Matter

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November 25, 2021

Matter

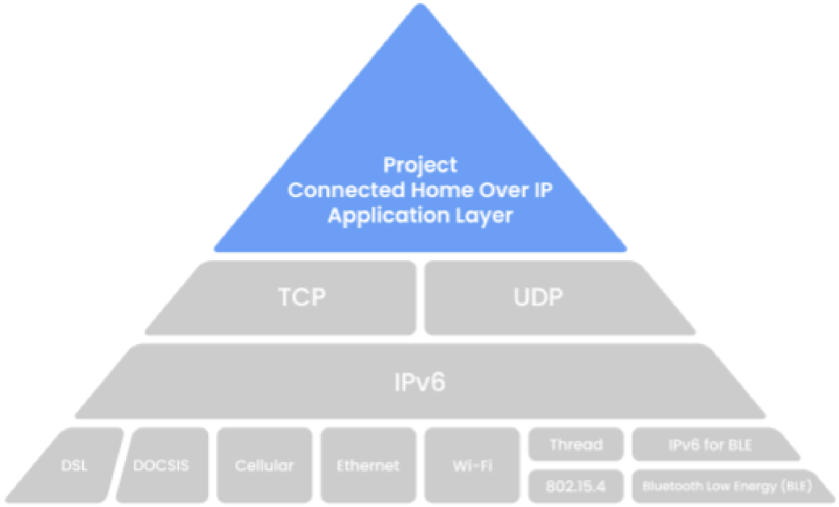
Objective

- Why Matter?
- When will it be available?
- How to use it today?

Why Matter?

- Why smart home?
- Limited smart home potential without interoperable devices
- Matter is driven by industry leading device manufacturers
- Matter implementation is open source and free of royalties
- Matter weaves together existing standards and fills in the blanks

Internet Protocols



When will it be available?

- Devices that support Matter pushed to sometime in 2022
- Preliminary support available on Android 12 and iOS 15
- Wide adoption is expected

amazon ASSA ABLOY COMCAST Google HUAWEI IKEA infineon Kroger

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Figure 2: Alliance Members

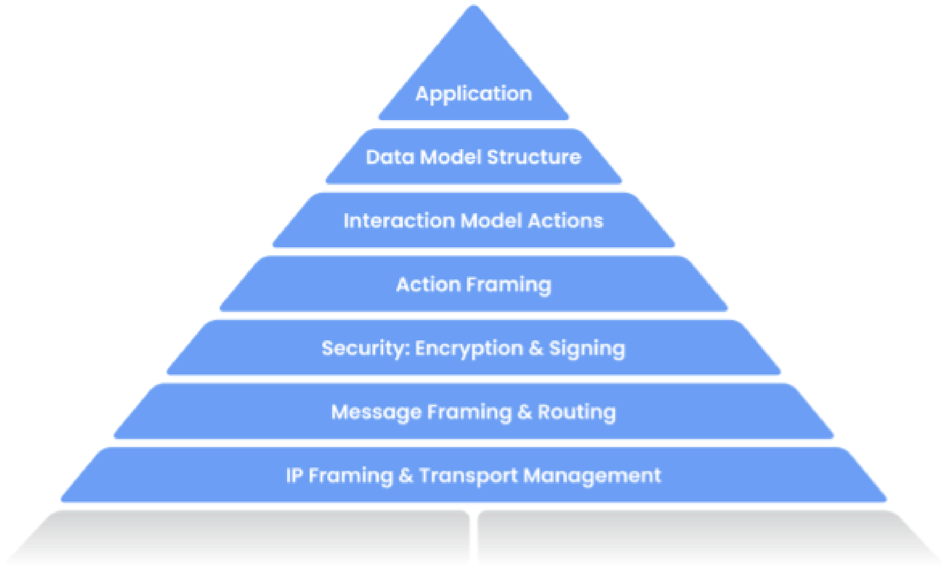
How to use it today?

- Start by reading the docs at https://github.com/project-chip/connectedhomeip
- Try it out in Linux on a Raspberry Pi
- Try it out on an embedded device such as ESP32

Core concepts

Matter	HomeKit	Zigbee
Attribute	Characteristic	Attribute
Binding	Event subscription	Binding
Cluster	Services	Cluster
Commissioning / Rendezvous	Pairing	Association
Controller / Commissioner	Admin	Coordinator
Device or Node	Accessory	Device or Node
Endpoint	Profile	Endpoint
Fabric	Network	Network

Architecture


Application
Data Model Structure
Interaction Model Actions
Action Framing
Security: Encryption & Signing
Message Framing & Routing
IP Framing & Transport Management

Code Repository

```
BUILD.gn
CONTRIBUTING.md
build
build_overrides
docs
examples
    all-clusters-app
        all-clusters-common
        esp32
        linux
    bridge-app
    chip-tool
    common
    platform
        esp32
        linux
integrations
```

```
scripts
    activate.sh -> bootstrap.sh
    bootstrap.sh
src
    include
    lib
    platform
        ESP32
        Linux
    protocols
    system
    tools
        chip-cert
    transport
third_party
    pigweed
    zap
```

Supported development platforms

- Embedded
  - ESP32
  - FreeRTOS
  - Linux
  - mbed
  - nrfconnect
  - nxp
  - Tizen
  - Zephyr
- Mobile
  - Android
  - iOS
- Desktop
  - Linux
  - macOS
  - Windows

Linux Device Firmware Development

- Build and test on a Raspberry Pi 4
- Install toolchain

```
sudo apt-get install git gcc g++ python pkg-config \
  libssl-dev libdbus-1-dev libglib2.0-dev \
  ninja-build python3-venv python3-dev unzip
```

- Build and run all-clusters-app

```
git clone --recurse-submodules \
  https://github.com/project-chip/connectedhomeip
cd connectedhomeip
unalias python
source ./scripts/bootstrap.sh
source ./scripts/activate.sh
cd examples/all-clusters-app/linux
gn gen out/debug
ninja -C out/debug
# Delete network
./out/debug/chip-all-clusters-app --wifi
```

ESP32 Device Firmware Development

- Build on macOS and test on M5STACK Core 2
- Install ESP-IDF

```
git clone https://github.com/espressif/esp-idf.git
cd esp-idf
git checkout v4.3
git submodule update --init
./install.sh
source ./export.sh
```

- Build and run all-clusters-app example on device

```
cd connectedhomeip
unalias python
source ./scripts/bootstrap.sh
source ./scripts/activate.sh
cd examples/all-clusters-app/esp32
idf.py build
idf.py -p /dev/cu.usbserial-022D45D6 erase_flash \
  flash monitor
```

chip-tool

Command line tool to commission and interact with devices

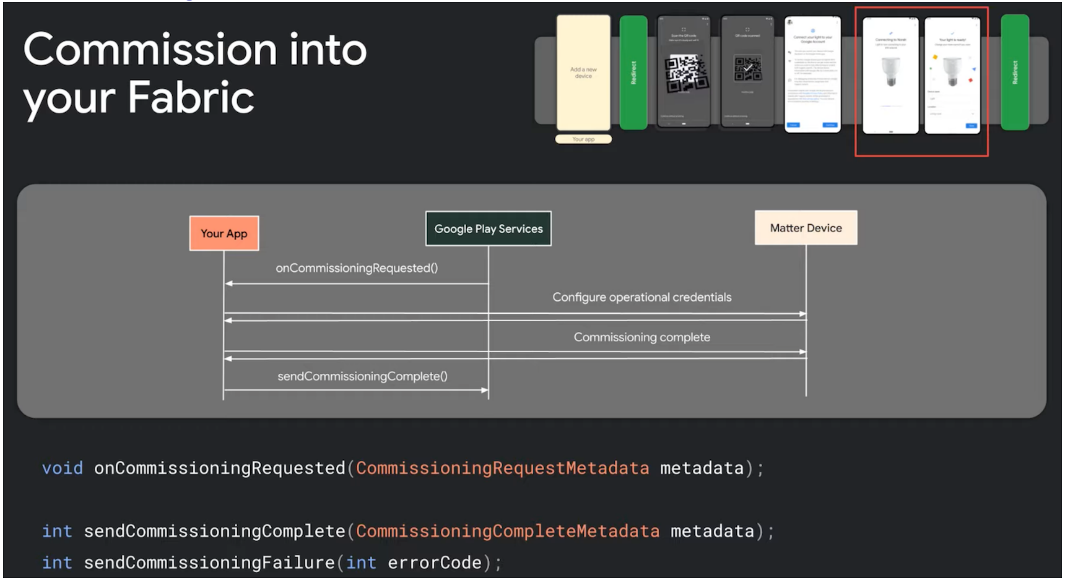
```
cd connectedhomeip
unalias python
source ./scripts/bootstrap.sh
source ./scripts/activate.sh
cd examples/chip-tool
gn gen out/debug
ninja -C out/debug
./out/debug/chip-tool onoff toggle 1 1
```

Commissioning

- Configures device into a Matter fabric
- Pair device with multiple controllers
- Commissioning over BLE/Wi-Fi using `chip-tool`

```
chip-tool pairing ble-wifi \
  ssid "password" \
  0 20202021 3840
```

Commissioning on Android 12

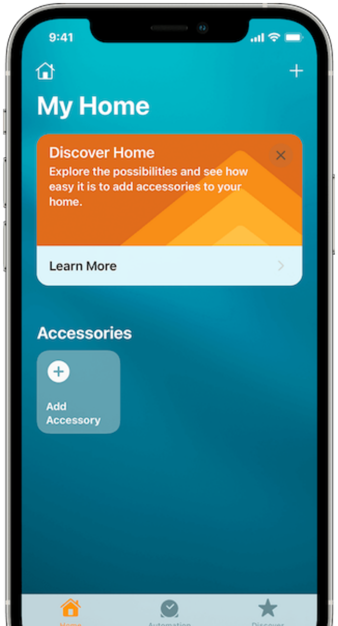

Commission into your Fabric

```
void onCommissioningRequested(CommissioningRequestMetadata metadata);

int sendCommissioningComplete(CommissioningCompleteMetadata metadata);
int sendCommissioningFailure(int errorCode);
```

Commissioning on iOS

- Open the Home app and tap Add Accessory or Add
- Tap Add Accessory
- Use the camera on your iPhone, iPad, or iPod touch to scan the QR code on the accessory or accessory documentation
- When your accessory appears, tap it. If asked to Add Accessory to Network, tap Allow.
- Name your accessory and assign it to a room to help you identify it in the Home app and control it with Siri
- Tap Next, then tap Done.


9:41
My Home
Discover Home
Explore the possibilities and see how easy it is to add accessories to your home.
Learn More
Accessories
Add Accessory

Read attributes using chip-tool

```
chip-tool onoff read on-off 1 1
chip-tool pressuremeasurement read measured-value 1 1
chip-tool relativehumiditymeasurement read measured-value 1 1
chip-tool temperaturemeasurement read measured-value 1 1
CHIP: [DMG]                 }
CHIP: [DMG]
CHIP: [DMG]                      Data = -32768,
CHIP: [DMG]                 DataVersion = 0x0,
CHIP: [DMG]             },
```

Write attributes using chip-tool

```
chip-tool onoff write on-time 5 1 1
chip-tool onoff read on-time 1 1
CHIP: [DMG]                 }
CHIP: [DMG]
CHIP: [DMG]                     Data = 5,
CHIP: [DMG]                 DataVersion = 0x0,
CHIP: [DMG]             },
```

Send commands using chip-tool

```
chip-tool onoff toggle 1 1
chip-tool onoff read on-off 1 1
CHIP: [DMG]                 }
CHIP: [DMG]
CHIP: [DMG]                     Data = true,
CHIP: [DMG]                 DataVersion = 0x0,
CHIP: [DMG]             },
```

View device configuration using ZAP Tool

- Endpoints are defined (along with the clusters and attributes they contain) in a `.zap` file which then generates code and static structures to define the endpoints
- Run Zigbee Cluster Configurator

```
brew install nvm
nvm use stable
cd connectedhomeip
cd third-party/zap/repo
npm i
npm run zap
```

- Open `examples/all-clusters-app/all-clusters-common/all-clusters-app.zap`
- Data definition specified in Zigbee Cluster Library Specification

Contributing to Matter

- Read CONTRIBUTING.md
- Submit bugs and features to https://github.com/project-chip/connectedhomeip/issues
- Change code
- Run automated test suite on host using act e.g.
  ```
  brew install act
  act -j test_suites_linux
  ```
- Run test on device using chip-tool
  ```
  chip-tool tests TestCluster 1
  ```
- Submit pull request via GitHub for maintainers to review and merge