Ultra-Wideband Media Event

Ultra-Wide Possibilities

NXP & Volkswagen, 22.08.2019, Hamburg

SECURE CONNECTIONS
FOR A SMARTER WORLD

PUBLIC

A Close Collaboration for Future Technologies

- NXP Infotainment solutions across a broad range of VW car models
- Jointly driving Vehicle-to-X communications – EU mandated or not
- NXP Battery Management solution enables VW Electrification:
  - NXP is lead supplier for VW MEB platform
- NXP Radar solution for high levels of Safety + Automation
- NXP Automotive processors for Computing needs in various applications
- VW and NXP for innovative Car Networking technology toward high bandwidth and robustness

Ultra-Wideband – Entering Ultra-Wide Possibilities

Device-to-device

Find a friend
Social media extension
Locate Uber

Smart Home

Hands-free access (garage/front door)
Home Control
AR Gaming

Smart Enterprises

Access control
Smart conference systems
Employee mustering in emergencies

Automotive

Secure key fob,
Precise and secure localization

Smart Retail

Indoor navigation
Interactive marketing
Asset tracking
Hands-free payments

Tagging

Detect objects
Monitor children in range

Meet the New Ultra-Wideband

Redefining itself as a secure, “Fine Ranging” technology

- Originally used for high data rate communication, UWB was in direct competition with WiFi
- Now as a secure sensing technology, UWB offers spatial context capability to a variety of applications:
  - Seamless access control
  - Location based services
  - Device-to-device services

UWB Transforms Connectivity Experiences

Across IoT and the Automotive Industries

	Smart Home and Enterprises	Smart Cities and Mobility	Consumer	Smart Retail	Industrial and Healthcare
Hands-Free Access Control	• Residential access control • Restricted enterprise access	• Smart parking garage • Keyless car access (CCC standard)	• Logical access control	• Unmanned store access	• Barrier-free and restricted access control
Location-Based Services	• Employee mustering in emergencies	• Ride sharing • Bike sharing	• AR gaming	• Indoor navigation • Foot traffic and shopping behavior analytics	• Asset tracking • Patient tracking
Device-to-Device (Peer-to-Peer) Services	• Smart conference systems	• Drone-controlled delivery • V2X, autonomous driving	• VR gaming and group play • Find someone nearby	• Targeted marketing	• Proximity based patient data sharing • Find equipment

Source: FiRa Consortium

FiRa | The Power to Be Precise

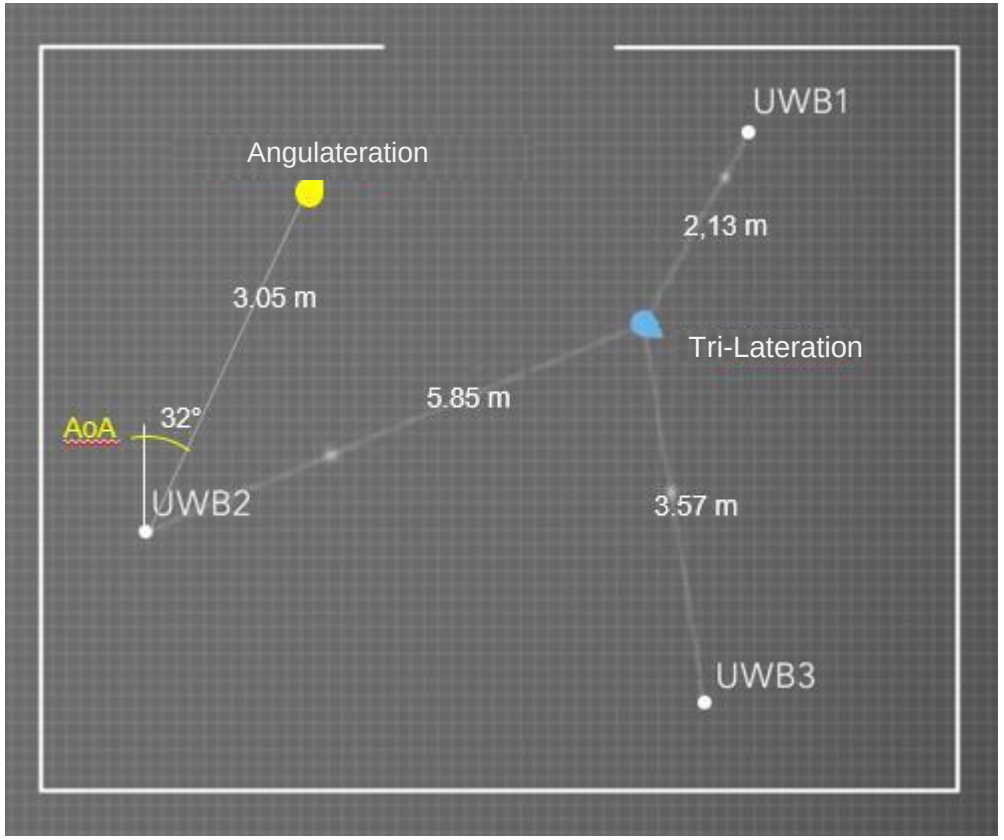
Ultra-Wideband

Indoor and Outdoor
localization

Ranging of
portable devices

Real-time
Communication

Precision
of a few centimeters



Source: NXP

The Unique Power Spectrum of UWB

- Sends and receives short signal pulses at bandwidth of over 500 MHz at very low power spectral densities
- Ultra-Wideband (UWB) features high robustness against narrow band jamming/interference
- Ultra-Wideband (UWB) does not constrain the WiFi / BT channel capacity

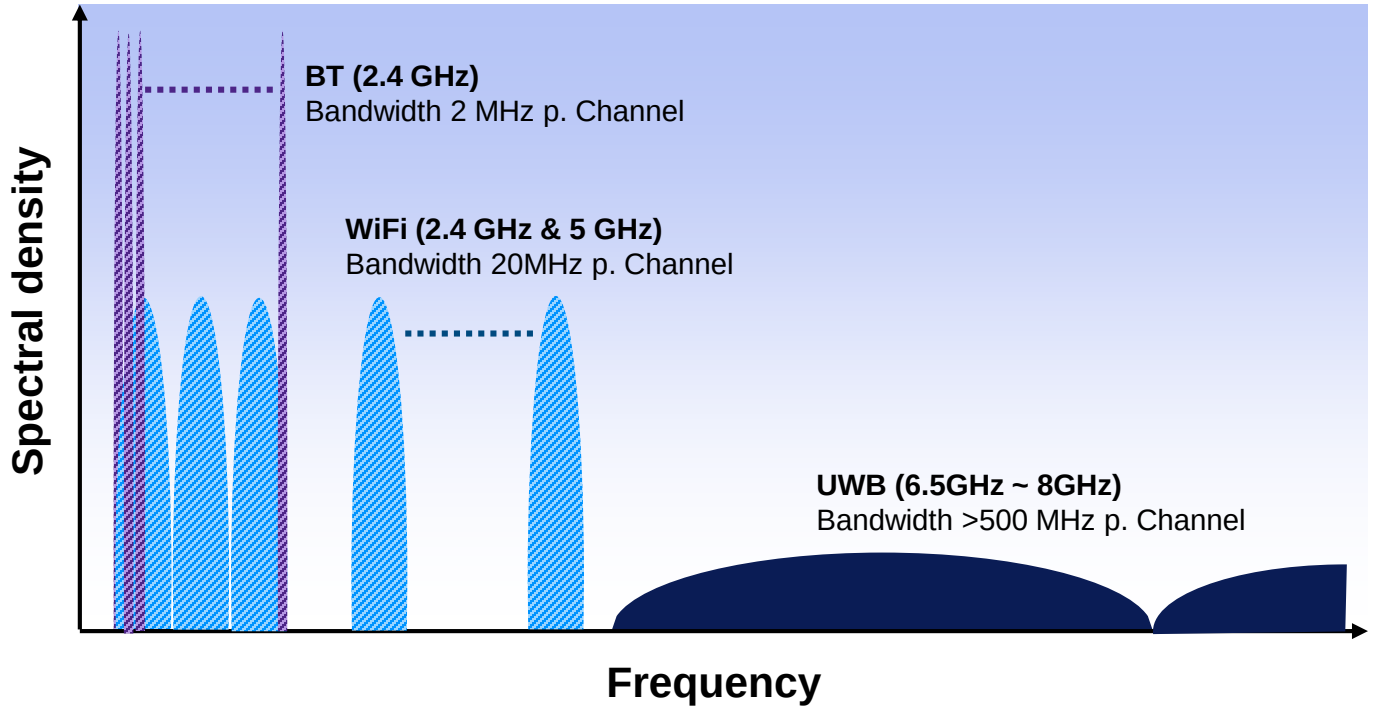
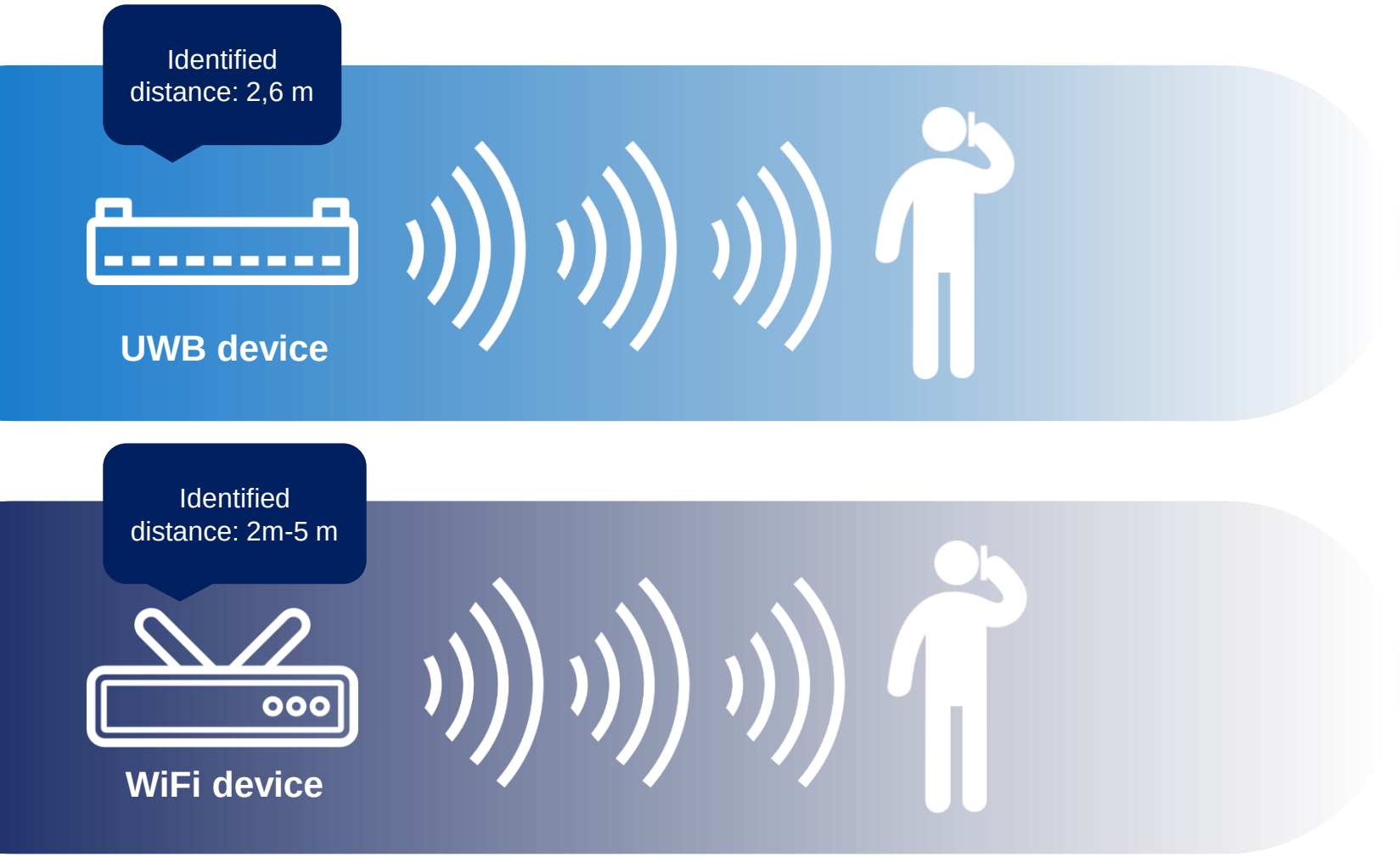


Image 1: Power spectrum for UWB and narrowband

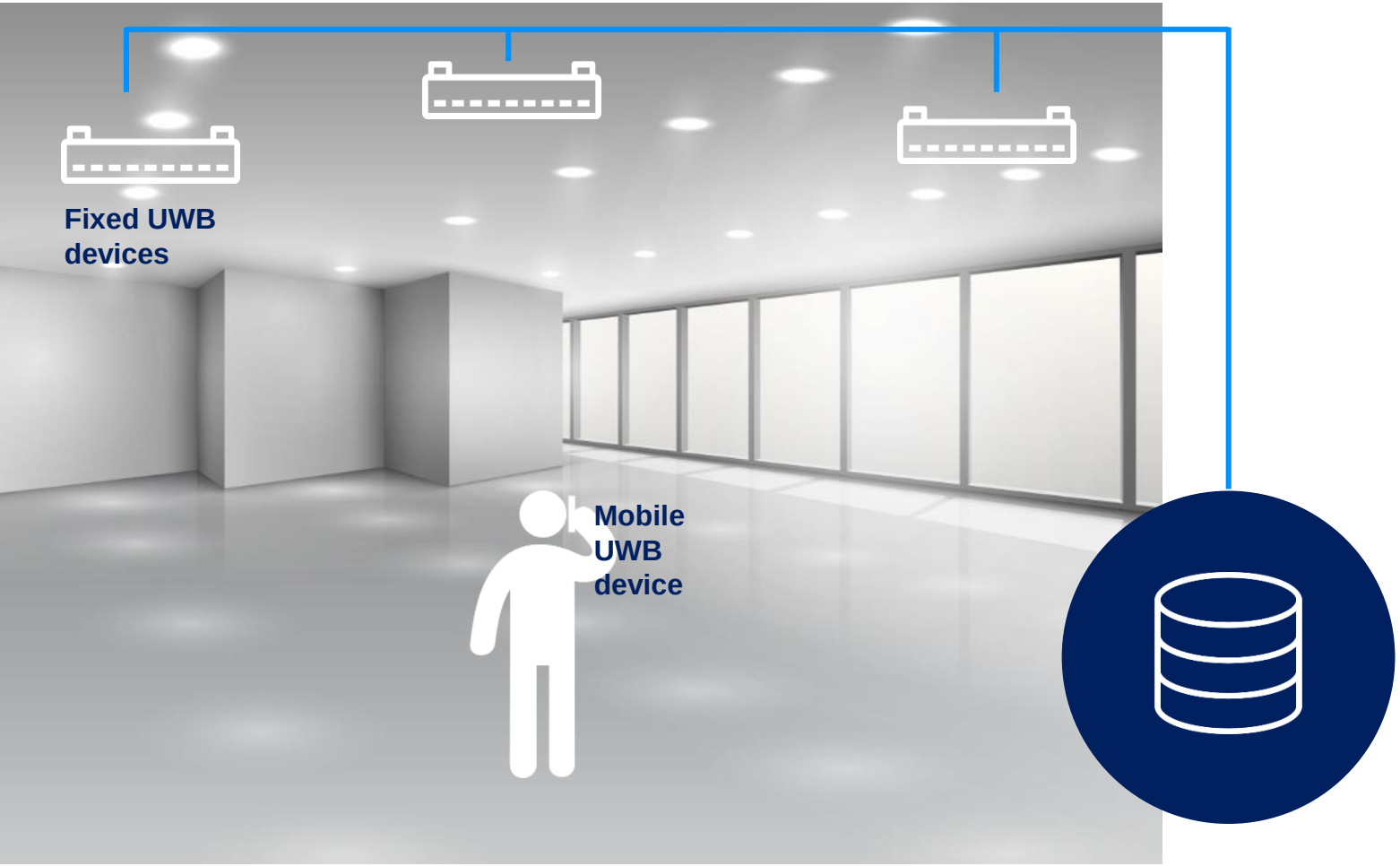
Acquire Accurate Location Data in Real-Time



- The lengths of the signal pulse affects accuracy
- UWB uses very short pulses of about 2ns

→ **Measure distances with a very high degree of accuracy**

UWB Positioning: How it Works

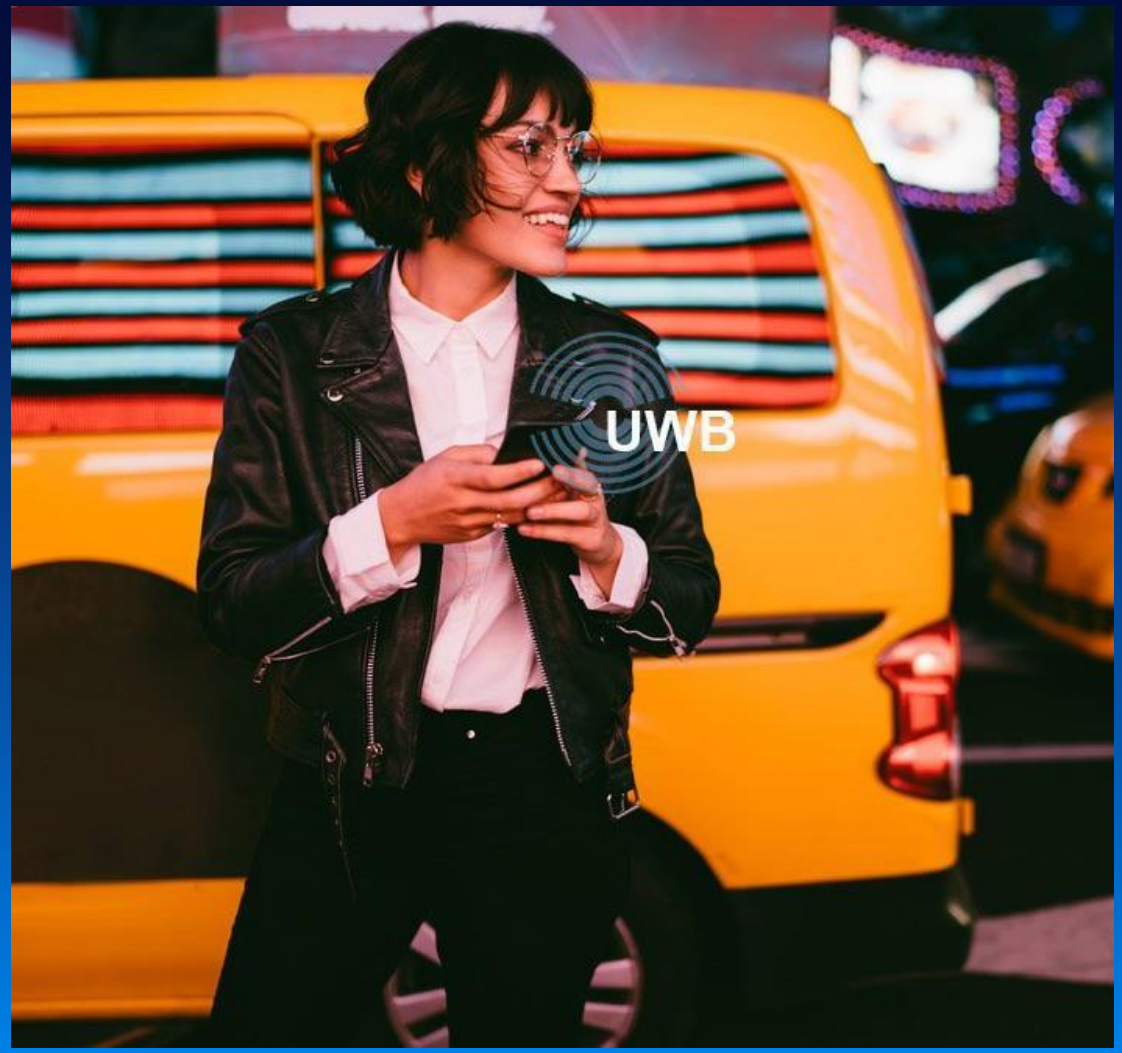


1. Each fixed UWB device sends signals to the nearby mobile.
2. Mobile UWB device immediately responds with acknowledgment signal.
3. Each fixed UWB device measures the time that the signal travels, known as Time of Flight (ToF).
4. Computer uses ToFs to calculate the location of the mobile device.

Recent NXP Announcement on UWB

Secure Ultra-Wideband Ranging Technology

- New breed of Ultra-Wideband (UWB) ranging technology to offer security, precision sensing, and spatial context behaviors for wireless devices
- Technology features unique mix of 2D and 3D precise positioning with low power consumption
- Addresses broad range of markets, including mobile, automotive, Internet-of-Things (IoT) and industrial
- Sets the stage for future UWB-enabled use cases



FiRa Consortium

Established by The ASSA ABLOY Group, Bosch, HID, LitePoint, NXP, Samsung, Sony, and TTA.

- Drive Seamless User Experiences Using Ultra-Wideband Technology
- The new coalition is designed to grow the UWB ecosystem so new use cases for fine ranging capabilities can thrive, ultimately setting a new standard in seamless user experiences.
- Ensure seamless end-user experiences by defining standards and certification programs for interoperability.

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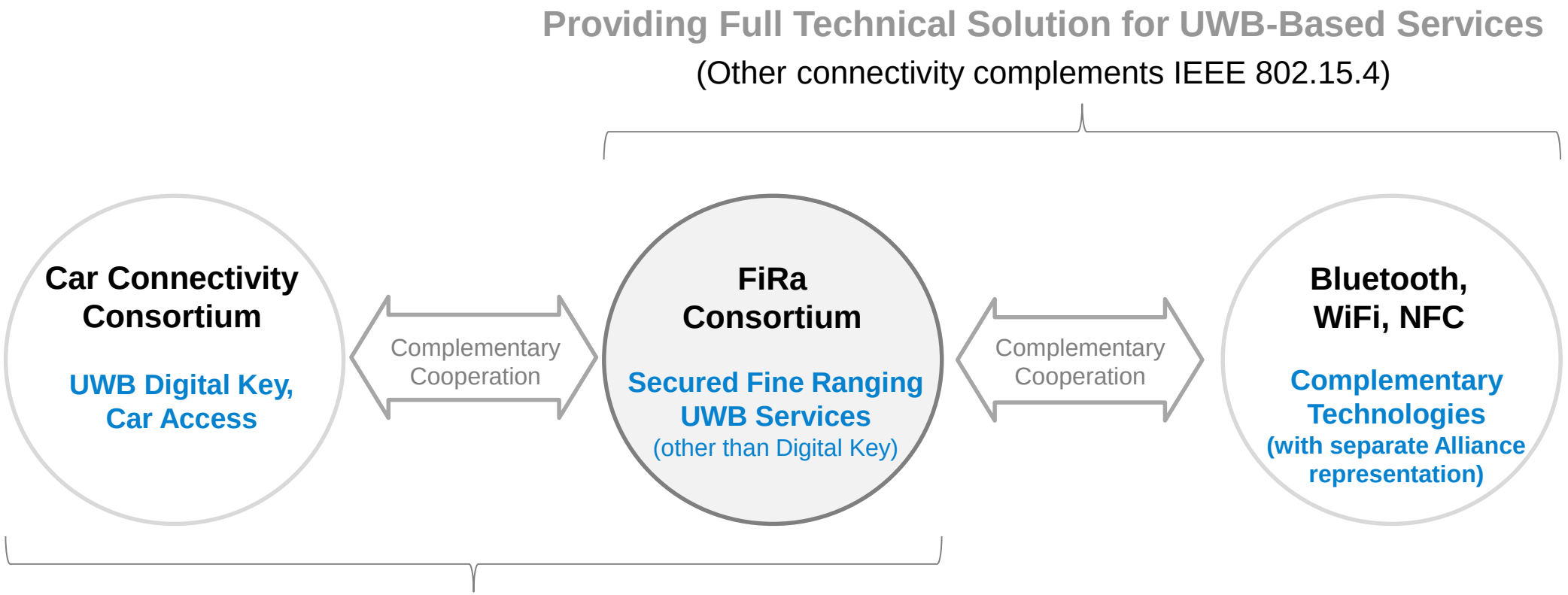
FiRa Collaborating With Other Consortia



Ultra-Wideband

- High Accuracy
- High Security
- High Robustness

UWB in Automotive – Benefits and Use Cases

Security

Highest protection against relay station attacks

UWB Radar

- In-cabin passenger detection
- Easy trunk access
- Park distance control

Real-time Localization

- Automated valet parking, indoor navigation, autonomous driving
- Communication between cars and infrastructure (example gas station cashier's desk)
- Asset tracking

Car as Key in Broader UWB Ecosystem

- Garage-door / parking-lot access
- Drive through payment (restaurant, gas station…)

NXP and VW – Ultra-Wide Possibilities

- 20 years of car access collaboration
- Close alignment on UWB system implementation & standardization: targeting highest level of security and novel customer features and use cases
  - Driving Innovation
  - Leverage UWB capabilities and demonstrate new use cases
  - Evaluate radio technologies and security concepts for future key fob architectures

VW Concept Car Demonstration

Use Case Selection for Enhanced Security, Safety, Comfort

- Protection against car theft (security)
- Door lock user recognition (convenience, security)
- Child seat use case (safety)
- Trailer recognition (convenience/camping scenario)
- Easy trunk opening (convenience/everyday life)

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