

**Project: IEEE P802.15 Working Group for Wireless Specialty Networks  
(WSNs)**

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**Re:** [UWB Aggregation and WiFi 6E]

**Abstract:** [ UWB Aggregation and Coexistence Testing with 802.11ax]

**Purpose:** [Discuss results of tests to determine impact of UWB on 802.11 ax and successors; and discuss aggregation of UWB transmissions]

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# UWB Alliance Aggregation and Wi-Fi 6E coexistence Testing

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# Goals of Tests

- Determine Aggregation Rate of IR UWB
  - Test multiple devices at different rates
  - with varying quantity of UWB devices operating
- Test Effects of UWB on Wi-Fi 6E
  - Do UWB Devices interfere with IEEE 802.11ax systems using the 6 GHz band?

# Test Conditions



- Typical indoor business office environment
  - WeWork, Washington, DC
  - Busy work area with people coming and going using various computer/smart phone devices

# Wi-Fi 6E Equipment for Tests

- Three models of APs' were used
  - ASUS AXE6600 tri-band mesh Wi-Fi 6e system
  - Linksys MX8500 Wi-Fi 6e tri-band
  - TP-link AXE7800 tri-band 8-stream Wi-Fi 6e router
  - APs' bandwidth was autoconfigured
- Multiple PC notebook and smartphone clients
  - Set at nominal fixed distances of 8 ft to AP's
- NETGEAR Nighthawk Wi-Fi 6e client device was used with laptop computer as iPerf client

# UWB Equipment for Tests

- 10 Qorvo DW3000 Development Kits
  - Set as ranging pairs
  - Each pair configured to transmit at a rate of one ranging exchange per second
- 10 Spark Microsystems SR1000 Series Evaluation Kits
  - Set as communications pairs
  - Each pair configured to transmit a continuous stream of data.
- AS-48461 Series Dual-polarized quad-ridged horn antenna was focused on the UWB transmitters to minimize reception from the Wi-Fi Access Points.

# WiFi 6E Test Process

- Ambient environment baseline measured
  - Aircheck3 used to examine the ambient RF
  - Recorded 305 RF devices operating in the 2.4, 5, and 6GHz bands
- UWB devices introduced to environment 1 at a time
- Measurements taken at 1 m , 0.5 m and 0.012 m distance from APs'

# UWB Had No Measurable Effect on Wi-Fi 6E

## No UWB

## 3 UWB devices



**No Statistically Significant Difference in Up or Down Throughput**



# Worst Case 6E Test



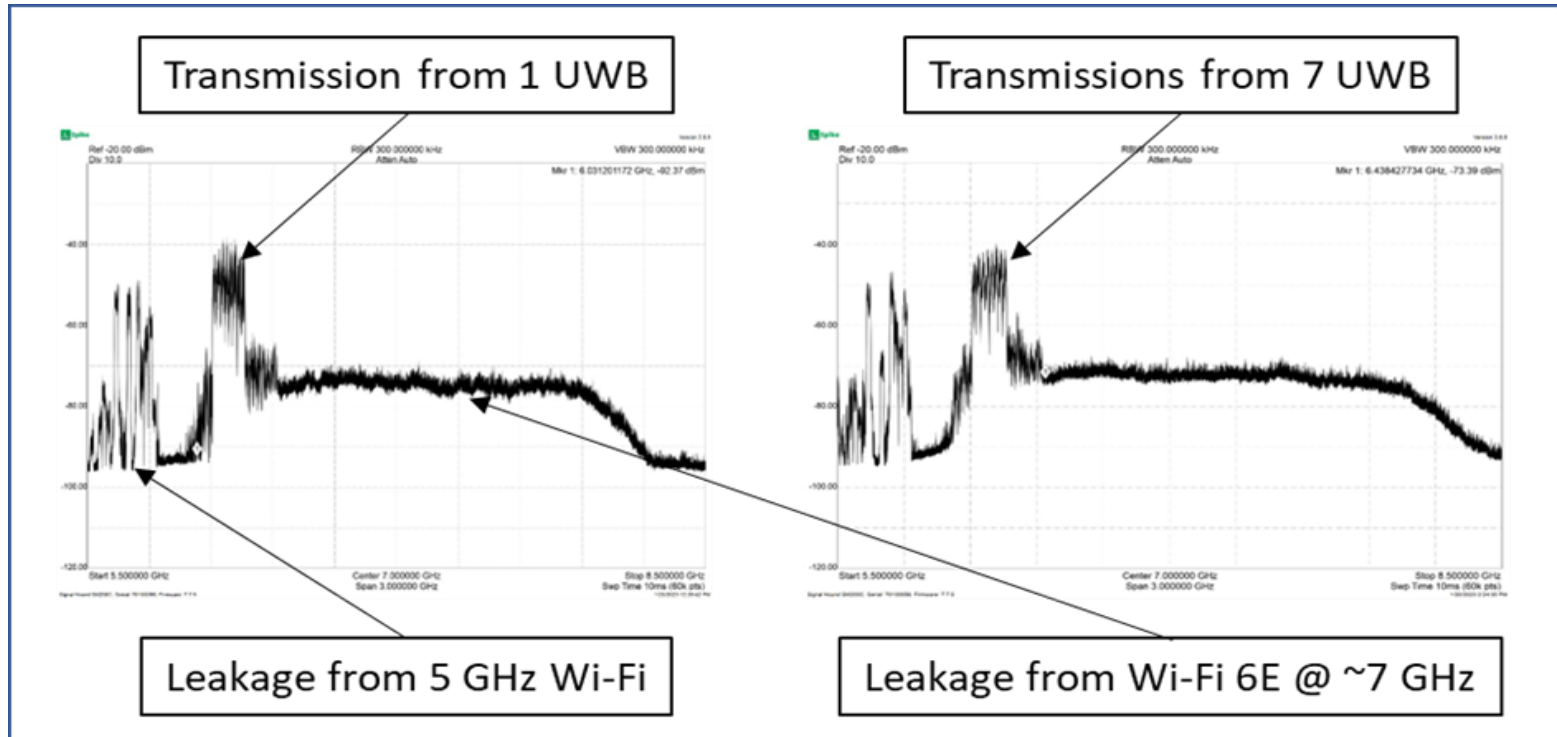
- 8 Spark UWB
  - 10 cm from the AP
  - Streaming
- 
- No measurable impact on the Wi-Fi 6E performance

# Test Results of UWB Effect on Wi-Fi 6E

- UWB did not have any measurable impact on 802.11ax performance
- Factors that did impact Wi-Fi 6E
  - Quantity of Wi-Fi 6E devices operating in the area
  - Presence of people near the Access Points
  - Positioning of the people throughout the room

# Detecting UWB and aggregation of UWB

- Minimal Aggregation detected



# Next Steps

- Additional Aggregation Tests
  - Increase quantity of UWB devices
    - 100+ devices
  - Increase duty cycle of UWB devices
  - Test at international facility
    - Joint Research Center – Ispra, Italy

# Summation of Results of Tests

- Determine Aggregation Rate of IR UWB
  - Even when operated at high transmission rates UWB power did not aggregate linearly with the number of devices.
- Test Effects of UWB on Wi-Fi 6E
  - UWB did not have any measurable impact on 802.11ax performance
  - Factors that did impact Wi-Fi 6E
    - Quantity of Wi-Fi 6E devices operating in the area
    - Presence of people near the Aps
    - Positioning of the people throughout the room