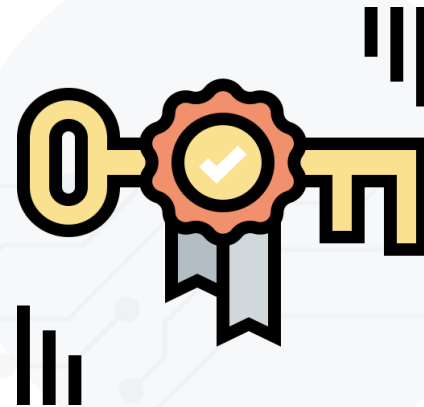
Cloud synchronization of ACLs



Controller Support for Remote control



Attestation Services



Module Pre-Provisioning Service

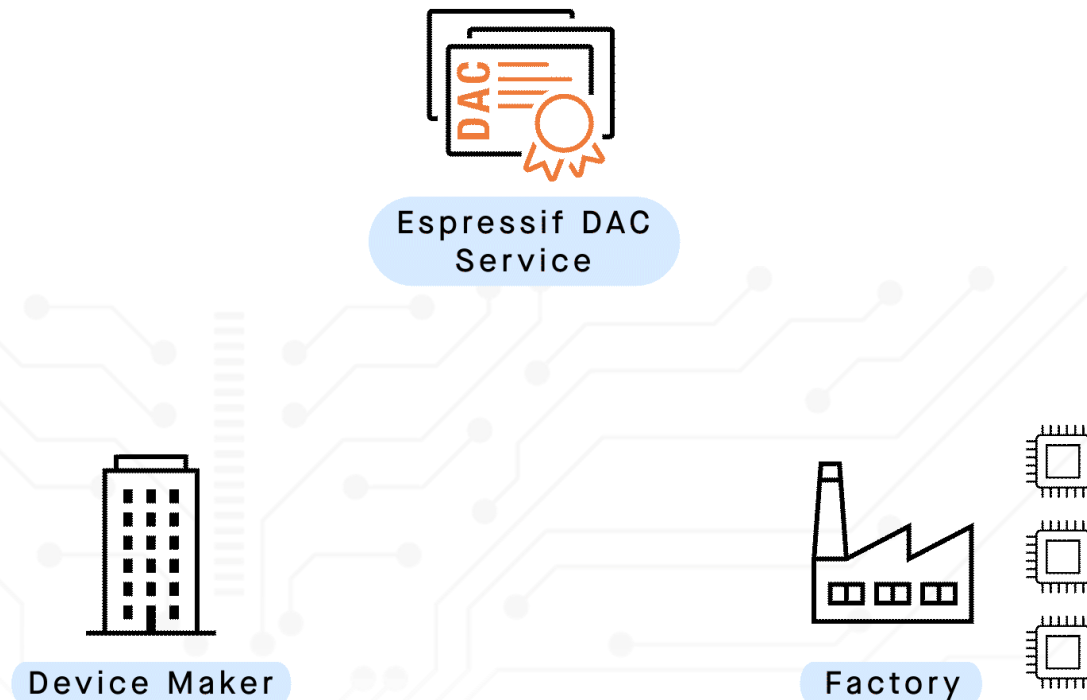


- Espressif is a CSA-approved PAA.
- Espressif connectivity modules and SoCs can be pre-provisioned with DAC certificates securely
- Modules and SoCs are locked to protect the DAC private key and sensitive data
- Programmed with unique passcode and verifier that can be used in the device QR codes
- Customers receive the secured, pre-provisioned modules and a database of module IDs, certificates, passcode and verifier



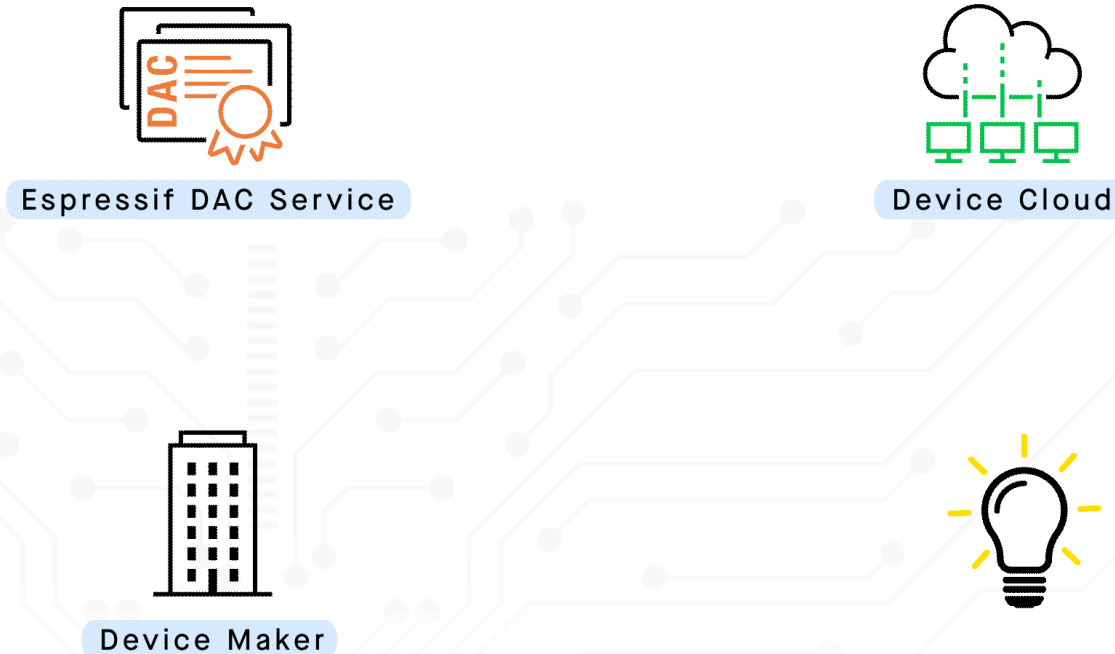
Customer Factory DAC Enablement

- Enabling customer factories to perform Matter manufacturing
- Ability to securely deliver cryptographically signed DACs to the modules without their private key ever leaving the module



In-Field Device DAC update

- Deliver DACs to in-field devices, to enable remote Matter support
- Devices must have a mutually authenticated secure connection to a cloud platform
- Cloud platform is expected to act as the trust broker for these devices





Certification Assistance



Certification Assistance Service

- Espressif's Matter Certification Assistance Service helps customers to carry out their product certification benefiting from Espressif's experience of Matter Certification
- Espressif can work with the lab to assist complete certification for customers' products
- Espressif can assist customers to run pre-cert test runs in Espressif's lab to ensure that the product passes all tests
- Espressif customers can benefit from a pre-negotiated certification price from an ATL if they want to go for certification directly



Matter QA-to-Go Service



Matter QA-to-Go Service

- Espressif's Matter QA-to-go service offers Espressif customers the benefit of intensive testing of their devices in Espressif Lab
- Currently freely available for all Espressif customers
- Fully Automated and Reproducible Testing
- Supports Matter-over-Wi-Fi and Matter-over-Thread end devices
- Test reports are available through an online system along with logs and videos wherever applicable
 - Logs require devices with serial console access – not mandatory



Matter QA-to-go Coverage

Test Category	Description
Commissioning	Commissioning and pairing-unpairing using chip-tool
Device Control	Device Control using chip-tool in normal and stress environment
Negative	Negative testing to test device behavior
OTA Upgrades	Upgrading device firmware using chip-tool in normal and stress environment
Multi-Admin	Commissioning and device control for multi-admin users in normal and stress environment
Longevity	Device discovery and control tests over few days with different fabrics
Noisy Environment	Device discovery and control in noisy environment
Ecosystems Compatibility	Normal and Stress testing with different Ecosystem Controllers and Commissioners



Amazon Alexa



Apple HomeKit



Google Home



Samsung
SmartThings



ESP RainMaker

ESP ZEROCODE



ESP-ZeroCode revolutionizes Matter-enabled product development by providing a hassle-free, one-stop Turn-Key solution



 matter

- ✓ Pre-provisioned, pre-programmed modules
- ✓ 150+ Matter Certifications completed
- ✓ Support for Wi-Fi and Thread based devices
- ✓ Support for Hosted mode devices



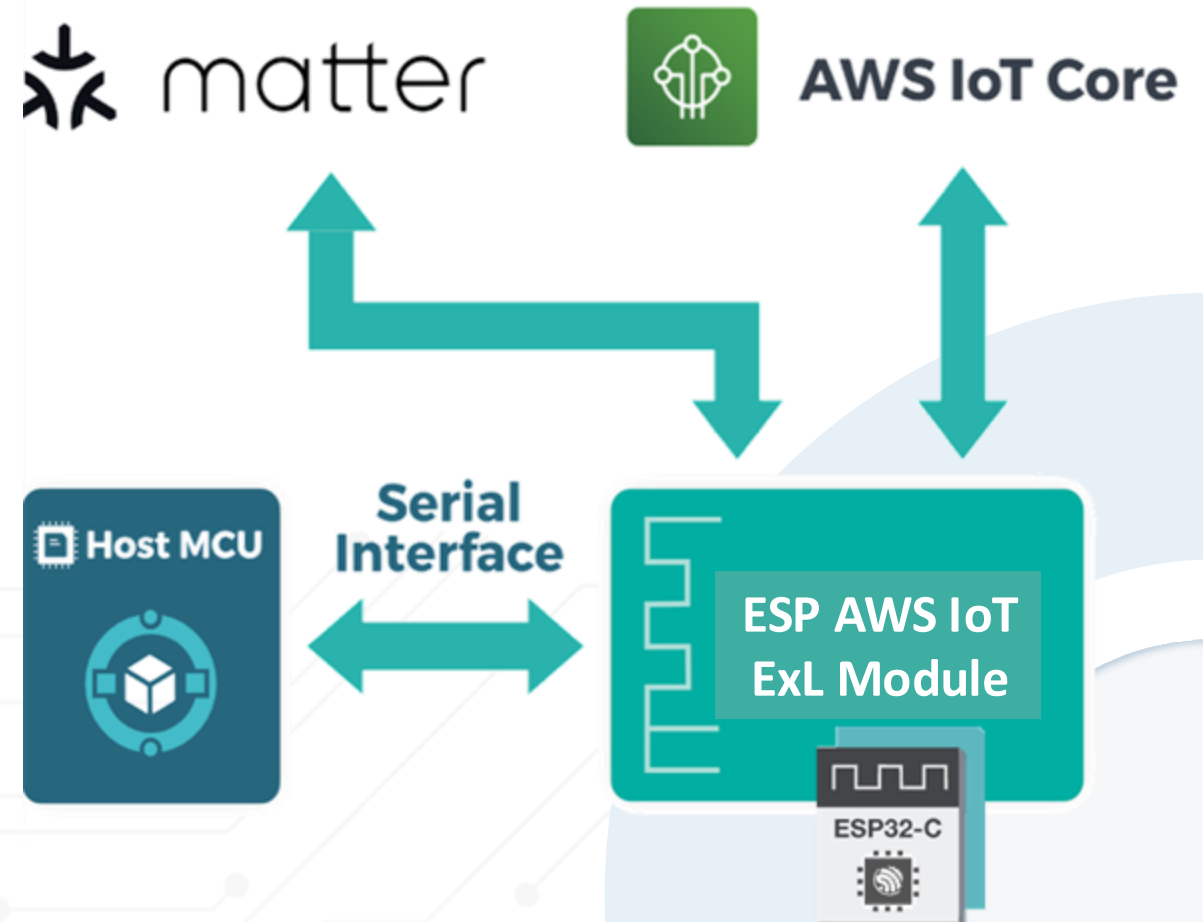
zerocode.espressif.com

ESP AWS IoT ExL Modules

ESP AWS IoT ExL module powered by AWS IoT ExpressLink —
Simplifying Matter-compatible Cloud-connected Devices

ESP AWS IoT ExL Module

- Simple AT command-based serial interface
- Easy Matter and AWS IoT Connectivity
- Out-of-box Security, OTA and Device Management
- Simplified Manufacturing



ESP AWS IoT ExL Features

Software Features

- Simple Protocol – AT Commands
- Matter Connectivity
- AWS IoT Core connectivity
- OTA and Device Management
- Out of Box ready to use Modules

Hardware Features

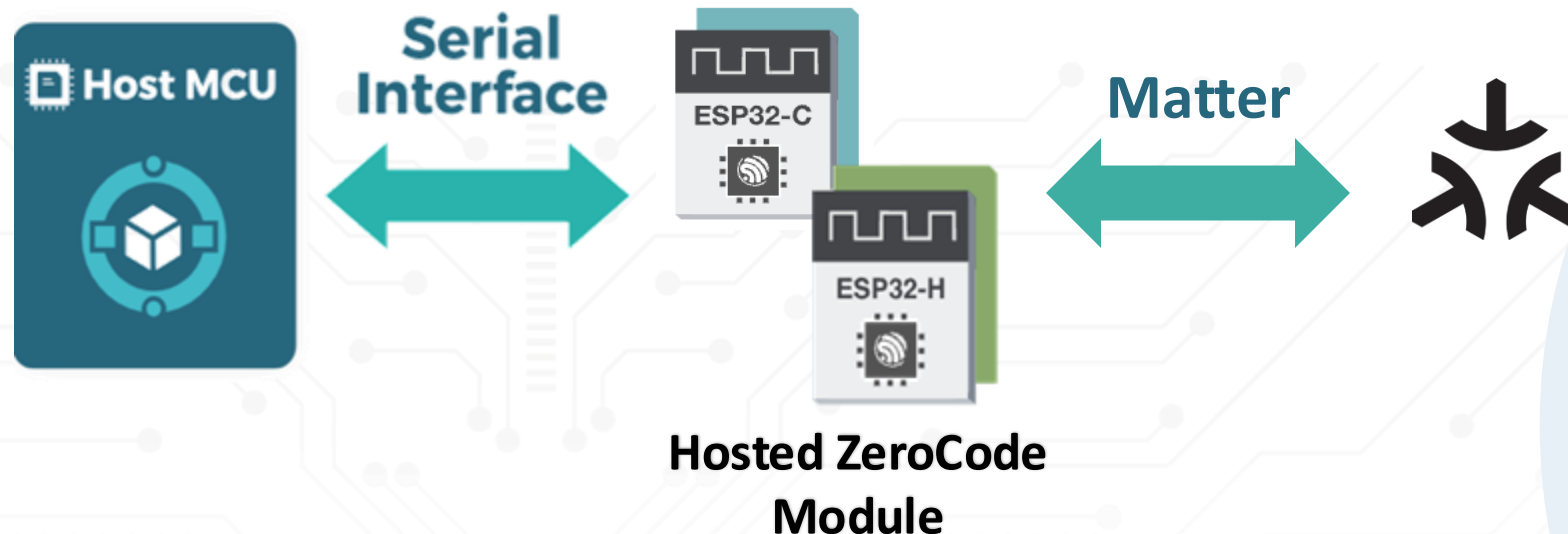
- Connectivity over Wi-Fi or Thread
- Secure Boot and Flash Encryption enabled
- Simple 2-wire UART interface
- Regulatory Certification for most geographies

ESP Hosted ZeroCode Modules

**ESP Hosted ZeroCode: Effortless Matter Connectivity with Minimal
Hardware and Software Changes**

ESP Hosted ZeroCode Modules

- 2-chip solution enabling Matter connectivity.
- Minimal hardware and software modifications required for integration.
- Full-duplex, flexible, and extensible UART-based communication protocol.



ESP Hosted ZeroCode Modules

Use Cases

- Ideal for manufacturers upgrading existing devices to smart connectivity.
- Device makers with specialized custom FW for dimming, control, touch, etc.
- Supports various device types: lights, fans, thermostats, blinds, and more.

Advantages

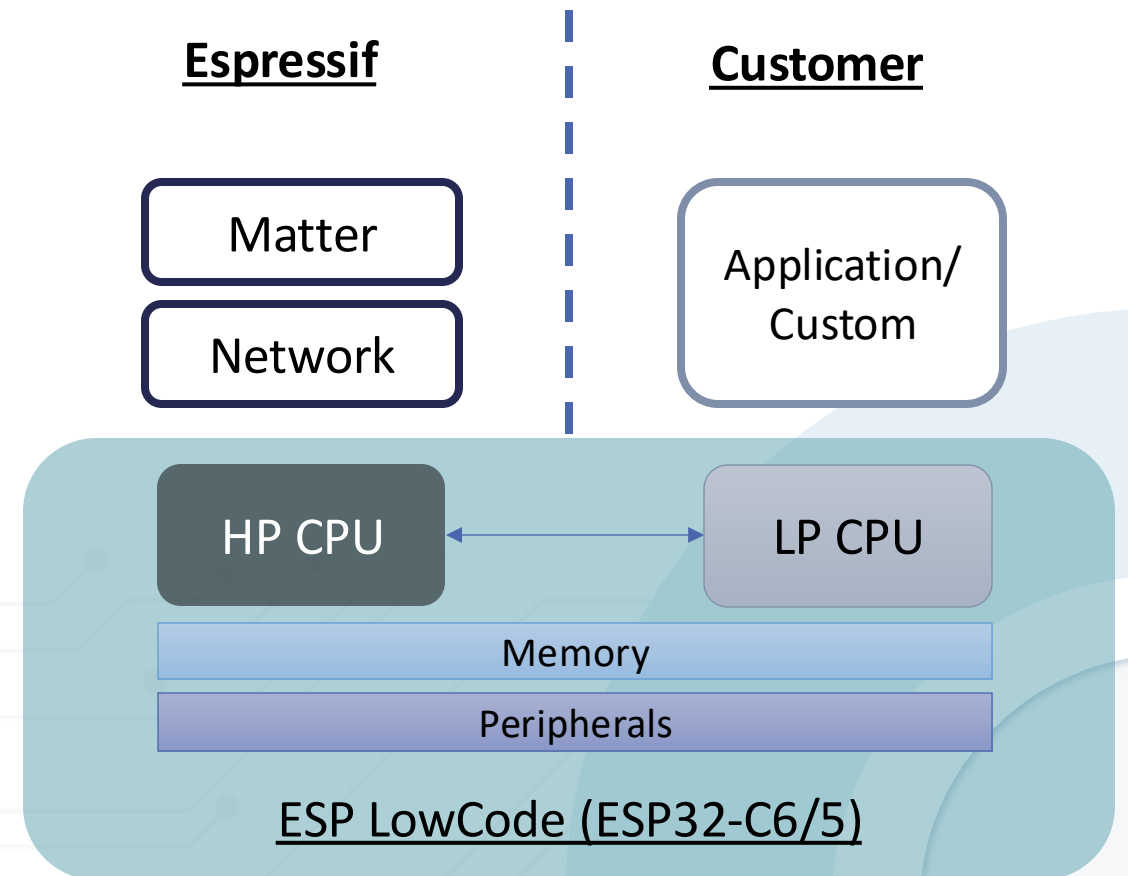
- Reduces time-to-market with minimal development effort.
- Supports over-the-air (OTA) firmware updates for remote device management.

ESP LowCode Modules

ESP LowCode: Accelerate Product Development with Custom Firmware and Built in Matter Connectivity.

ESP LowCode Modules (Upcoming)

- > Single chip solution enabling Matter connectivity with full customization.
- > Focus on application-specific FW and Espressif Handles all Matter and Network complexities
- > Framework to develop custom FW on the LP core with peripheral HAL drivers.
- > Effective low latency Inter Processor Communication using ESP-AMP framework



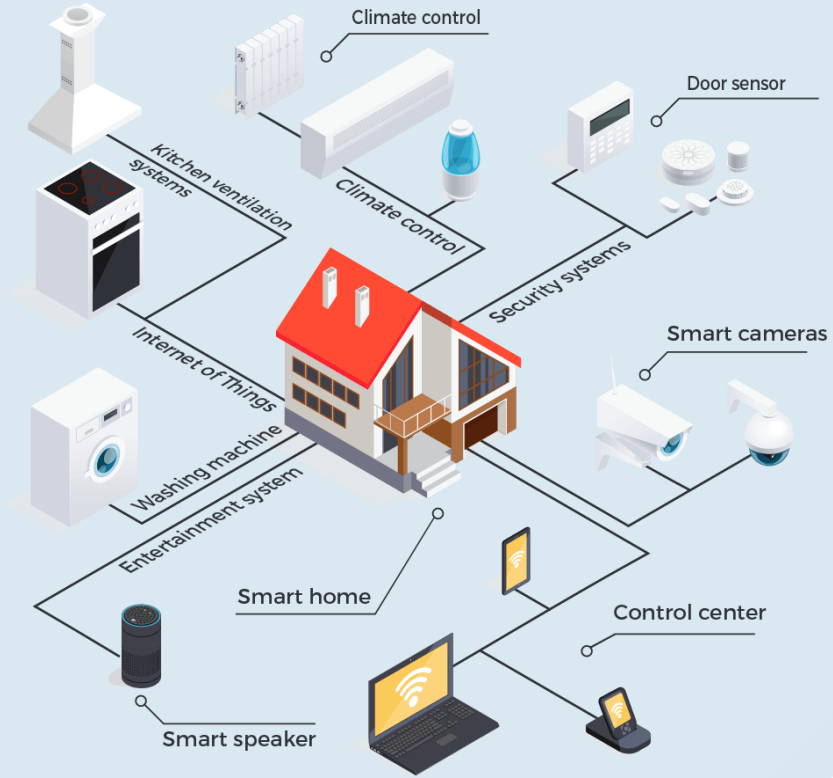
ESP LowCode Modules

Use Cases

- Ideal for manufacturers with proprietary algorithms and real-time requirements.
- Customers looking for Single chip solution optimizing design and costs.
- Supports various device types: lights, fans, thermostats, blinds, and more.

Advantages

- Reduces time-to-market with minimal development effort.
- Custom FW on the LP core, optimizes resources and components, lowering R&D and BOM costs while maintaining flexibility in product differentiation.



Thank You!!

Any Questions?