

muRata SPEAKS

TECHNOLOGY | SOLUTIONS | INNOVATIONS

Murata Speaks - Monthly Webinar Series #25 [Sep 2022]

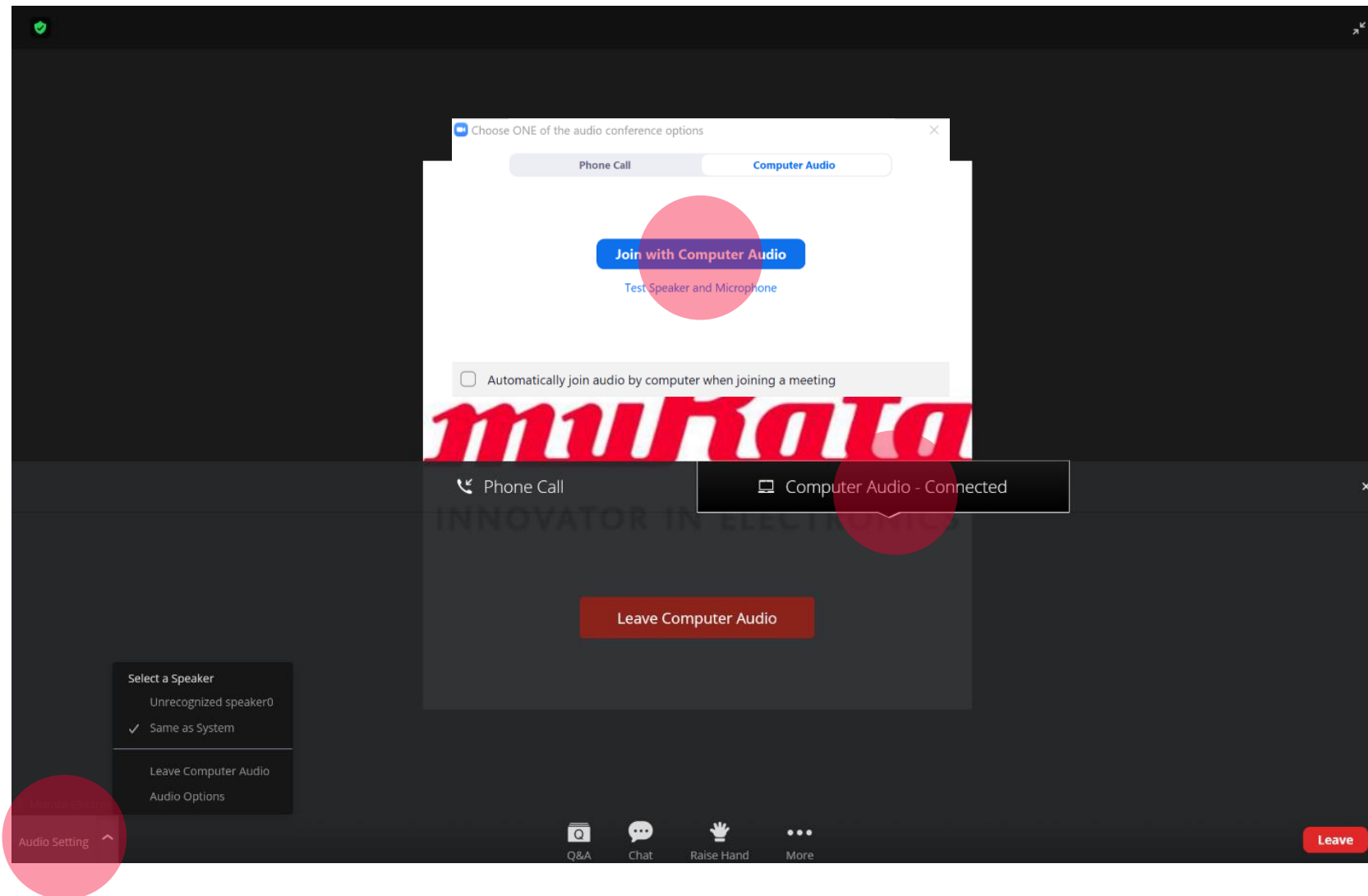
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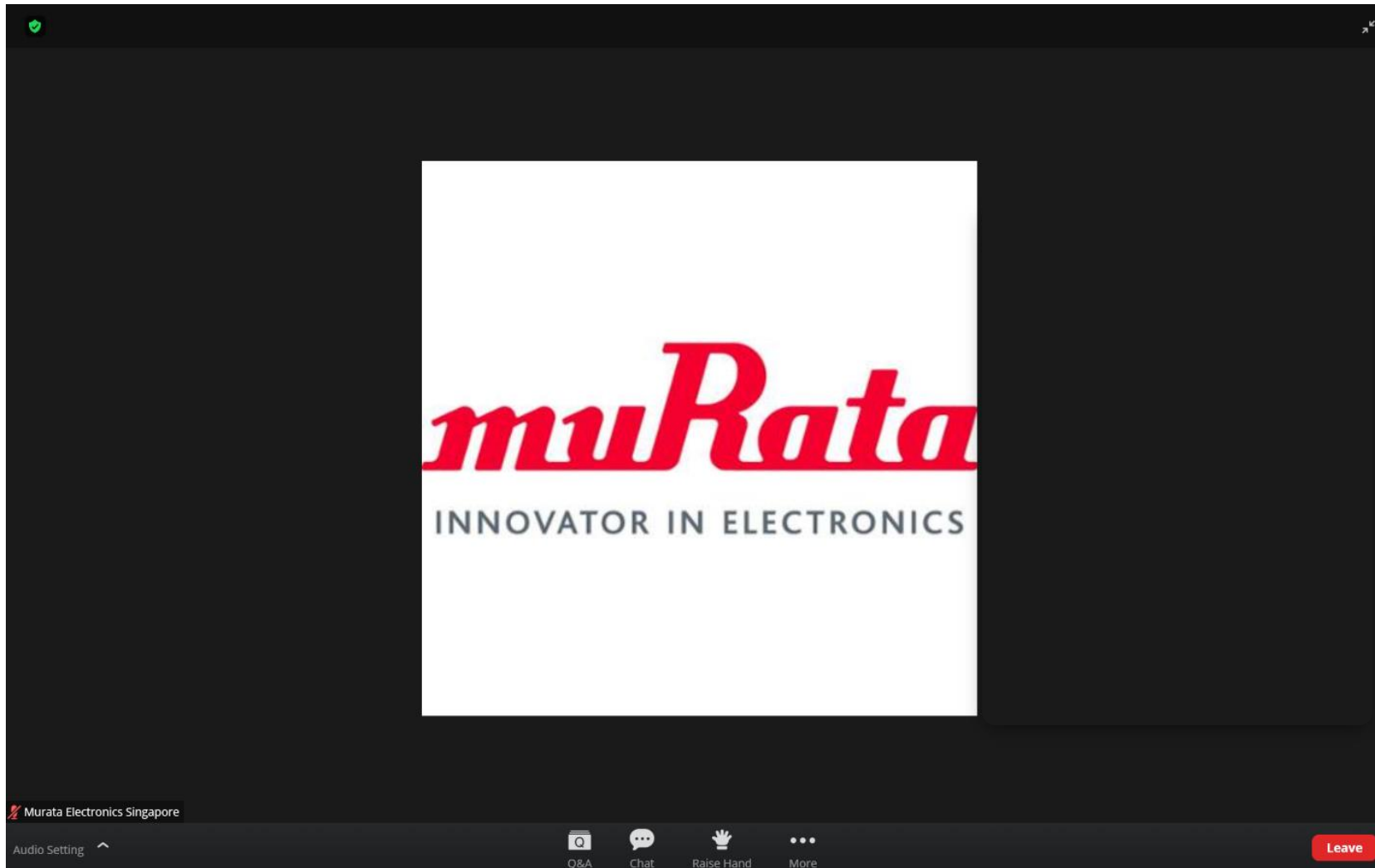


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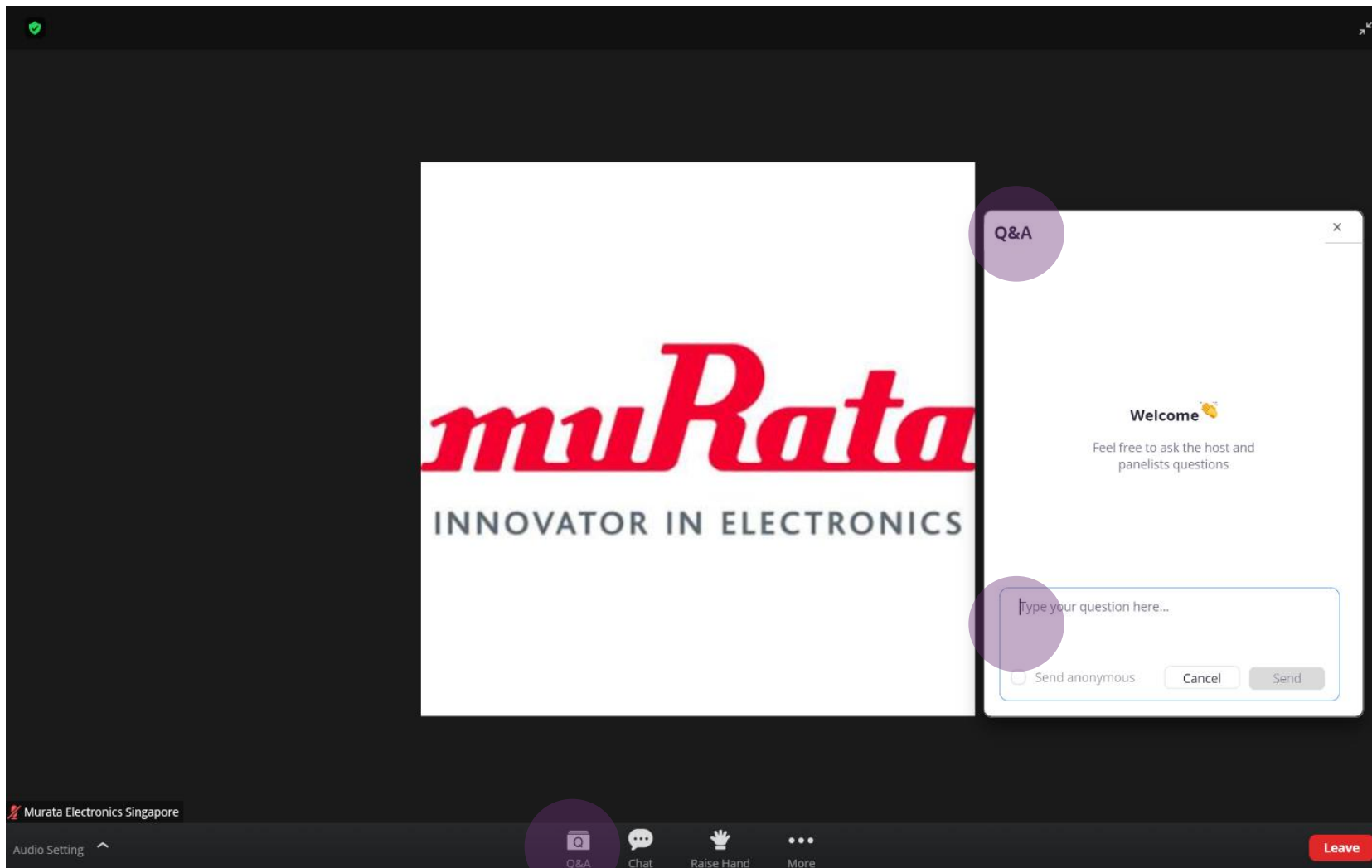


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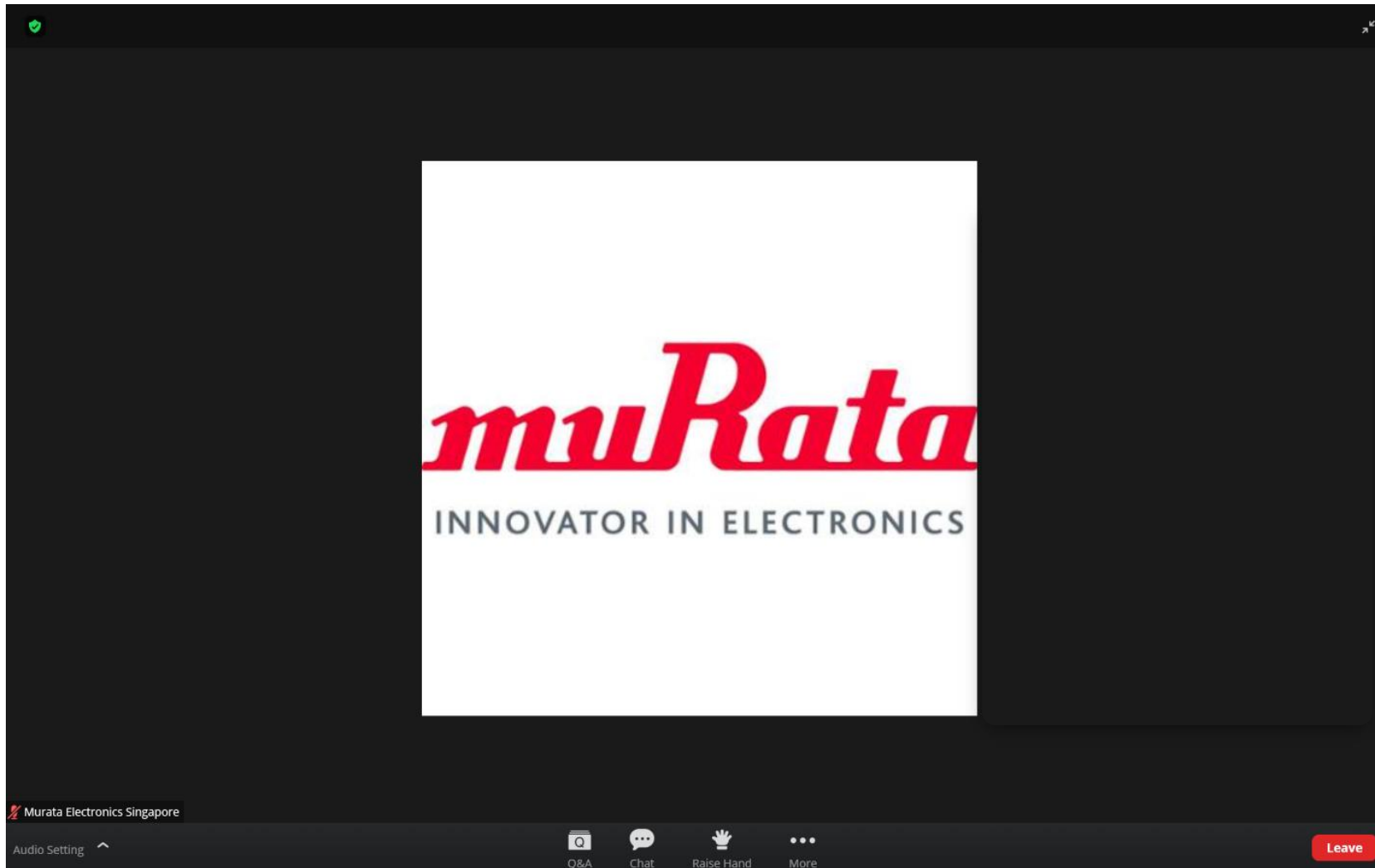


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QUESTIONS?
PLEASE TYPE
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SLIDES AND
RECORDING WILL
BE AVAILABLE
AFTER THE
SESSION.

muRata x **NXP**

STRETCH YOUR POSSIBILITIES

with Murata x NXP's UWB Technology

 29th September 2022, Thursday

 2.00pm (SGT)

muRata SPEAKS

TECHNOLOGY | SOLUTIONS | INNOVATIONS

with Partners



Today's Speakers



Jacey Ng

Product Engineer
RF Components & Wireless
Connectivity

Jacey is deeply passionate about new technologies in the area of Radio Frequency (RF), 5G and the Internet of things (IOT). She is experienced in providing the bespoke solution that focuses on the core deliverables the customer requires and delivers on the specifics. Jacey actively seek opportunities to collaborate with various business partners such as RFID integrators, and other key service providers



Zeno Maverick Low

Application Engineer

Specializing in the LPWA products and solutions domain, coupled with a design-centric mindset and strong IoT background, Zeno enjoys new challenges and overcomes them by developing solutions to meet business needs and goals. Passionate about learning new technologies, he strives to deliver exceptional value to business partners and markets in the ASEAN, India and ANZ region.



Simon Wu

Business Development Manager
South Asia Pacific
Global Sales & Marketing

Simon has been working with NXP Semiconductor Singapore as Senior Business Development Manager since 2011. His primary focus is on the Smart Mobile Transaction, NFC Readers and Infrastructure, Secure Element for embedded electronics & IoT, Smart city and retail applications and market development in south Asia region though working closely with all the stakeholders in the ecosystem and value chain of respective industries. Prior to his service in NXP, Simon had been working in Samsung Semiconductor as application manager to support System LSI product portfolios to the regional customers in electronics and smartcard industries for more than a decade.



Kevin Chia

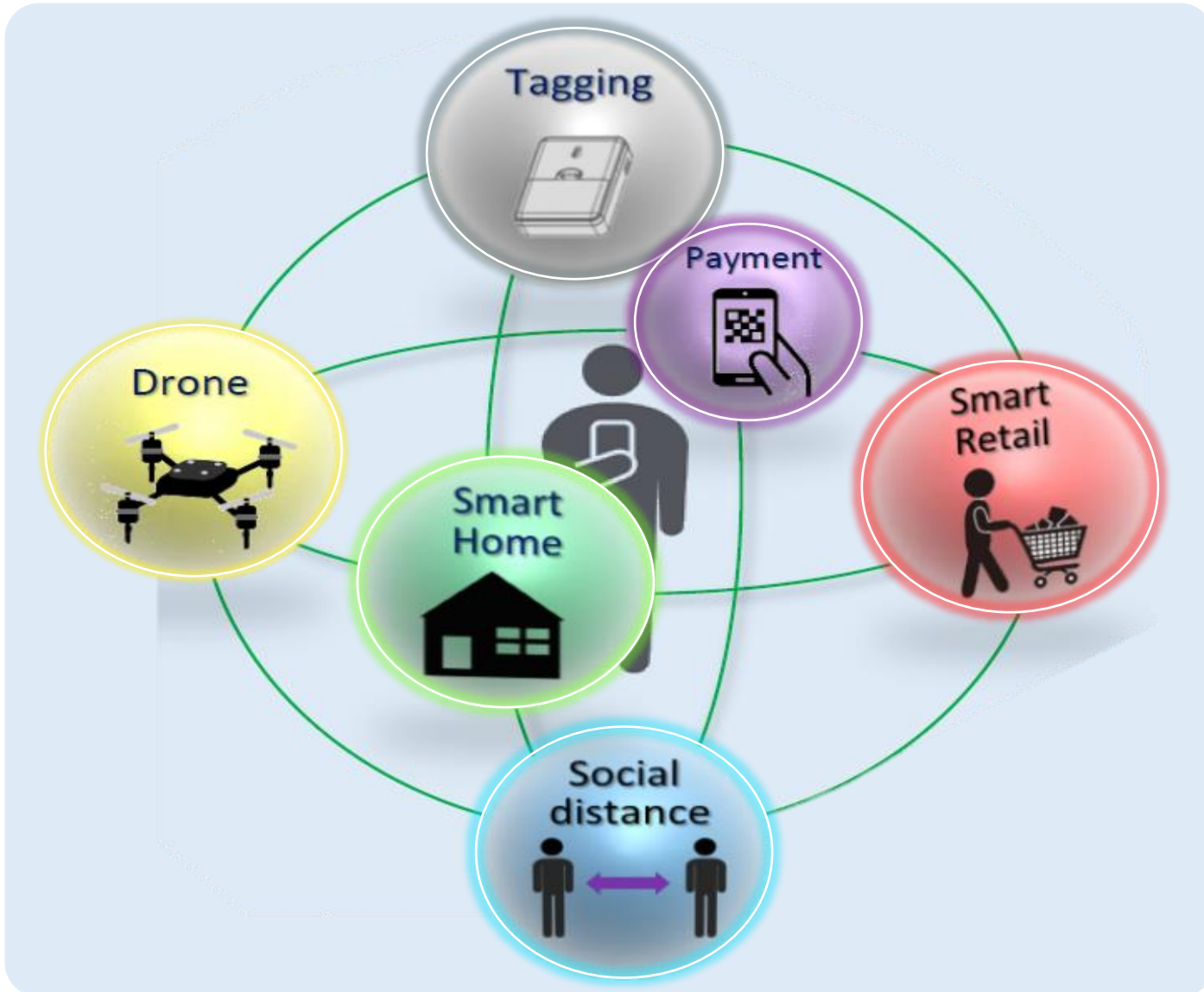
Chief Engineer,
Southeast Asia, Australia,
New Zealand

An experienced security architect related on smart card and NFC reader, Kevin Chia has worked across multiple markets like eGov, Payments, and Infrastructure in both solutions and silicon technology companies. He leads the NXP Singapore Customer Application Support (CAS) team on NFC for Mobile and Infrastructure, Authentication and Mobile Secure Element, Smart Labels for NFC Tags, MIFARE and RFID. His job covers South Sea Asia countries, Austria and New Zealand. Prior to NXP, Kevin Chia served in Head of Department role managing smart card and NFC reader solutions, covering SEA and Middle East with government projects for eID, ePassport and Public Transport domain. His unique experience spans various technology solutions focusing on future-proofing products and the introduction of eID and ePassport applications to government agencies, system integrators and enterprises.

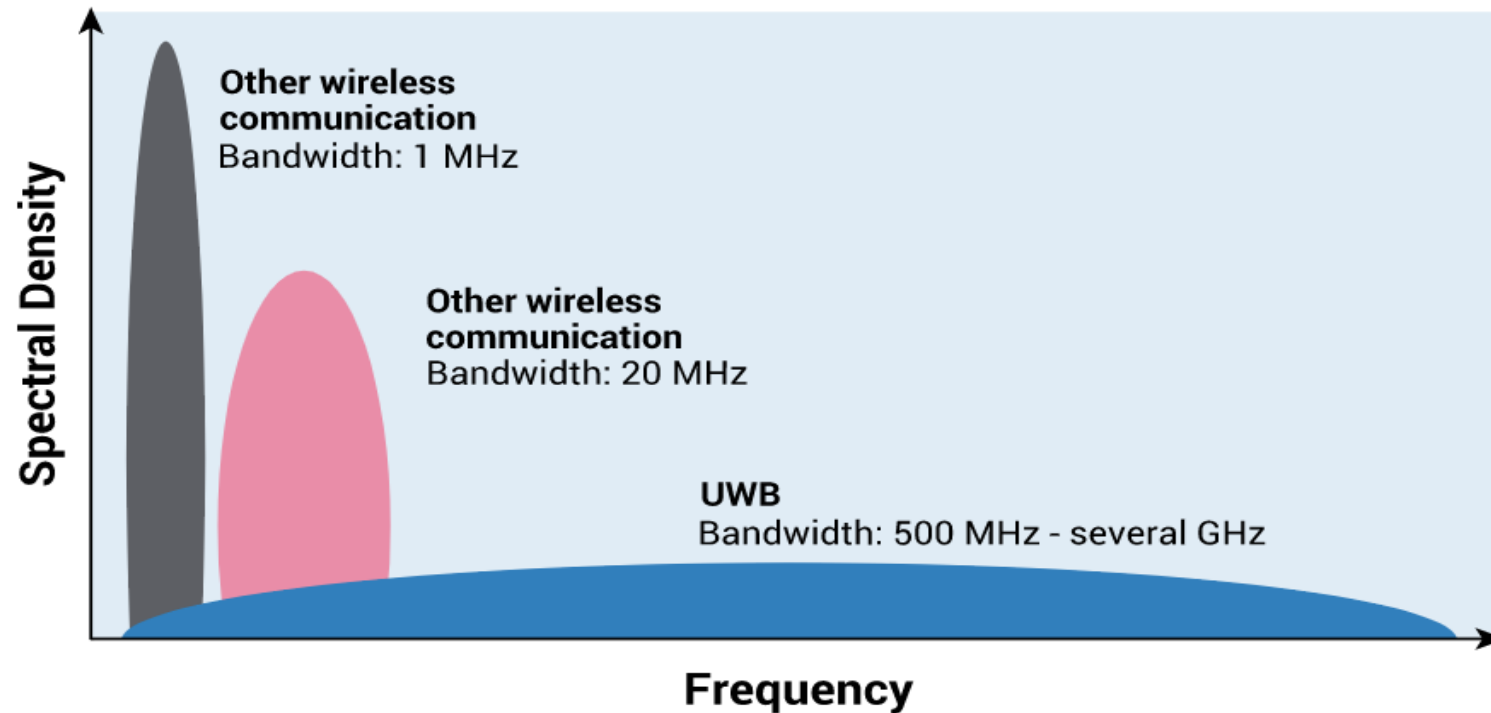
Today's Agenda

- What is Ultra-wideband (UWB) Technology
- UWB Market Trend & Key Features
- UWB Basic Principle of Position Detection – **TWR/ AOA/ TDOA**
- NXP'S UWB Product
- Use Cases
- Murata (NXP-based) UWB Modules and Evaluation Kits
- Why Murata Ultra-wideband (UWB) Solution
 - Comprehensive ONLINE Support
 - Exclusive Murata UWB Community Forum
 - Calibration Guide
 - Regulatory Compliance Guide
- **[DEMO] How to get started**
 - Step by step guide on how to start the evaluation with EVK
 - Sample codes available
 - Smart home multisession and data transfer
 - Door Access demo with iPhone – NXP

What is Ultra-Wide Band (UWB) Technology?



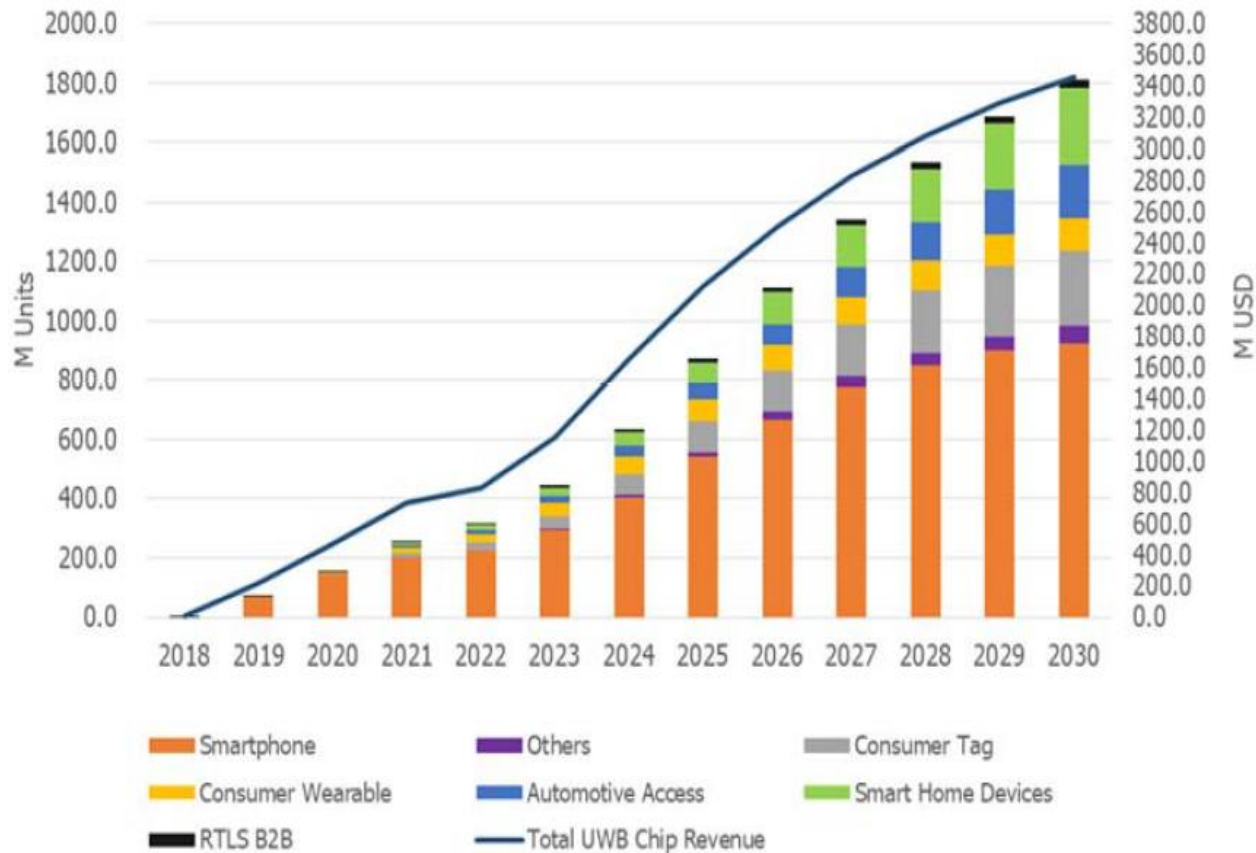
UWB Technology



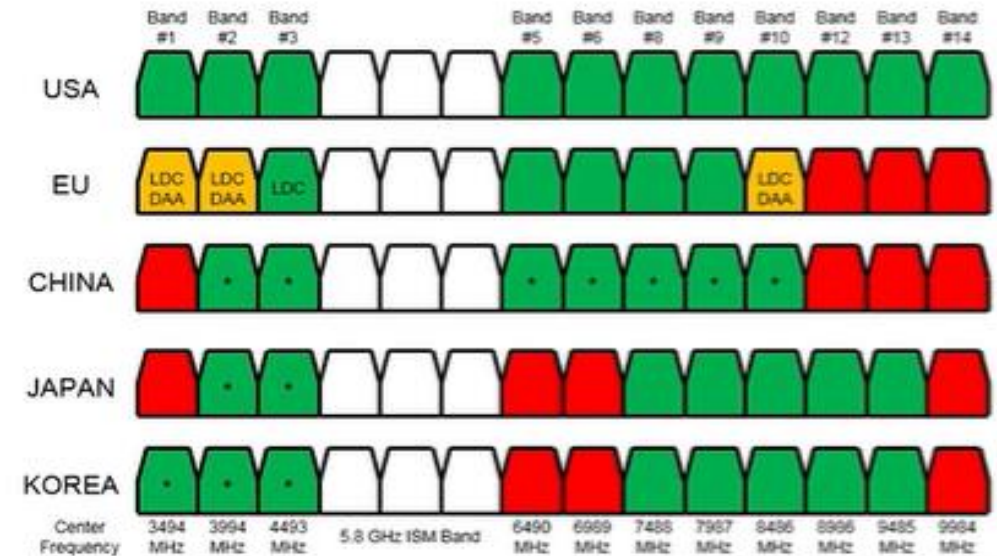
- Short-range wireless communication protocol
- Uses radio waves of short pulses over a spectrum of frequencies ranging
- Low power spectral density which minimizes interference with other technologies operating in the same frequency band

UWB Market Trend and Focused Channel

Total UWB Device Shipment & Total Chip Revenue 2018-2030



Source: 2021 UWB Market Analysis.pdf (TechnoSystem Research Co., Ltd.)



Based on the UWB spectrum, the most frequency permission by major countries bandwidth are between 6.0 and 9.0GHz

Focused Channel:
Channel 9
(7.7GHz-8.2GHz)

Technical Profile of UWB



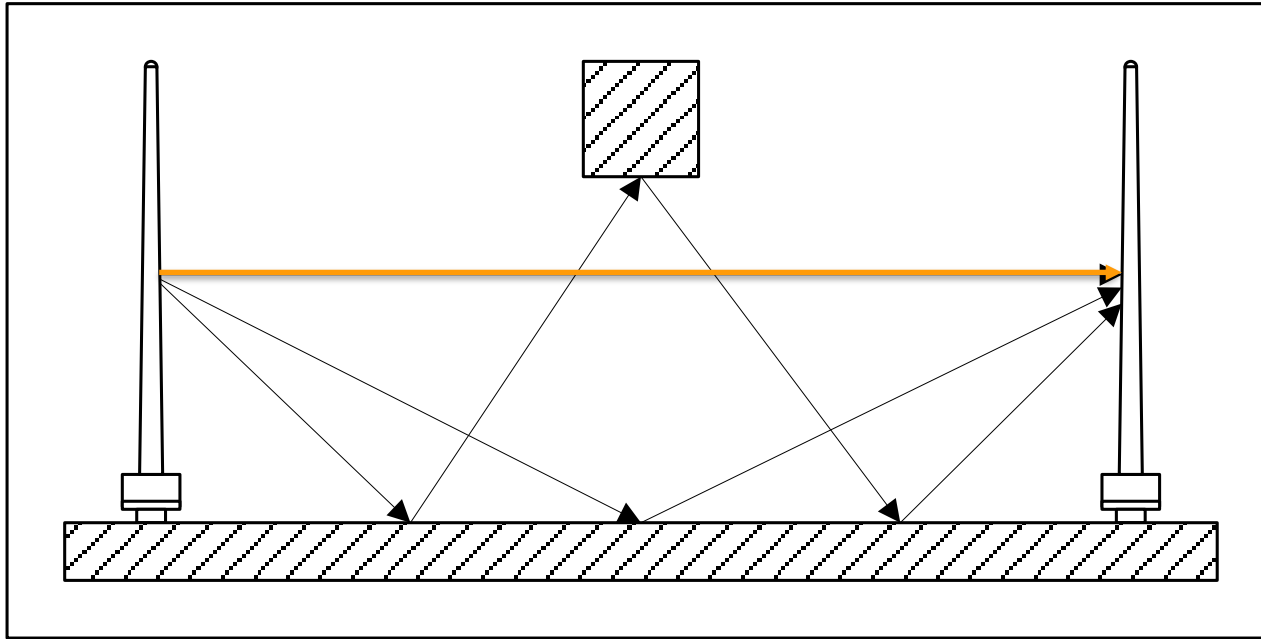
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UWB SIGNAL PROPAGATION



- RF signal propagates following a straight line in several directions at the **speed of light**:
 $c=299\,792\,458\text{m/s} \approx 3\text{e}8\text{m/s}$
- The signal while travelling is affected by absorption, reflection, refraction and/or diffraction
- As radio wave propagates in all directions, it can follow multipaths to reach its target. Then the same message will be received multiple times with different intensity

STRONG LOCALIZATION IN NON LINE-OF-SIGHT (NLOS) SCENARIOS

Accurate ranging also needed in NLOS scenarios, such as crowded, multipath signal environments with numerous walls, people, and other obstacles.

NXP's UWB solutions provide the robustness in NLOS

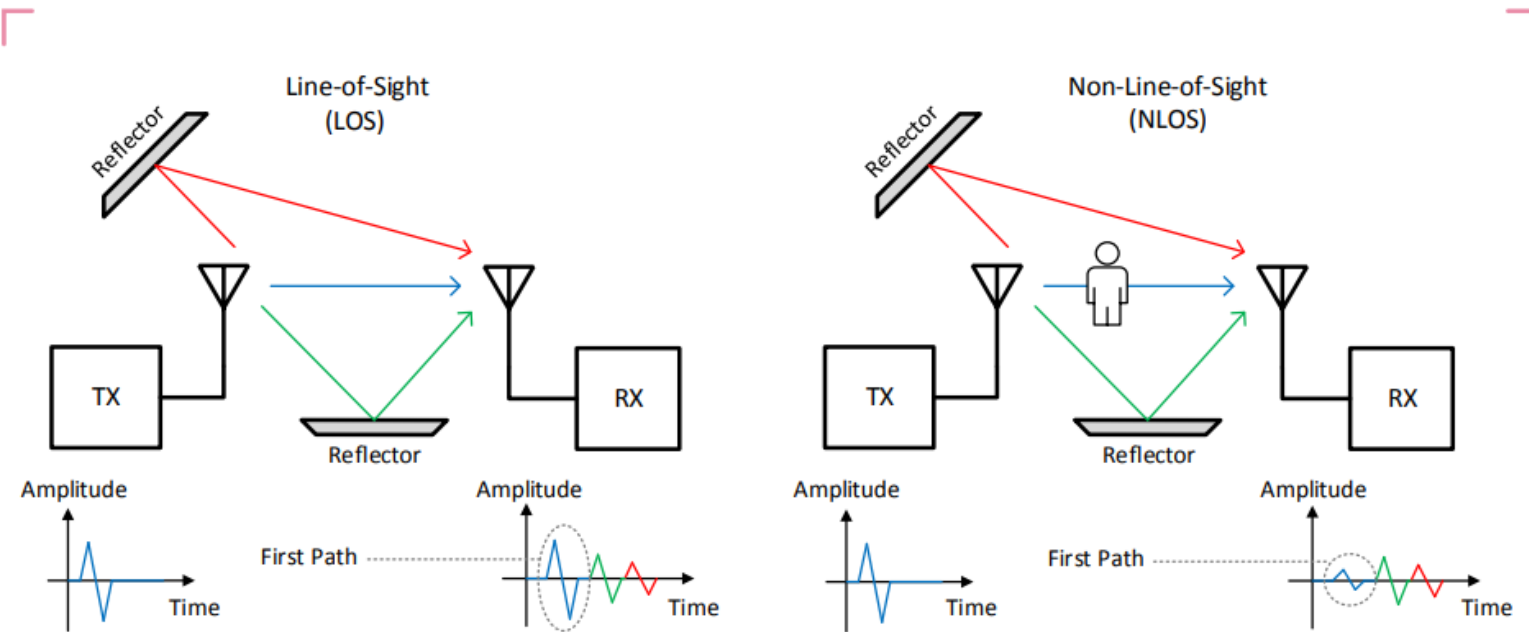


Figure 3: Simplified example of multipath components in LOS and NLOS scenario

Source: FiRa Consortium

Key Differentiators of UWB Ranging



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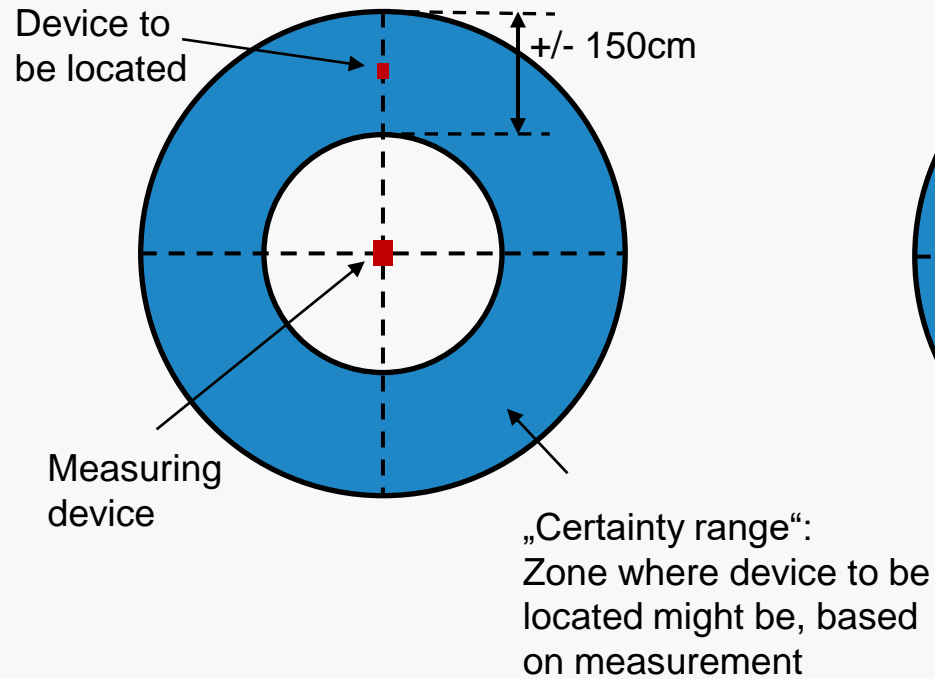
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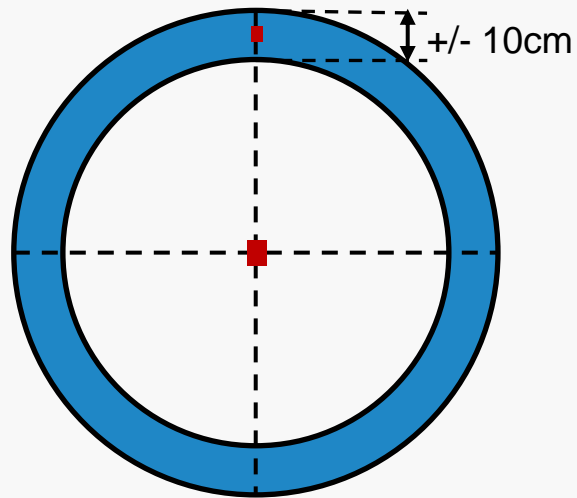


UWB DELIVERS ADVANCED LOCALIZATION USER EXPERIENCE

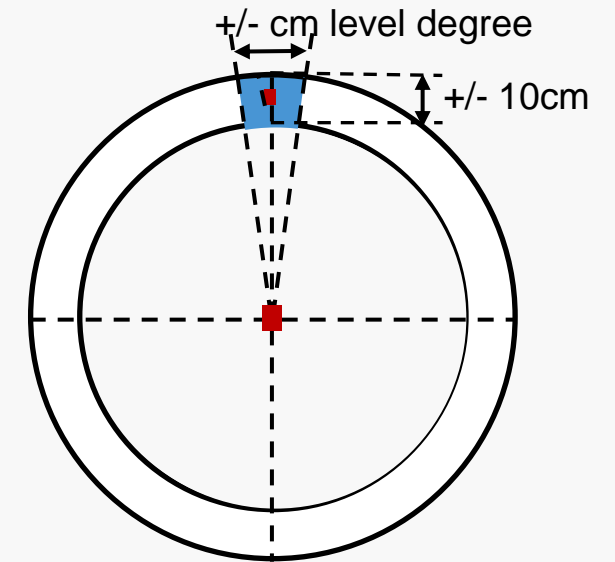
Ranging with BTLE, WiFi,...



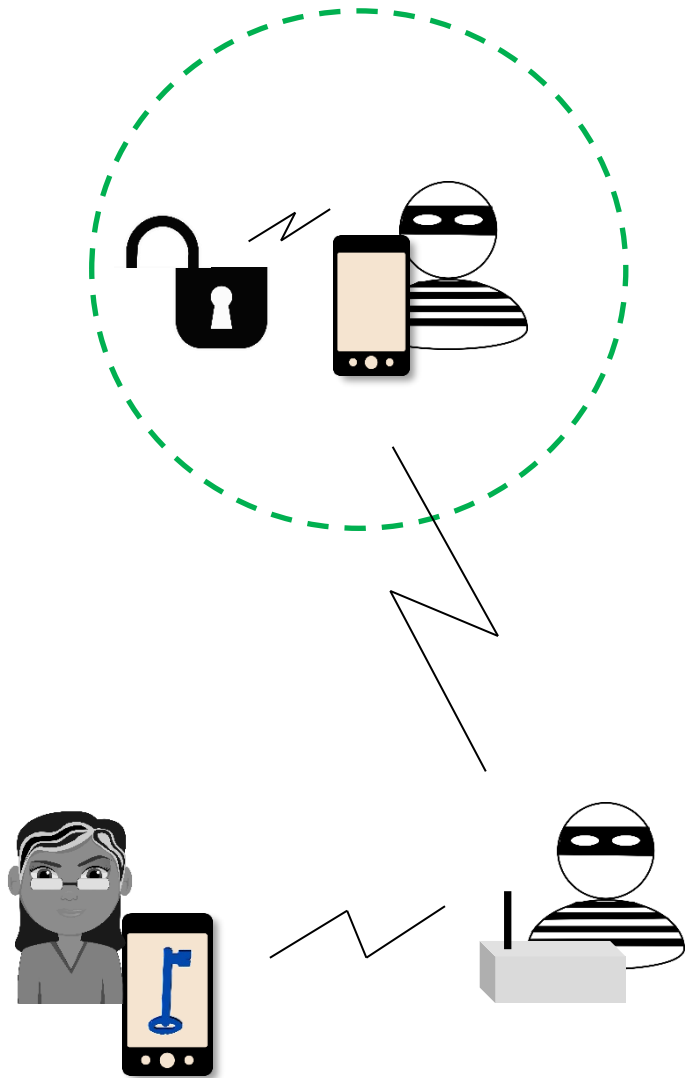
Ranging with UWB



Ranging and localization with NXP UWB



BEST PROTECTION AGAINST RELAY ATTACKS



- UWB is resistant to relay attacks thanks to :
 - The use of time-of-flight measurements
 - Extra PHY layer security in IEEE 802.15.4z
- UWB is tightly coupled to the phone SE



SUMMARY: UWB KEY DIFFERENTIATORS

Secure

Integrity of distance result due to PHY layer encryption

Real Time

Refresh rate of 200~1000 times/second

Co-existent

Support band different from Bluetooth/Wi-Fi



Reliable

Immune to narrowband fading or jamming

Accurate

Centimeter resolution in dense multipath environments

Low Energy

Ultra short airtime

Source: FiRa Consortium

Ranging Technics



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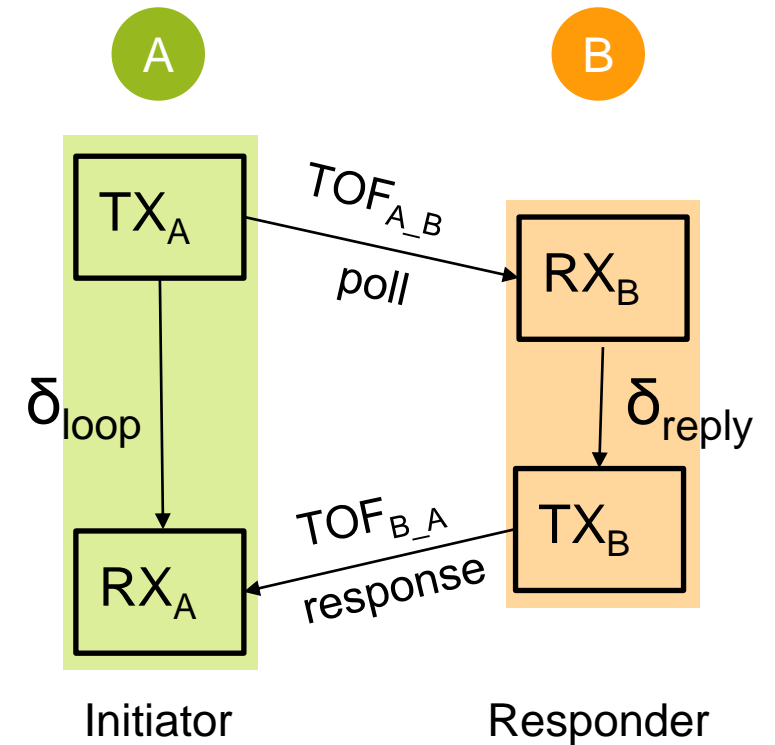


SINGLE SIDED – TWO WAY RANGING (SS-TWR)

- **Time of Flight (ToF)** is measurement of the time it takes for the radio waves to travel a distance in the air
- **Initiator (A)** send a **poll** to **Responder (B)**
- Time needed by the **poll** to cross the distance D_{A_B} between A&B and reach B, is $\text{ToF}_{A_B} = D_{A_B}/c$
- Delay of processing (between request receiving and response sending) δ_{reply} is added in the PSDU response
- Delay needed by the **response** to reach A, is $\text{ToF}_{B_A} = D_{B_A}/c = \text{ToF}_{A_B}$
- Initiator knows delay between the poll sending and response receiving): $\delta_{\text{loop}} = 2 \times \text{ToF}_{A_B} + \delta_{\text{reply}}$

• Then

$$\text{ToF}_{A_B} = \frac{\delta_{\text{loop}} - \delta_{\text{reply}}}{2}$$



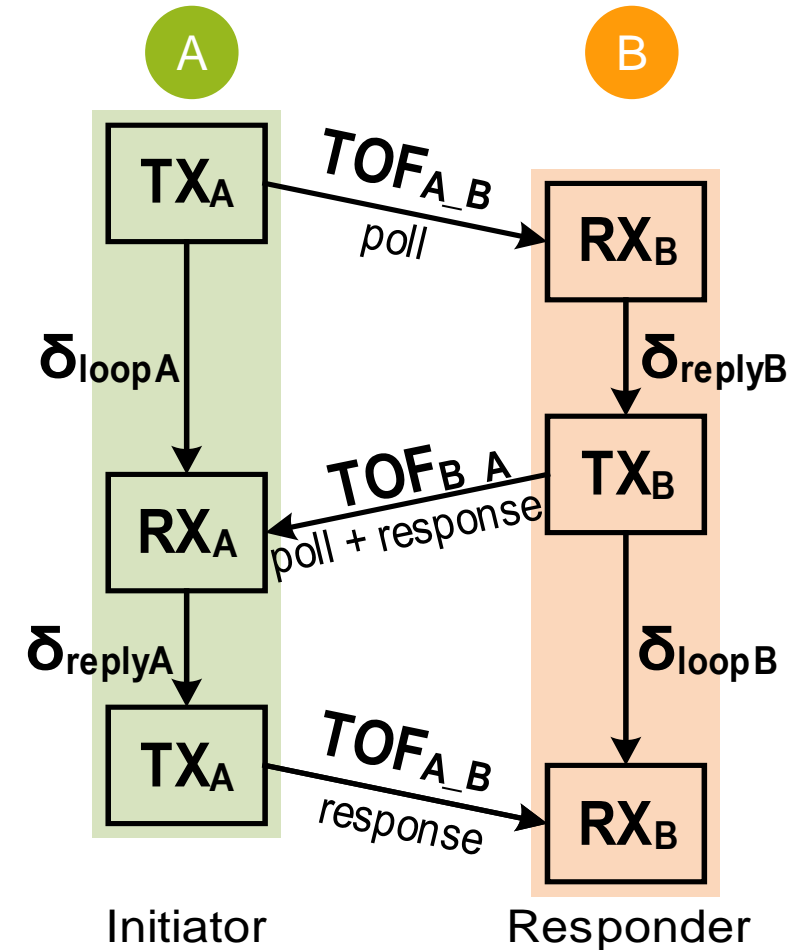
DOUBLE SIDED – TWO WAY RANGING (DS-TWR) DOUBLE SIDED (DS-TWR)

- SS-TWR is a simple technic, but any clock reference difference between Initiator and responder leads to TOF calculation error
- To avoid this **Two Way Ranging Double Sided (DS-TWR)** could be used
- Two SS-TWR are performed
- Each device can calculate the ToF

• Then

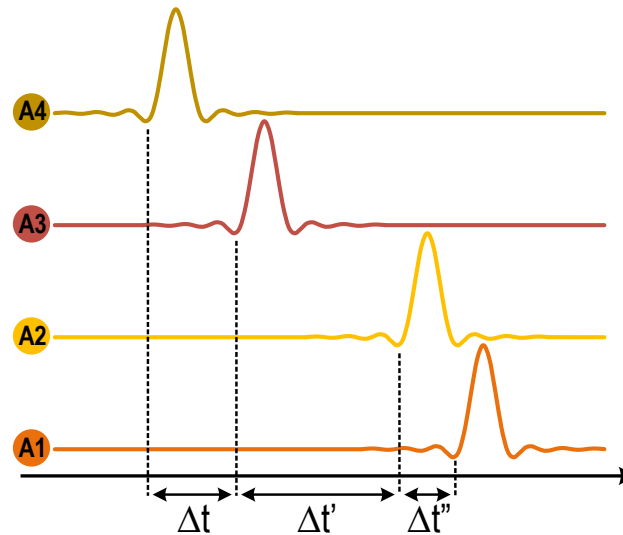
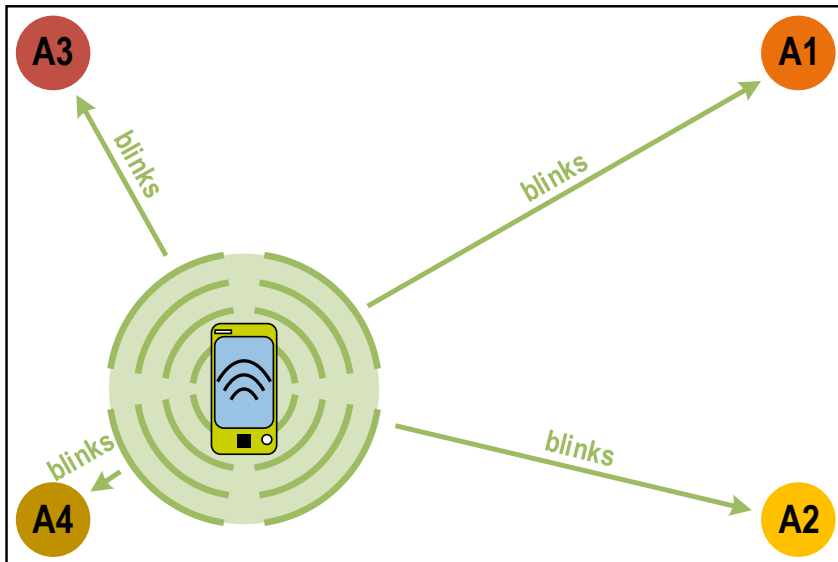
$$\text{ToF}_{A_B} = \frac{\delta_{\text{loopA}} \times \delta_{\text{loopB}} - \delta_{\text{replyA}} \times \delta_{\text{replyB}}}{\delta_{\text{loopA}} + \delta_{\text{loopB}} + \delta_{\text{replyA}} + \delta_{\text{replyB}}}$$

- Clock difference in the two devices are compensated but more energy is required due to 3 frames



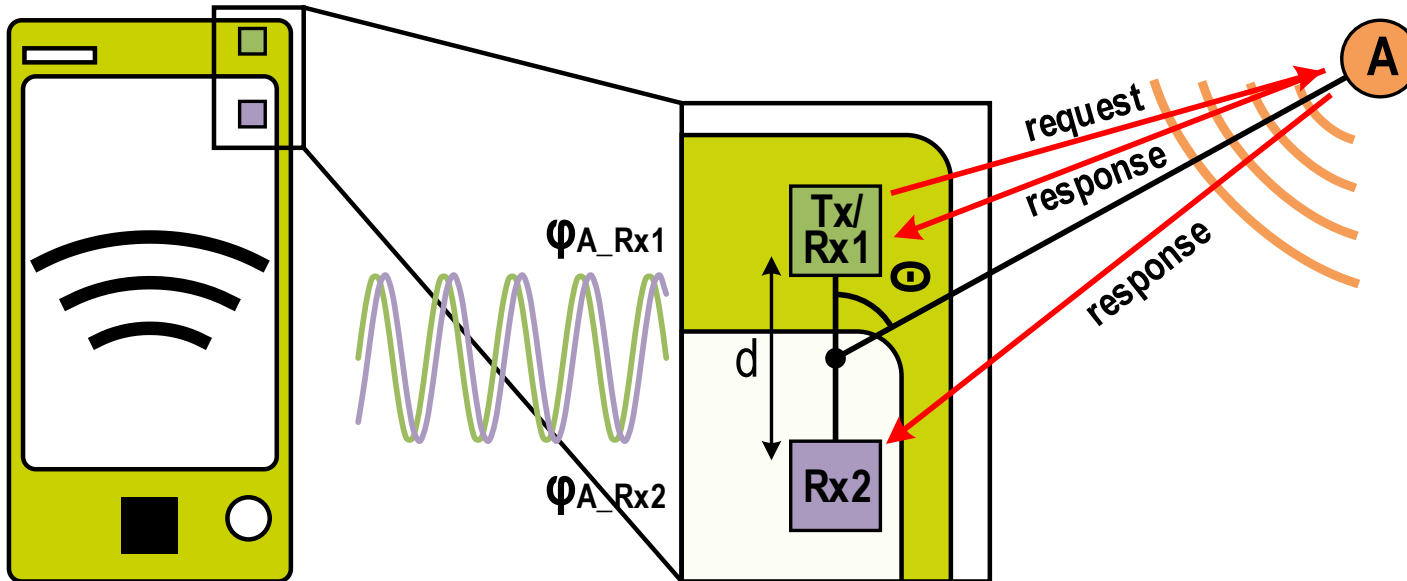
TIME DIFFERENCE OF ARRIVAL (TDOA) (TIME DIFFERENCE OF ARRIVAL)

- TDoA is normally used for indoor location service and navigation use cases
- Initiator send out one data packets (blinks), and Anchors ($A_{1,2,3,4}$) don't respond back
- **TDoA (Time Difference of Arrival)** method estimates the distance by using the difference of timestamps between anchors with a known spacing
- Four anchors are needed localization without ambiguities
- All anchors must be synchronized. This induces system complexity and hardware costs increase compared to TWR



ANGLE OF ARRIVAL (AOA) ANGLE OF ARRIVAL – PHASE DIFFERENCE OF ARRIVAL

- **Angle of Arrival (AoA)** is based on **Phase Difference of Arrival (PDoA)** method.
- **PDOA** calculation is done during response of TWR using the phase difference ($\Delta\phi$) between two antennas of received signals.
- Phase difference ($\Delta\phi$) is calculated using carrier signal and not UWB pulse envelope.
- Reception antenna spacing (d) should be below $\lambda/2$. (~18,8mm for CH9)
- **AoA** (θ) is a computation of above quantities:



$$\begin{aligned}\Delta\phi &= \phi_{A_Rx1} - \phi_{A_Rx2} \\ &= 2\pi \times f \times \Delta t \\ &= 2\pi \times f \times \frac{\Delta D}{c} \\ &= 2\pi \times \frac{d \times \cos(\theta)}{\lambda}\end{aligned}$$

$$\Rightarrow \theta = \text{acos} \left(\frac{\Delta\phi \times \lambda}{2\pi \times d} \right)$$

Standardization



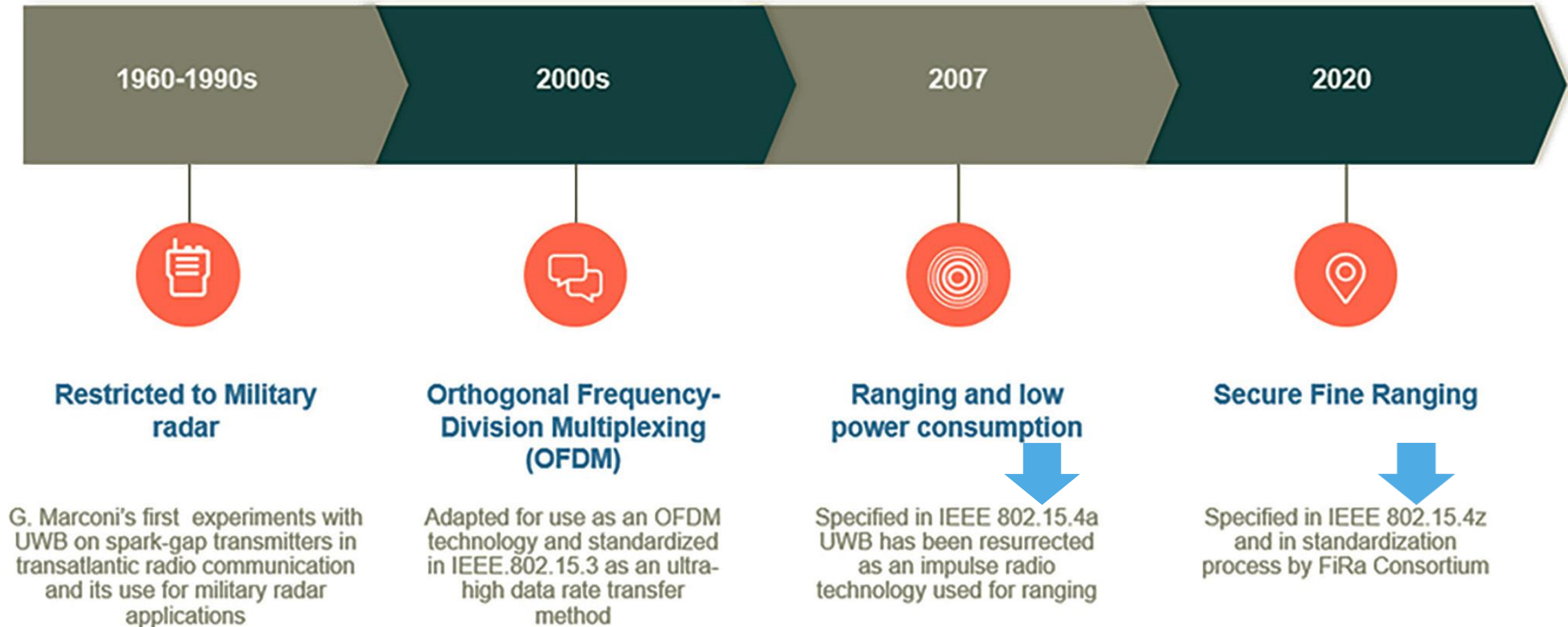
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UWB HISTORY



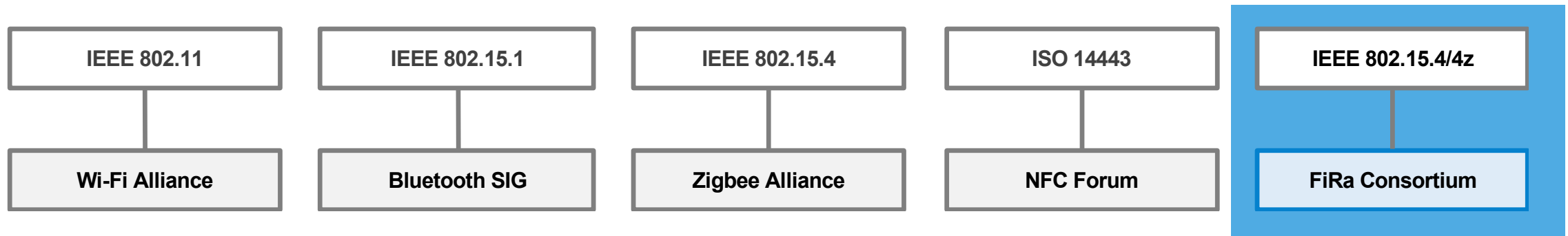


FiRa: Making Fine Ranging a Reality

1. Create opportunities by identifying and developing **use cases**
2. Ensure seamless end-user experiences by defining **standards and certification** programs for interoperability
3. Support rapid deployment by fostering the **UWB ecosystem**

DEVELOP USE CASES AND GUARANTEE INTEROPERABILITY

- Develop use cases based on IEEE 802.15.4z enhanced ranging technologies (basis is HRP portion of the IEEE 802.15.4-2020™ and 802.15.4z™-2020)
- Develop specifications and a certification program to ensure interoperability among chipsets, devices and solutions



Most recently MAC & PHY layer specifications has been released

- FiRa PHY Technical Requirements Specification prescribe hardware and RF communications
- FiRa MAC Technical Requirement:
 - Prescribes UWB ranging protocols and behavior of the ranging devices
 - Basis to develop test cases for functional and interoperability testing
 - Basis for certification program development

UWB Deployments in Mobile Devices and IoT



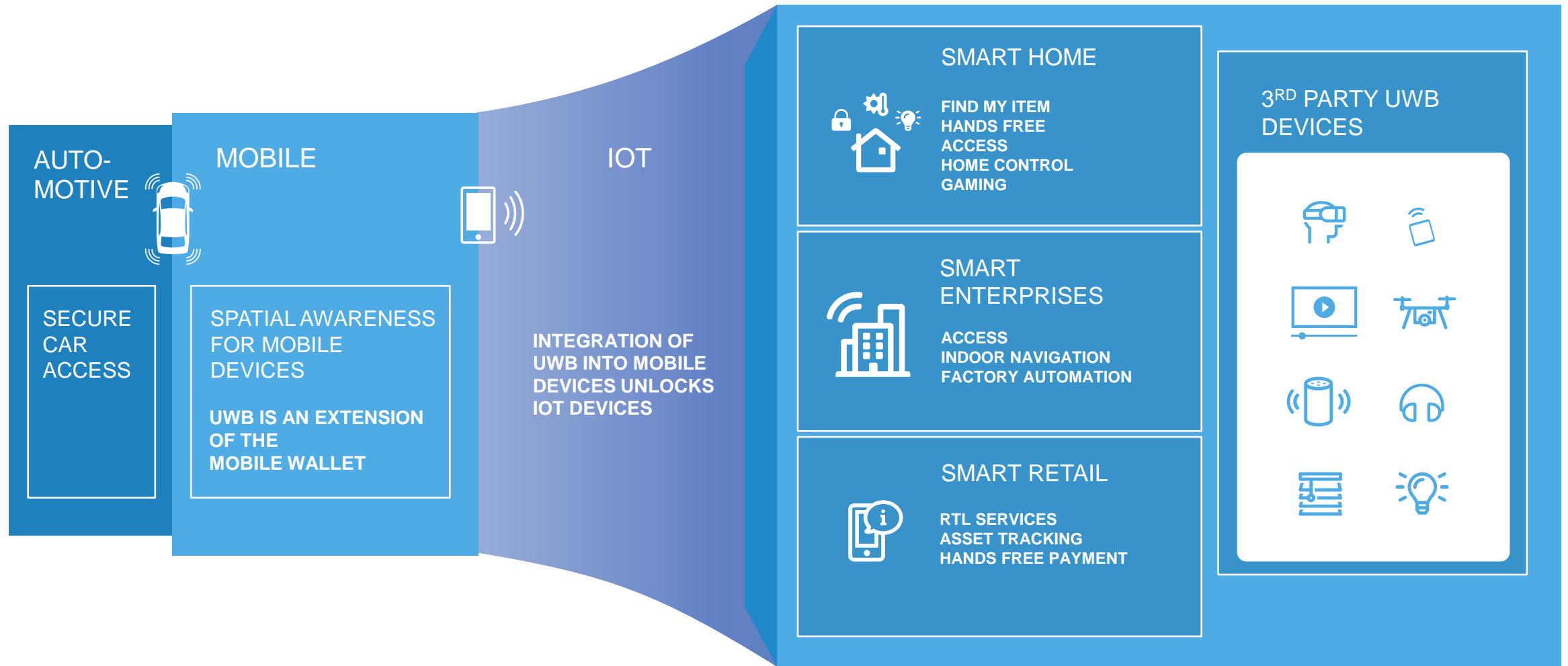
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DEPLOYMENT OF UWB IN MOBILE IS AN ENABLER FOR IOT ECOSYSTEM



INTEGRATION OF UWB INTO MOBILE & IOT DEVICES



Apple's decision to utilize its own UWB technology in its iPhone 11, iPhone 12 and iPhone 13 series of devices has given significant attention to UWB technology



Samsung introduced UWB within its Galaxy Note 20 Ultra and Z Fold 2, and has since incorporated this into its latest Galaxy S21 Ultra and Galaxy S21+



Xiaomi MIX4 Smartphone Deliver New "Point to Connect" Smart Home Solution



Airtag



Homepod Mini



Apple Watch



Smart Tag+

Xiaomi Sound Smart speakers and TVs announced

The install base of several generations of UWB-enabled mobile devices provides the infrastructure for new IoT devices to interact with. By 2025 ABI Research expects that 1/3 of smartphones shipping will be UWB enabled, equating to well over **500 million annual shipments**.

UWB DEVELOPMENT RESOURCES FROM MAJOR SMARTPHONE OEMS

iOS UWB Nearby Interaction Framework

- Leveraging the U1 chip in iPhone or Apple Watch.
- iPhone 11 and Apple Watch Series 6 or later.
- iOS 15 and watchOS 8 or later
- Accessory manufacturers have to use iOS Nearby accessory protocol and an Apple-approved UWB solution to manufacture accessories.
- Nearby Interaction Accessory Protocol Specification for iOS 15 and iOS 16

Android UWB Default Framework

- Android 13 Platform AOSP UWB stack, an optional module for device manufacturer
- The UWB stack consists of the UWB mainline module and the HAL implementation provided by a UWB chip vendor.
- The UWB stack includes API surfaces for system apps and third-party apps.
- Third-party apps uses the Jetpack UWB public API surface



Trimension SR150

Trimension SR040



IoT UWB Accessories with fine Ranging and AoA features

UWB Products From NXP



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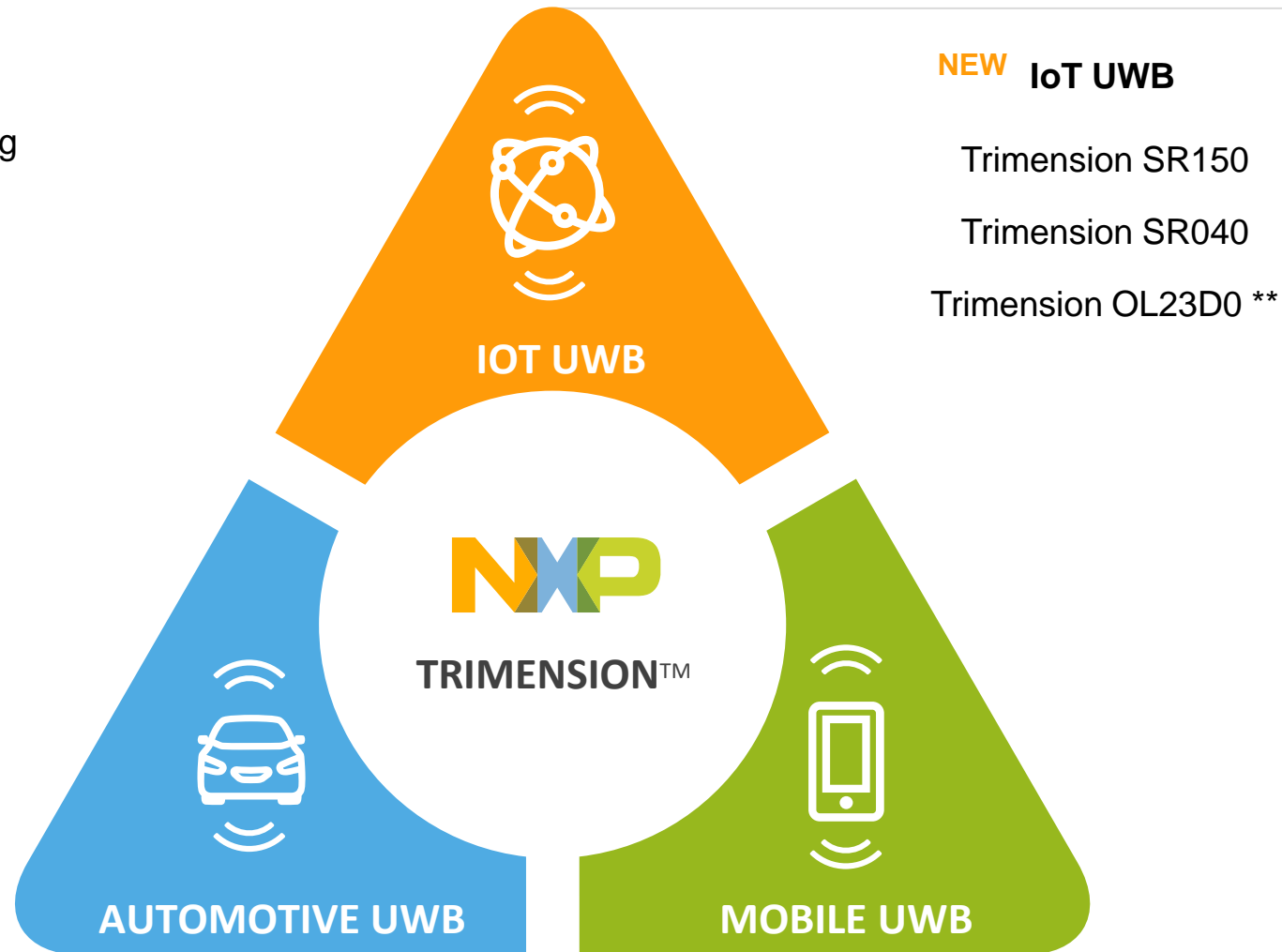
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DRIVING INNOVATION AT THE INTERSECTION OF KEY VERTICALS

NXP Trimention™ represents NXP's UWB portfolio, a rich collection of UWB solutions that enable secure fine ranging and sensing across automotive, mobile and IoT devices.

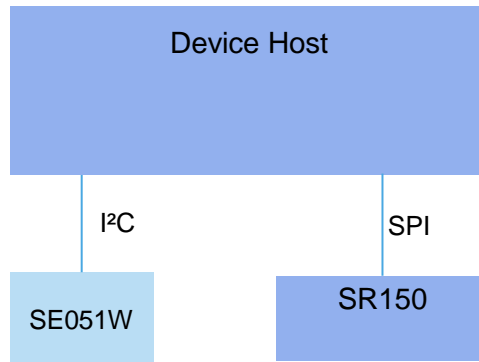


** Available to selected customers and applications

NXP TRIMENSION

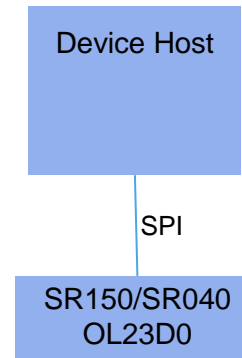
Trimension™			
IoT UWB		Mobile UWB	Auto UWB
Trimension SR150	Trimension SR040	Trimension SR100T	Trimension NCJ29D5B/C
<ul style="list-style-type: none">• Dual-RX for AoA functionality• 3D AoA possible• Connected to EdgeLock SE for Secure Ranging Use Cases• RTOS and Linux SW Solution for IoT integration• In accordance with FiRa• Arm® Cortex®-based	<ul style="list-style-type: none">• Specialized part for battery-operated use cases• On-chip program memory, for download-free booting• Optimized low-power modes• Integrated Tx/Rx switch• Arm® Cortex®-based	<ul style="list-style-type: none">• Connected to SE SN100 Family for Secure Ranging Use Cases• Android SW Solution for Mobile Integration	<ul style="list-style-type: none">• Interoperability granted for smart car access• Highest localization resolution• Lowest system cost• Integrated power management• High band operation from 6.0-8.5 GHz• Arm® Cortex®-based• On-chip support for a wide range of cryptographic operations
<div>Trimension OL23D0</div> <p>Open, fully customer programmable UWB controller for IoT applications</p>		<div>More information: https://www.nxp.com/products/wireless/secure-ultra-wideband-uwband:UWB-TRIMENSION</div>	

UWB PLATFORM VARIANTS (NXP ONE-STOP-SHOP)

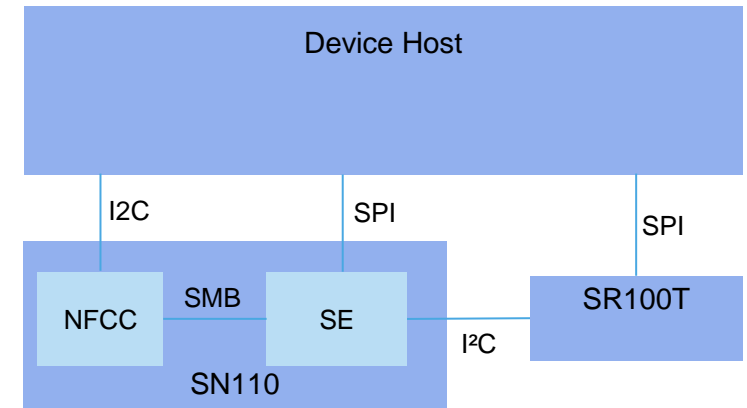


Dynamic Secure Ranging IoT Platform

SR150 and SE051W (EdgeLock) are designed to work together to fulfil system level secure use cases in IoT devices



Static Secure Ranging IoT Platform



Dynamic Secure Ranging Mobile Platform

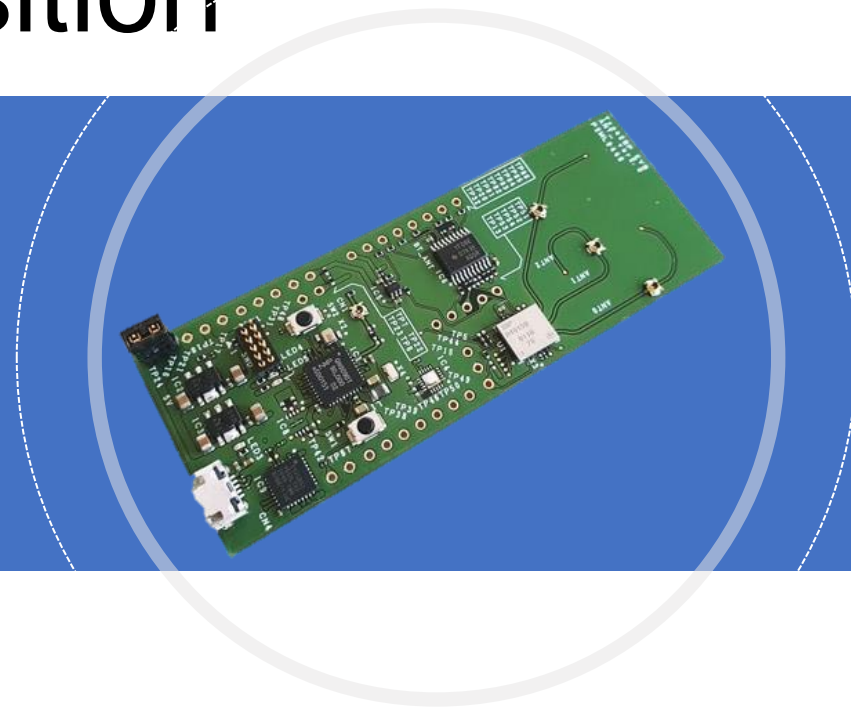
SN110 and SR100T are designed to work together to fulfil system level use cases in a secure way for smart phones

UWB Module value proposition

WHAT IT TAKES TO INTEGRATE A UWB CHIP ON BOARD

- Experienced manpower on HW design in 6.5 – 8GHz band
- Simulation tools for PCB and RF simulations
- Tester dedicated for UWB needed (debugging and testing)

~300k\$ Tools Investment
+ Manpower

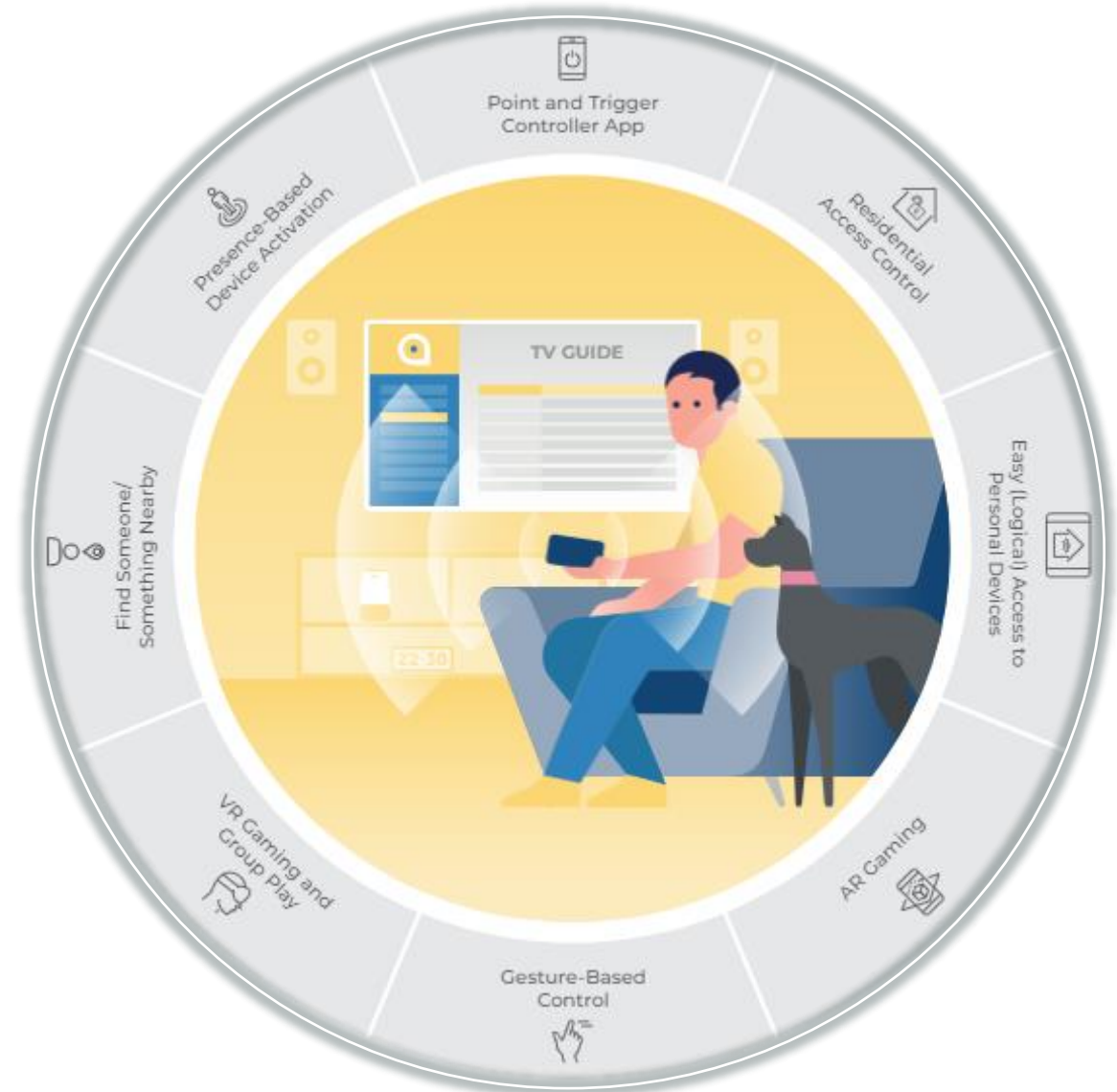


BENEFITS OF UWB MODULE VS. COB

- | | |
|----------------------------------|--|
| • PCB – 2 Layer vs. 4-6 Layer HD | ➔ Low-cost PCB design |
| • Proven and tested design | ➔ First time right UWB design |
| • Calibration of Power and Xtal | ➔ Shorter production test time |
| • FCC Module cert (on demand) | ➔ Lower certification cost |
| • Form factor agnostic RF design | ➔ Easy re-use of same design in various form factors |

Use Cases:

UWB Technology in your life....



Use Case (1): Remote Door Access

Enter a code on a keypad, place a finger on a scanner, tap a badge or wristband on a reader
– to open a doorway and enter a secured area, like your home or garage



Recommended Module: Type 2BP , Type 2DK

With UWB setup...

- **Hands-free access**
– complete freedom of movement
- **Secure Entry and Exit**
– security credentials verification
- **Better User Experiences**

Use Case (2): Smart Appliances

UWB-enabled connected home devices, such as speakers, televisions, light bulbs or thermostats

- **Colour and Brightness Control** of smart light bulb



Recommended Module: Type 2BP, Type 2DK



- **Thermostat Control** or **Seamlessly Casting of Video and Audio** from mobile device to a TV or speaker
- **Song Changing** or **Volume Adjustment** on speaker
- **Turning TV ON or OFF**

Use Case (3): Payment System

Enable consumers to make peer-to-peer (P2P) mobile payments to another user's smartphone without needing to find, enter or exchange personal data



- **Hands-free Payment** with secure ranging



Recommended Module: Type 2BP, Type 2DK

Use Case (4): Indoor Navigation

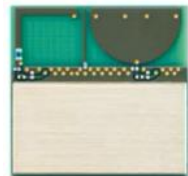


Recommended Module: Type 2BP, Type 2DK

With UWB setup...

- Locating quickly the necessary room, goods and services
- Sending notifications and tips based on the location
- Provide the useful content in real-time





Type 2DK



Type 2BP

Murata (NXP-based) UWB Modules and EVKs

Murata UWB Modules & Evaluation Kits



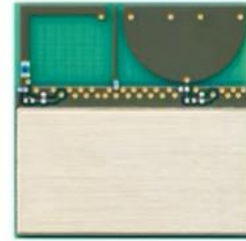
Type-2BP Module



Type-2BP EVK

TYPE 2BP (*Ideal for IoT Devices)

- **NXP SR150 UWB IC embedded**
- **Small package with shielding**
- **Support 3D AoA**



Type-2DK Module



Type-2DK EVK

TYPE 2DK (*Ideal for UWB Tags)

- **UWB + Bluetooth LE embedded (NXP SR040 + QN9090)**
- **Antenna embedded/ Whole in one package**

[Mass Production]

Type 2BP: SR150 UWB Module

Part Number

Part Number LBUA0VG2BP

Chipset

RF/BB SR150

Features

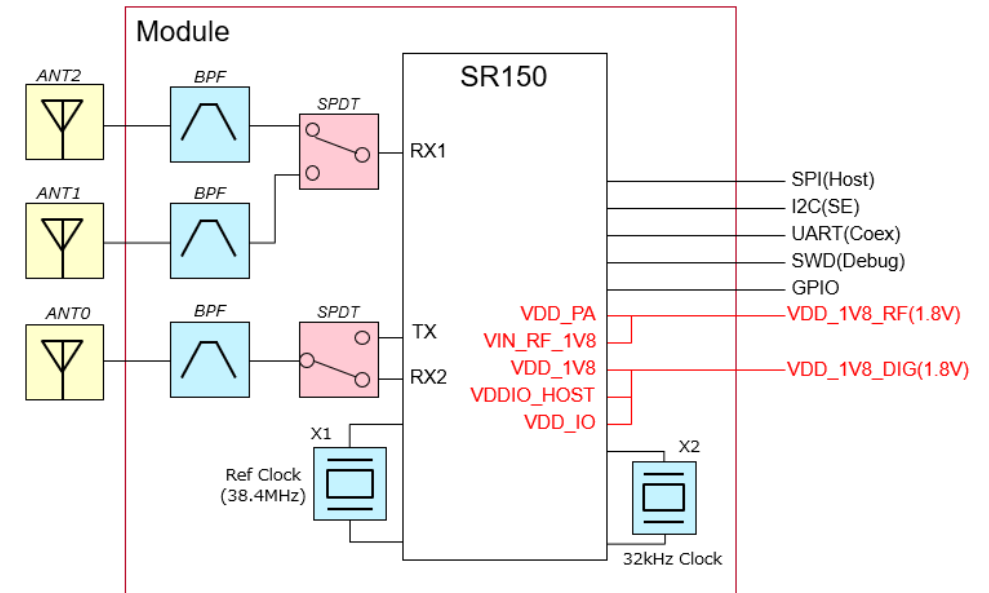
Interface SPI/GPIOs
RF technology UWB Ch5 and Ch9
Dimensions L x W x H (mm) 6.6 x 5.8 x 1.2 mm Max
Package Resin Mold with conformal shield + LGA
Supply Voltage (V) VDD: 1.71~1.98
Operating Temp. (°C) -30 to 85

Certification

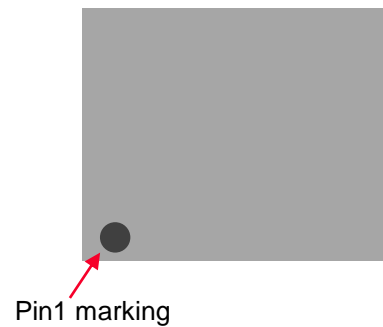
FCC/IC Available

Schedule

Sample NOW
MP NOW

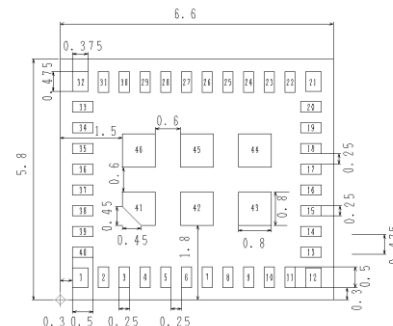


Top View



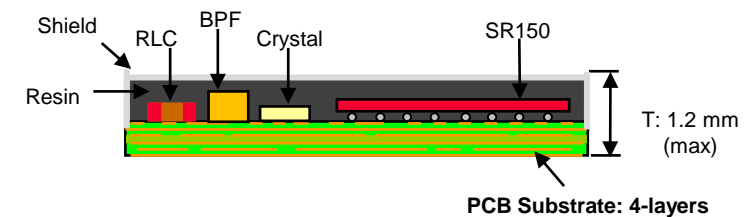
(Top side of marking : TBD)

Bottom View

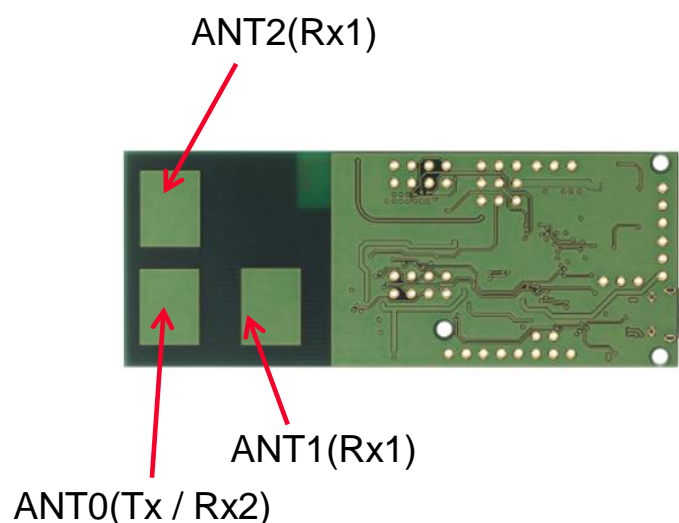
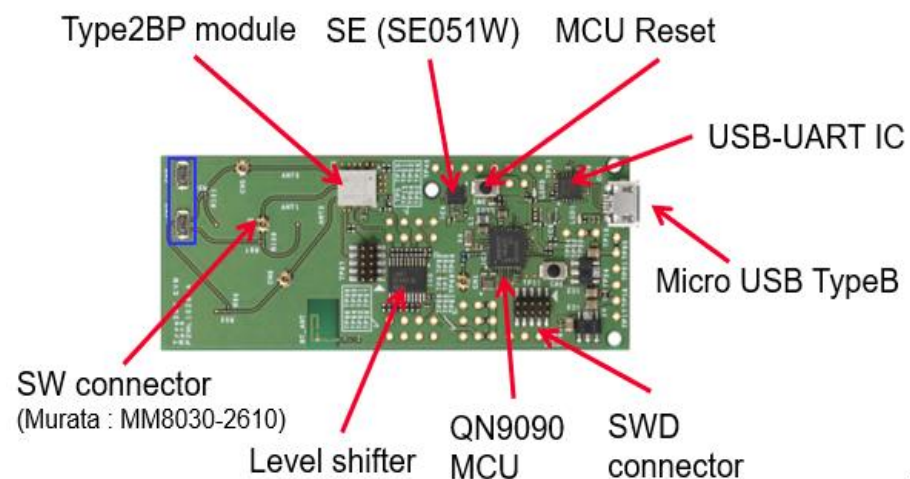


CONFIDENTIAL

Cross-Sectional Diagram



Type 2BP EVK: Features & Specification



Features & Specification

Size

8.0 x 3.1 x 0.1 cm

On-board Component

QN9090 (with 32.768 KHz sleep clock),
SPI Serial Flash memory,
Secure Element

Host Interface

USB

Other Interface

Debug UART, SWD Connector

Secure Element Interface (Yes/ No)

Yes (SE051W)

Application

Industrial:
Asset Tracking, Indoor Navigation
Smart City:
POS Terminal (Payment System)
Smart Lock

[Under Development; Preliminary Data]

Type 2DK: SR040 + QN9090 UWB + BLE Module

muRata
INNOVATOR IN ELECTRONICS

Part Number

Part Number LBUA2ZZ2DK

Chipset

RF/BB SR040

BLE/MCU QN9090

Features

Interface UART/I2C/SWD/GPIOs

RF technology UWB Ch5,6(*1),8(*1),9 and BLE 5.0

Dimensions L x W x H (mm) 19.6 x 18.2 x 2.3 mm Max

Package Metal case + LGA

Supply Voltage (V) VBAT_IO: 3.3V

VDD_BUF:3.3V

Operating Temp. (°C) -30 to 85

Certification

FCC/IC TBD

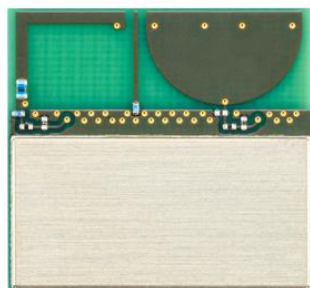
Schedule

Sample 2021 Q3

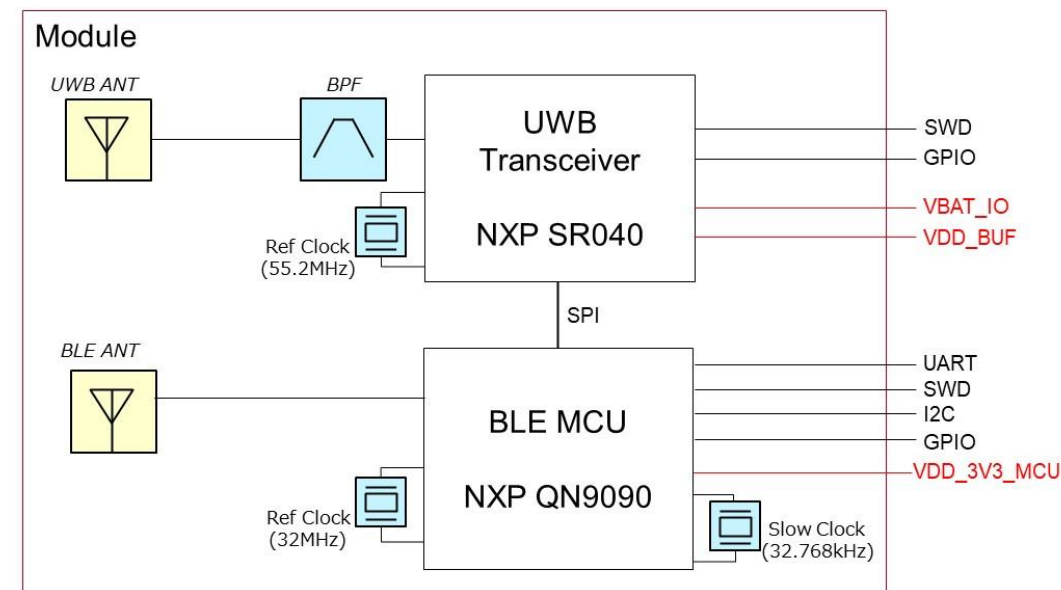
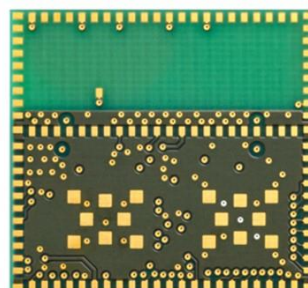
MP 2022 Q4

(*1) Ch6,8 support is option, please contact to Murata FAE in case to use Ch6 or/and 8.

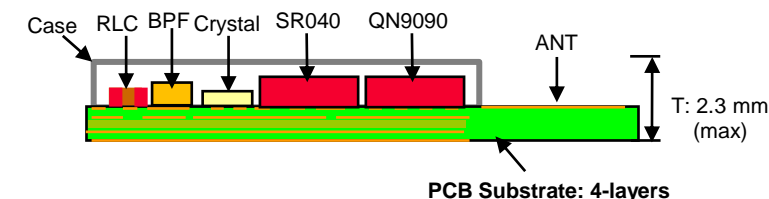
Top View



Bottom View



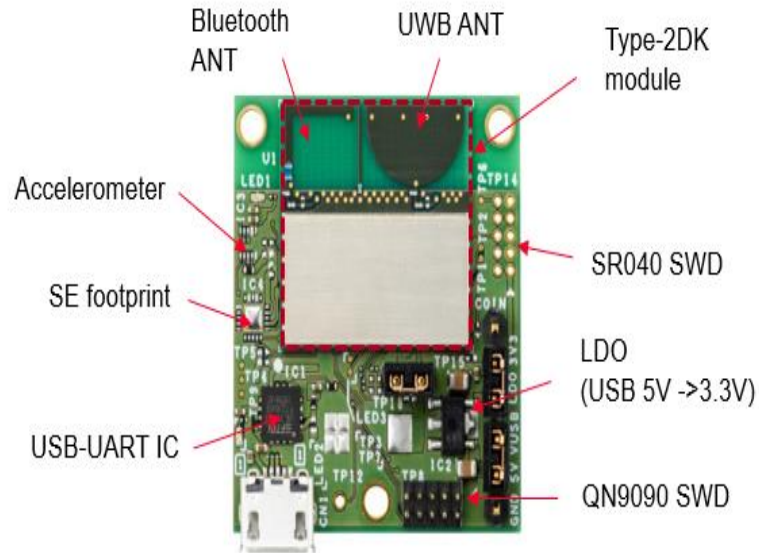
Cross-Sectional Diagram



CONFIDENTIAL

[Available]

Type 2DK EVK: Features & Specification



Features & Specification

Size	2.9 x 3.2 x 0.1 cm
On-board Component	SR040, QN9090, UWB and RTC Crystal, Band Pass Filter
Host Interface	USB
Other Interface	SWD for SR040 and QN9090
Accelerometer	Yes
Antenna	On Board UWB/ BLE Antenna
Application	Industrial: Indoor Navigation Smart City: Inventory and Supply Chain Management, Trackers, TDoA Tags

Pair Ranging with Murata Modules (Type 2BP/2DK)

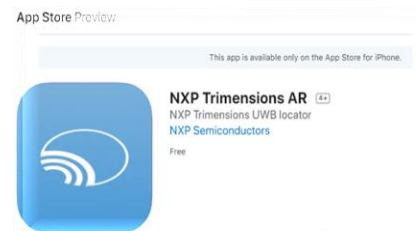
Pair Ranging (TWR/ AoA/TDoA)

- Power Plugged/ Battery Operation
- Two-way Ranging
- Supported Multisession/ Multicast

■ Pair ranging with Type2BP/ 2DK EVK

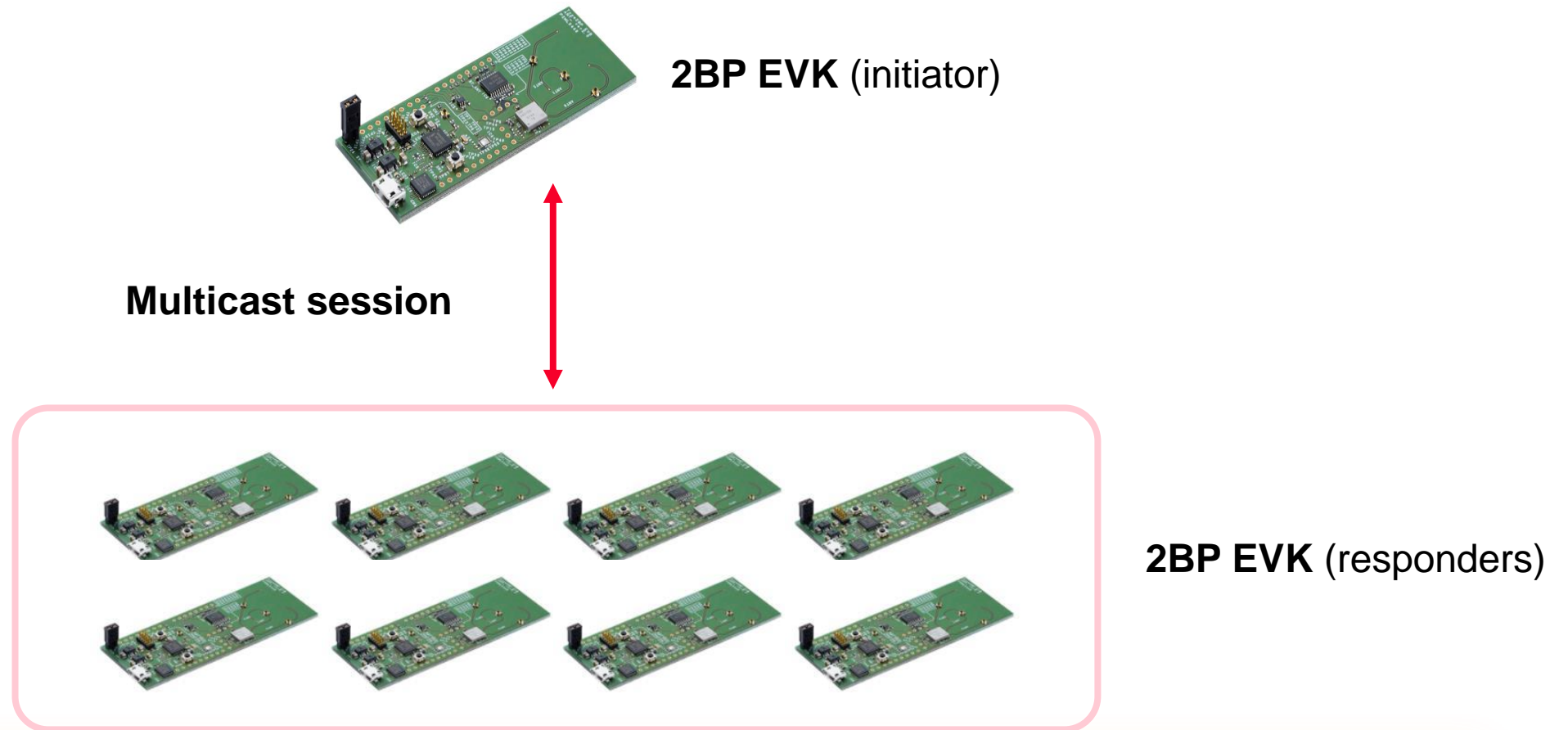


■ iPhone ranging with Type2BP/ 2DK EVK



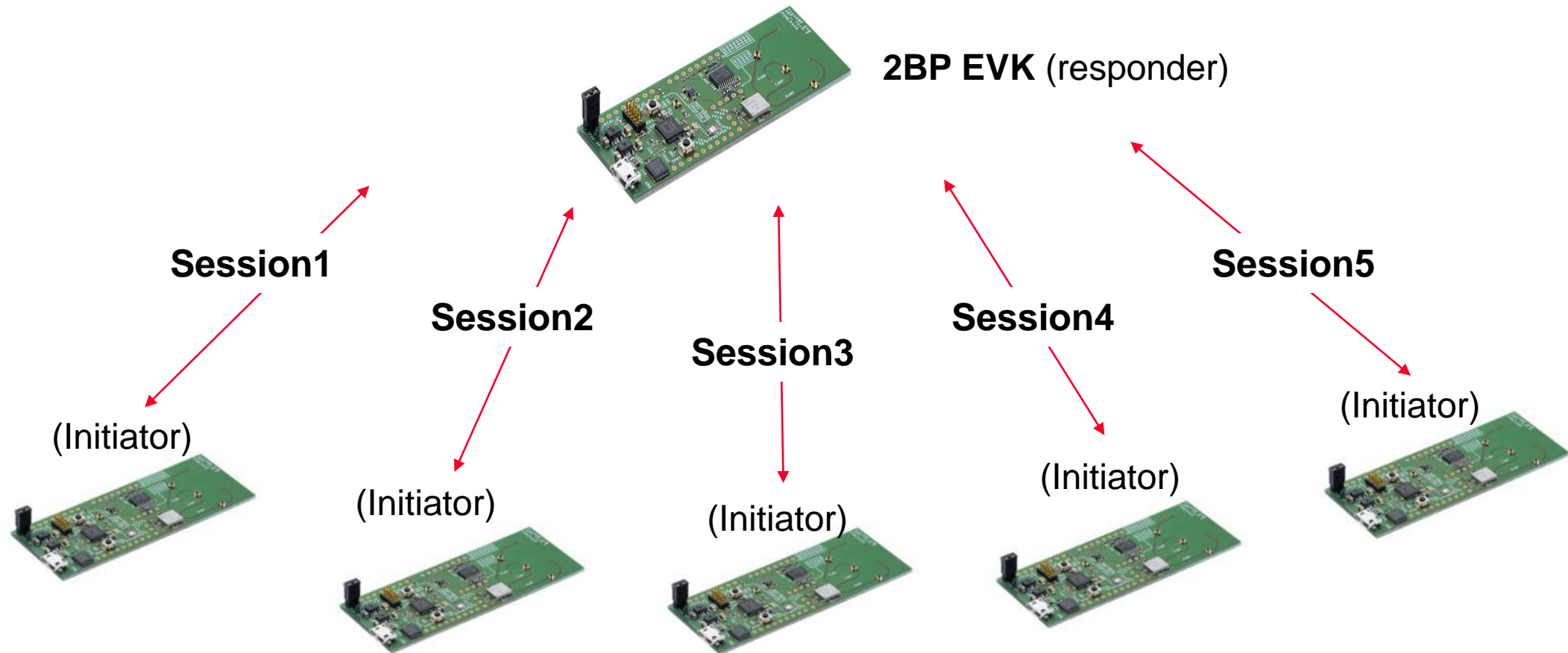
Multi DUT Connection: Multicast

Multicast



*One initiator can communicate with multiple responders using Multicast protocol (max. 8 responders)

Multi session



*One responder can support multiple sessions with initiators (max. 5 units)



Common Challenges Faced ...

- How to get started
- RF Design/ Antenna Design
- Prototype Design
- Radio Regulatory Certification



Type 2DK



Type 2BP

[DEMO]:
How to get started?

Agenda



1

Step by Step Guide
i.e. How to start
your evaluation with
EVK

2

Sample Codes
Available

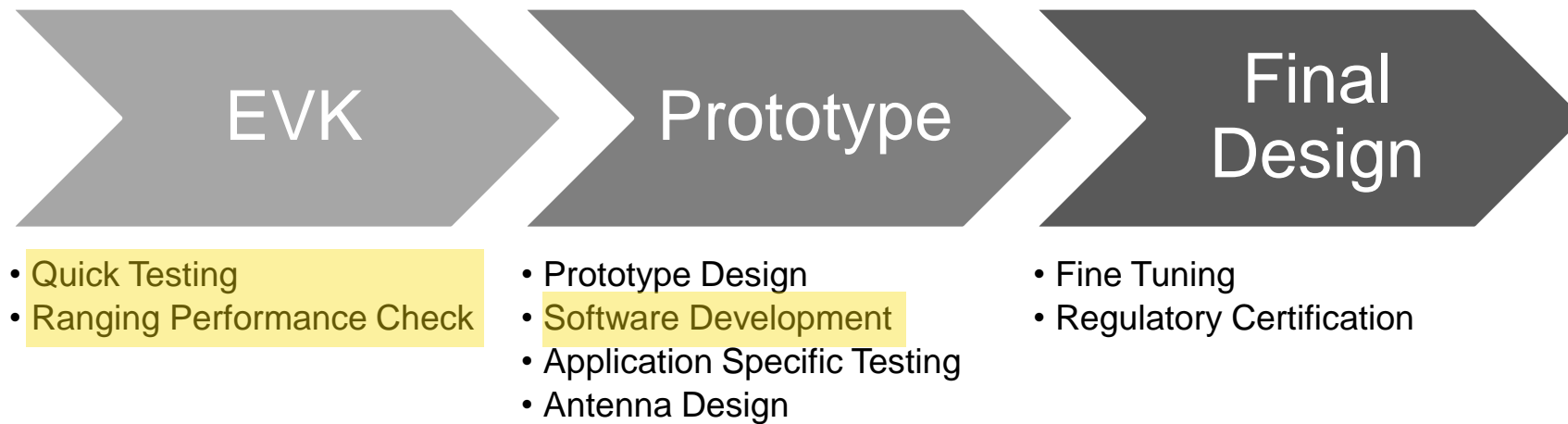
3

Smart Home
Multisession and
Data Transfer
Demo

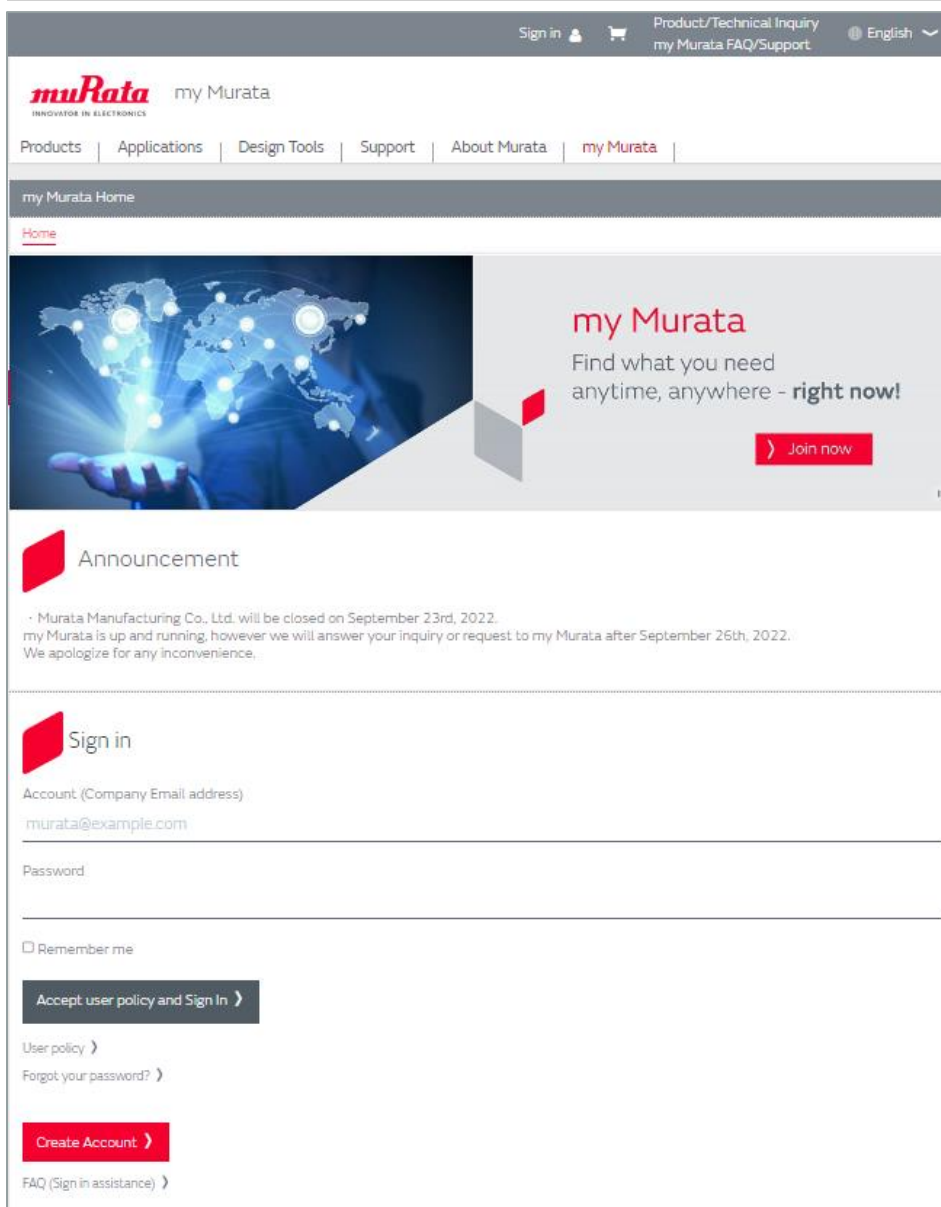
Step by Step Guide

So how can I get started?

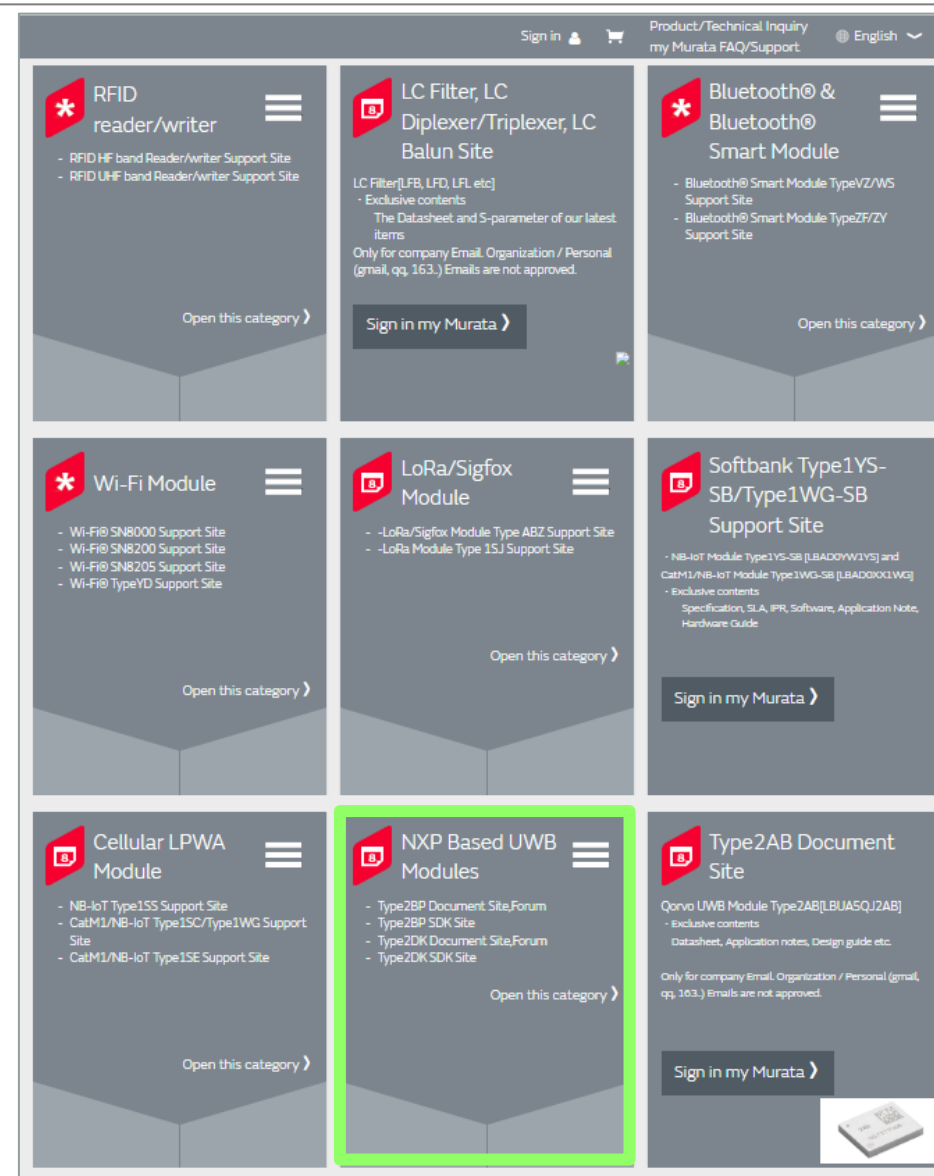
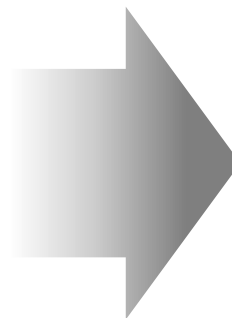
High-level Development Overview



my Murata: “Find what you need anytime, anywhere!”



The screenshot shows the my Murata homepage. At the top, there's a navigation bar with links for Sign in, Product/Technical Inquiry, my Murata FAQ/Support, and a language dropdown set to English. Below this is the my Murata logo and a navigation menu with links for Products, Applications, Design Tools, Support, About Murata, and my Murata. The main content area features a large banner with a world map and the text "my Murata Find what you need anytime, anywhere - right now!" with a "Join now" button. Below the banner is an "Announcement" section stating that Murata Manufacturing Co., Ltd. will be closed on September 23rd, 2022, and that my Murata is up and running, with inquiries to be handled after September 26th, 2022. Further down is a "Sign in" section with fields for Account (Company Email address) and Password, a "Remember me" checkbox, and buttons for "Accept user policy and Sign In", "User policy", "Forgot your password?", "Create Account", and "FAQ (Sign in assistance)".

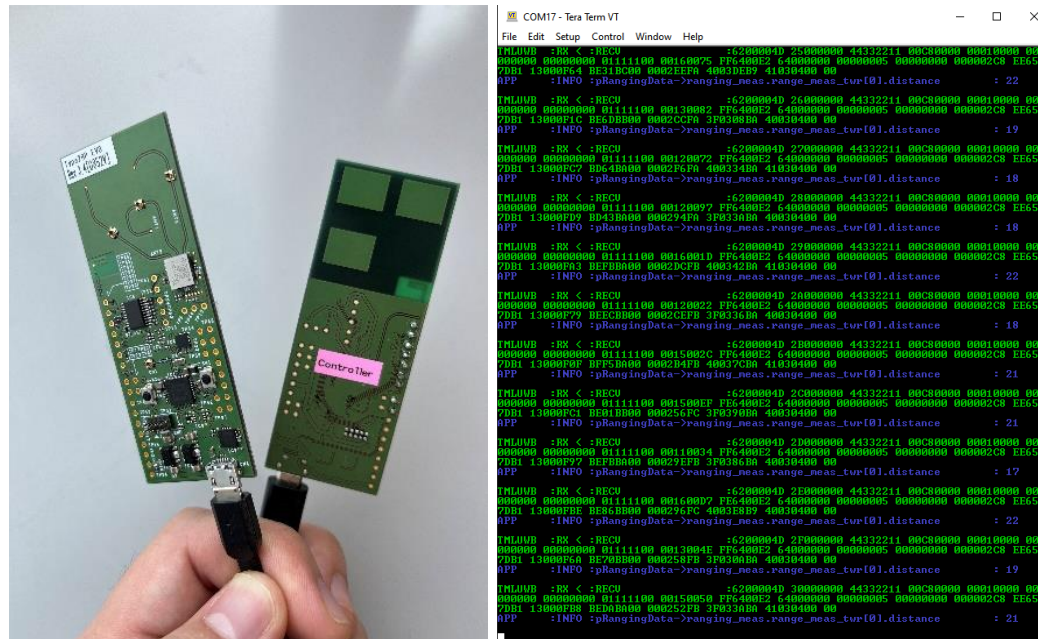


The screenshot shows a grid of product categories on the my Murata website. The grid is organized into three rows and three columns. Each category card includes a red icon, a title, a list of links, and a button to "Open this category" or "Sign in my Murata". The categories are: RFID reader/writer, LC Filter, LC Diplexer/Triplexer, LC Balun Site, Bluetooth® & Bluetooth® Smart Module, Wi-Fi Module, LoRa/Sigfox Module, Softbank Type1YS-SB/Type1WG-SB Support Site, Cellular LPWA Module, NXP Based UWB Modules (highlighted with a green border), and Type2AB Document Site. The NXP Based UWB Modules card is highlighted with a green border.

Step 1: EVK (Quick Testing)

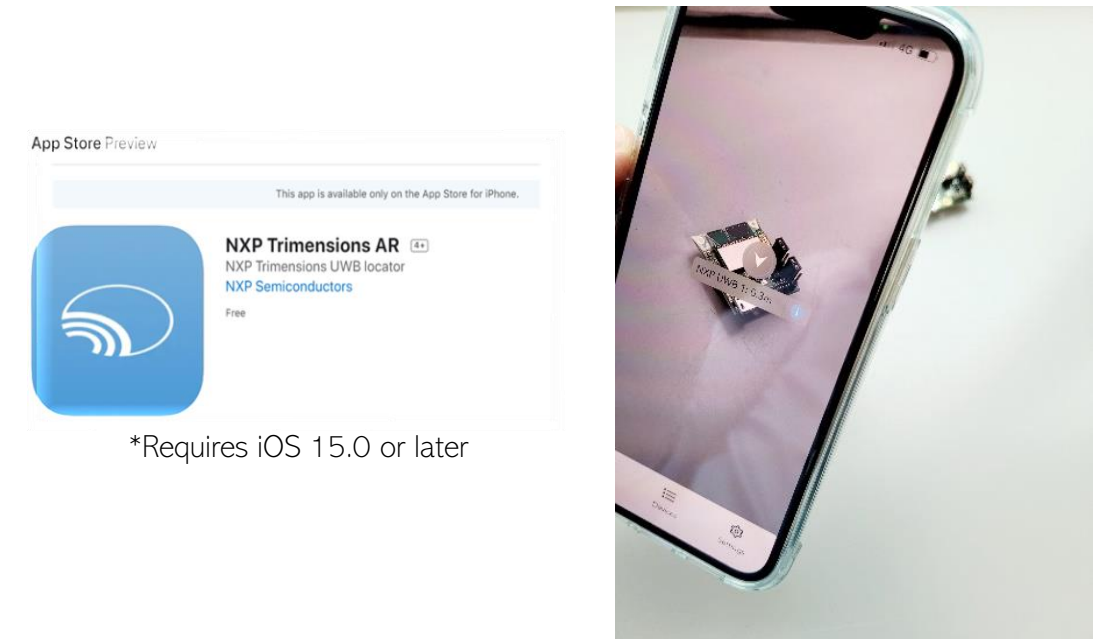
Upon receiving your EVK, just **power on** the EVK and start **ranging**!

1. Pair ranging test



Controller/controlee pair (left) Serial terminal output on PC (right)

2. Apple device connection test



*Requires iOS 15.0 or later

NXP UWB application (left) Type 2DK ranging with iPhone (right)

*Note: The distance and AoA are not fine tuned yet. Thus, not suitable for detailed performance evaluation.

Step 1: EVK (Quick Testing)

15:47

4G



NXP Trimension™ AR



NXP UWB AR application demonstration on iPhone 13

Step 1: EVK (Quick Testing)



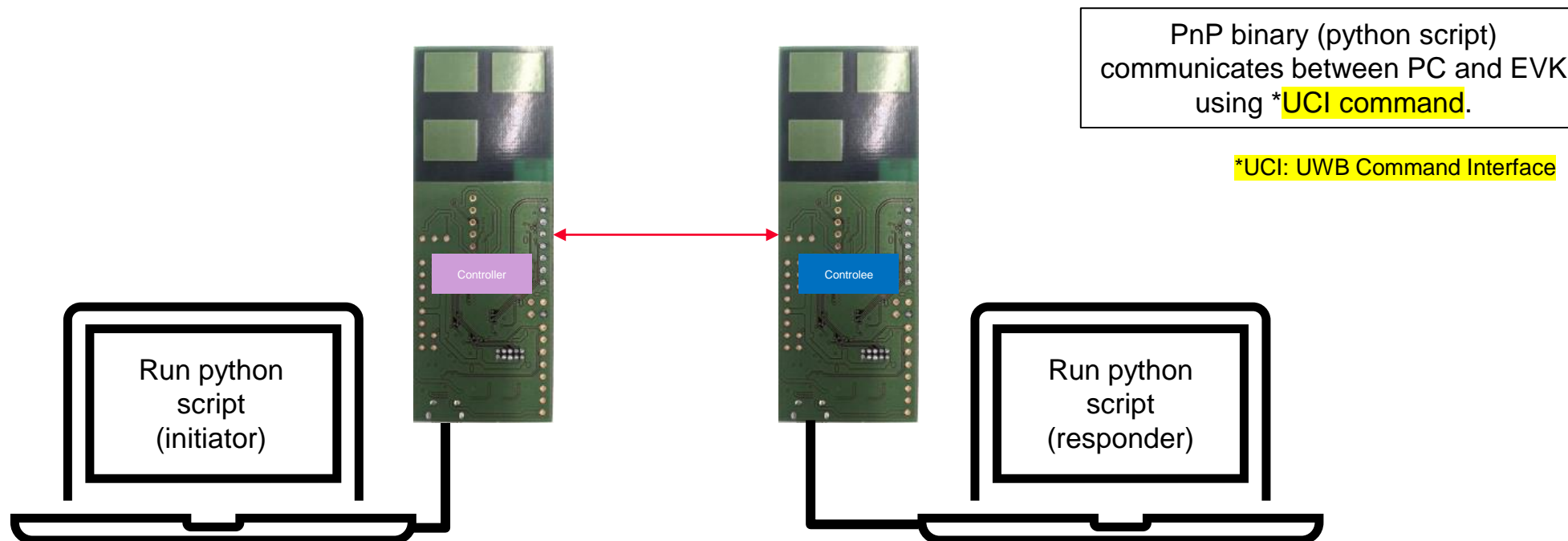
Source: Apple Design for spatial interaction - WWDC21

For information to build your UWB applications on iOS

https://developer.apple.com/documentation/nearbyinteraction/implementing_spatial_interactions_with_third-party_accessories

Step 2: EVK (Ranging Performance check)

For ranging performance testing, use **Plug and Play (PnP) binary**.



This is useful for UWB performance testing and calibration before development stage.
Setting parameters are easily changeable in Python script.

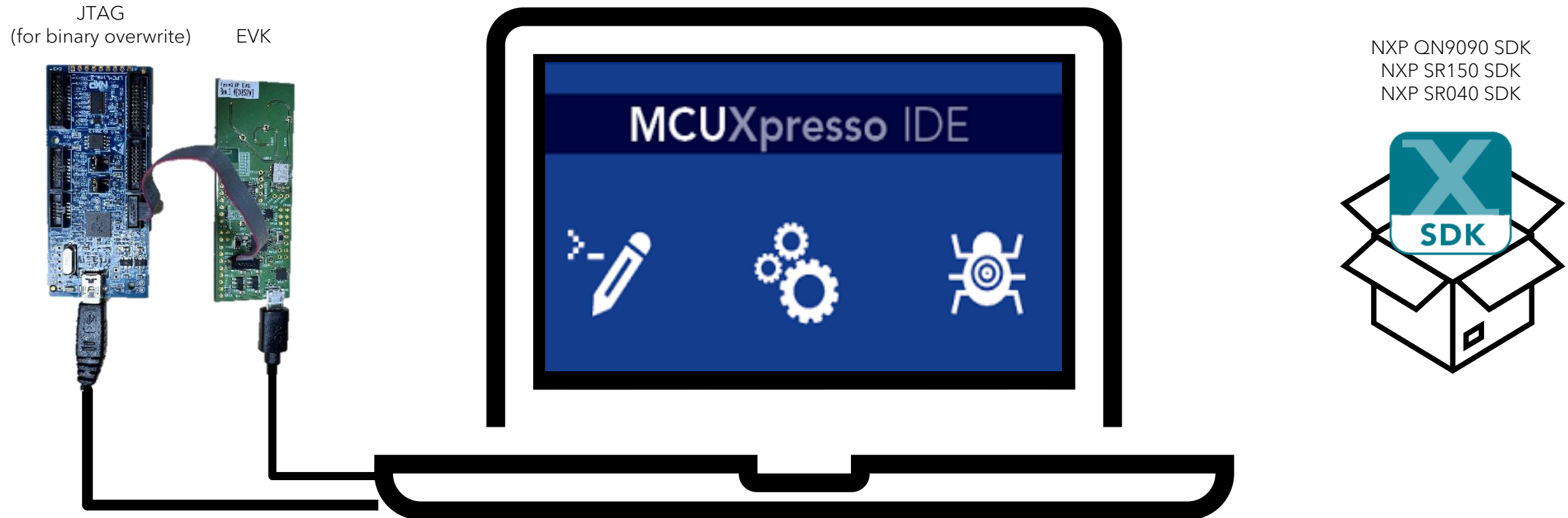
Step 2: EVK (Ranging Performance check)



PnP Binary demonstration on PC

Step 3: Prototype (Software Development)


Software development can be done using NXP SDK and IDE.



There are several **sample codes** available in the SR150 and SR040 SDK. Refer to these codes for faster development!

For more information


Please visit my Murata and look for
NXP Based UWB Modules site.



NXP Based UWB Modules

- Type2BP Document Site,Forum
- Type2BP SDK Site
- Type2DK Document Site,Forum
- Type2DK SDK Site

Open this category >



Type2AB Document Site


Qorvo UWB Module Type2AB[LBUA5QJ2AB]


- Exclusive contents
- Datasheet, Application notes, Design guide etc.

Only for company Email. Organization / Personal (gmail, qq, 163..) Emails are not approved.

Visit site home >


2022-05-12
✓ Approved





Centralized Power Products Support Site

Request access >



Type2BP Document Site


- Datasheet
- Quick Start Guide
- Starting Software Development Guide
- Calibration Guide
- PnP Mode Guide


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2022-03-31
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Type2BP SDK UWB IOT SR150 v03.13.03 Linux Site


- UWB IOT SR150 v03.13.03 Linux SDK


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Type2BP SDK UWB IOT SR150 v03.13.03 MCUx Site


- SR150 v03.13.03 MCUx Site

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2022-04-01
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You might have noticed...

1. Running from Linux host (Embedded Linux)

[MTD-APN-021-A_Type2BP_EVK_with_RaspberryPi4_Linux.pdf](#)



Type2BP SDK UWB IoT SR150 v03.13.03 Linux Site

- UWB IoT SR150 v03.13.03 Linux SDK

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Type2BP SDK UWB IoT SR150 v03.13.03 MCUx Site

- SR150 v03.13.03 MCUx Site

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2. Running from QN9090 (RTOS Embedded Device)

[MCM-21F-0091_Type2BP-Starting_Software_Development_Rev3.0A.pdf](#)

*Rev3.0A is for SDK v03.10.02 or before

[MCM-21F-0091_Type2BP-Starting_Software_Development_Rev3.0C.pdf](#)

*Rev3.0C is for SDK v03.13.03/v3.14.05

[MCM-21F-0091_Type2BP-Starting_Software_Development_Rev4.0.pdf](#)

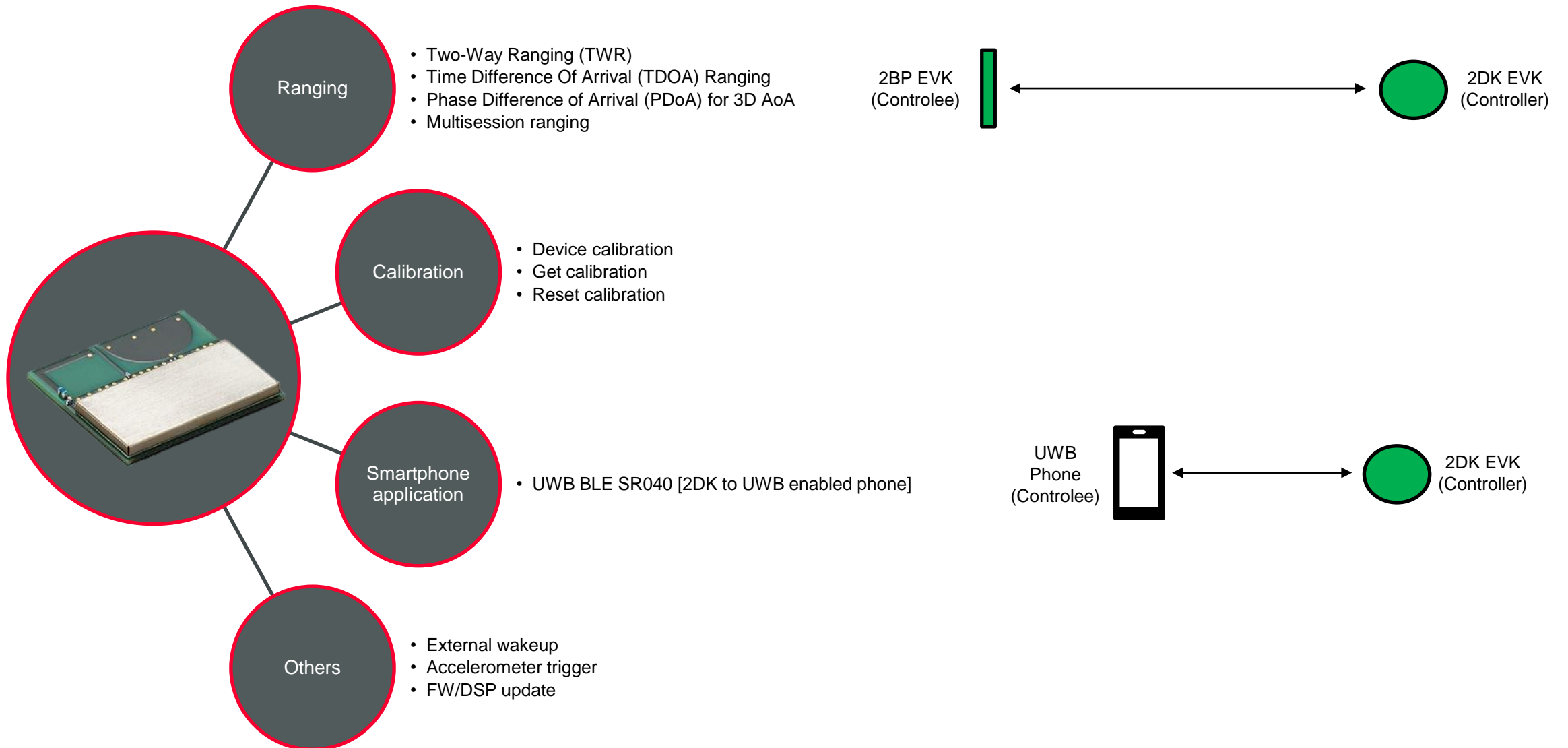
*Rev4.0 is for SDK v3.15.11

Two development options, offering flexibility for IoT enablement

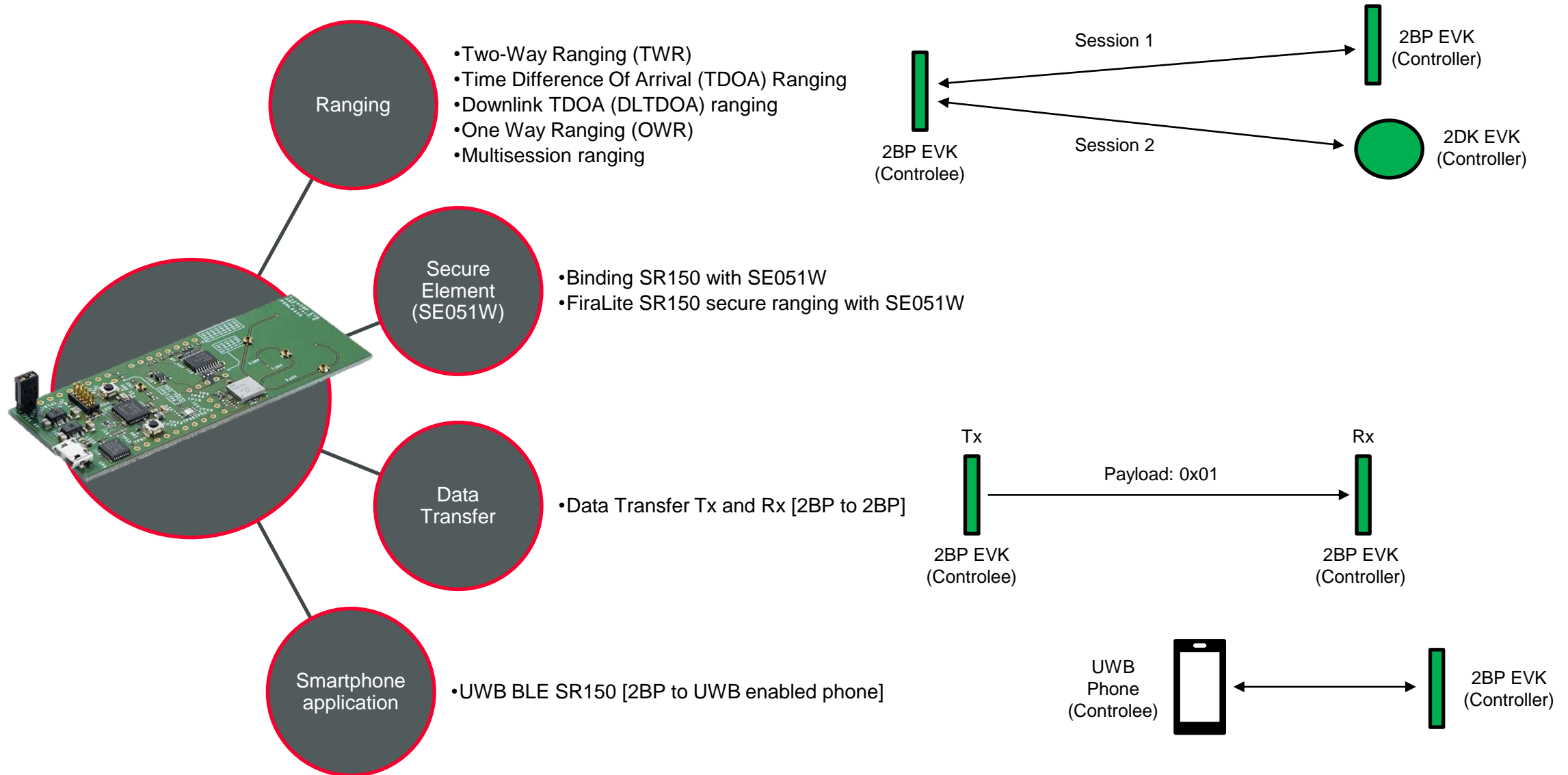
Sample Codes

What are the sample codes available on the Type 2BP and Type 2DK?

2DK Sample codes



2BP Sample codes



Where can I find it?

NXP Based UWB Modules

- Type2BP Document Site,Forum
- Type2BP SDK Site
- Type2DK Document Site,Forum
- Type2DK SDK Site

Open this category >

Type2AB Document Site


Qorvo UWB Module Type2AB[LBUA5QJ2AB]

- Exclusive contents
- Datasheet, Application notes, Design guide etc.

Only for company Email Organization / Personal (gmail, qq, 163..) Emails are not approved.

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Centralized Power Products Support Site

Request access >

Type2BP Document Site


- Datasheet
- Quick Start Guide
- Starting Software Development Guide
- Calibration Guide
- PnP Mode Guide

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Type2BP SDK UWB IOT SR150 v03.13.03 Linux Site


- UWB IOT SR150 v03.13.03 Linux SDK

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Type2BP SDK UWB IOT SR150 v03.13.03 MCUx Site


- SR150 v03.13.03 MCUx Site

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2022-04-01
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Where can I find it?

my Murata Home › Type2BP SDK UWBIOT SR150 v03.13.03 MCUx Site

[Home](#)

Announcements

[New](#) | [Previous](#)

About this site

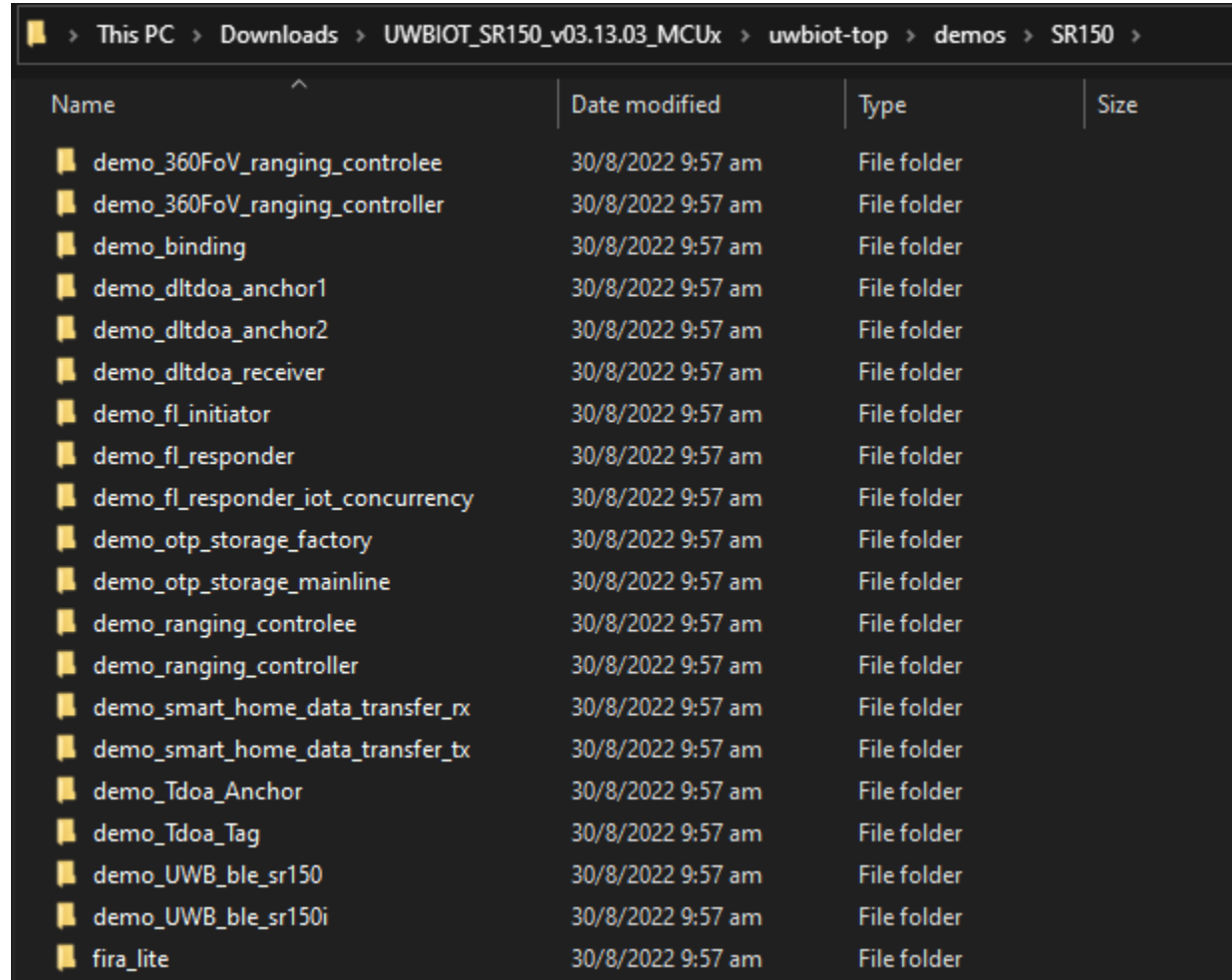
This site contains SDK of Type2BP UWB Module.

Type2BP SDK UWBIOT SR150 v03.13.03 MCUx

Title	Date	File name
UWBIOT SR150 v03.13.03 MCUx	2022/2/16	UWBIOT_SR150_v03.13.03_MCUx.zip
PnP binary for Type2BP EVK (v03.13.03)	2022/4/4	2bp_pnp_v03.13.03.zip

Download and
extract the file

Where can I find it?



Name	Date modified	Type	Size
demo_360FoV_ranging_controlee	30/8/2022 9:57 am	File folder	
demo_360FoV_ranging_controller	30/8/2022 9:57 am	File folder	
demo_binding	30/8/2022 9:57 am	File folder	
demo_dltdoa_anchor1	30/8/2022 9:57 am	File folder	
demo_dltdoa_anchor2	30/8/2022 9:57 am	File folder	
demo_dltdoa_receiver	30/8/2022 9:57 am	File folder	
demo_fl_initiator	30/8/2022 9:57 am	File folder	
demo_fl_responder	30/8/2022 9:57 am	File folder	
demo_fl_responder_iot_concurrency	30/8/2022 9:57 am	File folder	
demo_otp_storage_factory	30/8/2022 9:57 am	File folder	
demo_otp_storage_mainline	30/8/2022 9:57 am	File folder	
demo_ranging_controlee	30/8/2022 9:57 am	File folder	
demo_ranging_controller	30/8/2022 9:57 am	File folder	
demo_smart_home_data_transfer_rx	30/8/2022 9:57 am	File folder	
demo_smart_home_data_transfer_tx	30/8/2022 9:57 am	File folder	
demo_Tdoa_Anchor	30/8/2022 9:57 am	File folder	
demo_Tdoa_Tag	30/8/2022 9:57 am	File folder	
demo_UWB_ble_sr150	30/8/2022 9:57 am	File folder	
demo_UWB_ble_sr150i	30/8/2022 9:57 am	File folder	
fira_lite	30/8/2022 9:57 am	File folder	

Navigate to *UWBIOT_SR150_vxx.xx.xx_x/uwbiot-top/demos*

Smart Home Multisession and Data Transfer Demo

How can UWB be used in a smart home setting?



UWB Access Control Architectures



SECURE CONNECTIONS
FOR A SMARTER WORLD

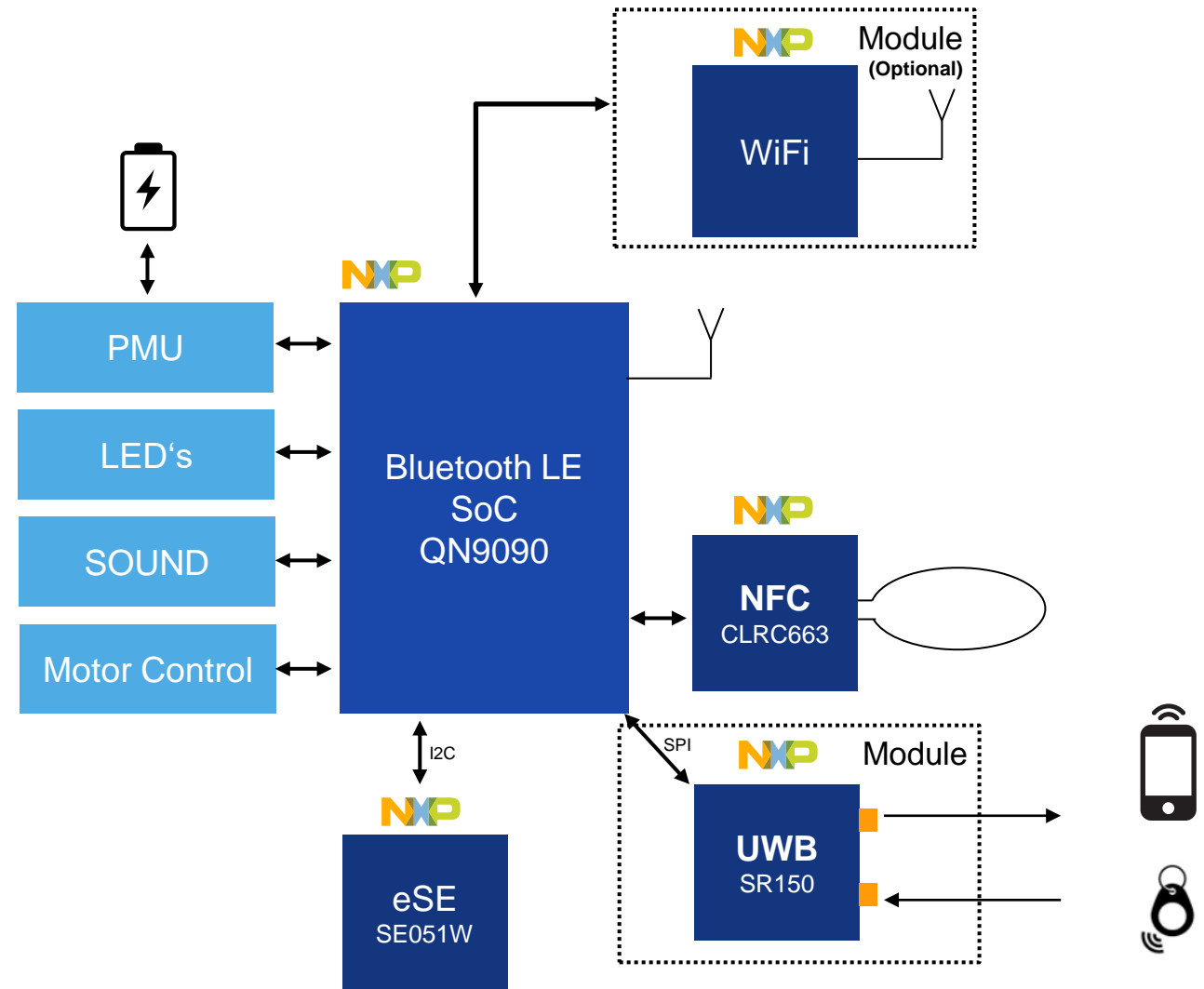
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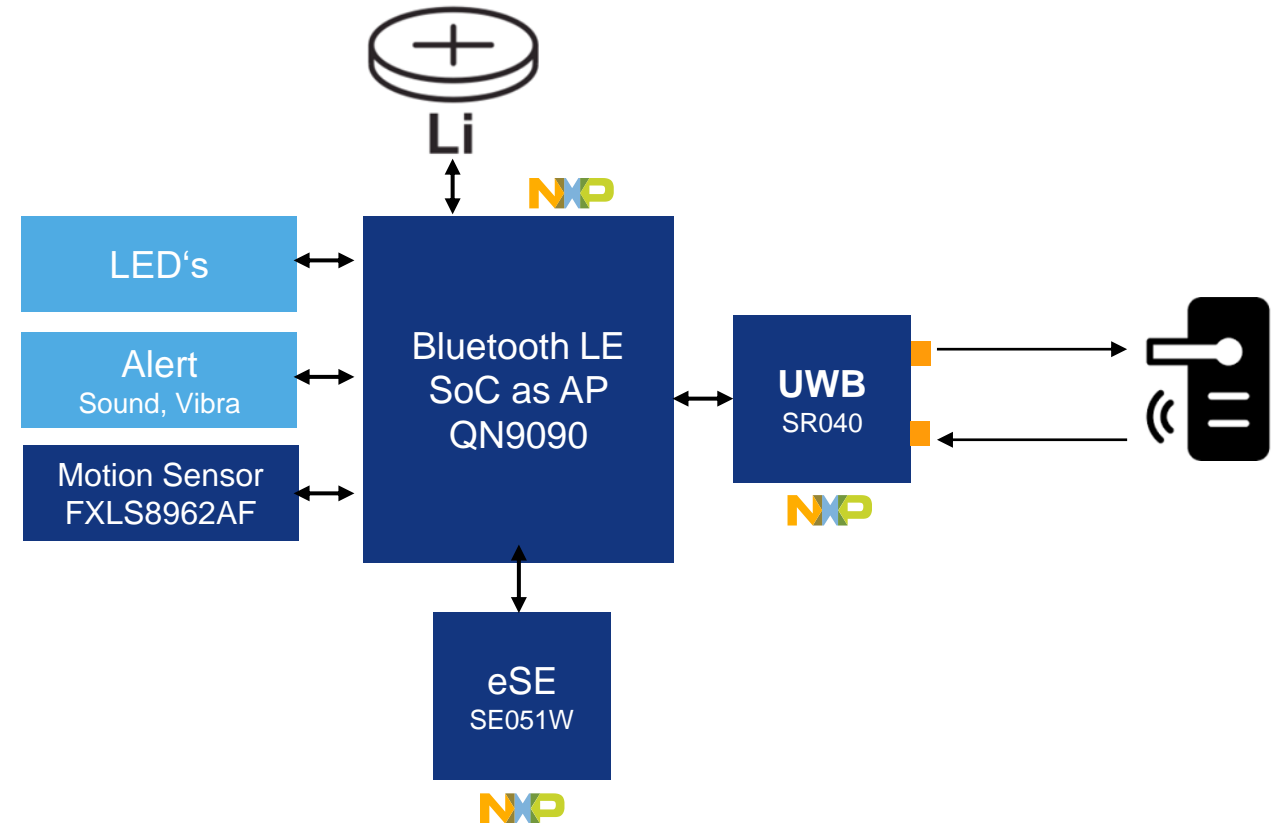
UWB ACCESS CONTROL DEVICE ARCHITECTURE

- eBoM and power optimized smart lock solution
- UWB enabled with SR150, IoT dedicated product, RTOS & Linux support
- SE051W eSE as a multiapplication credential vault, supporting UWB, NFC & Cloud connectivity
- UWB and WiFi are available as modules through NXP module partners, other components available as MM on chip level
- Evaluation support with SmartLock2.0 Demo



UWB ACCESS CONTROL KEYFOB ARCHITECTURE

- Fully integrated UWB with single Tx/Rx fine ranging
- Bluetooth LE presence functionality
- QN9090 Arm CortexM4 open for customer applications
- Power optimized design for coin cell battery supply
- Secure ranging enabled
- Motion sensor for event wake-up
- Small formfactor
- Expandable



UWB Access Control SmartLock2.0 Demo



SECURE CONNECTIONS
FOR A SMARTER WORLD

PUBLIC

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SMART LOCK 2.0 DEMO – OVERVIEW

Demo kit for smart door lock applications providing **secure NFC access** with MIFARE DESFire and **innovative features**.

Arduino shield form factor for many MCU platforms
(**LPC55S69** supported out of the box)

Feature summary:

- **NFC/RFID card reading**
- **Configuration** via NFC phone (**Android + iPhone**)
- **NFC mobile credential** via Android phone
- **NFC emergency power** in case of empty lock battery
- **MIFARE DESFire security** with integrated secure element
- **UWB** enabled for handsfree access
- **Fingerprint** and **Pinpad** support
- Open firmware



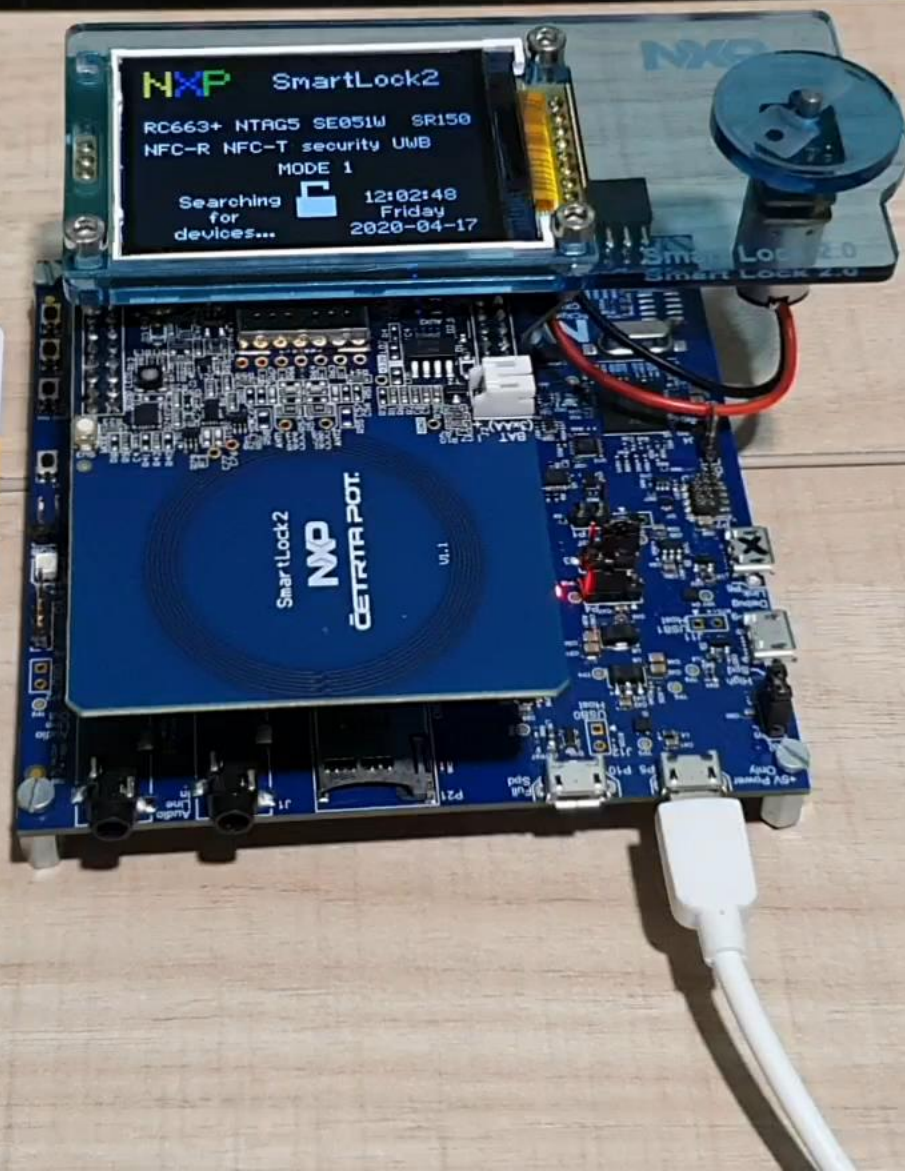
Key application:

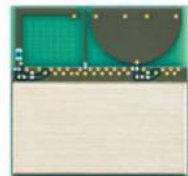
- Primary: Smart door locks for residential use
- Smart locks for hospitality or enterprise use

Availability

Available now!

Modular approach allows retrofit of UWB only onto existing customer Smart Lock!





Type 2DK



Type 2BP

Murata and NXP Value Proposition

NXP and Murata value Proposition



NXP

NXP Semiconductors is a global semiconductor company creating innovation that enable secure connections and infrastructure for a smarter works



Murata

Murata is a worldwide leader in the design, manufacture and supply of electronic components and solutions



Flexible Architectures

Murata's NXP based UWB module enablement is based on providing easy-to-use, well-supported hardware to partners and customers



Customer Oriented

Available documentation, custom value-added software, regulatory solutions, and an easy support path

Murata Online Support

- **Latest technical document and software package available** (*inside my Murata site)
- **Minimize “wait time” for all customers** (*access information necessary to support Murata module design-in activities)
- **Everything included – online access** (*Datasheets, product briefs, module footprints, hardware/ software application notes, antenna/ regulatory guides, etc.)
- ***NEW feature!**
Direct link to my Murata website

https://my.murata.com/en/home/-/my_sites/sites/available-sites

UWB Modules Type 2BP

Murata Type2BP is the ultra small UWB module which includes NXP's SR150 UWB chipset, clock, filters and peripheral components.
Ideally suited for general IoT devices including battery operated devices.

Features Product Information Evaluation Kit

Features

Small size UWB module with conformal shielding

- Chipset: NXP Trimension SR150
- UWB Channel 5.9 support
- Interface: SPI
- 3 Antenna support (3D AoA or 2D AoA support)
- Small size: Resin molded + Conformal shielding structure
- Power calibration & Txal calibration support



NXP

Type2BP Document Site	Type2BP SDK UWBBIOT SR150 v03.13.03 Linux Site	Type2BP SDK UWBBIOT SR150 v03.13.03 MCUx Site
<ul style="list-style-type: none">- Datasheet- Quick Start Guide- Starting Software Development Guide- Calibration Guide- PoP Mode Guide <p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Visit site home ></p> <p>2021-12-01 Approved</p>	<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Visit site home ></p> <p>2022-06-14 Approved</p>	<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Visit site home ></p> <p>2022-03-01 Approved</p>
Type2BP SDK UWBBIOT SR150 v03.14.05 MCUx Site	Type2BP SDK UWBBIOT SR150 v03.14.05 Linux Site	Type2BP SDK UWBBIOT SR150 v03.15.11 MCUx
<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Under audit</p>	<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Request access ></p>	<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Request access ></p>
Type2BP SDK UWBBIOT SR150 v03.15.11 Linux	Type2DK Document Site	Type2DK SDK UWBBIOT SR040 v03.07.01 MCUx Site
<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2BP.</p> <p>Visit site home ></p> <p>2022-07-28 Approved</p>	<ul style="list-style-type: none">- Datasheet- Quick start guide- Design guide etc... <p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2DK.</p> <p>Visit site home ></p> <p>2022-03-03 Approved</p>	<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved. Required to input "Serial No" in the development kits of Type2DK.</p> <p>Visit site home ></p> <p>2022-03-03 Approved</p>
Type2DK SDK UWBBIOT SR040 v03.13.07 MCUx Site		
<p>Only for company Email, Organization / Personal (gmail, qq, 163...) Emails are not approved.</p>		

Murata Exclusive UWB Forum [*within my Murata]

- **Murata new exclusive UWB Forum – to support customer queries:**
 - All NXP-based UWB modules are supported
 - To solve your UWB hardware, performance, software and others...
- **Murata engages directly with customers**



REGISTER

A screenshot of the Murata UWB Forum web interface. The top navigation bar includes a search icon, a user profile for "Jacey", a shopping cart icon, and links for "Product/Technical Inquiry" and "my Murata FAQ/Support". The main header shows "Home" and "Forum" links. Below the header, there's a "Forum" section with tabs for "Forum Home", "Recent Posts", "My Posts", "Your commented thread", and "Statistics". A search bar is present with two tabs: "search by item/status" and "search by keywords". A note states: "*Please set one or more filtering conditions before searching by item/status." The "search by item" section includes a dropdown menu for "Select an item" and a text input for "Enter keywords to filter after selecting items." The "Post Form" section has checkboxes for "Discussion" and "Task". The "Status of task" section has checkboxes for "Completed task", "Not completed task", and "Your not completed task". The "Status of post" section has checkboxes for "Posted" and "Your draft". A "Search" button is located at the bottom right of the search section. Below the search section, there's a "HOME" link and an "order by: Modified Date" dropdown. The "Categories" section lists two categories: "Hardware" (0 Subcategories, 4 Threads) and "Others" (0 Subcategories, 0 Threads).

How to create and register an account on my Murata

- Create an account on my Murata
- Check your EVK serial number to register



Example
EVK label : Rev 4.0
SERIAL: 1234ABC

my Murata Home

[Home](#)

< Request Membership for Type2BP Nearby Interaction with U1 SDK Site

This is Type2BP Nearby Interaction with U1 SDK Site for customers who purchased Type2BP EVBs.
Input the Serial No. written in the development kit and click the "Request Membership" button. You will receive an email after the number is confirmed.
(The confirmation process might take a few days. We appreciate for your kind understanding and cooperation.)

Please input a serial number. (8 -16 characters)
(Registration code provided upon my Murata account ID registration process is NOT a serial code for here.)

1234ABC

Please read the notes below and click "Request Membership" at the bottom of the page.

- Site approval request is required to access to this site/page.
- Result of this site approval request can be found in the corresponding site panel in my Murata home after Signed in.
- We may decline for your site registration if you meet the following conditions. Thank you for your understanding in advance.
 1. Every kind of code (Serial Code or Registration Code etc.) which you entered when requesting site membership is incorrect.

Please read the notes below and click "Request Membership" at the bottom of the page.

- Site approval request is required to access to this site/page.
- Result of this site approval request can be found in the corresponding site panel in my Murata home after Signed in.
- We may decline for your site registration if you meet the following conditions. Thank you for your understanding in advance.
 1. Every kind of code (Serial Code or Registration Code etc.) which you entered when requesting site membership is incorrect.
 2. Based on your e-mail address domain which you entered when creating my Murata account, you may not be considered as an applicable client in products or solution of each site.

Example 1: The e-mail address domain does not belong to a company. Educational institution, including university (e.g., *@*.ac.jp), organization except company, personal (e.g., *@*.ne.jp), free e-mail (e.g., @gmail.com, @outlook.com, @gg.com, @163.com etc.) or e-mail address domain of internet provider (e.g., *@att.net, *@softbank.ne.jp, *@*.biglobe.ne.jp, *@*.ocn.ne.jp etc.) may not be approved as site membership.

Example 2: Based on your e-mail address domain, we cannot find your company's website or business.

Example 3: Based on your company's website, you belong to one of our competitors or its distributors which offer the same products or solutions of this site.




Example 4: Based on your company's website, you may not be considered as an applicable client in products or solution of each site.
 3. You belong to a defense/military company* or your "Primary Application" selected in account creation page or "Primary Application" of sample request is related to defense/military/weapons.

*Our policy regarding defense/military applications.
 4. Your company belongs to a country, region, or company that is designated by law or regulation.
 5. Other

Request membership Cancel

Where to purchase?



Area of coverage			
ASEAN region	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
INDIA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Australia & New Zealand	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

*For information on other regions, please contact the Murata sales office or authorized distributors in each region.

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