**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | UWB Coexistence working session notes | |
| Date Submitted | 15-Sept-2018 | |
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| Re: | TG4z September Meeting | |
| Abstract | Notes from working session on coexistence. | |
| Purpose | Document results | |
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**Working Notes:**

**UWB Coexistence Discussion**

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# Introduction and Background

At the September 2018 Task Group 4z meeting, a “split out” session was conducted to discuss UWB coexistence. This document captures the results of the discussion. There were many contributors to the contents of this document. The discussion was coordinated by Tony Fagan (Decawave) who took notes and provided the results for capture in this document.

The goal is to discuss and develop a “good coexistence story” for all 802 wireless that considers the existing UWB standard and related regulatory considerations along with ongoing work in 802.15 and 802.11 and proposed changes to licensed exempt rules.

The three “work items” identified by the group:

1. Justification for UWB current and near term forecasts – size of UWB opportunity;
2. What are the technical impacts if 802.11 allowed to operate at high power
3. Elevator pitch

The group broke into teams to brainstorm and work on each re-converge. This document captures the results from Group 1 and Group 2. The results of group 3 are contained in document 15-18-0464-01 [<https://mentor.ieee.org/802.15/dcn/18/15-18-0464-01-004z-uwb-protection-elevator-pitch.docx>].

# Outcomes

## Group 1 outcome:

* Largest markets in order
  + Mobile
    - 30% of phones are UWB 1.7B units by 2025
    - Wearables 30% of 1b = 300M by 2025
  + Commercial
    - Payment systems, smart sensors, remotes, smart home, etc
    - Wave of mobile half the mobile unites = 850M
  + Automotive
    - 1-2M chips/year today
    - 100 M units/year by 2025
    - Driven by major car makers coming on board now
  + Industrial
    - Robots, manufacturing, etc.
    - 70M units by 2025
  + Total about 3 billion units per year

## Group 2 outcome:

* Provide specific coexistence scenarios for study
* Work with 11ax to do the work
* Look at use cases and features being added in 11ax
  + Is it mainly indoor?
  + Mainly fix stations?
  + Likely restrictions?
* Joint efforts
  + Analysis 15+11
  + Mitigation 19
  + Regulatory recommendations w/18
* Scenarios include
  + What if….IR operating under “new rules”
  + Power increase + 320 MHz – higher power UWB
    - 802.11 CSMA w/ higher power IR
    - UWB device using 802.11 signaling e.g. bandwidth reservations
    - Long range ranging scenarios
  + Realistic scenarios based on both perspectives;
    - Impact of 11 on UWB is half the story
    - Impact of IR on 11 if using the same rules needs to be added
    - Avoiding killing low power IR when high power used
  + Mitigation techniques
    - Time based sharing
    - Power restrictions – expect 802.11 will reject substantially lower power than currently allowed in the 5 GHz bands.
    - Other that are suitably “mobile friendly”
  + Need to show that what we have is useful, significant and bi-directional in impact.
    - Coexistence analysis is good for 802.11 vendors as well as UWB vendors
    - Good coexistence benefits everyone
  + We want useful new rules that do not harm the efficacy of UWB in current and expanding markets
  + Need volunteers to do the work
  + Specific additions to Billy’s work so far
    - Better emulation of 11ax operation
    - Add scenarios with “gaps” in the OFDM signal
    - Need a good characterization of 11ax

## Group 3 outcome:

See document 15-18-0464-01.

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