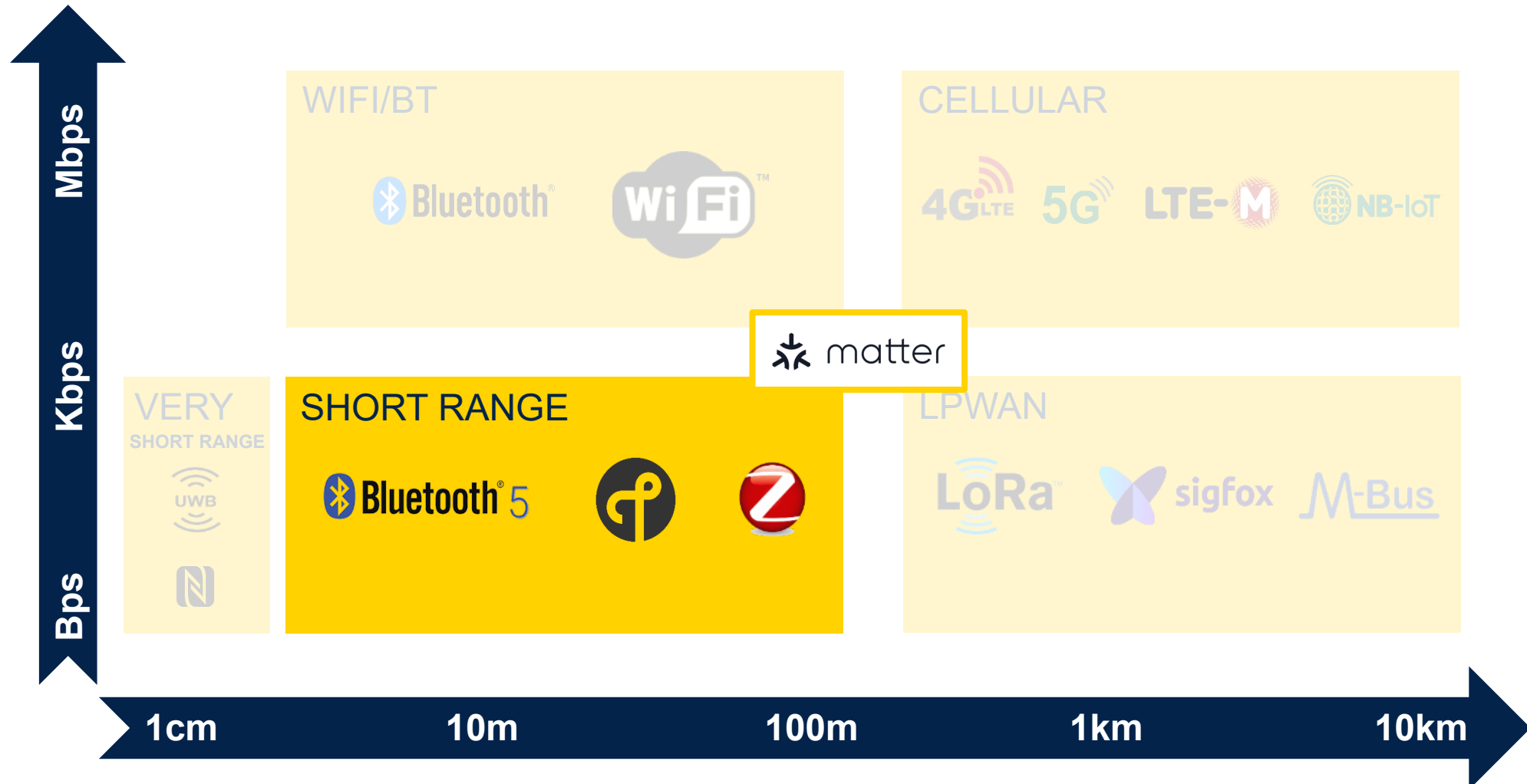**Matter, Bluetooth® LE, Zigbee & Thread**

How ST's connectivity solutions support these evolving standards

life.augmented

Communication Technologies – overview
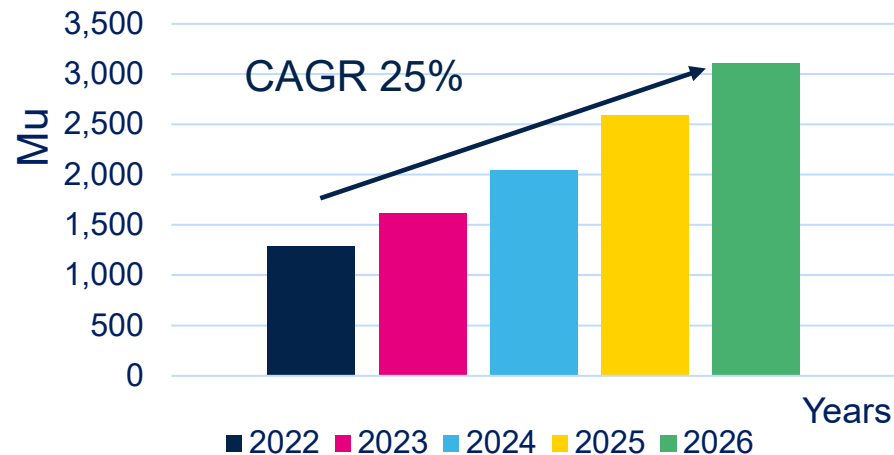# Matter, Bluetooth® LE, Zigbee & Thread

Wireless connectivity expansion

IoT is everywhere

Bluetooth LE Growth drivers

Accessories
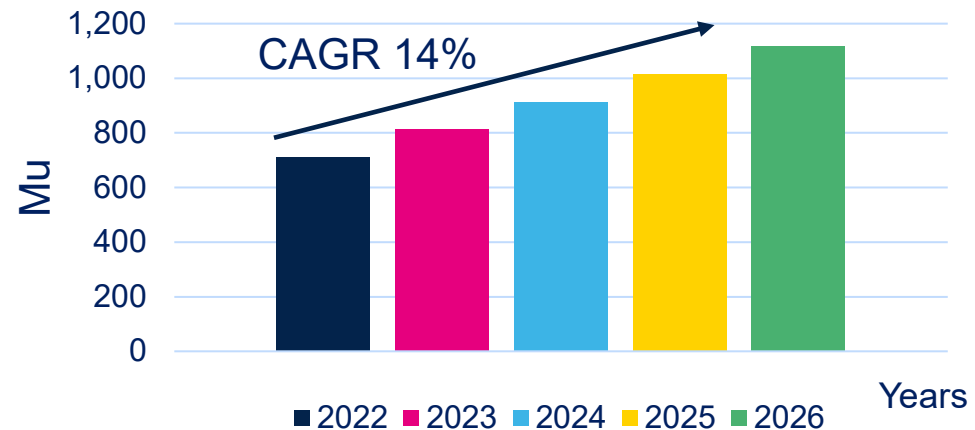Speakers
Hearables

Residential
Smart home appliance

802.15.4 Growth drivers

Smart Home
Smart Appliance

Commercial building automation
Video surveillance

Bluetooth LE market trend

CAGR 25%

Mu

3,500
3,000
2,500
2,000
1,500
1,000
500
0

Years

■ 2022 ■ 2023 ■ 2024 ■ 2025 ■ 2026

802.15.4 Market trend

CAGR 14%

Mu

1,200
1,000
800
600
400
200
0

Years

■ 2022 ■ 2023 ■ 2024 ■ 2025 ■ 2026

Source: ABI Research

Matter, Bluetooth® LE, Zigbee & Thread

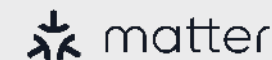## More features for more applications

From Bluetooth classic to Bluetooth Low Energy v5.3

From early light link to Zigbee PRO & Zigbee 3.0

From early Thread network to baseline for Matter

matter

From Bluetooth classic to Bluetooth® Low Energy v5.3

Bluetooth Classic

- Audio quality
- Data rate
- Interoperability

Bluetooth LE 4.x

- Power consumption
- Multi-connection

Bluetooth LE 5.0 to 5.3

- **Mesh** topology
- Data rate increase **2Mbps**
- Operating volume **Coded PHY**
- Direction Finding: **Aox**
- Audio introduction **isochronous channel**

What's next

- Speed
- Audio increment
- Localization / Distance

1999   2010   2016   2021

From early light link to Zigbee PRO & Zigbee 3.0

Zigbee early solution

- Light link
- Home automation
- Smart metering

Zigbee Pro

- Cluster libraries
- Multi-casting
- Many-to-one routing
- Enhanced security

Zigbee 3.0

- Unified profiles
- Cluster IP (ZCL)
- Robustness
- Interoperability improved
- Green power proxy
- Long Range

What's next

- ZUTH
- Zigbee Direct
- Security enhancement

2005-2006 **2007** **2016** **2021**

From early Thread network to a baseline for Matter

Thread DNA

- IEEE 802.15.4 radio
- Mesh network
- Low power
- IP networks
- Self managed, self healing

Thread 1.1

- Low power
- Multi-roles topology
  - End device
  - Mesh extender
  - Leader
  - Border Router

Thread 1.2 & 1.3

- Low power enhancement
- BLE over Thread
- Border Router extension
- IP routing
- Service discovery
- Matter support

What's next

- Long range
- OT 1.3 optimizations

2016   **2022**

Matter makes smart home connectivity simple

"**Smart home devices should be secure, reliable, and seamless to use. And with Matter, they are.**"

The Connectivity Standards Alliance

- **A great user experience**
  Matter ensures connected objects from multiple brands can work together seamlessly

- **Wide adoption**
  Matter is an application layer which addresses many applications in an open-source delivery and certification infrastructure

8

What is Matter? How will it help?

Matter DNA

- Simplify smart home connectivity
- Protect personal data
- Remove borders between devices (technologies, interoperability)
- Open Source

Matter Technology

- IoT needs cloud connection
- Cloud means IPV6
- Wi-Fi and Thread are IPV6
- Matter unified application layer

Matter security & profiles

- Each Matter device has unique identifier
- Profiles based on Zigbee clusters
- V1.0 covers already wide panel of applications - lighting, HVAC control, access control, window covering, TVs…

Matter availability

- Release V1.0 Q4'2022
  - SDK
  - Certified laboratories
- Next: more applications

2022

matter

Connected home – seamless infrastructure

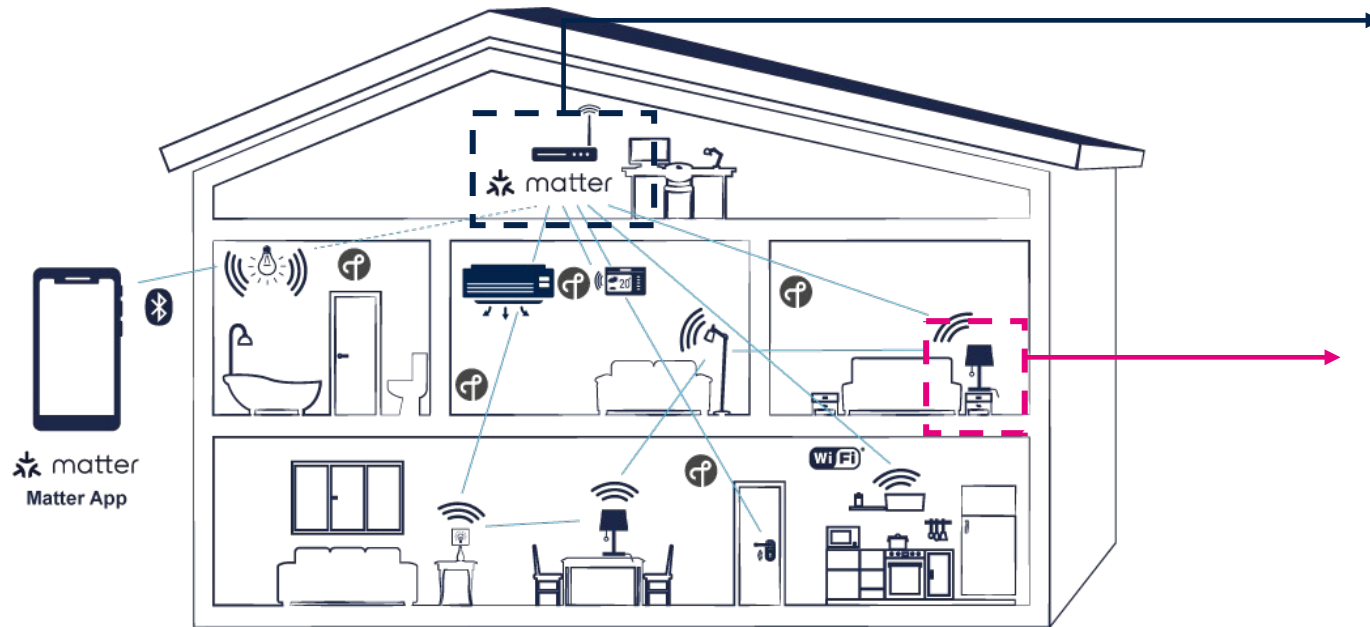**Smart home & building markets**
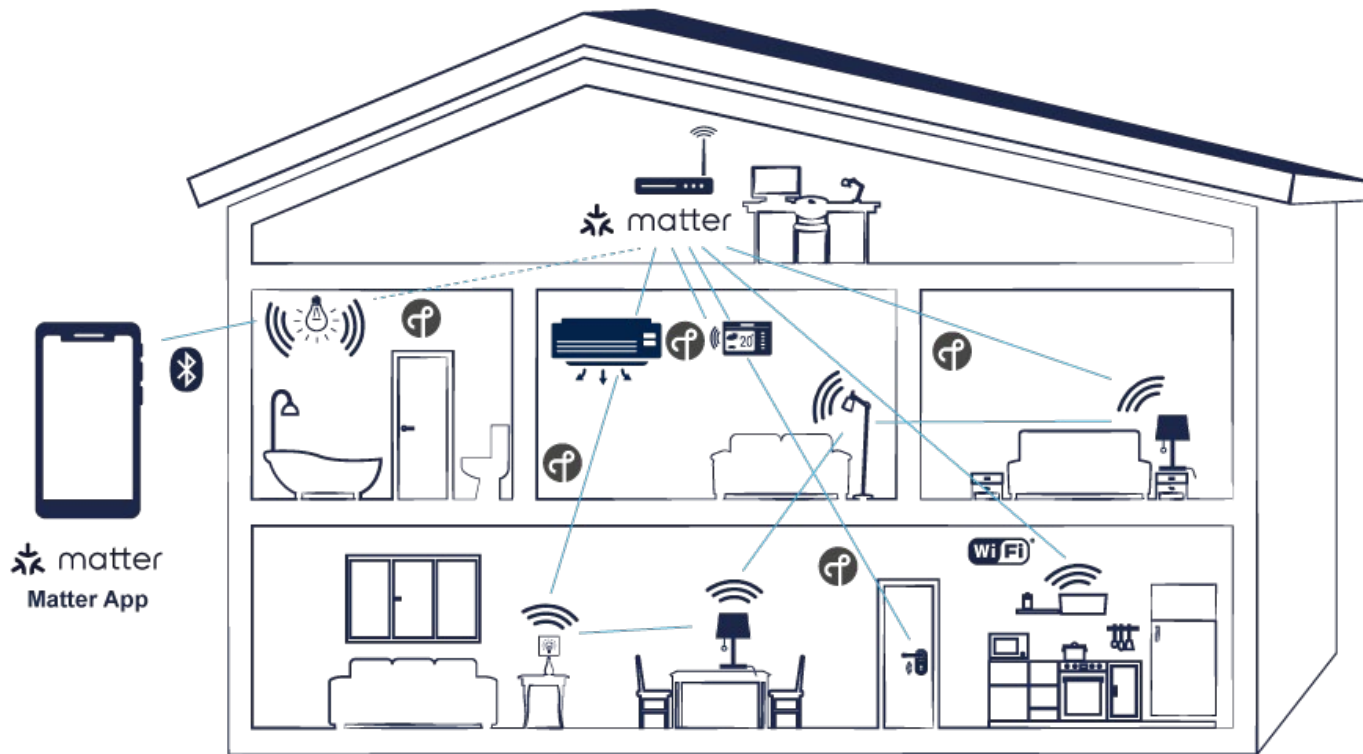
Wi-Fi & Thread for transport

Bluetooth LE for commissioning

Secure at each stage
- Authentication & attestation for commissioning
- Protection of any message
- Certified Matter device only

STM32 portfolio supporting Matter

STM32WB, STM32H7, STM32U5, STM32MP1 MPU provide a supporting infrastructure to run Matter in bridge devices

STM32WB MCUs enables Matter networks in end devices thanks to:
- multi-protocol capabilities
- 1Mbyte of Flash and 256-Kbyte of RAM
- Quad-SPI peripheral to extend the memory size externally with execution in place
- Over-The-Air firmware updates whatever the application and the connectivity stack

How ST enables these wireless technologies

STM32, ultra low power, connectivity

STM32 MCUs

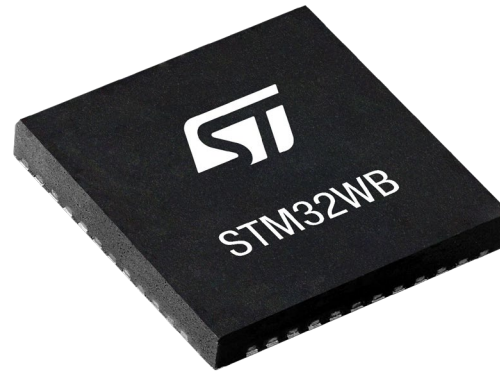STM32WB product series

STM32 ecosystem

STM32WB – Application processor for connectivity

Dual core architecture

Arm® Cortex® M4
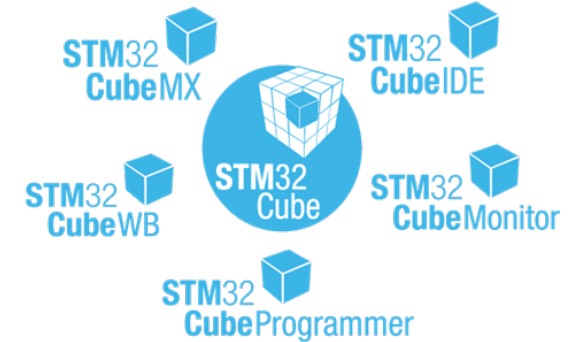Arm® Cortex® M0+
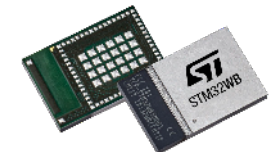
Up to
1MB flash / 256KB RAM

Multi-protocols

One-Stop-Shop

STM32 CubeMX
STM32 CubeIDE
STM32 CubeWB
STM32 Cube
STM32 CubeMonitor
STM32 CubeProgrammer

Whatever the end device

LONGEVITY 10 YEARS COMMITMENT

STM32WB

life.augmented

Addressing the full 2.4GHz market

BlueNRG series

STM32WB series

Bluetooth 5	Bluetooth Mesh	matter	THREAD	Zigbee
Wearable, healthcare, smart appliances	Home appliances, industrial	End device border router	Sensors, home appliances, industrial	Sensors, home automation, industrial
• 2Mbps • Long range • Adv extension • AOA/AOD	• Mesh topology • Large scale • BT SIG standard	• End device • Border router • Matter V1.0 candidate	• OT1.1 certified • OT1.3 candidate	• Mesh topology • Large scale • Zigbee compliant

STM32 ecosystem for developers

Hardware development tools

Evaluation boards
Debug & programming probes

Software development tools

Configuration, development, debugging & monitoring tools

Ecosystem

Embedded software

Drivers
RTOS
Stacks & application bricks

Information and sharing

Developer zone
Product selectors
Wiki, GitHub
Communities & social media

STM32 Cube

Open source

Partners

Designed by ST

STM32Cube software suite
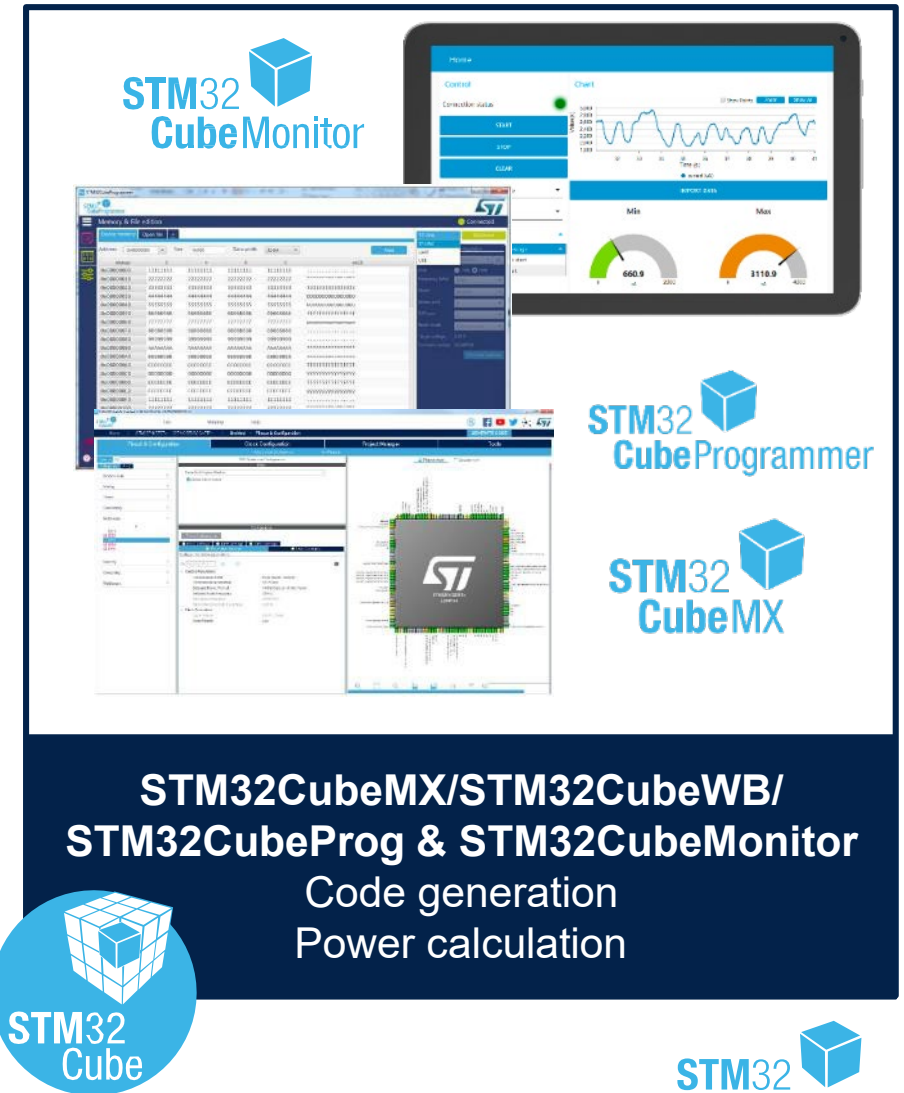
Software tools

Embedded software

Configure
- STM32 CubeIDE
- STM32 CubeMX

Develop
- IAR SYSTEMS
- STM32 CubeIDE
- arm KEIL

Program
- STM32 CubeIDE
- STM32 CubeProgrammer

Monitor
- STM32 CubeMonitor-RF

STM32WB

STM32CubeWB
- User application
- Middleware
- Drivers

Bluetooth® 5

OPENTHREAD
released by Google

Z 3.0

matter

STM32Cube expansions and function packs
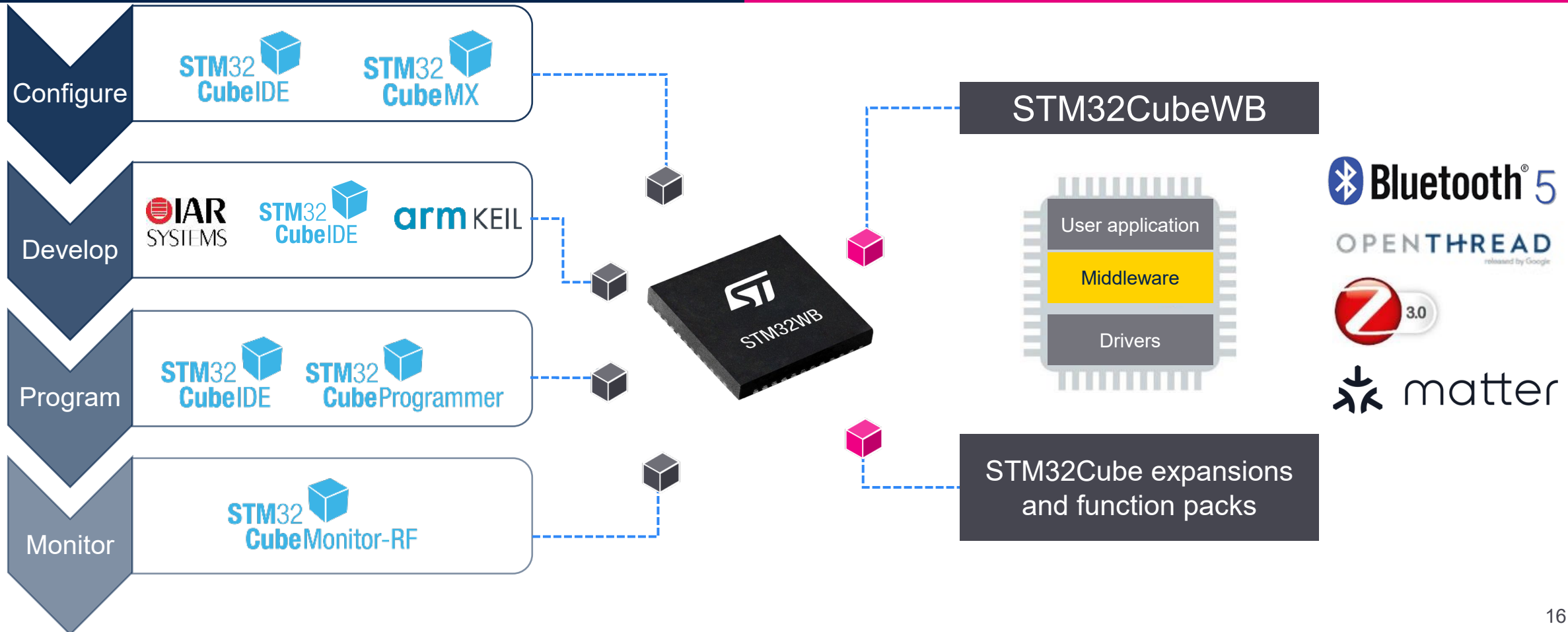
Prototyping made as easy as 1,2,3

NUCLEO-WB55RG

NUCLEO-WB15CC

STM32WB5MM-DK

STM32**WB**

**STM32CubeMX/STM32CubeWB/
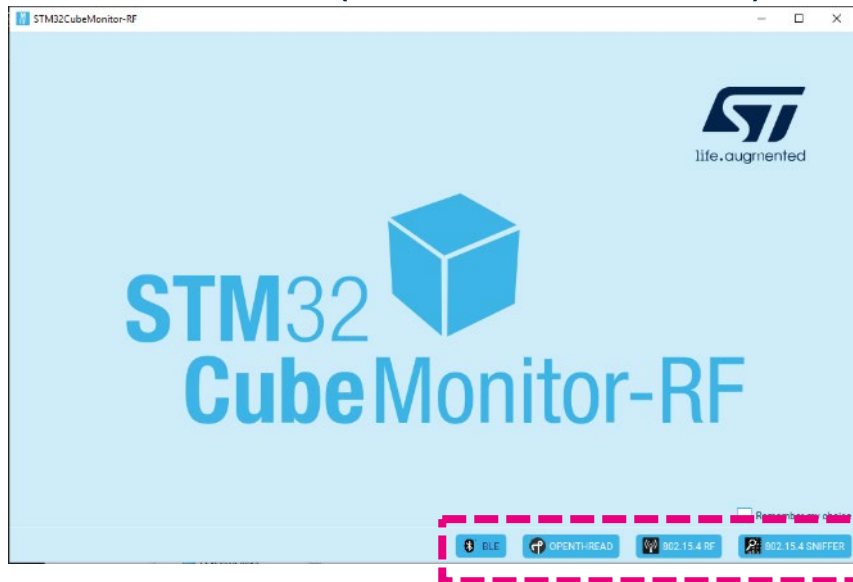STM32CubeProg & STM32CubeMonitor**
Code generation
Power calculation
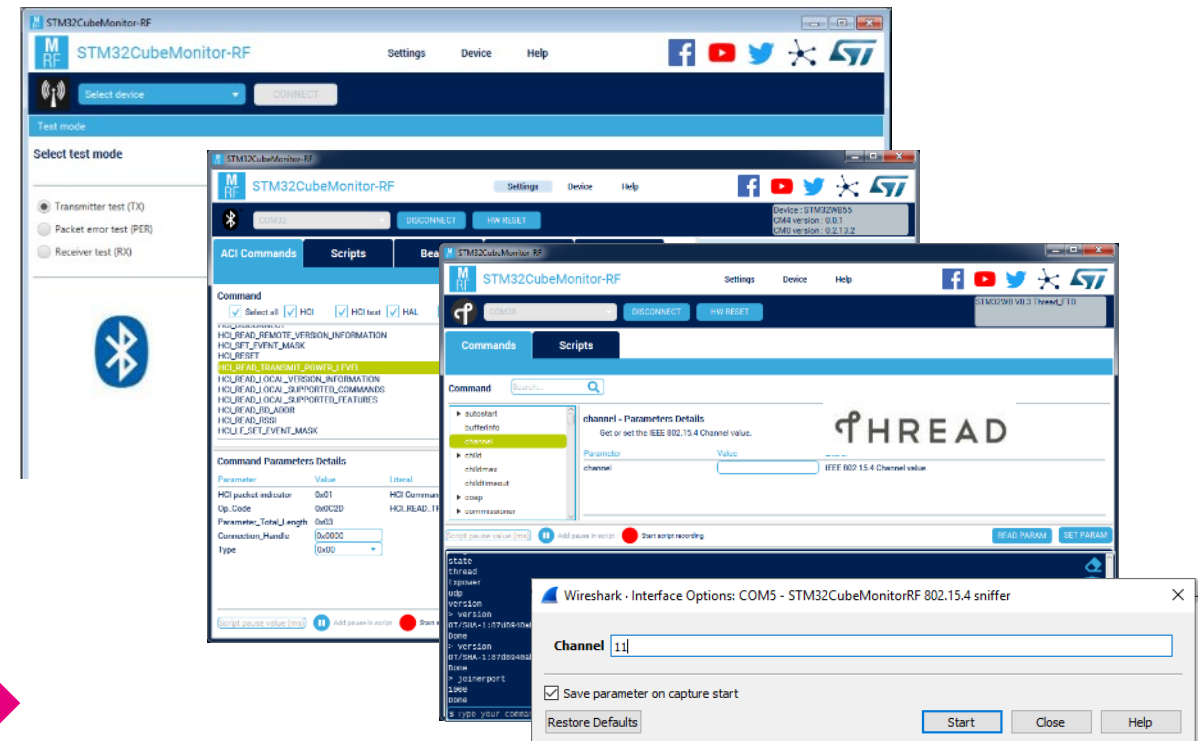
STM32CubeMonitor-RF

Exercise wireless features of STM32WB

- Bluetooth Low Energy (BLE) commands
- Bluetooth LE RF tests
- send OpenThread commands
- perform 802.15.4 RF tests
- 802.15.4 sniffer (Wireshark based)

- DUT - Nucleo, USB dongle or customer boards
- USB or UART to Virtual Com Port

Mode selection

ST BLE Smart Phone apps

ST BLE Sensor

ST BLE StarNet

ST BLE Mesh

new

ST BLE Toolbox

ST BLE Sensor – Used with our OOB demo
> It shows the data exported by a BLE device using the BlueST protocol

ST BLE StarNet (Star topology)
> It allows viewing the data exported by a BLE gateway connected to a network of devices

ST BLE Mesh
> It allows to create your own Bluetooth® Mesh Profile compliant mobile Apps

ST BLE ToolBox

> It allows to discover peripherals, services and characteristics, performs R&W, Collect Cloud based Analytics on Azure App Center, Bond devices, Throughput Test, Log messages

Our technology starts with You

🌐 Find out more at www.st.com/connectivity

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