



Build Your Matter Portfolio with NXP

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September 2024



Agenda

Understanding Matter

NXP's Matter Solutions

Connect with NXP and Matter

Successful story sharing

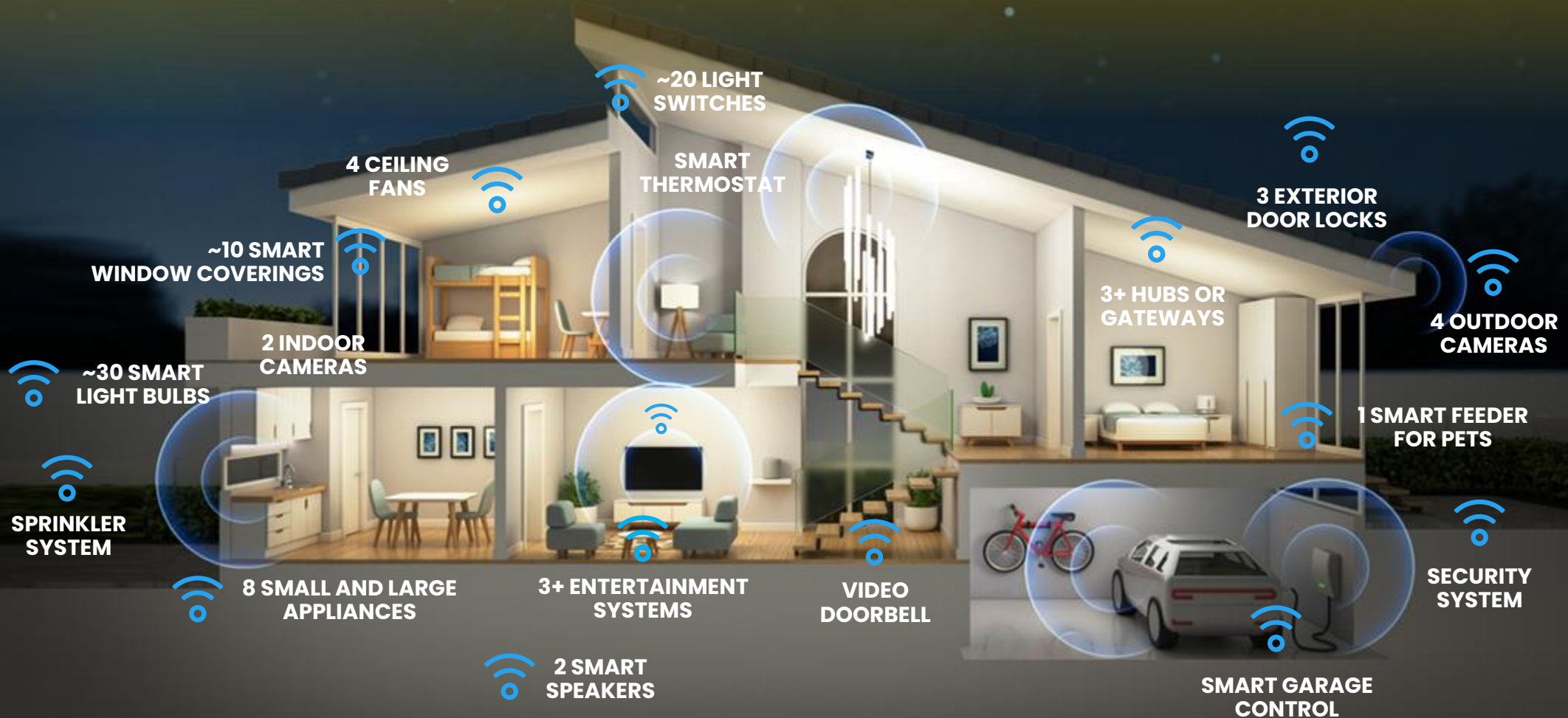


Understanding Matter



Everything Connected

By 2027, **more than 2 BILLION** smart home connected devices will be shipped annually



Source: ABI Research

100+ IoT Devices

10+ IoT Ecosystems

30+ Protocols

TODAY'S CHALLENGES

Interoperability

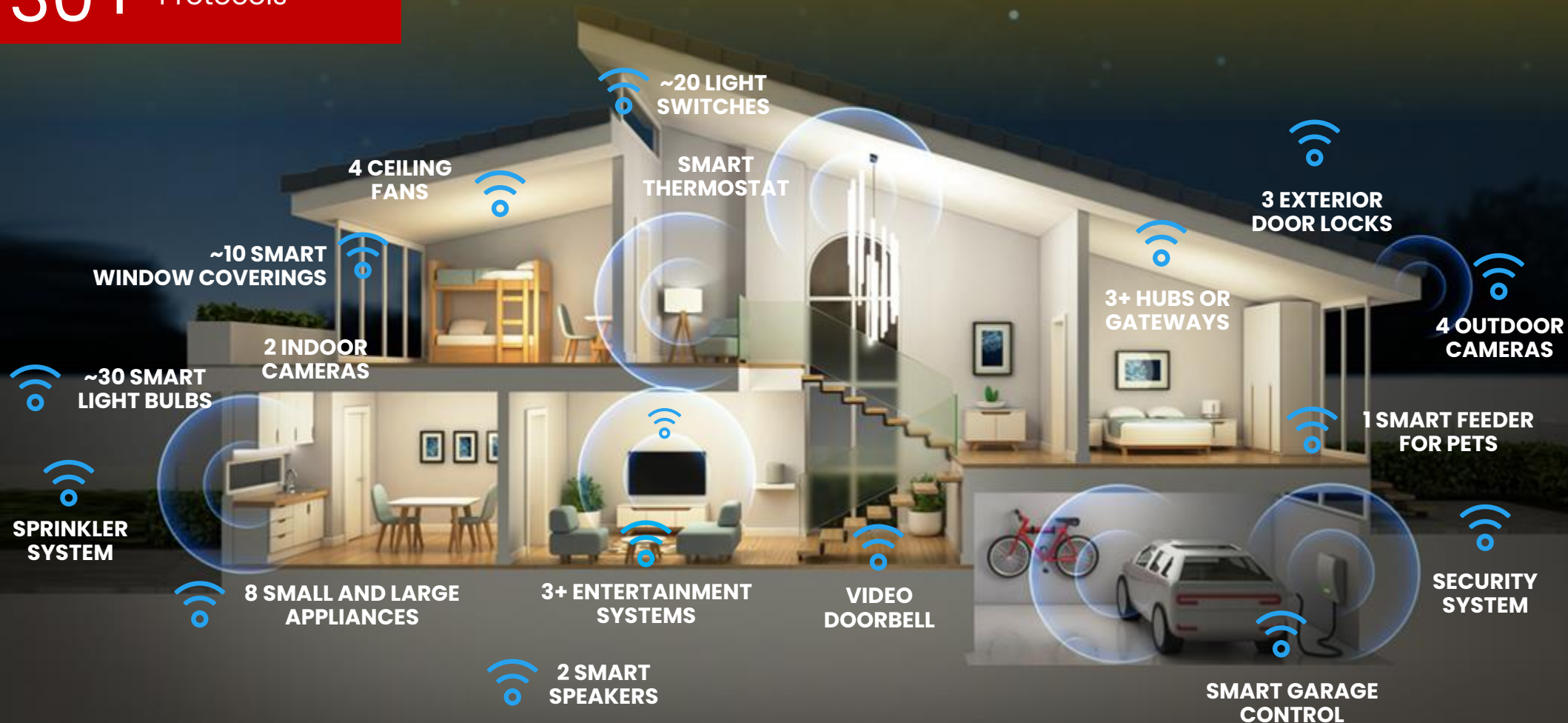
Ambient sensing

Energy footprint, battery life

Cloud vs Local computation

Security and privacy

Setup and control



Source: ABI Research

Matter

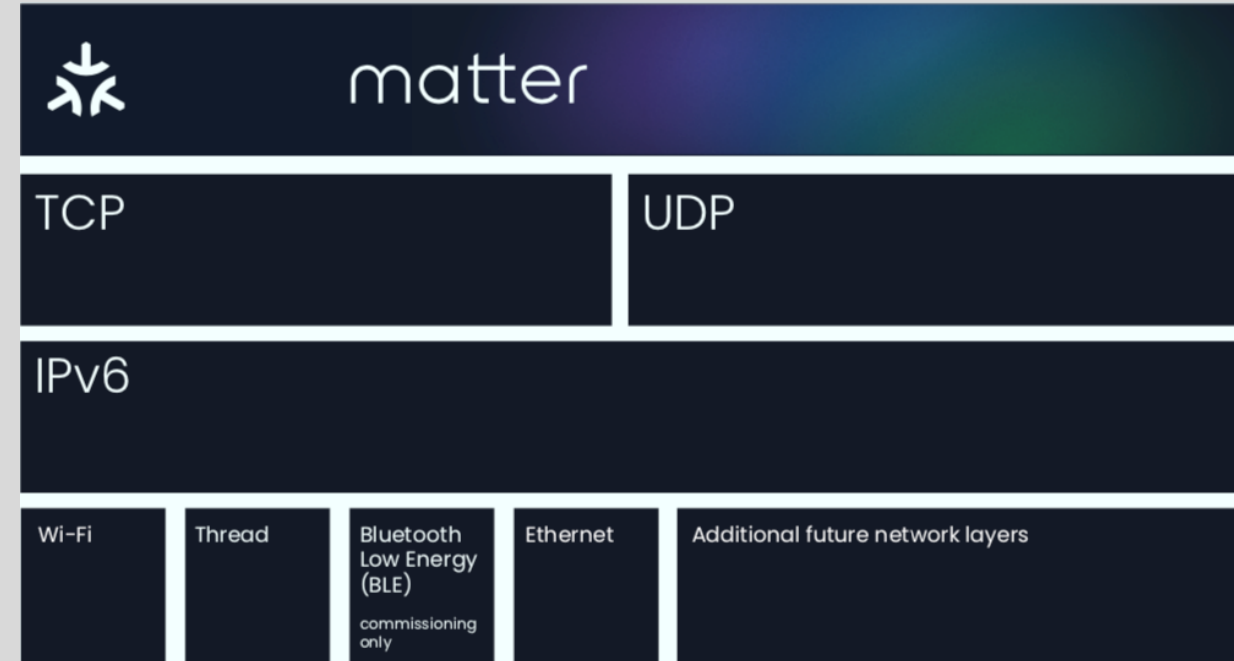
Open Source, Royalty-Free Interoperability Standard from the Connectivity Standards Alliance

Single, application layer protocol using IP network transports (Wi-Fi, Ethernet, Thread)

Secure certificate-based **local network connectivity** across smart home platforms without cloud reliance

Simplified development and **larger TAM** for manufacturers

Certification and logo program that devices will interoperate seamlessly and securely together



Led by global brands and 300+ companies



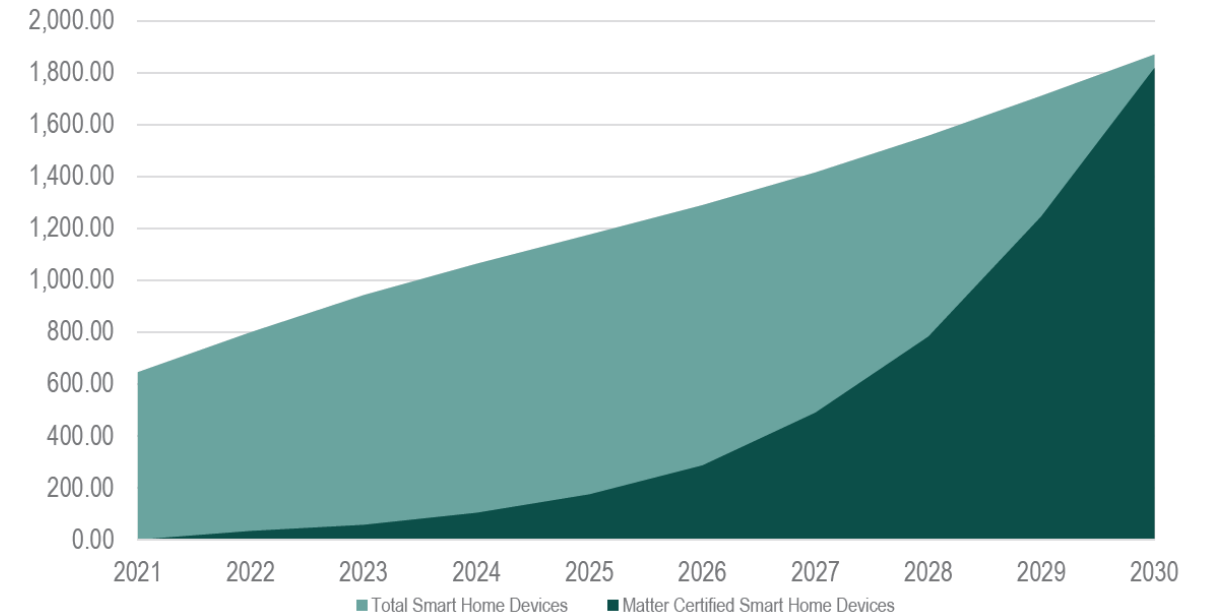
Matter Market Momentum

[The Verge Oct 2023](#) listed over 100 Matter devices as available or coming in 2023 and 2024

- Matter Controllers with Thread Border Routers
- Matter-enabled Smart Home Apps
- Bridges
- Wi-Fi Routers with Matter & Thread
- End Devices

Smart Home Matter Compliant Device Shipments by Type
World Markets: 2021 to 2030

(Source: ABI Research)



[Connectivity Standards Alliance Certified Products Listing](#) in October 2023 included over 2100 Matter product SKUs

Devices supported by Matter



HVAC Controls



Safety and Security Sensors



Smoke & CO Detection



Door Locks



Lighting and Electrical



Air Quality Control



Media Devices + Media



Window Coverings & Shades



Robot Vacuums



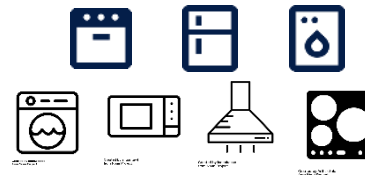
Controllers & Bridges



Energy Management



White Goods (Appliances)



Water Management



Matter Specs



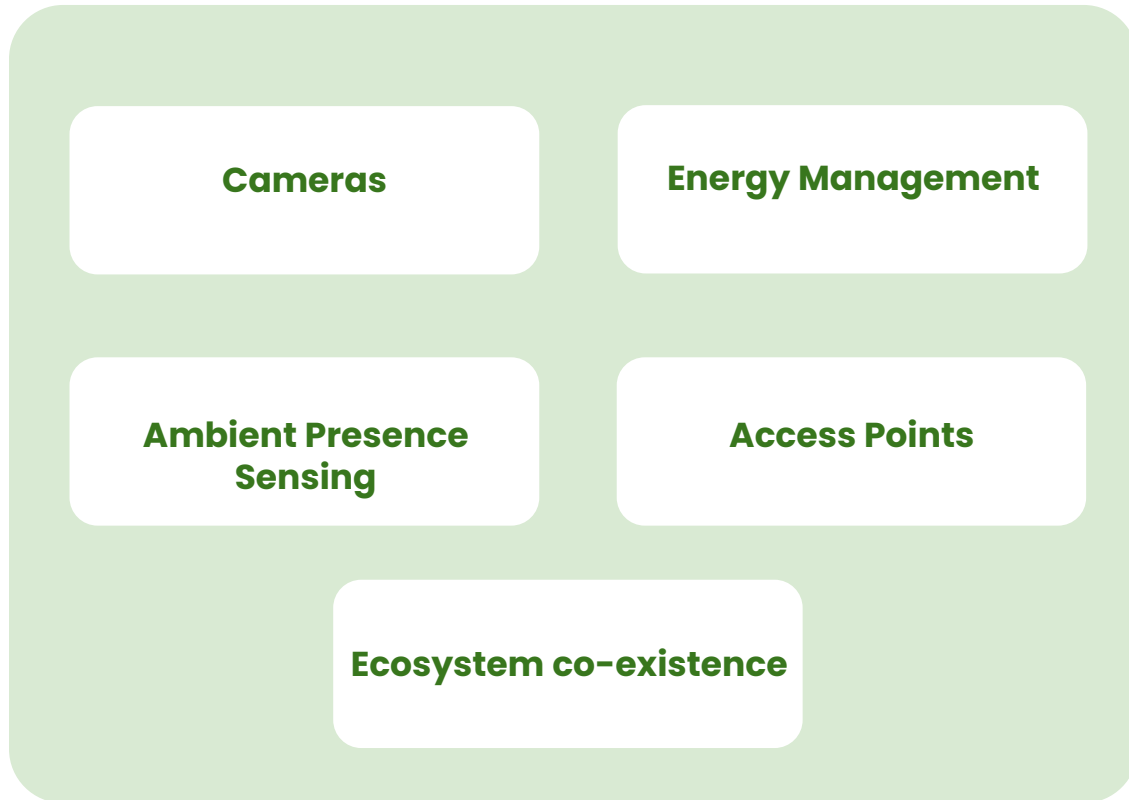
Matter 1.3 Additions

- Microwave Ovens
- Ovens, Cooktops
- Extractor Hoods
- Laundry Dryers
- Energy & Water Management
- Energy Reporting
- Matter Casting Media Players
- Scenes, Command Batching
- Improved network commissioning
- Other Developer Enhancements

[Matter 1.3 Released](#) (8May2024)

NOTE: Functions from several Matter Device Types can be combined into a single device

Matter device types in development



Evolving Matter

Bi-Annual Release Cadence

Future releases will cover

- Matter Device Types
- Function updates
- Continuous improvement efforts
- Diagram shows what is in progress
- Managed in the Matter Working Group within the Connectivity Standards Alliance

Topics driven by member companies

Matter Network Topology overview

MATTER ROLES

Bridge

Allows non-Matter smart home devices to connect to a Matter Fabric. Bridges may be built into a number of devices like controllers and hubs.

Controller

A device or app that can control Matter devices the user has connected to it.

Commissioner

A device or application that can be used as a tool to set up a Matter device. Commissioners first verify the authenticity of the device and then assign network credentials.

A platform, device vendor, or other Matter-enabled app, mobile OS, or smart speaker or display may all provide a Matter Commissioner. A Commissioner can be an independent tool, or part of a device or system that includes other roles such as Controller

RELATED NETWORKING ROLES

End Nodes (Thread Sleepy)

Typically battery powered devices that connect to a Thread Mesh Extender node or Border Router

Edge Nodes (Thread Mesh Extenders, or Wi-Fi)

Typically powered devices connected to Wi-Fi, or routing Thread Mesh Extenders

Gateway

A hardware device which allows IP communication to flow between the local home network and the Internet. Examples include Wi-Fi routers and Access Points

Thread Border Router

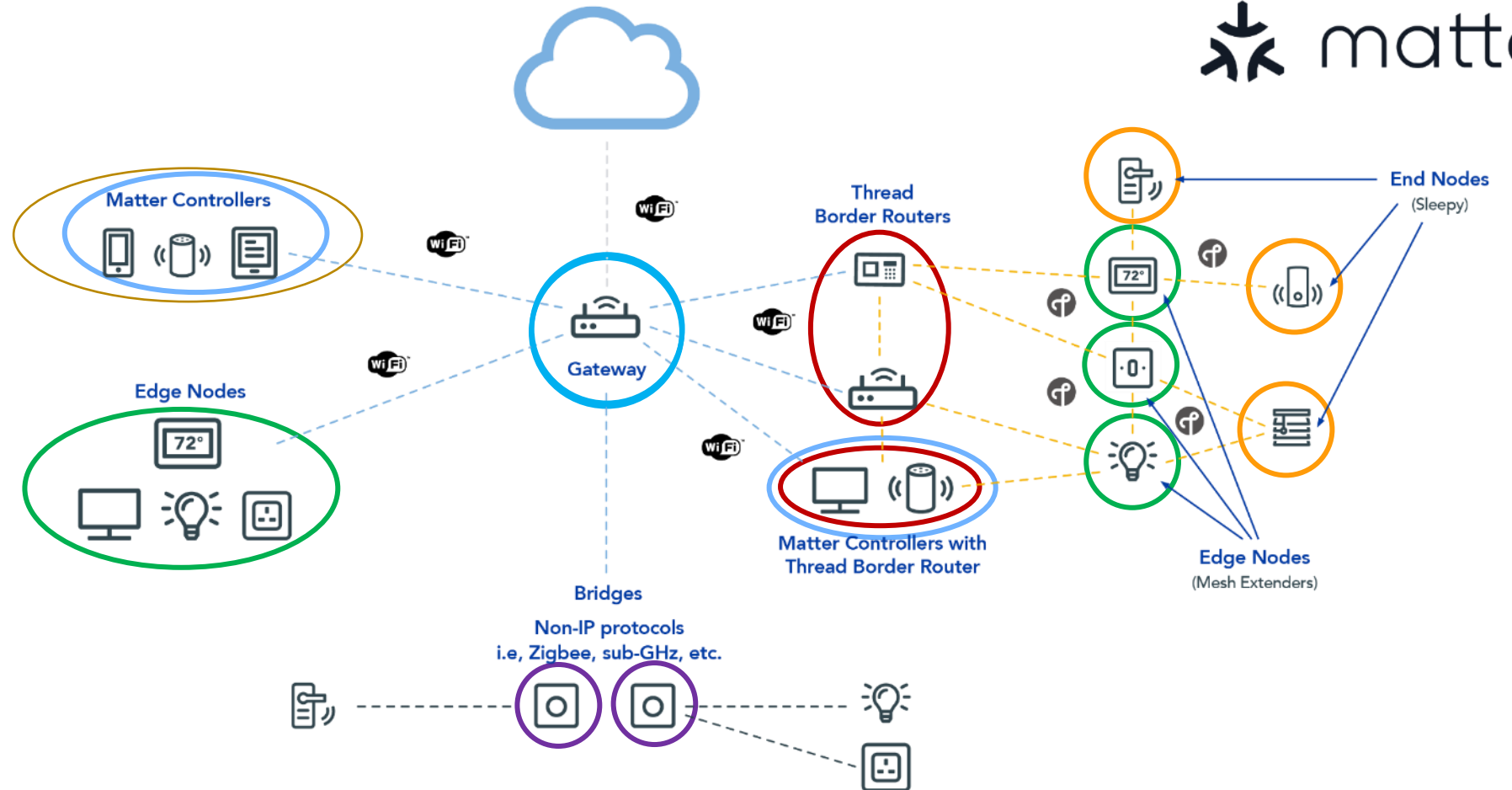
Connects Thread devices to devices using other IP-based technologies, e.g., Wi-Fi or Ethernet. Thread Border Routers may be built into existing products, such as Wi-Fi Access Points or smart speakers. Thread supports multiple Border Routers in a network.

NOTE: Various Matter and related network roles can be combined into a single Matter Device, e.g., A gateway could include Matter Controller, Commissioner, Bridge and Thread Border Router functions.

Matter Network Topology Overview

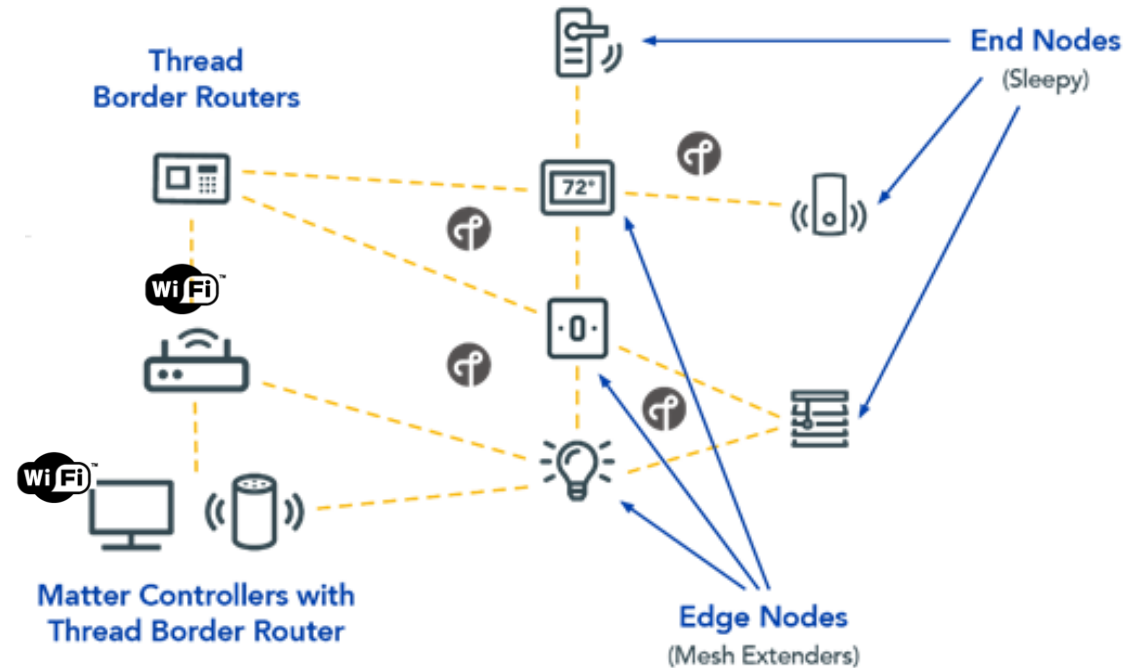


- End Nodes
- Edge Nodes
- Thread Border Router
- Gateway
- Bridge
- Controller
- Commissioner



Matter Fabric

- Matter Fabric is a collection of Matter devices connected in a common security domain
 - Only authorized devices have access
 - Allows secure communication between devices in the fabric
 - Devices share the same Certificate Authority (CA) top-level certificate (Root of Trust) and a 64-bit identifier named Fabric ID, unique within the context of that CA
 - Fabric credentials assigned to a new device during the commissioning process



“Matter Hub” Functional Blocks

User Interface Options
Select one

Simple User Interface
Physical buttons
LEDs

Graphical User Interface (GUI)
Touch screen

External User Interface
Web interface
Smart phone App

Matter Client Functions
Select one, two, or all

Matter Administrator
Scenes and Automation configuration
Manages Access Control List (ACL)

Matter Controller
Device control

Matter Commissioner
Onboarding of Matter Devices

Matter Bridge to non-IP Protocols
e.g. Zigbee, Z-Wave, Sub-GHz

Matter SDK

Matter Open-Source SDK

Thread Border Router

Connectivity Stacks

Ethernet stack

Wi-Fi stack

Thread stack

Other protocol stack

RTOS or Linux

Select Processor and Connectivity

NXP MPU or MCU
i.MX 8M x, i.MX 9x, i.MX RT1170

NXP MCU with Connectivity
RW612, K32W, MCX W

Note: Matter Bridge is not a “Matter Controller Function”, but is often included in a “Matter Hub” device

Matter Built-In security

- Easy, secure and flexible device commissioning
- Validation that each device is authentic and certified
- Strong device identity so only your device can join your smart home
- Up-to-date info via Distributed Compliance Ledger
- Verified access controls to prevent unauthorized actions
- Secured unicast communications
- Secured group communications
- Secured, standard software updates
- Verification of software integrity



Matter Security Certificates

A Device Attestation Certificate (DAC) is required to join a Matter fabric

Ensures only certified, valid devices join an end users' network

A Product Attestation Authority (PAA) issues the DAC

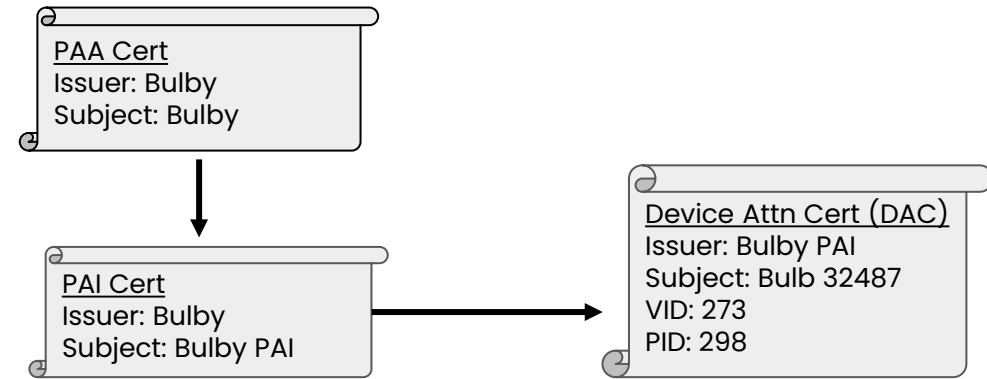
Typically, the PAA is a third-party security firm

Most charge both a setup fee and a per DAC fee

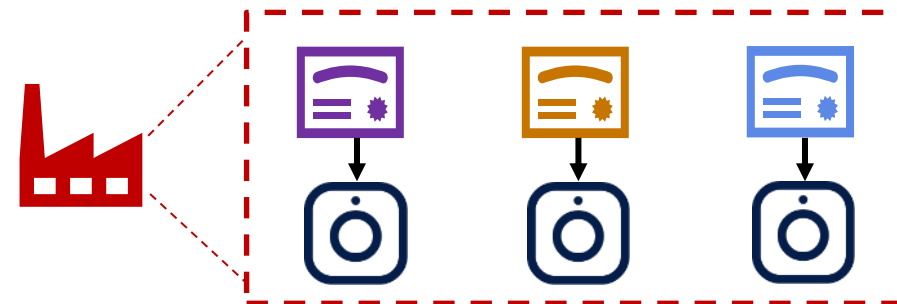
When a device is manufactured, individual DACs must be securely injected into each device

If a DAC is easily accessible, it can be used to create gray market devices that will appear valid since they have a valid DAC

Many contract manufacturer environments are not secure



Device attestation certificate creation



DACs injected into devices at manufacturing



NXP's Matter Solutions



NXP's leadership in Matter Enabling the Autonomous Edge

Total Systems Solutions

Complete fit for purpose product offering

Embedded platforms: compute, connect (multiprotocol, tri-radio) and secure

Standalone and hosted architectures for sensors to bridges and gateways



Trusted Development Partner

Unified silicon, software, tools and enablement

Security expertise with EdgeLock Assurance IP and EdgeLock 2GO Service

- CSA-approved Product Attestation Authority for all companies

Leadership in IoT standards

Enabling Innovation

Developers time to focus on user experience innovation

IoT technology solutions to build on Matter

Partnered with ecosystem platform providers

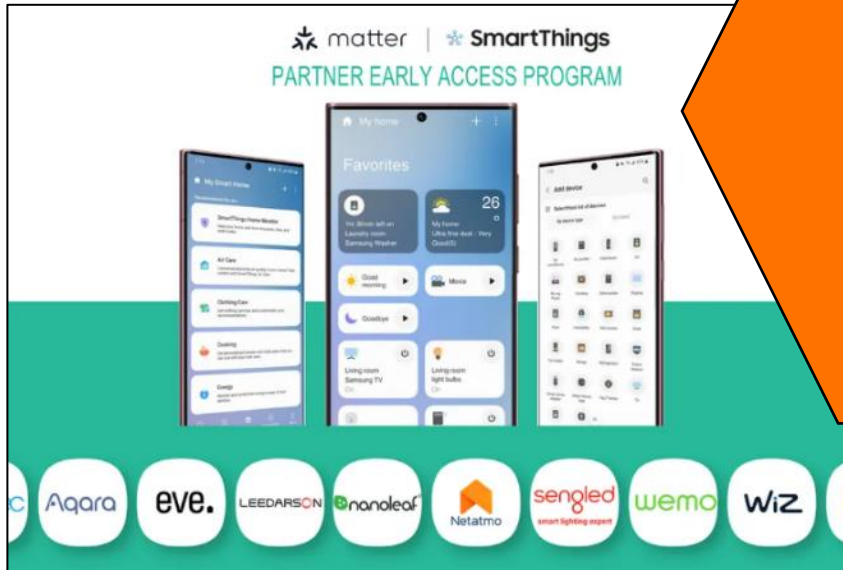


Ecosystem Matter programs – NXP partnerships



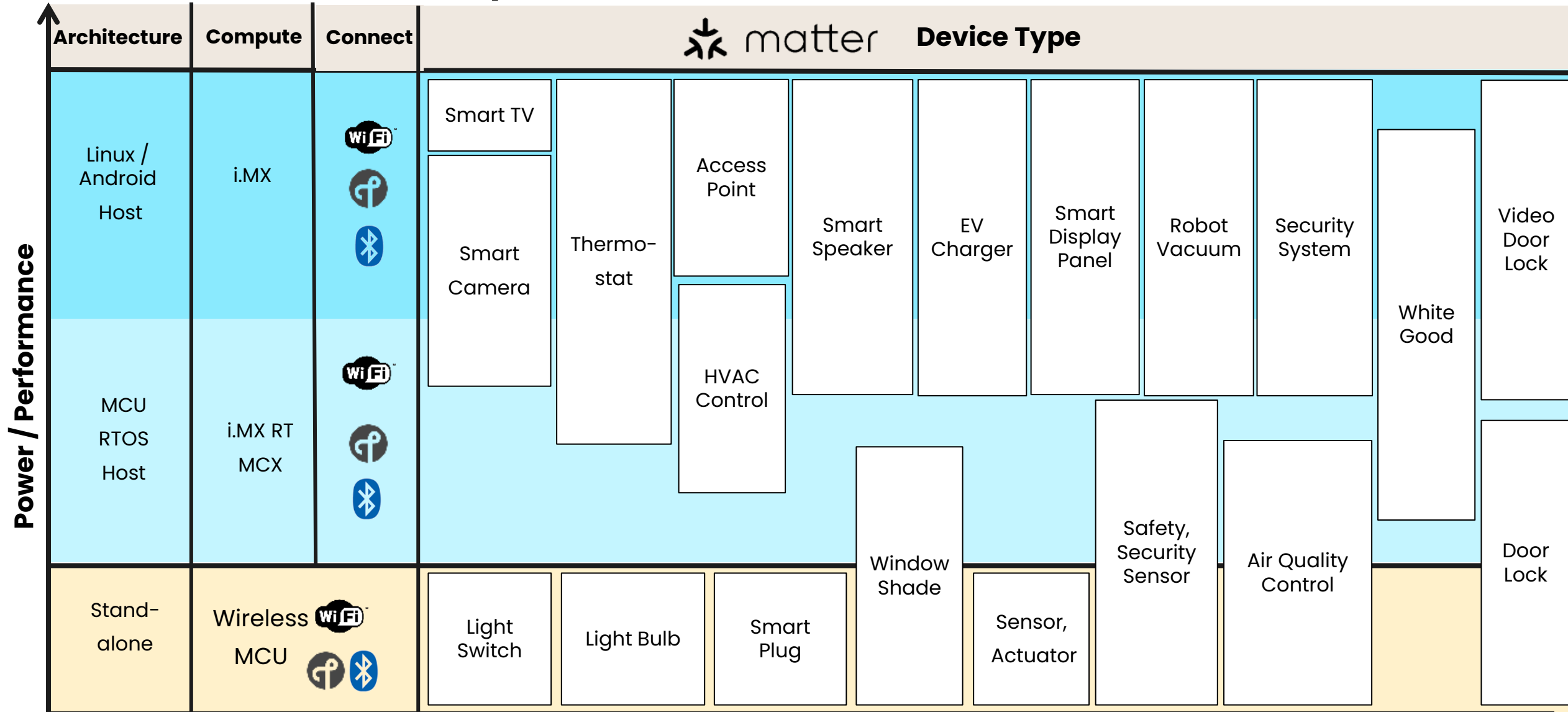
NXP partners with major smart home platform providers

- Validate our development platforms
- Support our customers

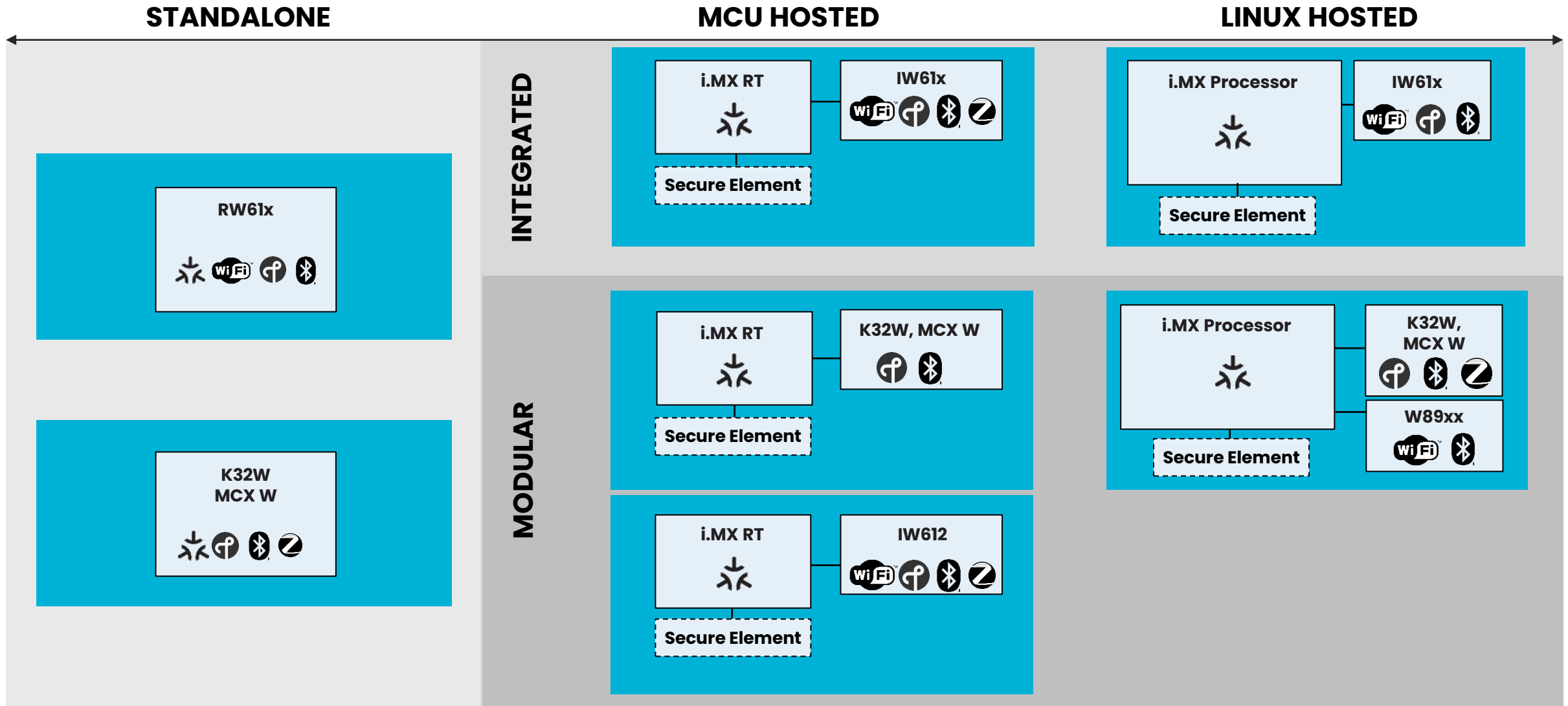


Matter Example Architectures

Different solutions for your Smart Home Use Case



Architectures for building Matter devices



□ NXP Technology

▤ Security can be expanded



EdgeLock Assurance Security and EdgeLock 2GO Provisioning Services supported on all architectures

Example System Platforms for Matter

Standalone	i.MX RT Crossover MCU Hosted	i.MX Linux Hosted										
<p>RW612</p> <p>260MHz M33, 1.2MB SRAM, 2.4/5GHz 1x1 Wi-Fi 6, 15.4, Bluetooth LE</p>	<table border="1"> <tr> <th>i.MX RT1170</th> <th>IW612</th> </tr> <tr> <td>1GHz M7, 2MB SRAM, 2D GPU, MIPI-DSI</td> <td>2.4/5GHz 1x1 Wi-Fi 6, 15.4, Bluetooth Radio Co-Processor</td> </tr> </table>	i.MX RT1170	IW612	1GHz M7, 2MB SRAM, 2D GPU, MIPI-DSI	2.4/5GHz 1x1 Wi-Fi 6, 15.4, Bluetooth Radio Co-Processor	<table border="1"> <tr> <th>i.MX 8M Mini</th> <th>IW612</th> </tr> <tr> <td>Quad core 1.8GHz A53, 2D/3D graphics</td> <td>2.4/5GHz 1x1 Wi-Fi 6, 15.4, Bluetooth Radio Co-Processor</td> </tr> </table>	i.MX 8M Mini	IW612	Quad core 1.8GHz A53, 2D/3D graphics	2.4/5GHz 1x1 Wi-Fi 6, 15.4, Bluetooth Radio Co-Processor		
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<p>K32W148 or MCX W72*</p> <p>96MHz M33, 1MB Flash and 128KB SRAM (W1), 2MB Flash and 256 KB SRAM (W2), 15.4, Bluetooth LE (W72 adds channel sounding)</p>	<table border="1"> <tr> <th>i.MX RT1060</th> <th>IW416</th> </tr> <tr> <td>600MHz M7, 1MB SRAM</td> <td>2.4/5GHz 1x1, Wi-Fi 4, Bluetooth Radio Co-Processor</td> </tr> </table>	i.MX RT1060	IW416	600MHz M7, 1MB SRAM	2.4/5GHz 1x1, Wi-Fi 4, Bluetooth Radio Co-Processor							
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<p>K32W0x</p> <p>48MHz M4, 640KB Flash + 1MB Data Flash, 152KB SRAM, 15.4, Bluetooth LE Zigbee only end devices</p>	<table border="1"> <tr> <th>i.MX RT1060</th> <th>K32W0 or MCX W71*</th> </tr> <tr> <td>600MHz M7, 1MB SRAM</td> <td>(W0) 48MHz M4, 640KB Flash, 152KB SRAM (MCX W) 96MHz M33, 1MB Flash, 128KB SRAM 15.4, Bluetooth LE Network Co-Processor</td> </tr> </table>	i.MX RT1060	K32W0 or MCX W71*	600MHz M7, 1MB SRAM	(W0) 48MHz M4, 640KB Flash, 152KB SRAM (MCX W) 96MHz M33, 1MB Flash, 128KB SRAM 15.4, Bluetooth LE Network Co-Processor	<table border="1"> <tr> <th>i.MX 8M Mini</th> <th>K32W0 or MCX W71*</th> </tr> <tr> <td>Quad core 1.8GHz A53, 2D/3D graphics</td> <td>(W0) 48MHz M4, 640KB Flash, 152KB SRAM (MCX W) 96MHz M33, 1MB Flash, 128KB SRAM Bluetooth LE</td> </tr> <tr> <td>SE051 EdgeLock Secure Element</td> <td>2.4/5GHz 1x1 Wi-Fi 5 Radio Co-Processor</td> </tr> </table>	i.MX 8M Mini	K32W0 or MCX W71*	Quad core 1.8GHz A53, 2D/3D graphics	(W0) 48MHz M4, 640KB Flash, 152KB SRAM (MCX W) 96MHz M33, 1MB Flash, 128KB SRAM Bluetooth LE	SE051 EdgeLock Secure Element	2.4/5GHz 1x1 Wi-Fi 5 Radio Co-Processor
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SE051 EdgeLock Secure Element	2.4/5GHz 1x1 Wi-Fi 5 Radio Co-Processor											

* - in development

NOTE: Yocto recipe can be cross-compiled for other i.MX 6, i.MX and i.MX 9 devices

Solution – Matter Security Certificates

NXP is an authorized Product Attestation Authority

- NXP can issue PAI and DAC certificates
- Reduces cost and complexity

NXP secure enclave stores certificates

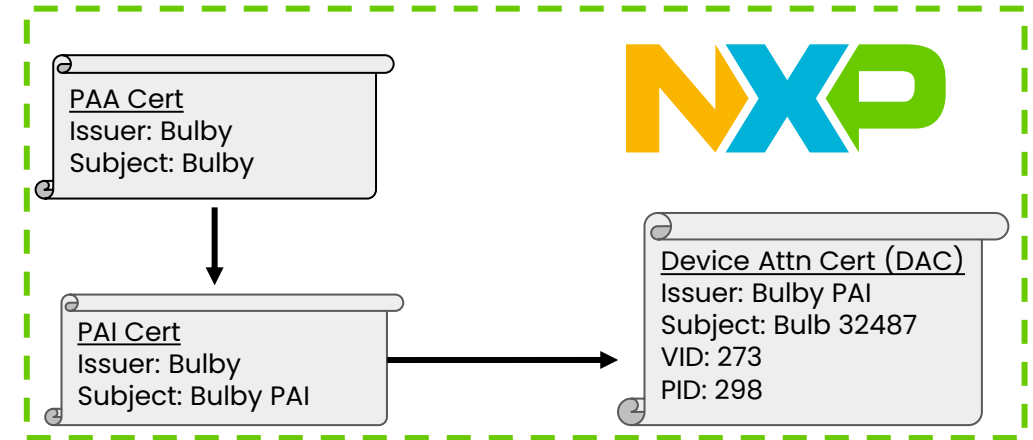
- Only the secure enclave can decrypt and access a stored certificate

Edgeloock 2GO fully supported by

- Using NXP's Edgeloock 2GO service, DACs are stored in NXP's cloud
- DACs are securely injected into devices from the cloud
- Contract manufacturer never has access to certificates

Keys and certificates pre-injected

- Secure element (EdgeLock SE05x) or secure authenticator (EdgeLock A5000)



NXP issues Matter certificates



Edgeloock 2GO securely injects certificates from the NXP cloud



Connect with NXP and Matter



The Customer Journey

1 Select Processor

NXP

i.MX Applications Processor

NXP

i.MX RT Crossover MCU

NXP

MCU

Graphics & Display



AI/ML



Motor control



Security



2 Select Connectivity

WiFi

Bluetooth

THREAD

zigbee

UWB



3 Select Wireless Architecture

Standalone

Network Co-Processor (NCP)

Radio Co-Processor (RCP)

NXP System Platform

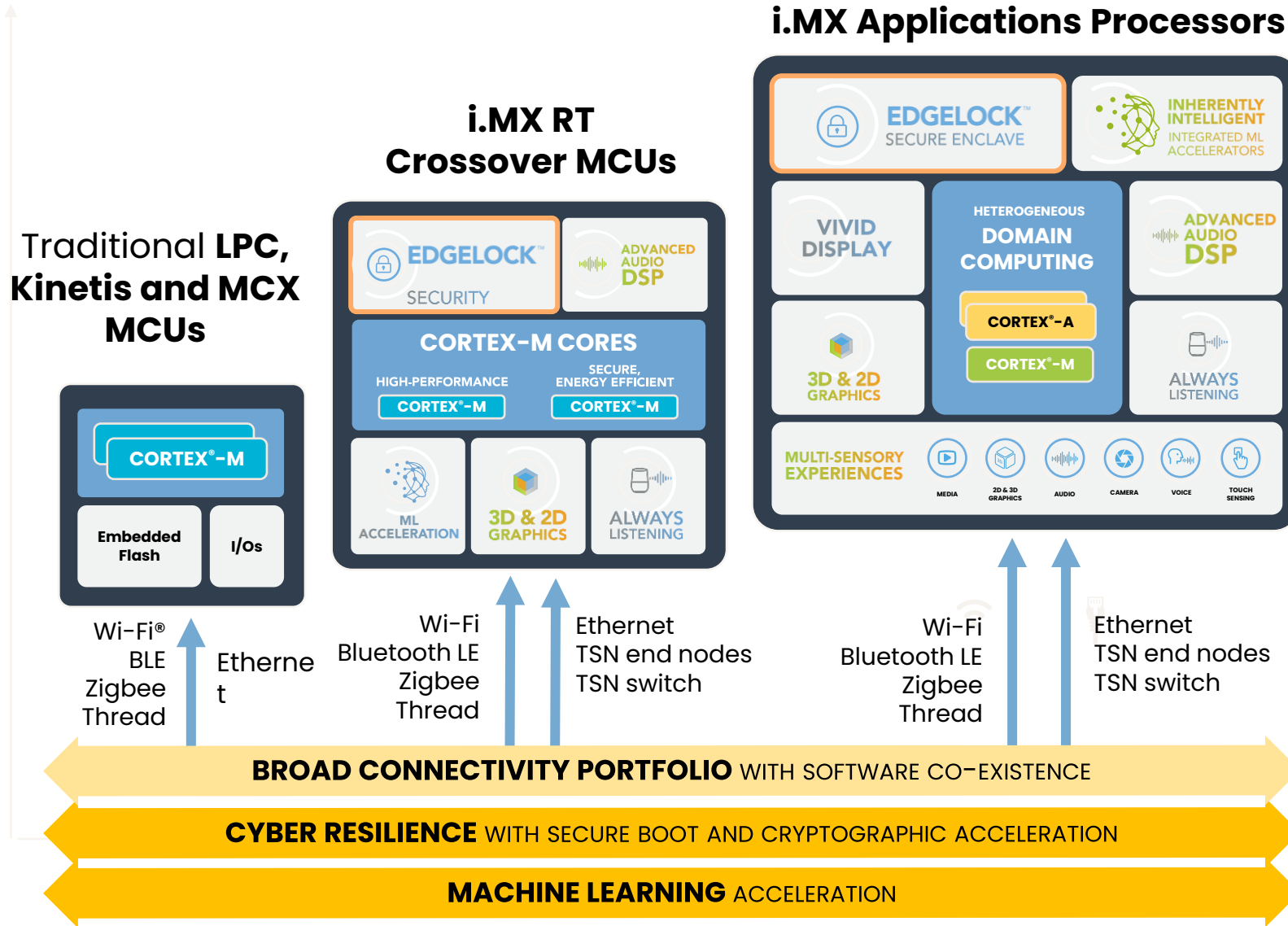
NXP
Processor

NXP
Wireless

NXP
Security

NXP
PMIC

NXP
Analog



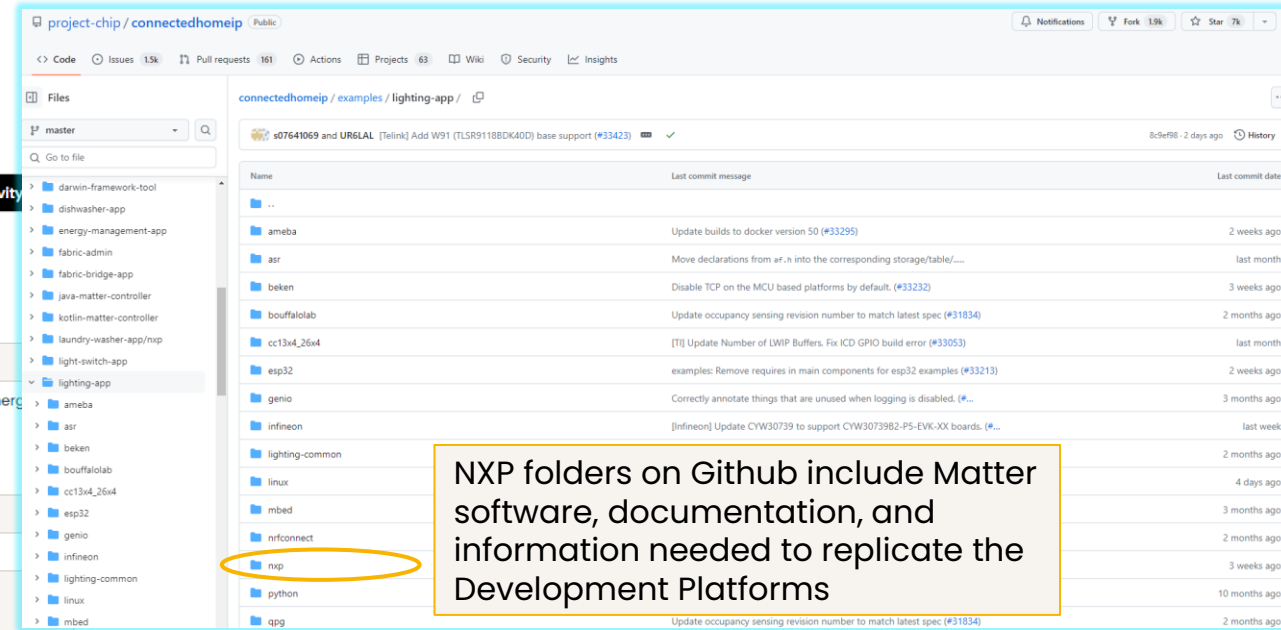
Select Connectivity



	K32W0x Basic function standalone / / hosted	K32W148 Simple function IoT with security for standalone	MCX W71 Simple function IoT with security for standalone	MCX W72 Full-featured IoT optimized for standalone	RW612 Matter over Thread and Wi-Fi
Example Use Cases	<ul style="list-style-type: none"> Simple sensors Thread or Zigbee RCP 	<ul style="list-style-type: none"> Advanced home, building sensors Smart plugs and switches Thread or Zigbee NCP or RCP 	<ul style="list-style-type: none"> Advanced home, building sensors Smart plugs and switches Thread or Zigbee NCP or RCP 	<ul style="list-style-type: none"> Building access control Advanced home, industrial sensors Smart window coverings 	<ul style="list-style-type: none"> Home hubs, border routers Wi-Fi sensors and actuators Lighting with sensors
Core	Arm Cortex-M4, 48 MHz	Arm Cortex-M33, 96 MHz	Arm Cortex-M33, 96 MHz	Arm Cortex-M33, 96 MHz	Arm Cortex-M33, 260 MHz
Flash	640KB, 1MB opt data flash	1.25 MB – 1 MB App, 256 KB Radio	1.25 MB – 1 MB App, 256 KB Radio	2.5 MB – 2 MB App, 512 KB Radio	N/A, external flash
RAM	152 KB	216 KB – 128 KB App, 88 KB Radio	216 KB – 128 KB App, 88 KB Radio	426 KB – 256 KB App, 170 KB Radio	1.2 MB
Radio	<ul style="list-style-type: none"> Bluetooth 5.0, Thread, Zigbee TX power: Up to +15dBm (K32W041Ax) RX/TX: 4.3 / 7.4 mA 	<ul style="list-style-type: none"> Bluetooth 5.3, Thread, Zigbee Dedicated radio core with software upgradability TX power: Up to +10 dBm RX/TX: <5 mA RX/TX 	<ul style="list-style-type: none"> Bluetooth 5.3, Thread, Zigbee Dedicated radio core with software upgradability TX power: Up to +10 dBm RX/TX: <5 mA RX/TX 	<ul style="list-style-type: none"> Bluetooth 5.4, Thread, Zigbee Channel sounding Enhanced radio core with software upgradability TX power: Up to +10 dBm RX/TX: <5 mA RX/TX 	<ul style="list-style-type: none"> Dual-band Wi-Fi 6 Bluetooth 5.3, Thread, Zigbee Wi-Fi TX: Up to +20 dBm NB TX: Up to +15 dBm <60 mA RX/TX (BT, 15.4)
Security	AES256, Hash engine (SHA256), Code readout protection	Edgelock Secure Enclave, Core Profile	Edgelock Secure Enclave, Core Profile	Edgelock Secure Enclave, Core Profile	Edgelock Secure Enclave, Core Profile
Other	Opt NFC (K32W061)	Smart Power Switch	Opt CAN-FD, Smart Power Switch	Opt CAN-FD, Smart Power Switch	
Package	6 x 6 40 QFN, 22 GPIO	7 x 7 48 QFN, 29 GPIO (pin compatible to MCX W71/72)	6 x 6 40 QFN, 22 GPIO (MCX W71 only) 7 x 7 48 QFN, 29 GPIO (pin compatible) 112 BGA, 59 GPIO (MCX W72 only)		8 x 8 145 BGA, 9 x 9 116 QFN, 5 x 5 WLCSP, GPIO varies by module
Temp	-40 to 125 °C	-40 to 105 °C	-40 to 125 °C		-40 to 85 °C
Status	In Production	In Production	Sampling 2Q24, Production 3Q24	Sampling 2H24	Production

Overview of Acquiring the Necessary Hardware and Software

www.nxp.com/matter



Matter Development Platform	Architecture	Components	Wireless Connectivity
Advanced Matter Development Platforms The i.MX Linux BSP supports Matter, Thread and Border Router via a Yocto cross-compile recipe, which is compatible with all devices (i.MX 9, i.MX 8 and i.MX 6) supported in the latest Linux BSP. Testing has been done on the devices shown in this table.	MPU (Linux) Hosted	i.MX 93 + IW612 Tri-Radio SoC	Wi-Fi, Thread, Bluetooth
		i.MX 8M Mini + IW612 Tri-Radio SoC*	
		i.MX 8M Mini + W8987 Wi-Fi SoC + K32W0x WMCU*	Wi-Fi, Bluetooth
		i.MX 8ULP + IW416 Wi-Fi SoC	
		i.MX 8M Mini + K32W148 WMCU	
		i.MX 8M Mini + K32W0x	Thread, Bluetooth Low Energy
		i.MX 8M Mini + MCX W71 (Pre-Production)	
		EdgeLock SE05x or A5000	
Edge Node Matter Development Platforms	MCU (RTOS) Hosted	i.MX RT1170 + IW612 Tri-Radio SoC*	Wi-Fi, Thread, Bluetooth
		i.MX RT1170 + IW611 Wi-Fi SoC*	Wi-Fi, Bluetooth
		i.MX RT1060 + IW416 SoC	Thread, Bluetooth Low Energy
		i.MX RT1060 + K32W0x	
		i.MX RT1060 + MCX W71 (Pre-Production)	
		EdgeLock SE05x or A5000	Discrete Security option
End-node Matter Development Platforms	Standalone	RW612 Tri-Radio WMCU	Wi-Fi, Thread, Bluetooth
		RW612 Tri-Radio WMCU*	Wi-Fi, Thread, Bluetooth Low Energy
		RW610 WMCU*	Wi-Fi, Bluetooth
		K32W148 or MCX W71 (Pre-Production) WMCU	Thread, Bluetooth Low Energy
		K32W0x WMCU*	Thread, Bluetooth Low Energy
MCX W72 WMCU (Pre-Production)	Thread, Bluetooth Low Energy		

* Matter Certified

Development Platform	Transports	Host processor	Radio	Software release link:
Advanced Matter Development Platforms	Wi-Fi, Thread, Ethernet	i.MX 6/7/8/9	All radio chips	Yocto recipes
Edge Node Development Platforms	Wi-Fi, Thread, Ethernet	i.MX RT1170	IW612	Releases · NXP/matter · GitHub
		i.MX RT1060	IW416 + K32W0	Releases · NXP/matter · GitHub
End Node Development Platform	Wi-Fi, Thread	RW61x	N/A	Releases · NXP/matter · GitHub
	Thread	K32W1	N/A	Releases · NXP/matter · GitHub
	Thread	K32W0	N/A	Releases · NXP/matter · GitHub

Matter support for i.MX Linux: looking deeper

nxp-imx / meta-matter (Public)

<> Code Issues 8 Pull requests 3 Security Insights

master 3 Branches 13 Tags

TE-N-ElvenWang MATTER-2183 update matter URL to be external Github 727290b · 2 months ago 155 Commits

conf	Q1-2024 update for imx8mmevk-iw612-matter and imx93ev...	3 months ago
docs	MATTER-2197 2024Q1 release doc update	2 months ago
recipes-imx-atf/imx-atf	Add imx8mmevk-matter target to build Trusty backed imx8...	last year
recipes-imx-mkimage/imx-mkimage	MATTER-1246-6 Use i.MX93A1 sentinel firmware from the BSP	9 months ago
recipes-imx/images	MATTER-1566 Add minimal SDK image target	7 months ago
recipes-kernel/linux	Q1-2024 update for imx8mmevk-iw612-matter and imx93ev...	3 months ago
recipes-matter/matter	MATTER-2183 update matter URL to be external Github	2 months ago

README License

Contents

- [Introduction](#)
- [i.MX MPU Matter platform](#)
- [How to build the Yocto image with integrated OpenThread Border Router](#)
- [How to build OpenThread Border Router with Yocto SDK](#)
- [How to setup OpenThread Border Router environment within the Yocto](#)
- [How to build Matter application](#)
- [Security configuration for Matter](#)
- [FAQ](#)

- Yocto cross-compile recipes available on NXPmicro github
 - [GitHub - NXPmicro/meta-matter: The layer files for integrate the Matter and OpenThread into i.MX Yocto Linux](#)
- Includes recipes to build Matter, OpenThread on i.MX Linux
 - Certified on i.MX 8M Mini EVK
 - Tested on i.MX 93 and i.MX 6ULL
 - Portable to all platforms supported by Linux BSP 5.4.47-2.1.0

Matter Controller

Local Matter control via Presence, Touch and Voice

Features & Benefits

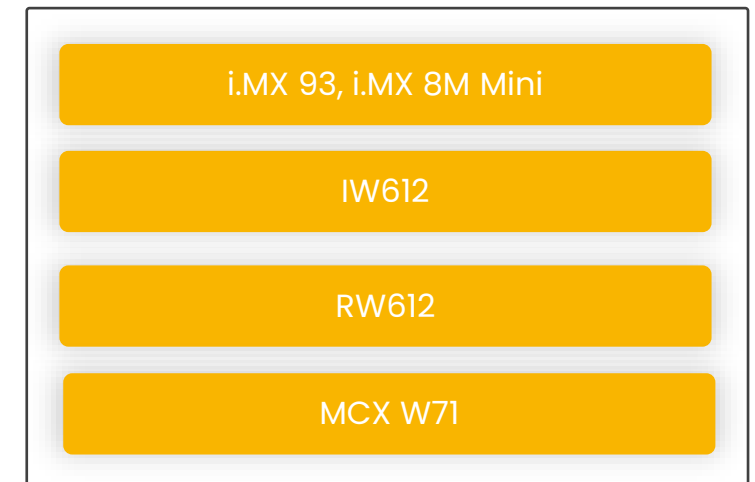
- Local, edge-based, integrated Matter solutions for intuitive and interoperable control of the range of Matter and legacy devices
- Interoperable solutions for coexistence of systems considerably reducing development complexity
- Building on Matter by adding edge-based intelligence with AI/ML engines and local voice control to enable innovation and elevate capabilities

Technology

- **IW612 Tri-radio Wireless SoC**
Secure, highly integrated 2.4/5 GHz dual-band 1x1 Wi-Fi 6, Bluetooth/Bluetooth LE 5.2, 802.15.4
- **RW612 Tri-radio Wireless MCU with Voice Intelligent Technology (VIT)**
Secure, highly integrated, low-power wireless MCU with Wi-Fi® 6, Bluetooth LE 5.3, 802.15.4
- **i.MX 93 Applications Processor with VIT Speech to Intent (VIT S2I)**
Machine learning acceleration and advanced security to support energy-efficient edge computing
- **i.MX 8Mini Multi Applications Processor**
Embedded multicore applications processor providing high performance and power efficiency
- **MCX W71 Wireless MCU**
Secure and Ultra-Low-Power MCU for Matter Over Thread and Bluetooth® LE 5.3



Security | Processing | Voice | Connectivity





Successful story sharing



Matter Devices

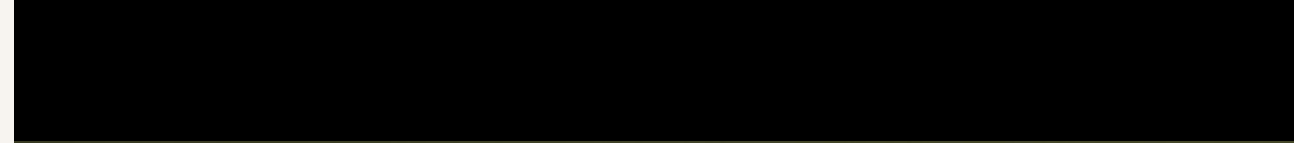
Matter Border Router Plug Matter Door and Window Sensor P2

Technology

- **NXP RW612 Tri-Radio Wireless MCU**
Integrated i.MX RT crossover MCU, this monolithic device simplifies design for smart home devices by supporting the Matter standard, including Matter over Wi-Fi®, Matter over Thread® and Matter over Ethernet.
- **NXP K32W0x Wireless MCU**
Multi-Protocol features ultra-low-power wireless solution for Zigbee®, Thread™ and Bluetooth® LE 5.0 applications.

Key Features

- Equipped with Thread and dual-band Wi-Fi, the new Border Router Plug can empower Matter controllers without Thread capability to manage Thread devices, allowing users to integrate Thread devices into their smart home setups without purchasing a new Matter controller.
- One of the first sensors to support Matter natively, the Door and Window Sensor P2 connects directly to Apple Home, Google Home, Amazon Alexa, Samsung SmartThings.



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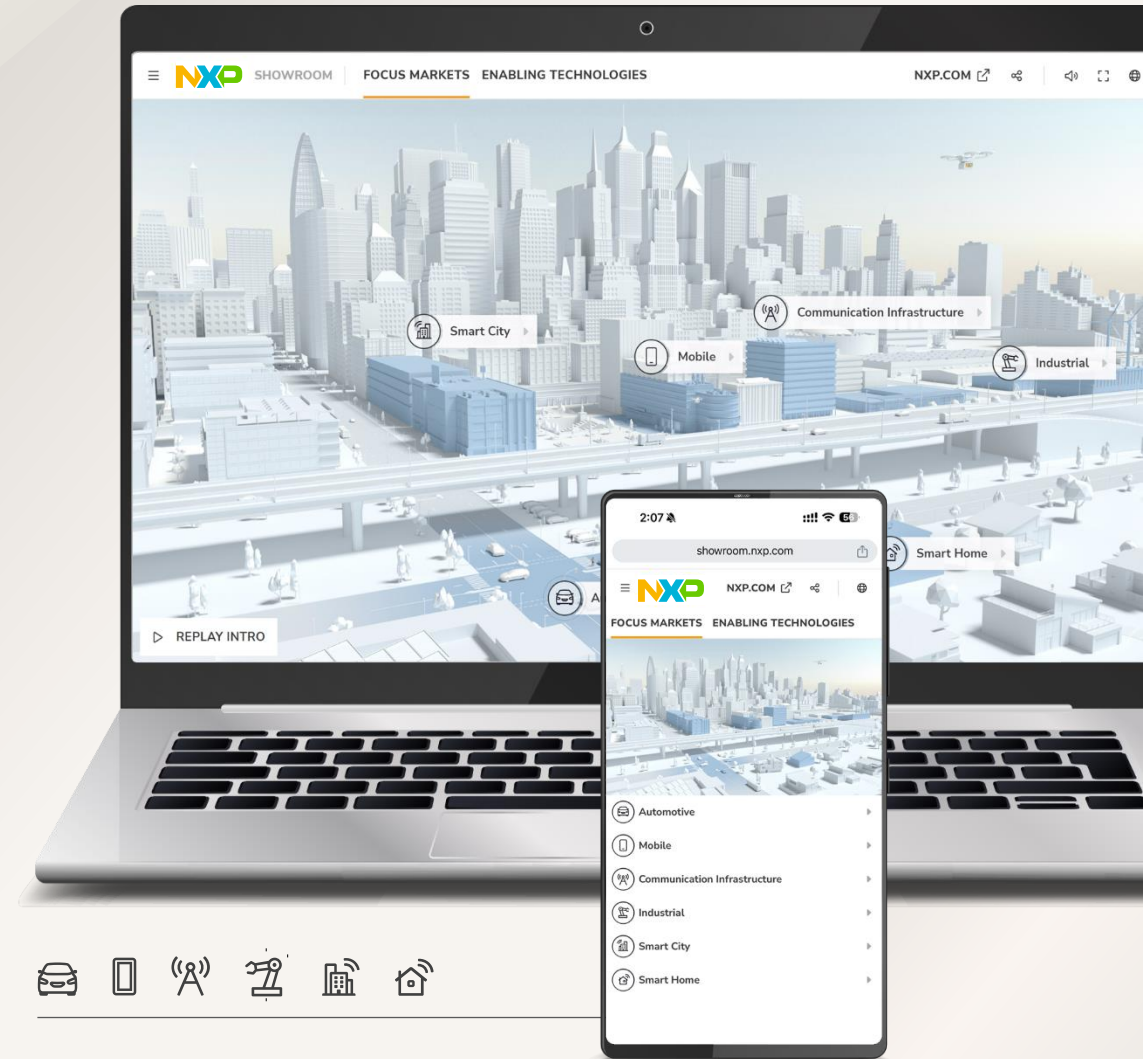
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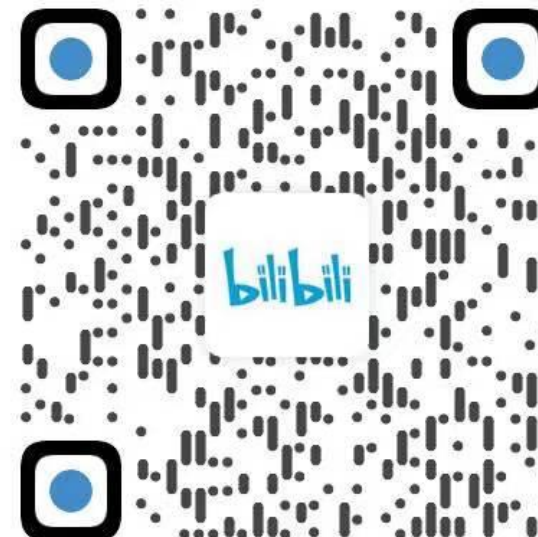
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