IEEE P802.11
Wireless LANs

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| [802.11az Availability Window for TB Ranging operations](relative to IEEE REVmd D1.0, 802.11ax D3.1 and 802.11az D0.4) |
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Abstract

This submission proposes spec text for the frame format and usage of the Availability Window IE in TB Ranging corresponding to document 11-18-1138-03-00az-ranging-availability-window-how-is-it-established-for-hez-ranging.pptx

History:

R0: Initial Version

R1: Removed auto-generated comments by MSWord to track changes; updated document headers to reflect dates

R2: Reorganized element definitions to be in separate subclauses; and refer to these definitions in the description of the Availability Window field in the definition of the Ranging Parameters element.

R3: Updated revision history which was missed in R2

R4: Updated based on discussion in Thu PM2

*Insert the following new element definitions to Table 9-87 Element IDs as shown below:*

|  |  |  |  |
| --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible |
| Secure LTF Parameters | 255 | <ANA> | Yes |
| NGP CSI Information | 255 | <ANA> | Yes |
| ISTA Availability Window | 255 | <ANA> | Yes |
| RSTA Availability Window | 255 | <ANA> | Yes |

*Insert the following clauses before 9.4.2.246 Ranging Parameters*

**9.4.2.246(-2) ISTA Availability Window**

The format of the ISTA Availability Window element is shown in Figure 9-610e.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID (255) | Length |  Element ID Extension | ISTA Availability Information |
| Octets | 1 | 1 | 1 | Variable |

Figure 9-610e ISTA Availability Window element format

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1.

The ISTA Availability Information field format is shown in Figure 9-610ee.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0-B8 | B9-B15 | B16 |  | B(n+15) | B(n+16)-B(count-1)\*8 |
|  | Count | Reserved | Availability bit B0 | … | Availability bit Bn-1 | Padding bits |
| Bits | 9 | 7 | 1 | … | 1 | Variable |

Figure 9-610ee – ISTA Availability Information field format

The Count subfield in the ISTA Availability Information field indicates the total number of Availability bits in this field.

Each Availability bit in the ISTA Availability Information field indicates the ISTA’s availability for TB Ranging with the recepient RSTA. The value indicated in the Availability bit is in units of 10 TUs. Bit Bk (where 0≤*k≤* Count-1) represents the ISTA’s periodic availability for TB Ranging with the RSTA in the interval [tstart,k , tend,k] repeated every N TUs where

 tstart,*k*= tstart,0 + 10*k* TU,

 tend,*k*= tstart,0 + 10(*k+1*) TU,

 tstart,0 = time 0 per RSTA’s TSF

 N = 10\*Count.

A value of 1 in the bit indicates ISTA’s availability at time tstart,k for a duration of 10 TUs, while a value of 0 indicates ISTA’s unavailability at time tstart,k for a duration of 10 TUs.

The Padding bits in the ISTA Availability Information field are only included for the length of the field to be a multiple of 8.

**9.4.2.246(-1) RSTA Availability Window**

The format of the RSTA Availability Window element is shown in Figure 9-610f.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID (255) | Length |  Element ID Extension | RSTA Availability Information |
| Octets | 1 | 1 | 1 | Variable |

Figure 9-610f RSTA Availability Window element format

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1.

The RSTA Availability Information field format is shown in Figure 9-610ff.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Count | Availability Window Information subfield-1 | …. | Availability Window Information subfield-n |
| Octets | 1 | 4 | … | 4 |

Figure 9-610ff RSTA Availability Information field format

The Count subfield in the RSTA Availability Information field indicates the number of Availability Window Information subfields included in that field. The format of each Availability Window Information subfield is shown in Figure 9-610h.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0-B15 | B16-B22 | B23 | B24-B31 |
|  | Partial TSF Timer | Duration | Reserved | Periodicity |
| Bits | 16 | 7 | 1 | 8 |

Figure 9-610h – Availability Window Information field format

The Partial TSF Timer subfield is the same as that in REVmc FTM (see section 9.4.2.168).

The Duration subfield in the Availability Window Information field indicates the duration of the corresponding Availability Window in units of 100 microseconds.

The Periodicity subfield in an Availability Window Information subfield indicates the periodicity of that availability window in units of the value of the Beacon Interval field in the most recent beacon sent by the RSTA.

9.4.2.246 Ranging Parameters

***802.11az EditorChange the description of the Availability Window field as shown below:***

The definition of Availability Window field is either an ISTA Availability Window element (9.4.2.226(-2) ISTA Availability Window) when the containing Ranging Parameters element is in an initial FTM Request frame; or a RSTA Availability Window element (9.4.2.226(-1) RSTA Availability Window) when the containing Ranging Parameters element is in a FTM frame.

Figure 9-610i1, 9-610i2 and 9-610i3 together show an example of how an RSTA can assign an availability window from the received RSTA Availability Window element. Figure 9-610i1 shows the bitmap in the ISTA Availability Information field of the ISTA Availability Window element included with an IFTMR. The bitmap has periodicity of 200 TUs and the RSTA Beacon Interval is 100 TUs. Figure 9-610i2 shows how the RSTA calculates ISTA’s periodic availability from this bitmap relative to RSTA TSF. Finally, Figure 9-610i3 shows how the RSTA constructs an availability window with requested periodicity of 200 TUs.



 **Figure 9-610i1. Example of a bitmap with 200 TU periodicity signalled in the ISTA Availability Window element.**

 

 **Figure 9-610i2. Example of mapping of ISTA’s availability bitmap to RSTA’s TSF.**



 **Figure 9-610i3. Example of construction of an availability window from received ISTA Availability Window element. The shaded region indicates the location of the assigned availability windows.**

**11.22.6.3.1 Range Measurement Negotiation**

***802.11az Editor: Add following after P58L8 of the 802.11az draft:***

The ISTA shall include one ISTA Availability Window element in the HEz specific subelement in the IFTMR indicating its availability for TB Ranging as well as the requested periodicity. The periodity of the availability windows requested by the ISTA is expressed in units of 10 TUs in the Count subfield in the ISTA Availability Information field of the ISTA Availability Window element. The value of the Count subfield in the ISTA Availability Information field of the ISTA Availability Window element shall be a multiple of the Beacon Interval of the RSTA in units of 10 TUs.

An RSTA shall reject a request for TB Ranging from an ISTA if the RSTA cannot assign the ISTA to an availability window that does not overlap with a 10 TU interval in which the ISTA is unavailable (as signalled by the ISTA Availability Window element in the IFTMR).

If the RSTA includes a HEz specific subelement in an IFTM to an ISTA and the Status Indication field in the IFTM is set to 1, then the RSTA shall include an RSTA Availability Window element in the IFTM. The RSTA Availability Information field in the RSTA Availability Window element shall contain exctly one Availability Window Information field. The Availability Window Information field represents the availability window assigned by the RSTA to the ISTA.

If the RSTA includes a HEz specific subelement in an IFTM to an ISTA and the Status Indication field in the IFTM is set to 2 or 3, then the RSTA may include an RSTA Availability Window element in the IFTM. The RSTA Availability Information field in the RSTA Availability Window element shall contain one or more Availability Window Information field(s). Each Availability Window Information field represents an availability window that the RSTA can assign to that ISTA if requested by the ISTA in future.