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

Submission Title: 802.15.4z upgrade requirements for larger industrial scenarios
Date Submitted: 20th January 2021
Source: Sven Zeisberg (Zigpos), Jean-Marie André (ST microelectronics)
Contact: Zigpos GmbH, Räcknitzhöhe 35a, 01217 Dresden, Germany
E-Mail: sven.zeisberg {at} zigpos.com, jean-marie.andre {at} st.com
Re: UWB Next Generation
Abstract: Backward compatible evolution of 802.15.4z to harmonize anchor-based scalable 3D location systems
Purpose: Discuss 4z enhancements to address the challenges of larger scale 3D location tracking
Notice: This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release: The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.
Introduction (1/2)

This contribution is proposing requirements for enhancements of 802.15.4(z) in order to efficiently support larger scale industrial UWB based positioning installations.

- there can be a large number of TAGs (5k+) and many anchor nodes not being in radio reach of each other → efficient radio resource usage, synchronous modes, minimize in-band cmd&ctrl
- objects may move in very large groups → very high number of simultaneous discoveries
- several scenarios & modes of operation (Blinks, GPS like, TWR, …) → flexibility in trading range/robustness vs. efficient channel usage
Introduction (2/2)

This contribution is proposing requirements for enhancements of 802.15.4(z) in order to efficiently support larger scale industrial UWB based positioning installations… continued

- ISM band operation for OoB cmd&ctrl not always possible → certain in band cmd&ctrl optionally required
- inter radio co-existence management desirable → distributed functionality with standardized information flow may keep efficiency of certain kind of nodes
- inter UWB interference mitigation desirable → scenario detection (self or by system+com) and reaction → flexibility in modes, rates, ranges, channels etc.
Enhancement of 802.15.4z for efficient and diverse larger scale 3D Locating

To address the challenge of a unified location tracking system, one must go beyond the current definition of 4z:

- including required additional functionality while keeping 4z backward compatibility
- enabling flexible longer distance measuring range
- allowing efficient scalability for larger positioning networks
- increasing fault tolerance
- allowing efficient in-band mean low rate command & ctrl
- supporting advanced radio co-existence mechanisms
Requirements for efficient and diverse larger scale 3D Precise Locating

3D Precise Location Systems inherently scalable to efficient larger object number installations require:

- providing all optionally required additional functionality while keeping energy efficiency (incl. also asymmetric scenarios) and optimal radio resource allocation for ranging
- allowing simultaneous multi-mode operation
- enabling optional tightly coupled (synch) infrastructure
- supporting efficient (synch) handover / discovery
- supporting fine-grain time slotting