Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: Low Power Applications for Next-Gen
Date Submitted: January 15, 2021
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Re: N/A

Abstract: Presentation to propose low-power applications for next generation UWB

Purpose: Discuss low-power applications

Key Enabling Property of UWB (1/2)

- One of the most unique property of UWB is the possibility to trade time for bandwidth.

- In this way, the airtime of a link can be significantly compressed.

- This characteristics enable precise ranging.

- It could also enable ultra-low power and low latency communication with sizable payloads.

- UWB technology is uniquely positioned to offer a power consumption, data rate, latency trade-off that no other wireless technology can offer for personal area networks.

  – UWB also has some favorable propagation properties.

Key Enabling Properties of UWB (2/2)

- UWB has access to a versatile spectrum that can be leveraged to coexist with other wireless technologies such as WiFi and mitigate their impact on QoS.

- UWB has unique emission regulatory requirements that can be leveraged to trade spectral usage with range.

Applications of Ultra-low Power UWB

- Wireless sensor networks (WSNs), comprising of tiny, radio-enabled, multi-function sensor nodes, are becoming ubiquitous.

- Their deployment and maintenance cost is directly related to their power source.
  – Large batteries are expensive, small ones require regular maintenance.
  – Low duty cycles to achieve suited battery life render sensor's less effective at collecting data to feed AI algorithms.

- Next Gen UWB is in prime position to enable ultra-low power responsive and battery-less wireless nodes relying on energy harvesting.
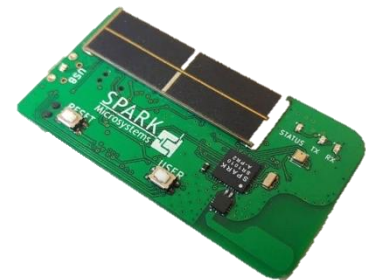
Requirement for Ultra-Low Power UWB

- In order to enable ultra-low power, UWB Next Gen should support aggressive duty cycling at the frame level.

  – Aggressive duty cycling (>99% of the non air-time) of both TX and RX need to be supported to enable symmetric power consumption.

- The specifications should be defined to enable low power of the complete system for the application.

  – Crystal frequency, clock stability, frequency precision have an important impact on the power consumption.

- The specification should enable for low-cost implementations to ensure competitivity.

- The specification should enable spectral agility in order to provide improved coexistence capabilities and range / spectral usage tradeoffs.

Added Benefits of Ultra-Low Power UWB

- Medium and high data rate applications could also benefit from aggressive duty cycling
  - Data streaming with increased battery life and very low latency.
  - More responsive wireless peripherals.
  - Real-time telemetry and control.
  - Low latency and energy efficient mesh networks.
    - An opportunity to offset range limitations of UWB while leveraging ultra low power and low latency capabilities of UWB to mitigate the systemic weakness of mesh networking

Thanks