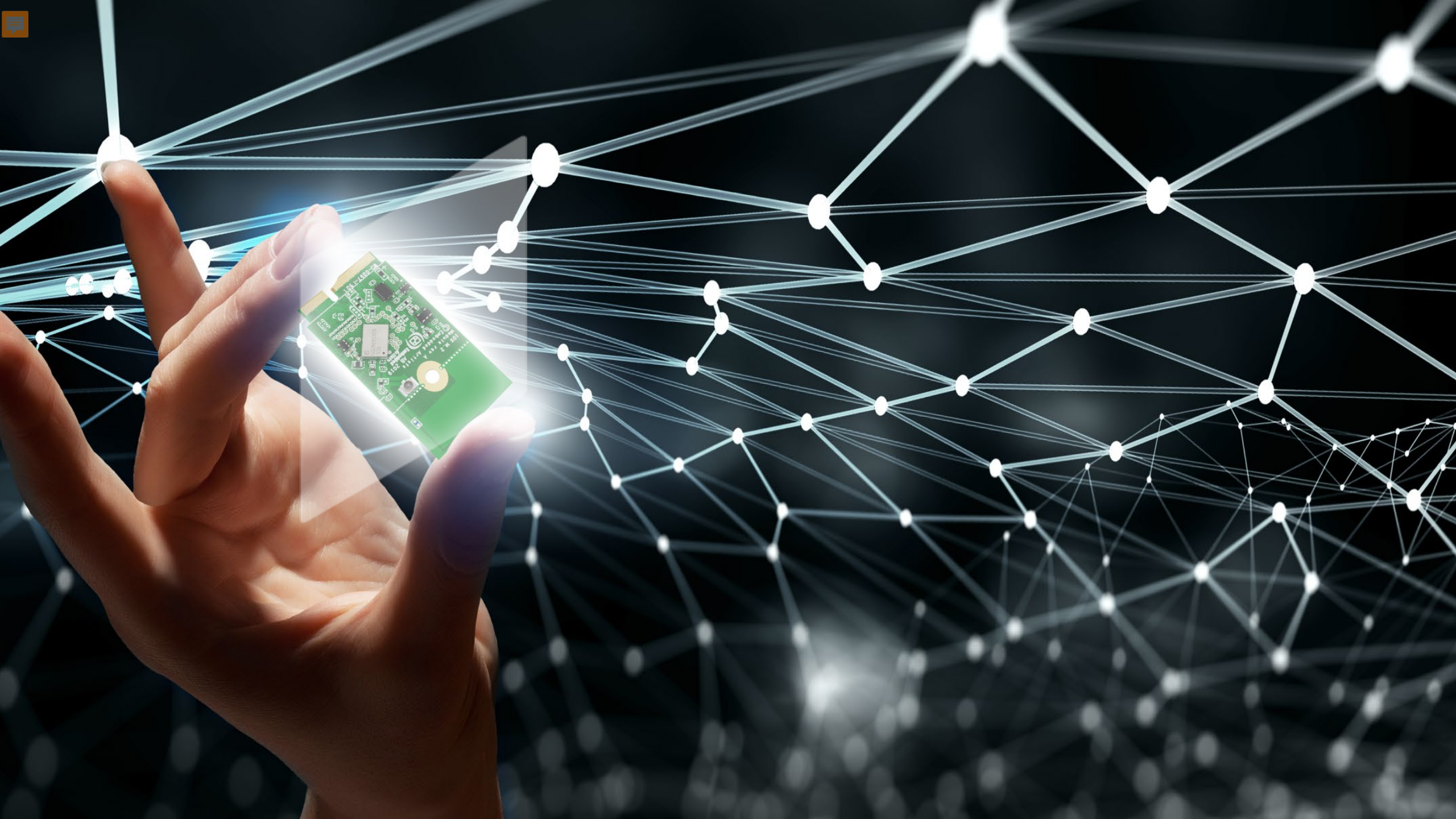






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NXP

Effortless wireless



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NXP

Plug & Play connectivity for IoT:
AI, voice recognition...



Thank you for joining us today



Scott Kerr

Senior Business Development Manager
Strategic Marketing



Mario Centeno

Marketing Manager
Low Power i.MX team



Nick Sargologos

Global Wi-Fi Solutions
& Strategy Manager







Today's topics



Steps to building a wireless solution

Pain points

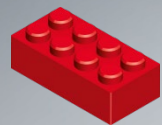
A simple solution

A deeper delve

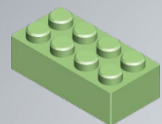
Further help



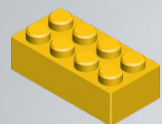
The building blocks of a wireless IoT solution



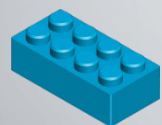
Services, cloud, etc.



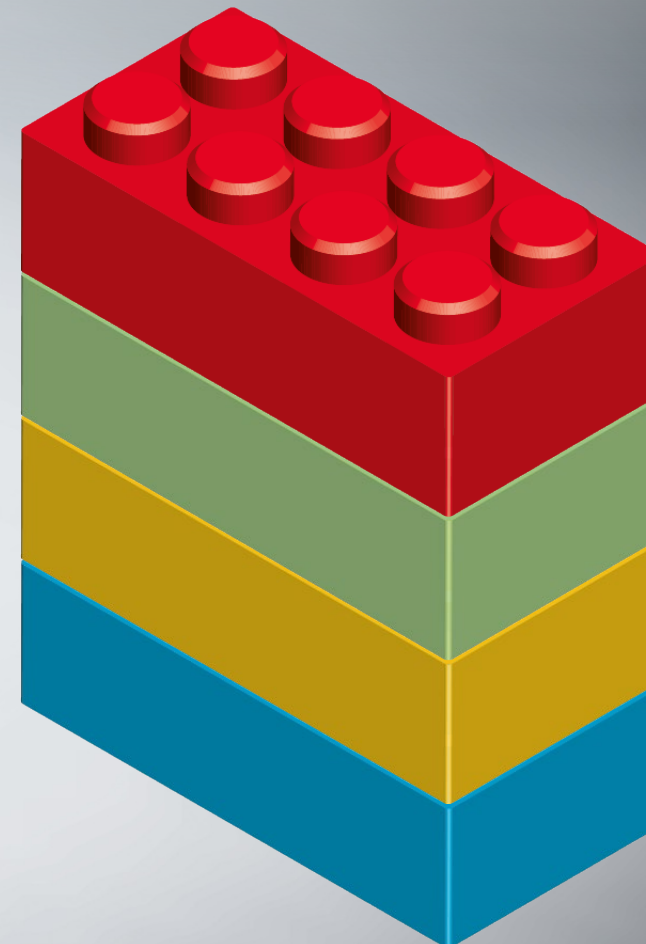
Control applications



i.MX MPU/MCU with software driver/firmware



Wireless module





Pain points in IoT wireless

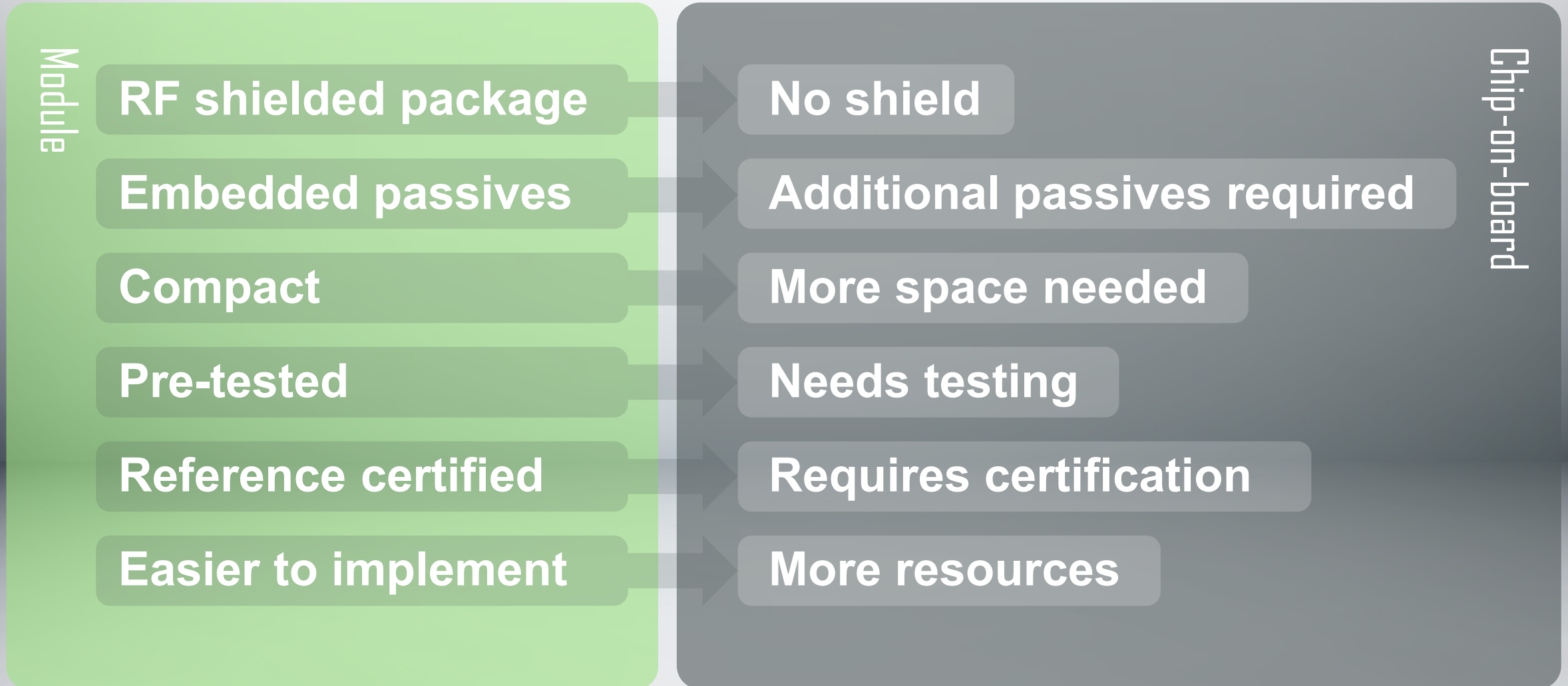


-  **CoB solution requires direct support**
-  **MPU vs. MCU solution?**
-  **Complex integration issues**
-  **Aggressive deadlines**
-  **Additional overhead**
-  **Regulatory certification!**





Modules versus CoB





Murata certified modules



Cost optimization

802.11 b/g/n
+ Bluetooth® 4.2



Low power consumption

802.11 a/b/g/n/ac-friendly™
+ Bluetooth® 5.0



High performance

802.11 a/b/g/n/ac
+ Bluetooth® 5.0

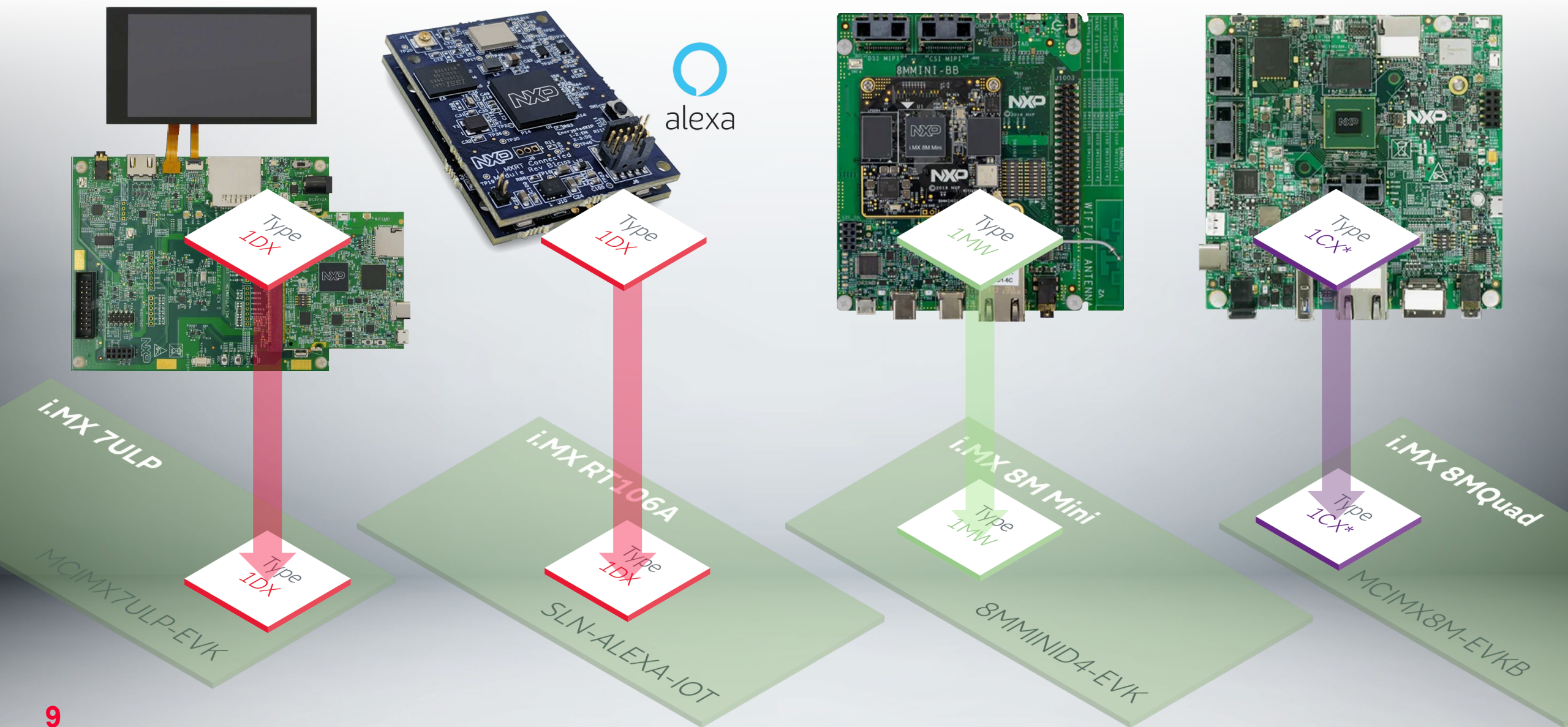


High throughput

802.11 a/b/g/n/ac (2x2 MIMO)
+ Bluetooth® 5.0

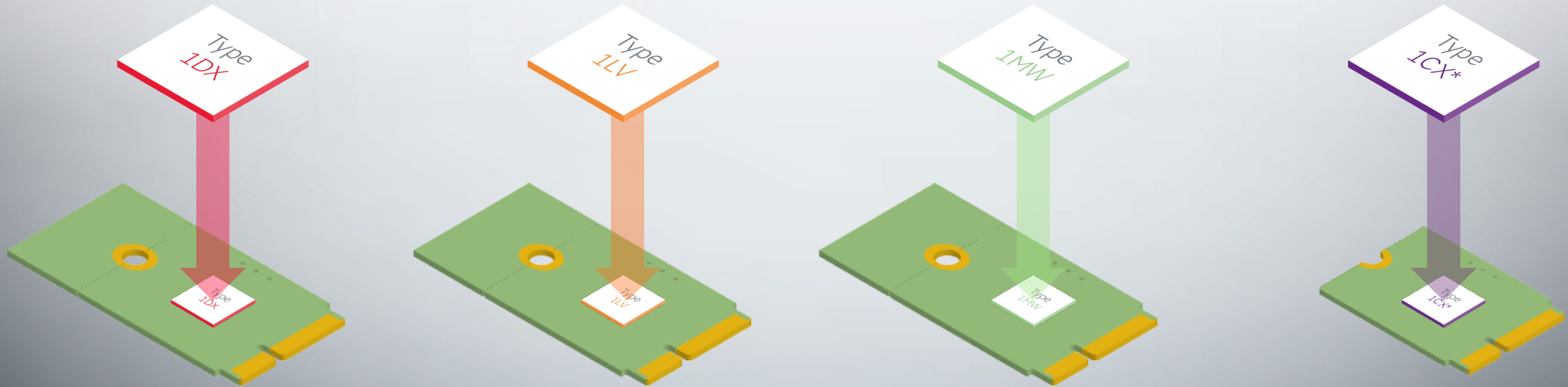


Murata certified modules





Murata M.2 EVB

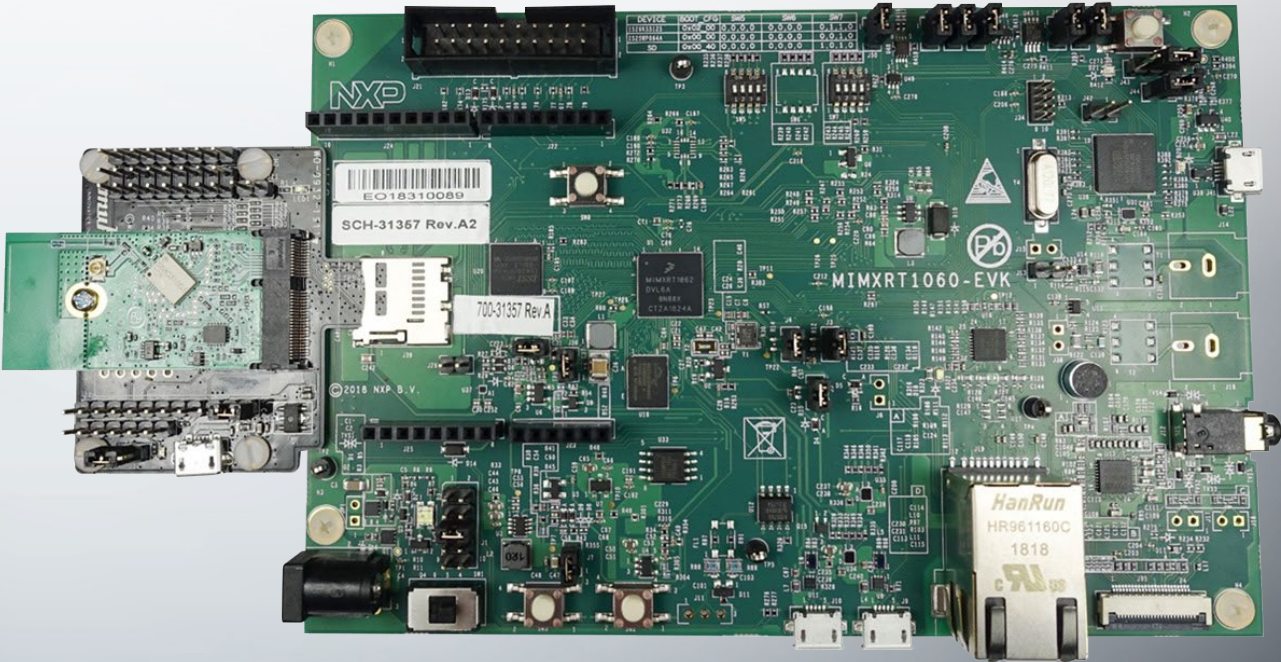
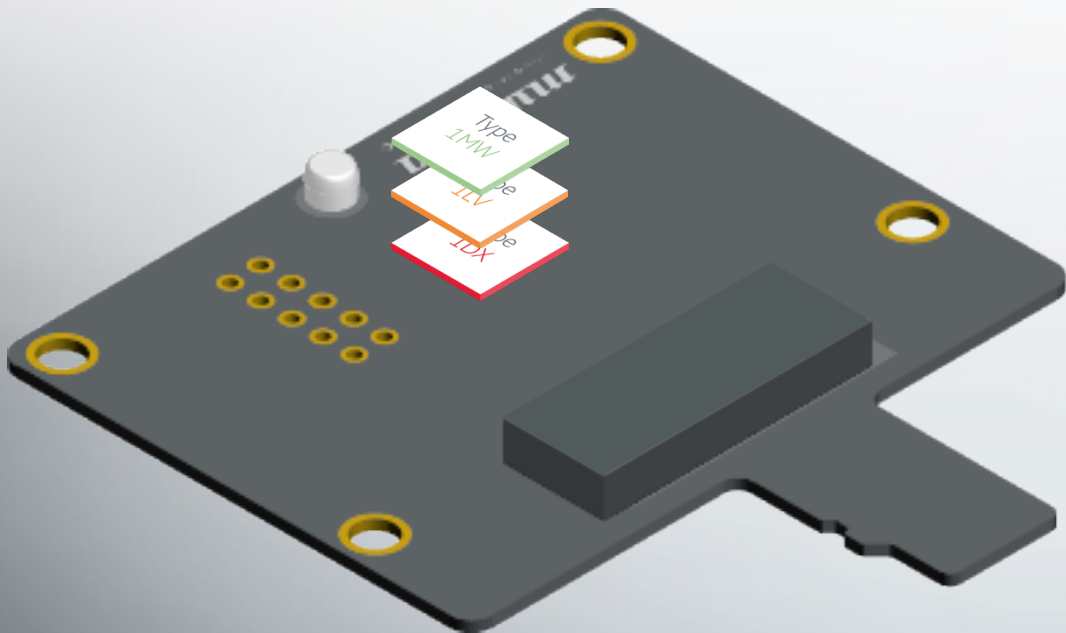




Murata μ SD-M.2 adapter



Connect...



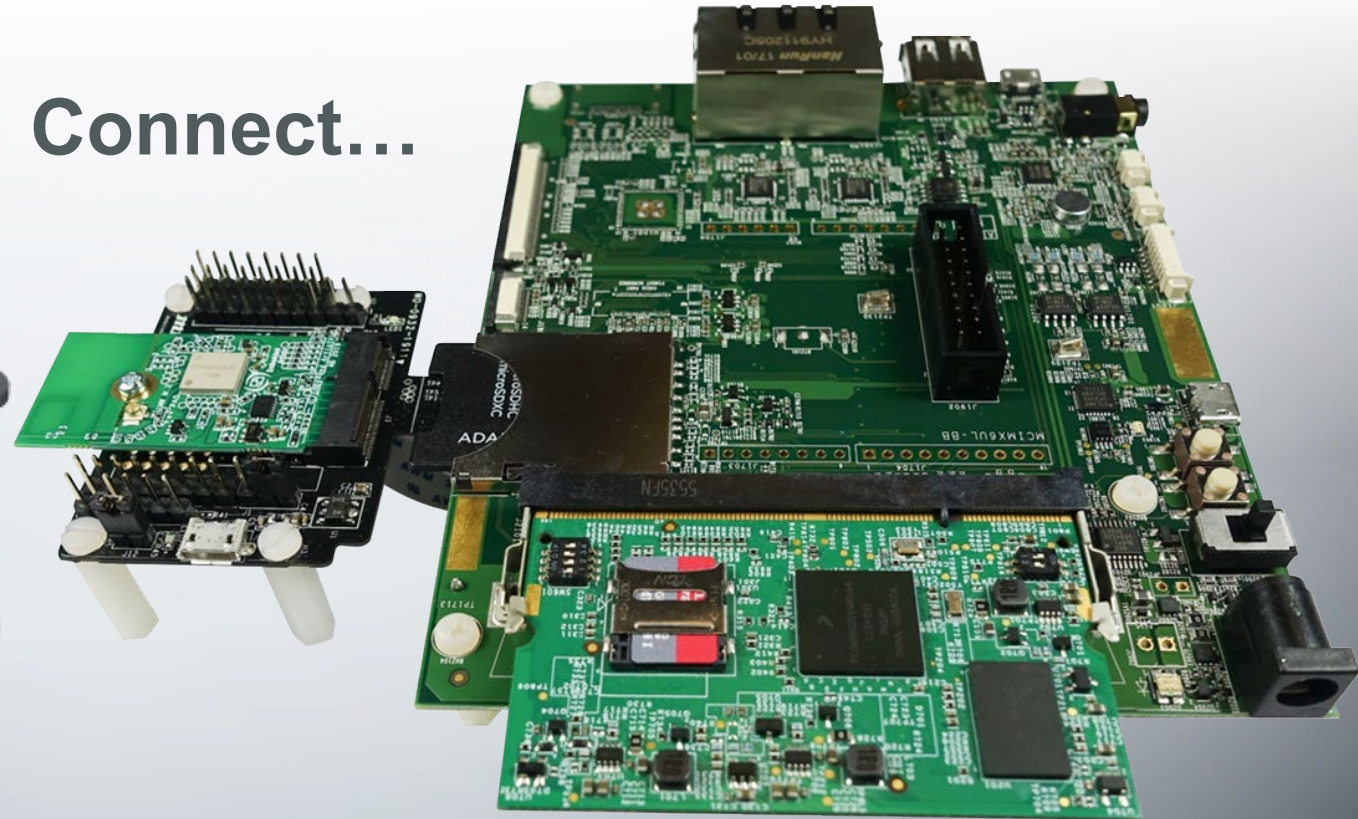
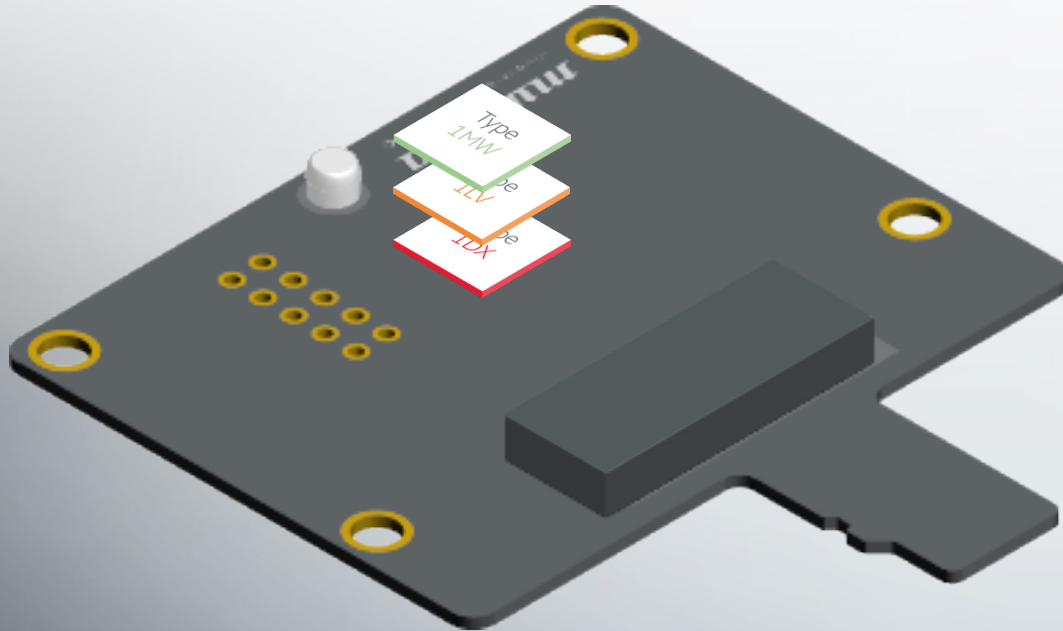
NXP i.MX RT1060 EVK



Murata μ SD-M.2 adapter



Connect...



NXP i.MX 6UL EVK



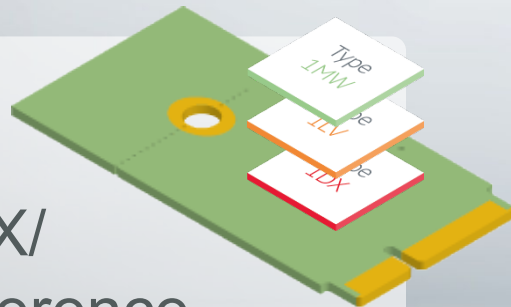
Regulatory options



- Customer with M.2 compatible form factor**
- Customer with a form factor permitting trace antenna**
- Customer who needs a specific antenna solution**

Starting point

Evaluate EA's 1DX/
1MW/1LV with reference
certified trace antenna



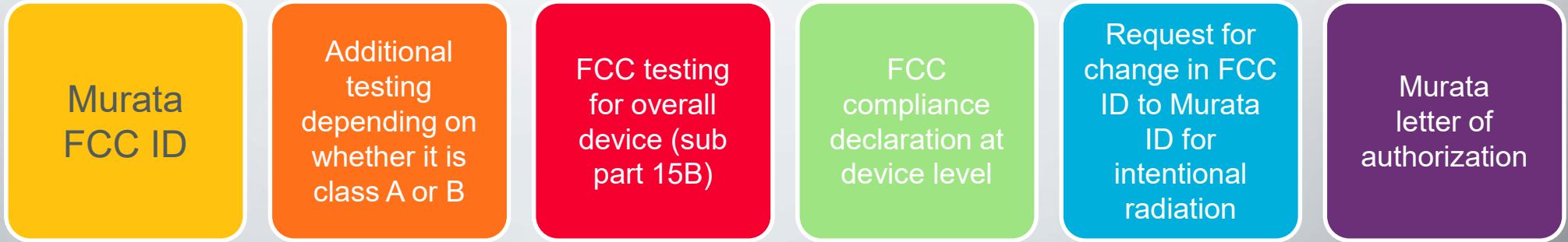
Re-use Murata FCC testing & apply for Class II permissive change after radiated testing

Copy reference PCB trace antenna & re-use Murata FCC regulatory certifications

Buy M.2 modules & re-use FCC regulatory certifications

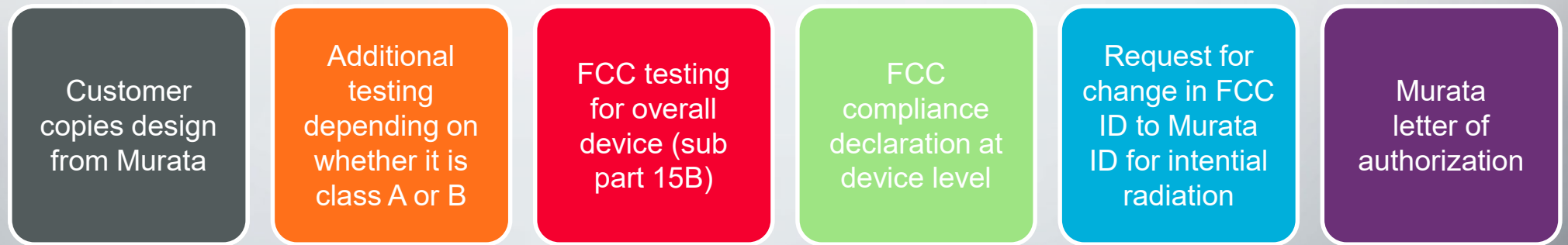


Cert responsibility with pre-cert. modules





Customer responsibility with ref. cert.





- ❓ **Murata modules**
- ❓ **NXP i.MX 6/7/8 Linux**
- ❓ **NXP i.MX RT FreeRTOS**
- ❓ **Hardware design**
- ❓ **Regulatory testing**
- ❓ **EA i.MX RT/6/7/8 Dev Kits**



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Secure connections
for a smarter world

i.MX RT Crossover MCU Family



Mario Centeno LP
i.MX Products



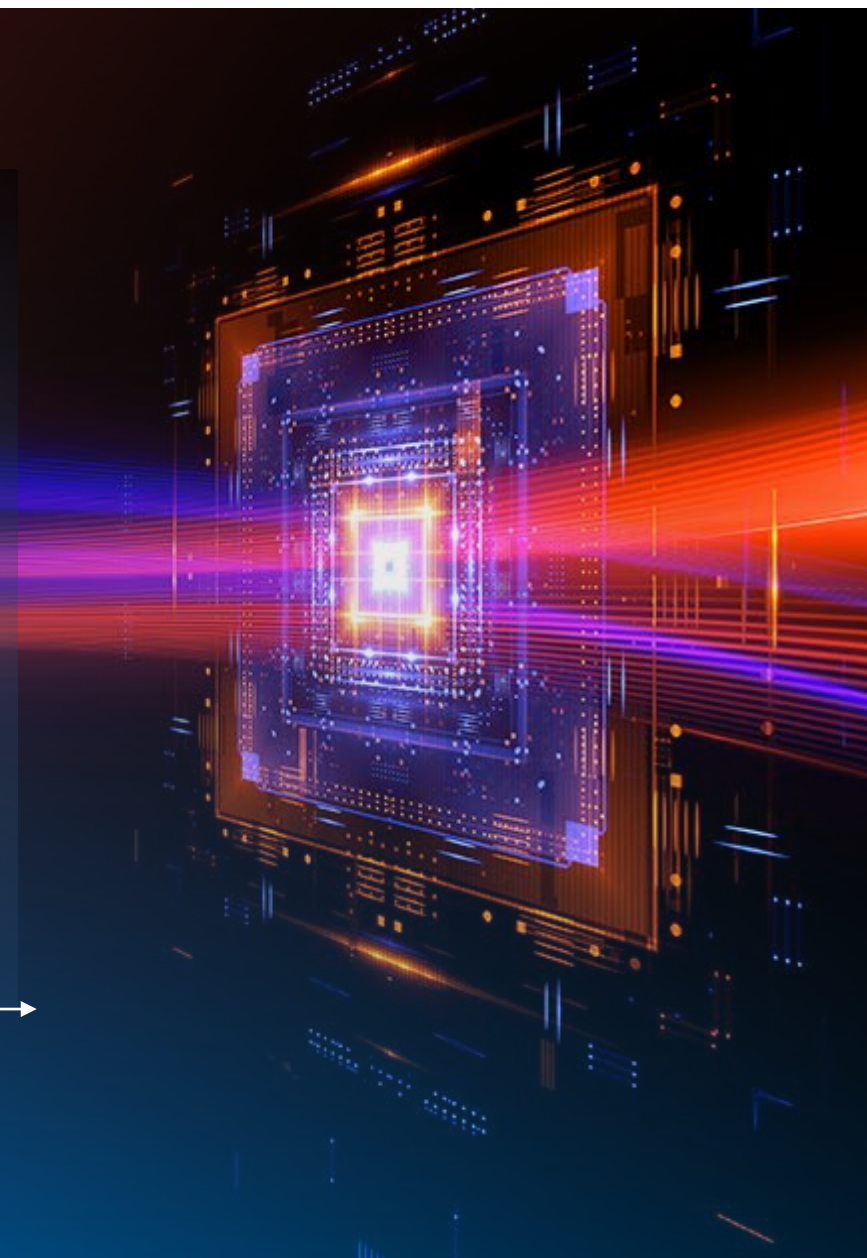
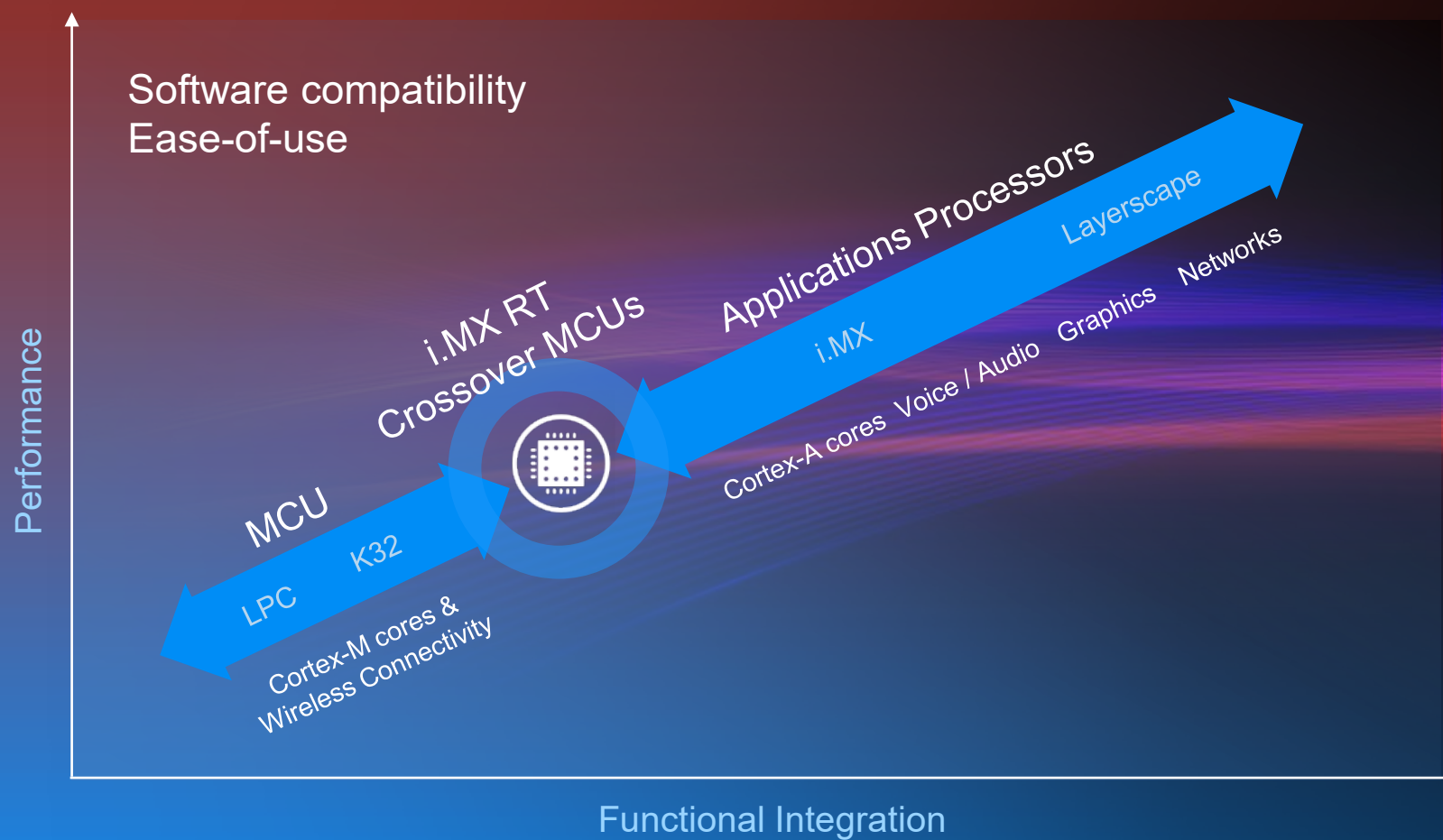
How familiar are you with NXP i.MX RT family or processors?

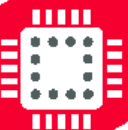
- (1) Very familiar
- (2) Somewhat familiar
- (3) Not familiar
- (4) Hearing for the first time





NXP scalable edge processing continuum



	Product	Highlights
 Performance & Integration	i.MX RT Crossover MCUs	Ultimate performance & extensibility
 Mainstream Efficiency	LPC5500 MCU Series	Unrivalled compute efficiency • ≥ 100 MHz, Cortex-M33, Arm TrustZone® technology and DSP acceleration • Enhanced security & accelerators • Balance power and performance (150-500 DMIPs) Cortex-M33
 Ultra-Low Power	K32 L MCU Series	Extended battery life • < 100 MHz, fast wake-up, security, & high-precision analog • Target low leakage across operating range (40-120 DMIPs); Cortex-M4 & M0+ • From 32KB to 1MB internal flash and 4-8:1 Flash to SRAM ratio
 Value	LPC800 MCU Series	Entry-level 8-bit Alternative • ≤ 30 MHz with range of features & package options • High power efficiency (10-50 DMIPs) Cortex-M0+ • From 8KB to 64KB internal flash and 4-8:1 Flash to SRAM ratio
 Vertical Focus	KE/KV/KM & S32K	Target markets • KE: 5V/Robust/Touch/CAN • KV: High performance control • KM: Metering and metrology

Best of both worlds



i.MX

APPLICATIONS PROCESSORS

- ARM Cortex-A class and Cortex-M cores
- 600 MHz to 2 GHz performance
- Rich HMI experience
- Full open-source OS platforms



APPLICATIONS PROCESSOR

PERFORMANCE + INTEGRATION



CROSSOVER PROCESSORS

EASE OF USE + REAL TIME

MICROCONTROLLER

- ARM Cortex-M cores
- Performance up to 300 MHz
- Embedded memory
- Easy to use tools
- RTOS support

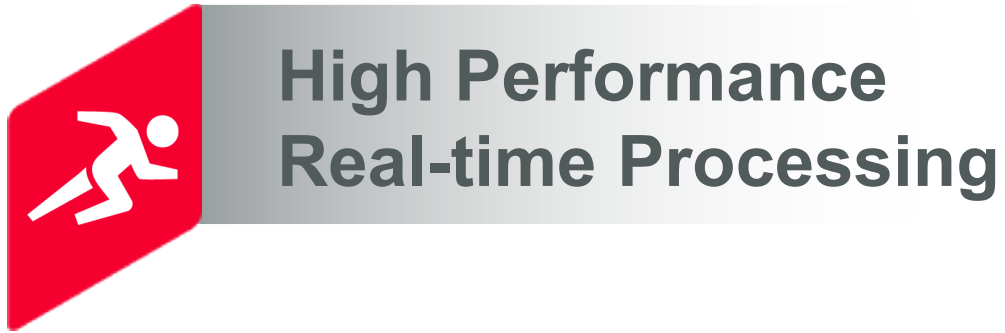


MCUXpresso

RTOS

KINETIS & LPC
MCUs



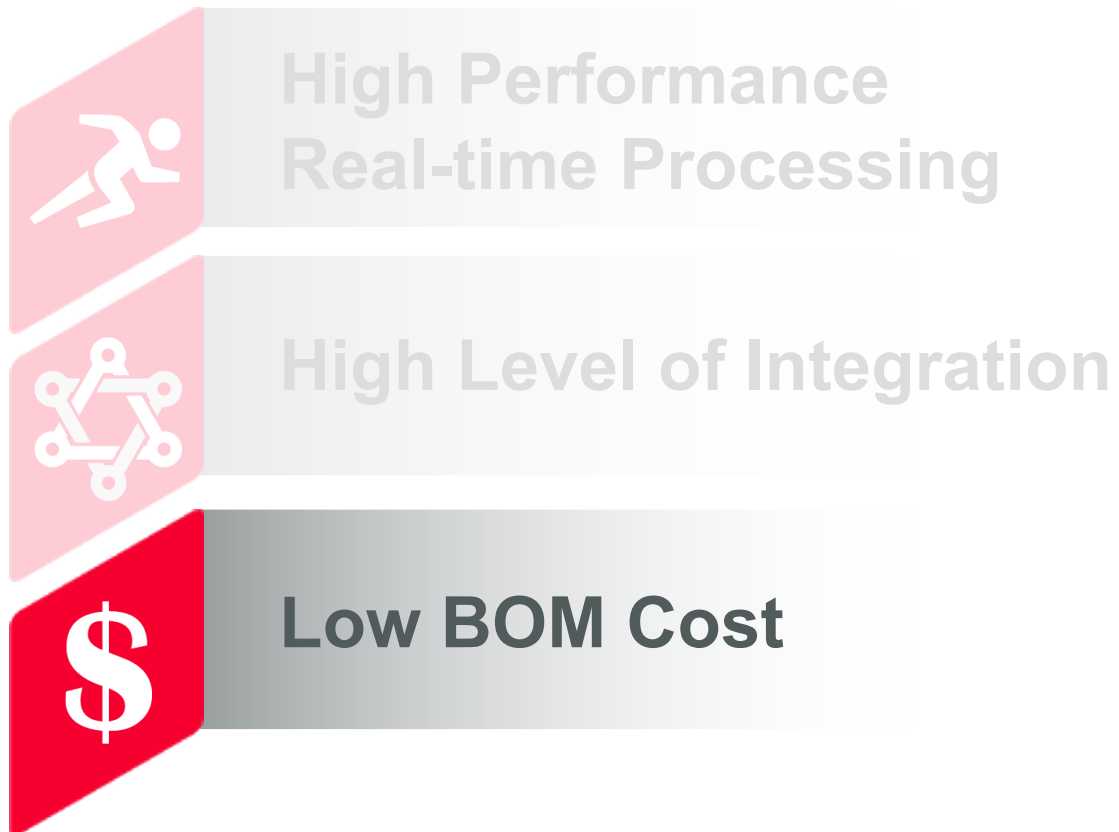


- Cortex-M7 up to 1GHz (RT1xxx) (50% faster than current existing M7 products)
- Cortex-M33 up to 275MHz with Trust Zone (RT6xx/5xx)
- Up to 600MHz DSP and other co-processor accelerators (RT6xx/5xx)
- Up to 5MB On Chip SRAM



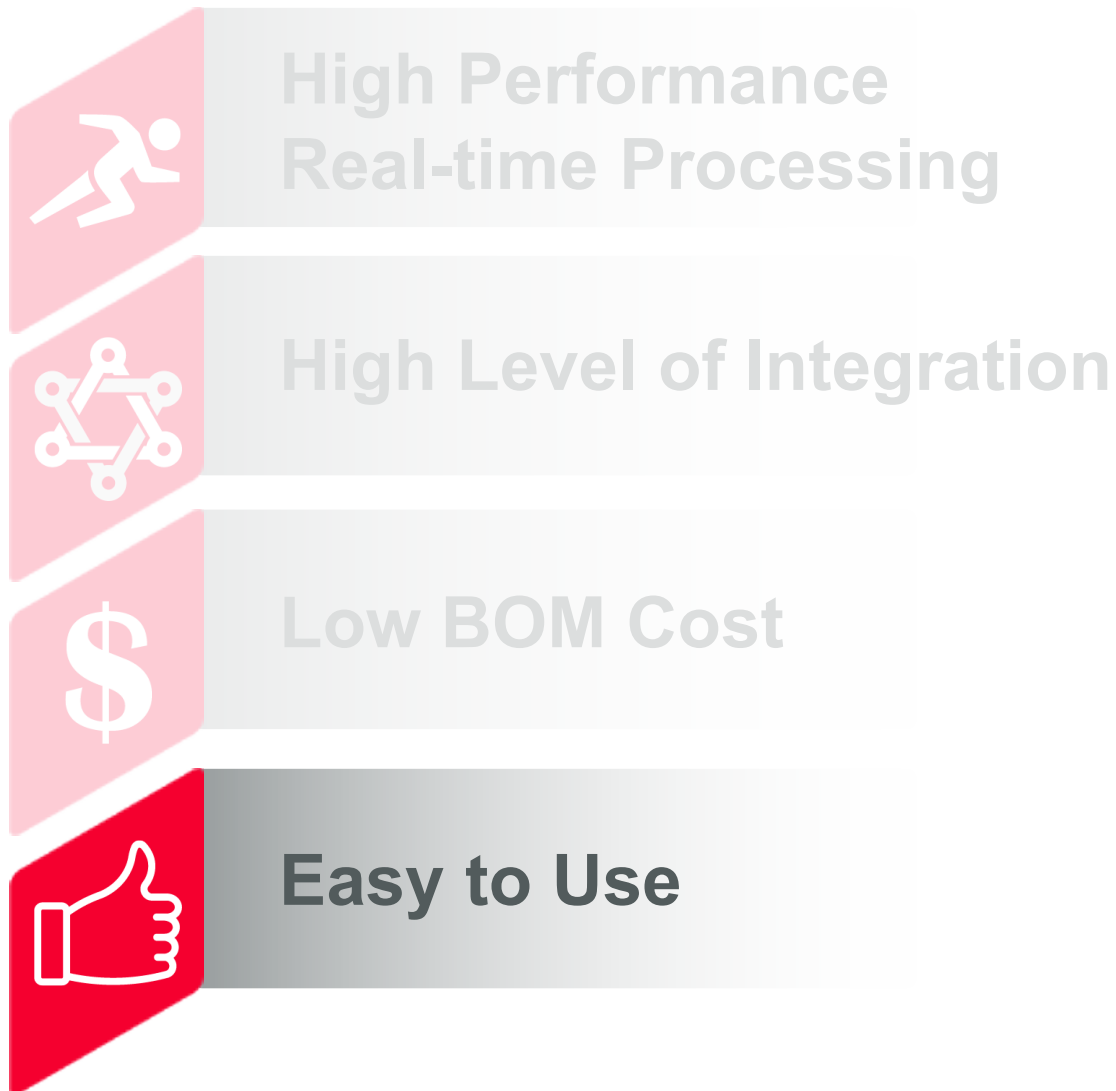
- High security enabled by AES-256, HAB and On-the-fly QSPI Flash decryption
- 2D graphics acceleration engine with Parallel &
- MIPI DSI/CSI
- LCD display controller up to WXGA (1366x768)
- Digital microphone and I2S interfaces for multichannel, high performance audio and voice
- Up to 3x Ethernet and 3x CANFD

i.MX RT series key highlights



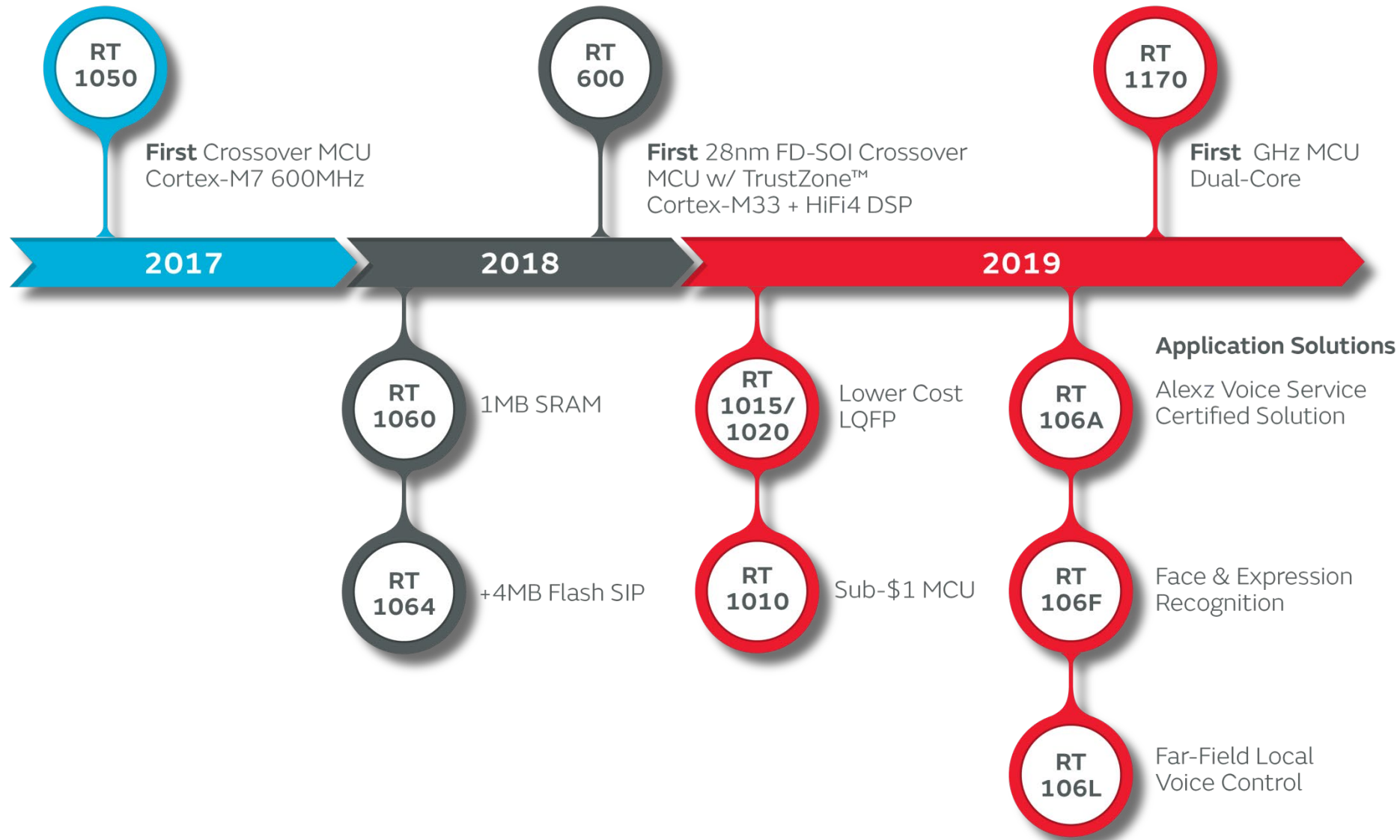
- Competitive pricing – starting @ \$0.99 100K RSL
- Fully integrated PMIC with DC-DC
- Low cost packages enabling 4 layer (BGA) & 2 layer (LQFP) PCB design
- Quad/Octal Serial and SDRAM interface

i.MX RT series key highlights



- MCU customers can leveraging their current tool chain (MCUXpresso, IAR, Keil)
- Rapid and easy prototyping and development with NXP FreeRTOS, SDK, ARM mbed and the global ARM ecosystem
- Single voltage input simplifies power circuit design
- Scalability to LPC, Kinetis & i.MX products

i.MX RT series key highlights



Do you see Wi-Fi/ Bluetooth (wireless connectivity?) as a requirement in your future IoT related projects?

- (1) Yes
- (2) No
- (3) Maybe
- (4) No idea



i.MX RT series target applications

Voice & Audio

High-end, consumer audio devices, including specialty equipment such as:

- Home Audio
- Professional microphone
- Guitar pedals
- Audio Tuners



Consumer & Healthcare

- Wearables
- Smart appliances
- Cameras & LCDs
- Mobile patient care, e.g. infusion pump or respirator
- Blood pressure monitor
- Activity & wellness monitor
- Exercise equipment with display



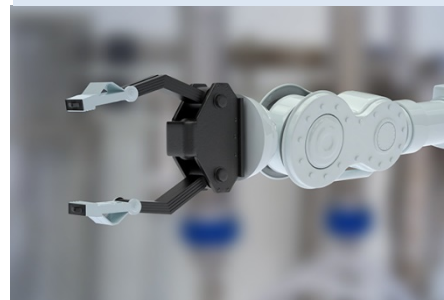
Home & Building Automation

- HVAC climate control
- Security
- Lighting control panels
- IoT gateways
- Smoke Detectors
- Thermostats



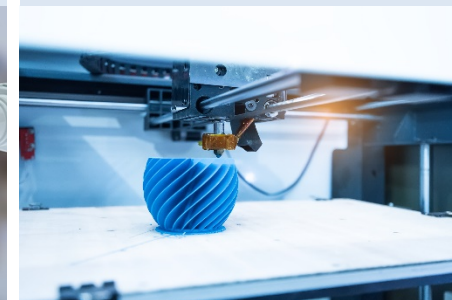
Industrial Computing

- EBS
- PLCs
- Factory automation
- Test and measurement
- HMI control assembly line robotics
- QR Readers
- Barcode Scanners

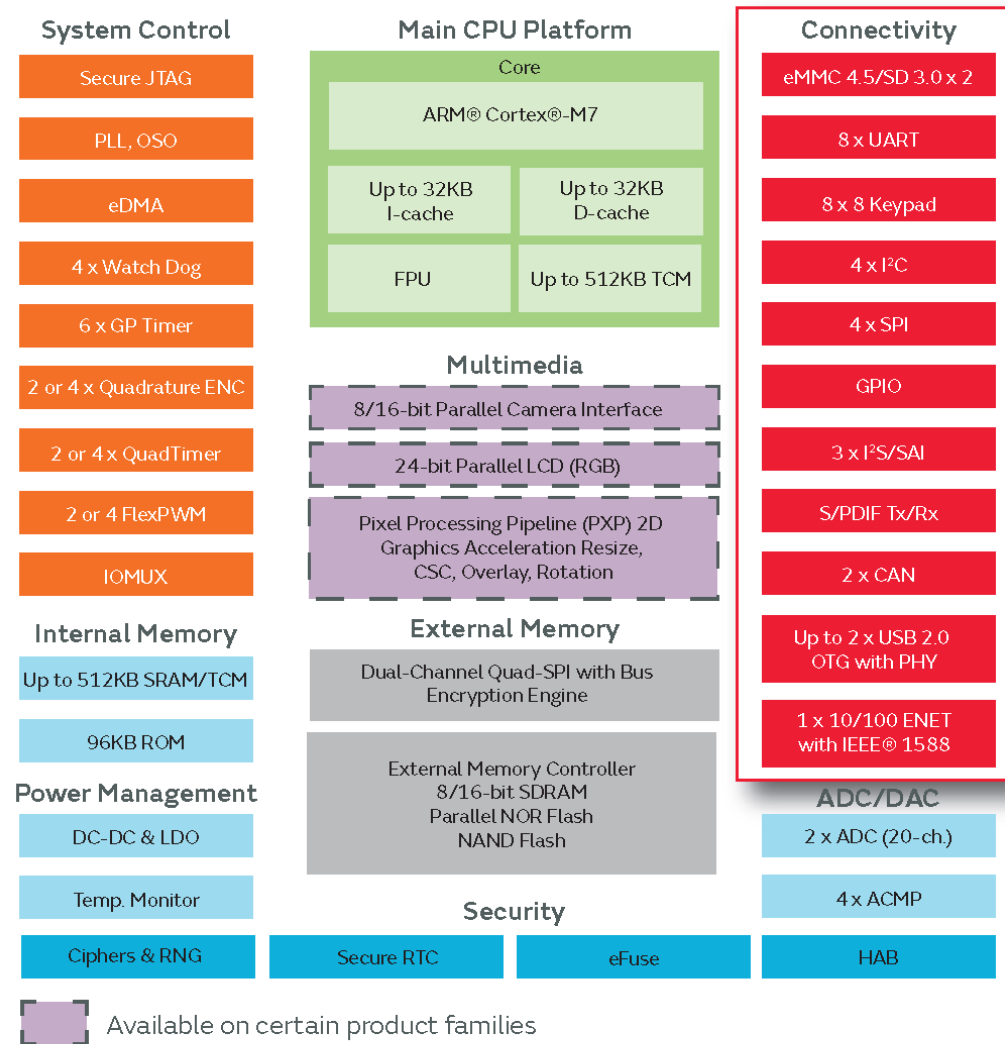


Motor Control & Power Conversion

- 3D printers
- Thermal printers
- Unmanned autonomous vehicles
- Robotic vacuum cleaners
- Drones



NXP 32-bit ARM based MCUs



Murata Modules

High Performance Real Time system

- Cortex-M7 up to 600MHz , 50% faster than any other existing M7 products
- 20ns interrupt latency, a TRUE Real time processor
- 512KB SRAM, configurable to 512KB TCM

Rich Peripheral

- Motor Control: Flex PWM X 4, Quad Timer X 4, ENC X 4
- 2x USB, 2x SDIO, 2x CAN, 1x ENET with 1588, 8xUART, 4x SPI, 4x I2C
- 8/16-bit CSI interface and 8/16/24-bit LCD interface
- Quad-SPI interface, with Bus Encryption Engine
- Audio interface: 3x SAI/ SPDIF RX & TX/ 1x ESAI

Security

- Security (On-the-fly FlexSPI decryption)
- Bus Encryption Engine: Protect QSPI Flash Content
- TRNG&PRNG(NIST SP 800-90 Certified)
- 128-AES cryptography

Specifications

- Package: MAPBGA196 | 10x10mm², 0.65mm pitch (130 GPIOs)
- MAPBGA196 | 12x12mm², 0.8mm pitch
- Temp / Qual: -40 to 105°C (Tj) Industrial / 0 to 95°C (Tj) Consumer

Ease-of-Use

- MCUXpresso IDE, FreeRTOS with SDK, plus IAR, Keil
- Comprehensive ecosystem

Low BOM Cost

- Competitive price
- Fully integrated PMIC with DC-DC
- QSPI and SDRAM interface

i.MX RT1050: Block diagram

Demo with i.MX RT106A



Marvell Connectivity Acquisition



- Marvell wireless acquisition completed on December 6th, ahead of schedule.
- Full range of Wi-Fi and combo connectivity solutions **now** available for use with i.MX and RT Crossover platforms
 - **New** Wi-Fi 6 client solutions for applications demanding highest speed and network efficiency
 - Premium Wi-Fi 5 client solutions for high performance & quality
 - Wi-Fi 4 client products for Smart Connected (IoT) devices
- Software drivers integrated in Linux and MCUXpresso SDKs supporting i.MX, RT and MCU products
- Module partners will offer a full range of Wi-Fi and combo solutions
 - M.2 cards compatible with i.MX EVK boards being developed



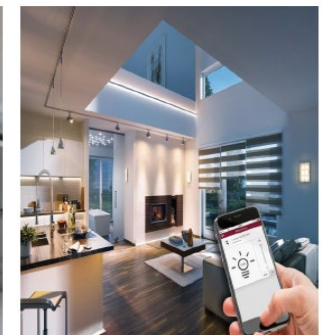
Gaming



Voice Assistants



Media Streaming
OTT/DTV



Smart Connected



Quick re-cap



- Murata modules lower the bar for wireless integration into IOT solutions
- Murata & NXP now provide the most enhanced i.MX wireless out-of-box solution
- Hardware, software and support available
- Building block solution for wireless evaluation and/or integration
- Community forum





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World-class connectivity
is now at your fingertips



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NXP

Questions & answers

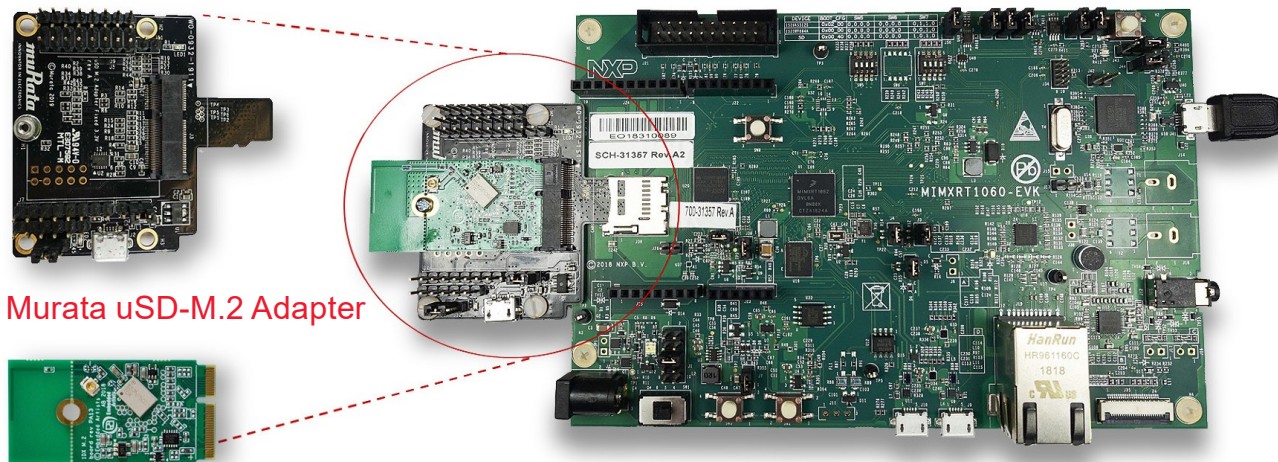
Most exciting moment...

We will be announcing the 5 lucky winners by email

5 Solution kits:

NXP RT Board = uSD-M.2 Adapter + 1DX M.2 + 1MW M.2 + 1LV M.2

MIMXRT1060-EVK = LBEE0ZZ1WE-TEMP + EAR00318 + EAR00315 + EAR00323



Murata uSD-M.2 Adapter

Embedded Artists' 1DX M.2 EVB
1MW M.2 EVB
1LV M.2 EVB

NXP i.MX RT EVK

