**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | Beacon Enabled In-Band Signaling for ERDEV |
| Date Submitted | [July 2019] |
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| Re: | Re: |  |
| Abstract | Text for possible inclusion in IEEE 802.15.4z MAC |
| Purpose | Provision of the text to facilitate its incorporation into the draft text of the IEEE 802.15.4z standard currently under development in the 802.15 TG4z. |
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***Goal of this submission:***

*The objective of this submission is to provide text for the proposal on beacon enabled in-band signaling for ERDEV*

*The changes are based on 802.15.4*

*Add Section 6.2.11*

**6.2.11 Beacon Enabled Ranging with ERDEV**

Support of beacon enabled ranging for ERDEV is optional. The ranging time structure for beacon enabled ERDEV is shown in Figure 6-X. The ranging time structure is characterized by repeating beacons. The time between two beacons is termed as Beacon Interval. The Beacon Interval of the ranging time structure comprises of ranging beacon slots (RBS). RBS is defined as the multiple of the Ranging Scheduling Time Unit (RSTU) specified in the Ranging Beacon, and spans sufficient duration for the transmission of at least one Enhanced Beacon frame. Beacon Interval consists of three periods: the Ranging Beacon, the Ranging Management Period consisting of one or more RBSs, and the Ranging Period consisting of one or more ranging slots (see 6.9.8).

Ranging Beacon shall be transmitted using the Enhanced Beacon Frame. The Beacon conveys the Beacon Interval, information on the usage of Ranging Management Period, the beginning of the Ranging Period, which is typically characterized by the transmission of the Ranging Control Message (see 6.9.8.2). The Ranging Descriptor IE (7.4.4.XX) is used to convey this information in the Beacon.

The Ranging Management Period may have one or more ranging contention access period(s) (RCAP) and one or more ranging contention free period(s) (RCFP). Each RCFP and RCAP comprises of one or more RBSs. The RCAP and RCFP may be interleaved with each other. The Ranging Management Period may or may not be present in a given Beacon Interval. The channel access for slots in RCAP is contention based and for slots in RCFP is schedule based.

The Ranging Period may contain ranging blocks, ranging rounds, ranging slots, etc. as defined in 6.9.8.1 and 6.9.8.2. The beginning of the ranging period is characterized with the ranging control message (RCM), which configures the ranging period. The ranging period may have more than one RCM. The Ranging Period may last until the next Ranging Beacon or could end before the next Ranging Beacon. The Ranging Period may or may not be present in a given Beacon Interval.



**Figure 6-X Ranging Time Structure for Beacon Enabled Ranging with ERDEV**

*Add Section 7.4.4.XX*

**7.4.4.XX Ranging Descriptor IE**

The Ranging Descriptor IE (RD IE) conveys the information of the ranging time structure. It is included in the beacon of the ranging time structure. The RD IE is formatted as shown in Figure 7-X.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Octets: 1** | **2** | **2/4** | **2/4** | **1** | **Variable** |
| Version | Slot Size Multiplier for RBS | Beacon Interval | First RCM Slot | RM Table length | RM Table |

**Figure 7-X. Format of the content field of Ranging Descriptor IE**

Each row of the RM Table is formatted as shown in Figure 7-Y.

|  |  |  |  |
| --- | --- | --- | --- |
| **Bits: 10** | **10** | **1** | **3** |
| Starting RBS Number | Ending RBS Slot Number | RCAP/ RCFP Indicator | Reserved |

**Figure 7-Y. Each row of the RM Table of the RD IE**

The Version field indicates the version of the RD IE and shall be set to zero for this version of the standard.

Slot Size Multiplier for RBS conveys the ranging slot duration as a multiple of the Ranging Scheduling Time Unit (RSTU).

Beacon Interval conveys the time duration or the time interval to the next beacon in units of RSTUs.

First RCM Slot field conveys the RBS of the first RCM in the Beacon Interval of the ranging time structure. This shall be set to zero if Ranging Period is not present in the current Beacon Interval. The first RCM occupies the slot zero of ranging slot.

Ranging Management (RM) Table Length specifies the length of the Ranging Management table. The RM Table Length shall be set to zero if Ranging Management Period is not present in the current Beacon Interval.

Each row of the RM Table sequentially indicates the starting and ending slot numbers of RCAP and/or RCFP periods that are present in the Ranging Management Period. The RCAP/RCFP indicator in each row indicates whether the set of slots specified in the row use RCAP (=0) or RCFP (=1).

The number of octets of the Beacon Interval field and the First RCM Slot field shall be the same.