IEEE P802.11  
Wireless LANs

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| Comment resolutions for CIDs 2079, 2080, 2098 | | | | |
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Resolutions for listed comments; proposed changes are relative to 11md **Draft 2.4.**

**CID 2079, 2080**

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| 2079 | 2314.00 | 11.20.1 | Few comments in one: (1) All STAs maintain a TSF timer, whether they send a Timing Advertisement frame or not. (2) How the Timestamp field is set (and note it is set differently for DMG/EDMG PHY for example) does not belong to this section, and in fact redundantly mentioned for (non-DMG) Beacon frames here, in addition to 11.1.3. (3) Time Advertising element can be included in some other frames that are not listed in second paragraph.  Fix (1) and (3) in this section, and for (2), use one place, the dedicated 11.1.3 section, to define how the Timestamp field is set for all applicable frames (Beacon, DMG Beacon, Timing Advertisement, Probe Response...) and different PHYs. Having a central place to specify how Timestamp field is set is important, e.g., I couldn't find how the Timestamp field is set in Probe Response frames (9.3.3.11).  Also see the related comment for 11.1.3 text. | (1) Remove the first paragraph in 11.20.1. (2) Change the first sentence in the second paragraph to "A STA may advertise a time standard by transmitting a Timing Advertisement element in one of the following frames: Timing Advertisement, Probe Response, Beacon, DMG Beacon, or Announce."  Also see the folow on comment for 11.1.3 text. |
| 2080 | 2115.00 | 11.1.3.1 | Few comments on second paragraph in 11.1.3.1: "timestamp" is not a field, "Timestamp" is. Break into two paragraphs for non-DMG and DMG for better reading. DMG text English is broken. The DMG text has mixed normative and informative text. DMG and non-DMG text can be simpler and alike. WM has a definition and "[e.g. antenna]" is unnecessary.  As suggested in a separate related comment, it is better to specify how the Timestamp field is set for all applicable frames and different PHYs here, because all are about "maintaining synchronization".  There is a non-normative text in DMG part "(which can be derived from the PHY-TXHEADEREND.indication primitive)", which doesn't mean anything. Timestamp field location in the PSDU needs to be known and compnsated for anyway (MAC header etc., and prior MPDUs if in an A-MPDU). | Change the second paragraph to,  "A non-DMG STA sending a Beacon, Timing Advertisement or Probe Response frame shall set the value of the frame's Timestamp field so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the Timestamp field is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM.  A DMG STA sending a DMG Beacon, Announce, Timing Advertisement or Probe Response frame shall set the value of the frame's Timestamp field so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the MPDU that includes the Timestamp field is transmitted to the PHY plus the transmitting STA's delays through its local PHY from the MAC-PHY interface to its interface with the WM.  NOTE -- The PHY-TXHEADEREND.indication primitive can be used to determine the transmission time of the data symbol that contains the first bit of the MPDU that includes the Timestamp field in DMG case."  ----------------------------  Alternatively, a simpler and in my view more accurate text is the following (above NOTE can still be kept, but preference is to remove it),  "A non-DMG STA sending a Beacon, Timing Advertisement or Probe Response frame shall set the value of the frame's Timestamp field so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the Timestamp field appears on the WM.  A DMG STA sending a DMG Beacon, Announce, Timing Advertisement or Probe Response frame shall set the value of the frame's Timestamp field so that it equals the value of the STA's TSF timer at the time that the data symbol containing the first bit of the MPDU that includes the Timestamp field appears on the WM." |

**Discussion:** Agree, with revisions. Comments propose a set of changes to 11.20.1, and two alternative changes to 11.1.3. On top of a few small fixes explained in resolution, and DMG/non-DMG harmonizatin,

1. Suggested edits ensure how Timestamp field is set for all frames and bands (PHYs) in one place – Section 11.1.3.1. This seems to have been the intention, but it hasn’t been followed over time: Timestamp field setting for Timing Advertisement and Probe Response frames is absent in 11.1.3.1, and perhaps as a result of that DMG (and I think now S1G) has missed to define how to set the Timestamp field for these two frames (in DMG case it should be set the same way as DMG Beacon and other DMG frames, and not how it is set for non-DMG frames).
2. Commenter also recommends removing the vague language for delay compensation from normative text, and specify the value of Timestamp field at the moment the field (or the MPDU that contains the field, if DMG) appears over the wireless medium, e.g., this text for non-DMG (putting other edits aside),

… shall set the frame’s Timestamp field so that it equals the value of the STA’s TSF timer at the time that the data symbol containing the first bit of the Timestamp field appears on the WM.

instead of the current text,

… shall set the frame’s Timestamp field so that it equals the value of the STA’s TSF timer at the time that the data symbol containing the first bit of the Timestamp field is transmitted to the PHY plus the transmitting STA’s delays through its local PHY from the MAC-PHY interface to its interface with the WM.

Simple analogy is to say “set the clock to to when the train arrives in B” (proposed text) as opposed to “set the clock to when the train leaves A to B, plus all delays it would take to get from A to B.” (existing text)

We note “transmitting STA’s delays through its local PHY from the MAC-PHY interface to its interface with the WM” does not specify anything. Where on transmit path Timestamp field is set is implementation dependent, in particular, it does not have to be immediately before submitting to PHY, which is what original text assumes; all matters is the value of Timestamp field to match the TSF at the time the field (or in DMG, the MPDU that contains the field) appears on the wireless medium.

We put the suggested edits for this last part for discussionin 11md.

**11.20 Timing Advertisement**

**11.20.1 Introduction**

A STA may advertise a time standard by transmitting a Timing Advertisement element in one of the following frames: Timing Advertisement, Probe Response, Beacon, DMG Beacon or Announce. As defined in 9.4.2.60 (Time Advertisement element) the Time Advertisement element contains two estimates. The Time Value field contains an estimate of the difference between a time standard and the timestamp included in the same frame. The Time Error field contains an estimate of the standard deviation of the error in the estimate in the Time Value field. The time standard might be derived from an external time source. A STA with an external time source might implement an estimator in a variety of ways, which are beyond the scope of this standard.

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**11.1.3 Maintaining synchronization**

**11.1.3.1 General**

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A non-DMG STA sending a Beacon, Timing Advertisement or Probe Response frame shall set the frame’s Timestamp field so that it equals the value of the STA’s TSF timer at the time that the data symbol containing the first bit of the Timestamp field appears at the transmit antenna connector.

A DMG STA sending a DMG Beacon, Announce, Timing Advertisement or Probe Response frame shall set the frame’s Timestamp field so that it equals the value of the STA’s TSF timer at the time that the data symbol containing the first bit of the frame appears at the transmit antenna connector.

NOTE –In order that the value of the Timestamp field matches the TSF value at the correct time, implementations need to compensate for delays along the transmit path, such as delays through the local PHY from the MAC-PHY interface to the transmit antenna connector.

**CID 2098**

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| 2098 | 2114.00 | 11.1.2.1 | In 11.1.2.1, 1st paragraph: "In a DMG BSS, the AP or PCP shall periodically transmit frames called DMG Beacon frames and ..", and 4th paragraph: "In a DMG infrastructure BSS, zero or more DMG Beacon frames shall be generated for transmission by the AP every dot11BeaconPeriod TUs (see 11.1.3.3 (Beacon generation in a DMG infrastructure BSS and in a PBSS)). The AP shall transmit at least one DMG Beacon frame through each sector available to the AP within a time interval that is not longer than dot11BeaconPeriod × dot11MaxLostBeacons TUs. The TXSS Span field in the DMG Beacon frame shall be set to a value that is less than or equal to dot11MaxLostBeacons."  Discussion: (1) This sentence in 4th paragraph "zero or more .. frames .. shall be generated .." does not specify anything because it is always true; suggest to delete the sentence. (2) An AP with a fixed number of STAs associated, and with no intention of being discovered or allowing new STAs to associate should not be required to transmit beacons through all available sectors - this is costly for performance (overhead), and arguably costly for co-ex (sending MCS 0 frames in all directions, without intention to be discoverable); even for co-ex, time is better spent sending beacons in active directions than going full circle and reducing the beacon frequency in those directions. (3) With the leeway given to AP to skip beacon transmission in some BIs, beacon transmission will not be necessarily periodic as mentioned in the first paragraph. | Proposed changes,  First paragraph: "In a DMG BSS, the AP or PCP regularly transmits frames called DMG Beacon frames and ..."  Fourth paragraph (first sentence deleted and additional changes): "In a DMG infrastructure BSS, the AP shall transmit at least one DMG Beacon frame through at least each sector from a group of sectors that the AP decides as sufficient to reach all associated STAs, within a time interval that is not longer than dot11BeaconPeriod × dot11MaxLostBeacons TUs. The AP can also transmit DMG Beacon frames through a larger group of sectors, including all sectors available to the AP. The TXSS Span field in the DMG Beacon frame shall be set to a value that is less than or equal to dot11MaxLostBeacons."  Suggest to also include the following NOTE after the 4th paragraph,  "NOTE - The group of sectors selected by the AP to transmit DMG Beacon frames, and the value of the TXSS Span field can change depending on the number of associated STAs, the beams the AP uses to transmit to those STAs, and the AP intention to be discoverable in various spatial directions." |

**Discussion:** Agree, with slight revisions for grammar and reading.

**11.1.2 Basic approach**

**11.1.2.1 TSF for an infrastructure BSS or a PBSS**

In an infrastructure BSS or in a PBSS, the AP in the infrastructure BSS or the PCP in the PBSS shall be the timing master for the TSF. In a non-DMG and non-S1G BSS, the AP shall periodically transmit frames called Beacon frames. Instead of Beacon frames, an S1G AP shall periodically transmit S1G Beacon frames (as described in 11.1.3.10.1 (General S1G synchronization)), which provide a similar function to the Beacon frame in a non-S1G BSS. Within an S1G BSS, the generation and/or reception of a Beacon frame and all references to it refer to that of the S1G Beacon frame. In a DMG BSS, the AP or PCP shall regularly transmit frames called DMG Beacon frames and Announce frames, which provide a similar function to the Beacon frame in a non-DMG BSS. Beacon, S1G Beacon, DMG Beacon, and Announce frames contain the value of the AP’s or PCP’s TSF timer in order to synchronize the TSF timers of other STAs in a BSS. A receiving STA shall accept the timing information in Beacon, S1G Beacon, DMG Beacon, and Announce frames sent from the AP or PCP servicing its BSS. An S1G STA that receives an S1G Beacon frame shall update its TSF timer according to the algorithm described in 11.1.3.10.3 (TSF timer accuracy with S1G Beacon frame(Ed)). If a STA’s TSF timer is different from the timestamp in the received Beacon, S1G Beacon, DMG Beacon, or Announce frame, the receiving STA shall set its local TSF timer to the received timestamp value. (11ah)A STA that receives a frame from its currently associated AP containing a Tetrapartial Timestamp or a Pentapartial Timestamp field may update its local TSF using the received portions of the AP’s TSF timer contained in the received field, following the procedure described in 11.1.3.10.3 (TSF timer accuracy with S1G Beacon frame(Ed)).

…

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In a DMG infrastructure BSS, zero or more DMG Beacon frames shall be generated for transmission by the AP every dot11BeaconPeriod TUs (see 11.1.3.3 (Beacon generation in a DMG infrastructure BSS and in a PBSS)). The AP shall transmit at least one DMG Beacon frame through each sector the AP chooses to use, within a time interval that is not longer than dot11BeaconPeriod × dot11MaxLostBeacons TUs. The determination of the sectors the AP chooses to use is implementation dependent, but should be determined in a way that allows unassociated STAs to discover the AP.The TXSS Span field in the DMG Beacon frame shall be set to a value that is less than or equal to dot11MaxLostBeacons.

NOTE - The AP can change the sectors it transmits DMG Beacon frames through, and the value of the TXSS Span field, depending on the number and location of associated STAs, and the AP’s intention to be discoverable in various sectors.