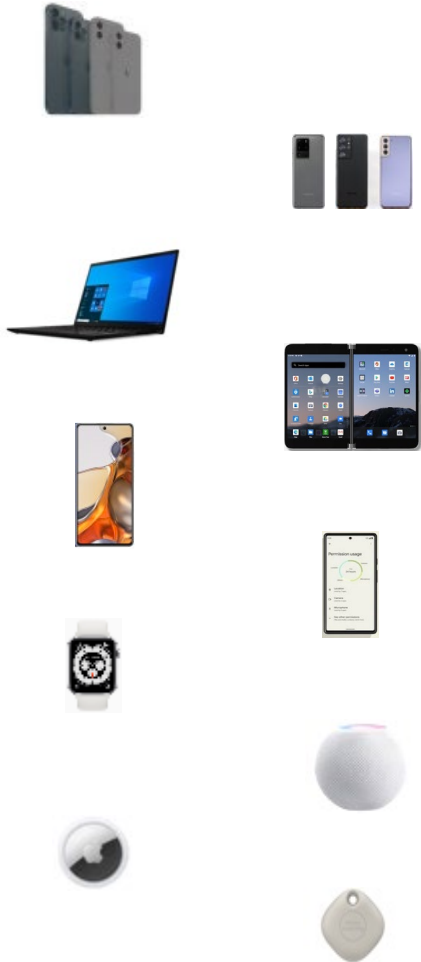


# 6 GHz Commercialization

WinnComm 2021  
December 1, 2021

# Smart Devices Use Multiple Radios to Match Technology to Task



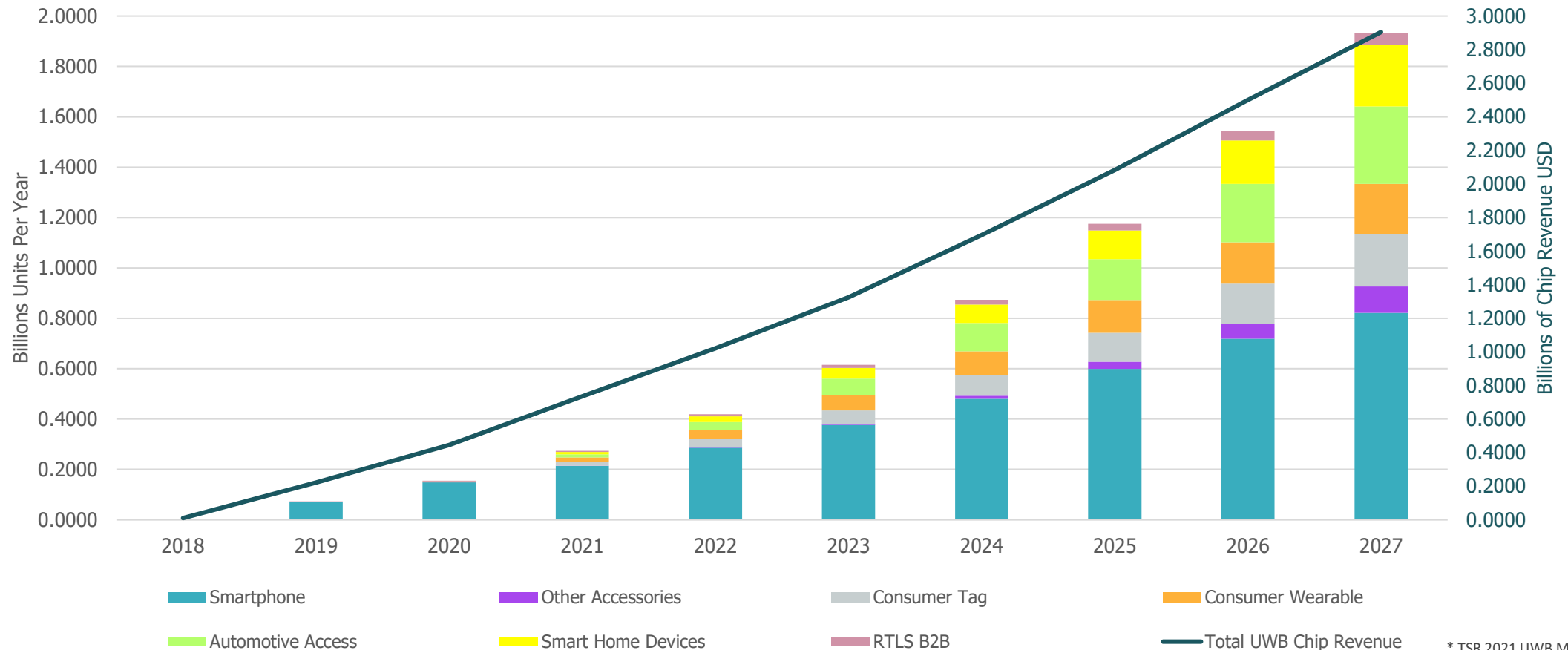
- Apple iPhone 11, 12, 13 Series
- Samsung Galaxy Z Fold 3, S21 Ultra, S21+, Note 20 Ultra
- Lenovo ThinkPad X1 Nano/ X1 Carbon, X1 Yoga
- Microsoft Surface Duo 2
- Xiaomi Mix 4, Sound, My TV
- Google Pixel 6 (Expected)
- Apple Watch 6, 7
- Apple HomePod
- Apple AirTag
- Samsung SmartTag+

UWB	4G-LTE 5G	Wi-Fi	Bluetooth BLE	NFC	GPS
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓		✓	✓	✓	
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓		✓
✓		✓	✓		
✓			✓	✓	
✓			✓		



# UWB Is Playing An Expanding Role At 6 and 8 GHz

- By the end of 2021 more than 500 Million UWB Consumer Devices in Circulation
- UWB Smartphone Accessories will drive a 1:1 chip ratio with Smartphones by end of 2025 \*
- Run rates exceeding 1 Billion Devices per year by 2025



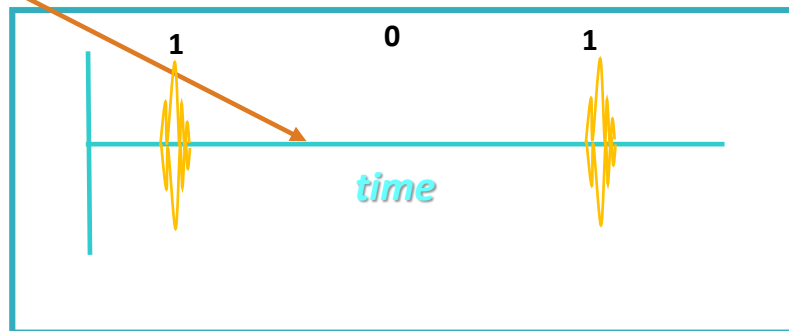
\* TSR 2021 UWB Market Report

# Characteristics of UWB – Why is it Compelling?

- UWB uses impulse-based waveforms instead of continuous carrier waves
- Ultra Wide Bandwidth spreads power to promote coexistence with incumbents

Key UWB  
Difference:  
Large space  
between  
pulses

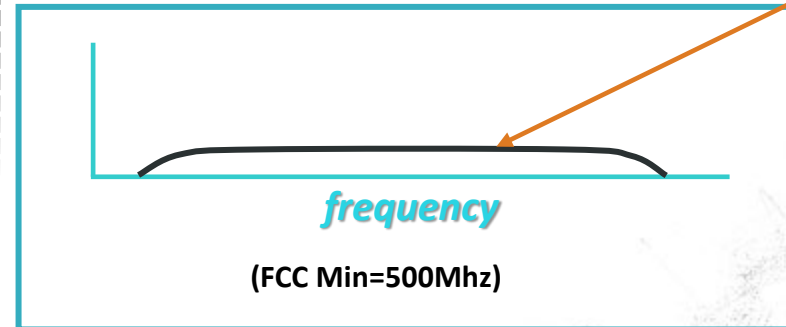
*Time-domain behavior*



**UWB Impulse-based Wave Forms**

Note: O/OK Example

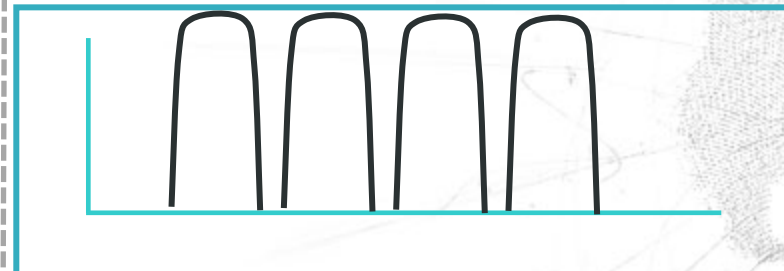
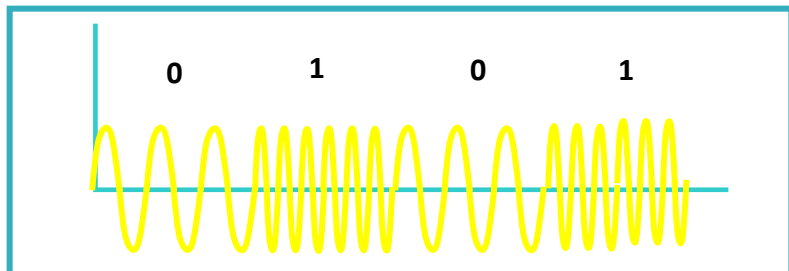
*Frequency-domain behavior*



Key UWB  
Difference:  
Low Power  
spectral  
density

**Frequency Modulation Wave**

Note: OFDM is used which send multiple waves across the frequency bands



# UWB Provides Matchless Ranging Accuracy and Short Burst Messaging

## It Is 5G for IOT

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- Precision ranging (1cm) can be used to determine if there is a target receiver in range before initiating high-rate communications/broadcasts or secure key exchange
- No continuous wave, just pulses
  - Thousands of devices can coexist while sharing spectrum with other technologies
- Operates using extremely low power per MHz (currently -41.3 dBm)
  - Aggregate noise is virtually undetectable
- Unlicensed spectrum allows innovators to dream and design New IOT gadgets
- These attributes make it essential for IOT
  - Ex: Apple AirTags, Samsung Galaxy SmartTag+, iWatch, Zebra Dart Tags for NFL, Directional AirDrop



# Thank You and Additional Notes

Tim Harrington  
[Tim@uwballiance.org](mailto:Tim@uwballiance.org)

**UWB**  
ALLIANCE  
Collectively Creating the Future

# Information About UWB Alliance

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- Established in 2018 as the Voice of the UWB Industry
- Founding Team Developed UWB Products from 2000, leading to IEEE 802.15.4z standard
- 30+ International Member Companies in UWB Silicon and Module Manufacturing, RTLS, Consumer Electronics, Automotive and Transportation
- Liaison/Membership agreements with:
  - ETSI, CEPT, IEEE, CCC, FiRa, omlox, Winnforum
- International Organization with regional offices:
  - Washington D.C. (Head Office), Silicon Valley, France and United Kingdom

[www.UWBAlliance.org](http://www.UWBAlliance.org)