**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Proposed Ranging Text Changes for TG4p and TG4m** |
| Date Submitted | [The date the document is contributed, in the format “21 May, 1999”] |
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| Re: |
| Abstract | This document shows proposed editorial changes for the ranging text common to both the TG4p and TG4m drafts. |
| Purpose | The contents of this document should be discussed among members of both task groups, and a joint decision regarding the final content of the ranging subclauses should be reached. |
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Marked up text:

5.1.8.5 **Ranging exchange with information elements**

In an RDEV that supports IEs, the ranging exchange may be performed by the MAC as part of the data/ acknowledgment process.

This process is initiated upon receipt of an MCPS-DATA.request with the RangingMethod parameter set to a supported ranging mode and the UseRangingIEparameter set to TRUE. The MAC sublayer will generate a Ranging request IE, as described in 5.2.4.34.1, and include it in the data or multipurpose frame sent. The Ranging Method field of the Ranging request IE shall be set according to the RangingMethod parameter of the MCPS-DATA.request primitive. The Ranging Message Sequence Number field shall be incremented upon receipt of each MCPS-DATA.request with ranging enabled. The AR field of the Frame Control field shall be set to request an acknowledgment.

When a data or multipurpose frame containing a Ranging request IE is received by an RDEV that supports IEs, the receive Timestamp is captured and a Ranging response IE, as described in 5.2.4.34.2, is included in the acknowledgment if two way ranging is requested. The Response TX Timestamp field of the Ranging response IE is set to the local time reference when the acknowledgment is transmitted. If the Ranging Method field of the received Ranging request IE indicates a two-way ranging request, the Request RX Timestamp field is set to the Timestamp captured when the packet containing the request was received.

Upon receipt of the acknowledgment by the originating device, the timestamp parameters of the MCPS-DATA. confirm primitive are set according to the contents of the Ranging response IE.

5.2.4.34.1 **Ranging request IE**

The Ranging request IE is used by a device to initiate the transfer of ranging measurements between devices. In a ranging capable device, the presence of a Ranging request IE signals the receiving MAC entity that the receive timestamp should be captured and returned to the requesting device. This IE is used in the ranging exchange described in 5.1.8.5.

The Ranging request IE content is encoded as shown in Figure 48nac.

**Figure 48nac—Ranging request IE content**

The Ranging Method field shall be set to zero to indicate one-way ranging and set to one to indicate two-way ranging. The Ranging Message Sequence Number field shall be set as described in 5.1.8.5. The TX Timestamp field shall be set to the time, in nanoseconds, as seen from the perspective of the sender, when a packet containing this IE is transmitted. The Request TX Timestamp field shall be set to the TX time when the ranging method is one-way ranging.

5.2.4.34.2 **Ranging response IE**

The Ranging response IE is encoded as shown in Figure 48nad.

**Figure 48nad—Ranging response IE content**

The Ranging Method field shall be set to zero to indicate one-way ranging and set to one to indicate two-way ranging. The Ranging Message Sequence Number field shall be set as described in 5.1.8.5.

The Request RX Timestamp field shall be present when the Ranging Method field is set to two-way ranging. The field shall contain the time, in microseconds, as seen from the perspective of the responding device, that the request was received.

The Response TX Timestamp field shall be set to the TX time, in microseconds, as seen from the perspective of the responding device, at which the response packet is transmitted.

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Cleaned up text (with changes incorporated):

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The Response TX Timestamp field shall be set to the TX time, in microseconds, as seen from the perspective of the responding device, at which the response packet is transmitted.