IEEE P802.11
Wireless LANs

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| Resolutions for some more comments on 11mc/D4.0  |
| Date: 2015-09-08 |
| Author(s): |
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Abstract

This submission proposes resolutions for CIDs 5193, 5194, 5195, 5196, 5198, 5199,

5200, 5201, 5202, 5204, 5205, 5206, 5207, 5208,

5495,

5984,

6209, 6210,

6779

 on 11mc/D4.0.

Green indicates material agreed to in the group,

yellow material to be discussed, red material rejected by the group and

cyan material not to be overlooked.

The “Final” view should be selected in Word.

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| Identifiers | Comment | Proposed change |
| CID 5193Stephens, Adrian10.1.11529.9 | 10.1.1 does not mention PBSS, which is not covered by any of the cases discussed. | Add ", PBSS" after "infrastructure BSS" at cited location. |

Discussion:

10.1.1. General

“STAs in a single infrastructure BSS or IBSS are synchronized to a common clock using the mechanisms defined in 10.1 (Synchronization).”

PBSS is different to IBSS and certainly does have a STA that assumes the PBSS control point (PCP which provides the basic timing. Hence the commentor is correct.

Accepting the comment. the sentence would then read:

“STAs in a single infrastructure BSS, PBSS or IBSS are synchronized to a common clock using the mechanisms defined in 10.1 (Synchronization).”

Unfortunately the commentor has two spaces after the comma so maybe this needs to be ‘revised”. I will assume the editor will know what to do.

Proposed Resolution

ACCEPT

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| Identifiers | Comment | Proposed change |
| CID 5194Stephens, Adrian10.1.2.11529.31 | "TSF for infrastructure and PBSS networks" -- this title is misleading and inconsistent with sibling subclauses. A PBSS is not really a network. | Change to "TSF for infrastructure BSS and PBSS" |

Discussion:

The opening sentence is :

“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”

Hence the proposed change seems consistent

Proposed resolution:

ACCEPT

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| CID 5195Stephens, Adrian10.1.2.11529.34 | "A STA contained in the AP or PCP shall initialize its TSF timer independently of any simultaneously started APs or PCPs, respectively in an effort to minimize the synchronization of the TSF timers of multiple APs or PCPs."This implies a model in which a single 802.11 logical entity known as an AP or a PCP includes multiple STAs.Try as I might, I can't find any support for this position in Clause 4. | Delete cited sentence, or replace it with a recommendation that if a device includes multiple APs or PCPs, it should use independent TSF values. |

Discussion:

This is a weird sentence and is very unclear as to what it is saying IMHO. I suppose it is saying that the TSF timer in an AP is indeoendent and not set based upon anything. Also the comma before ‘respectively’ wrong.

The commentor suggests two appraches two possible approaches. I think I prefer the second.

Proposed Resolution

REVISED

Replace:

“A STA contained in the AP or PCP shall initialize its TSF timer independently of any simultaneously started APs or PCPs, respectively in an effort to minimize the synchronization of the TSF timers of multiple APs or PCPs.

With

“A STA contained in the AP or PCP shall independently initialize its TSF timer values.”

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| Identifiers | Comment | Proposed change |
| CID 5196Stephens, Adrian10.1.2.21530.13 | "The TSF in an IBSS shall be implemented via a distributed algorithm that shall be performed by all of the members of the BSS."This has an excess of shalls. The next two sentences suffice. Furthermore it is a "shall" on all members, which is generally useless. | Reword thus: "The TSF in an IBSS is implemented via a distributed algorithm that is performed by all of the members of the BSS." |

Discussion:

I agree with the comment.

Proposed resolution:

ACCEPT

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| Identifiers | Comment | Proposed change |
| CID 5198Stephens, Adrian10.1.3.51534.60 | "A STA that has joined an IBSS shall transmit Beacon frames only during the awake period of the IBSS. This is described in more detail in 10.2 (Power management)."Why is an extra shall required here? The previous list explains when and how to generate a Beacon. | Either delete cited sentence or replace with:"A STA that is a member of an IBSS shall not transmit a Beacon frame except as described above.". |

Discussion:

I read the 7 criteria isted above this cited sentence and I do not see anything with respect to ‘awake period’. Hence this does seem to be an extra requirement and leading the reader to look at 10.2. If the commentor is concerned with the “shall” here maybe we make this a note.

Proposed resolution:

REVISED

At P1534L60

Replace:

“A STA that has joined an IBSS shall transmit Beacon frames only during the awake period of the IBSS. This is described in more detail in 10.2 (Power management).”

With

“Note: A STA that has joined an IBSS transmits Beacon frames only during the awake period of the IBSS. This is described in more detail in 10.2 (Power management).”

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| Identifiers | Comment | Proposed change |
| CID 5199Stephens, Adrian10.1.3.71535.42 | "A non-AP or non-PCP STA" -- wrong conjunction | change "or" to "and". |

Discussion:

“A non-AP or non-PCP STA in an infrastructure or PBSS network respectively, that supports the Multiple BSSID capability shall use,…”

Comment seems right, but do we need a second “a”?

“A non-AP and a non-PCP STA in an infrastructure

Proposed resolution:

REVISE

P1535 L 42 edit as shown:

“A non-AP and a non-PCP STA in an infrastructure or PBSS network respectively …”

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| Identifiers | Comment | Proposed change |
| CID 5200Stephens, Adrian10.1.3.71536.14 | "An active STA operating in a BSS shall be ready to receive a DMG Beacon frame or a frame from the AP or PCP for a period of time of at least dot11MinBHIDuration" - this is specific to DMG. Also meaning of "DMG Beacon frame or frame" is unclear.. | Replace cited sentence with: "An active DMG STA operating in a BSS shall be ready to receive a DMG Beacon frame from the AP or PCP for a period of time of at least dot11MinBHIDuration". Or possibly add in an Announce frame: "DMG Beacon frame or Announce frame". |

Discussion:

dot11MinBHIDuration does indeed appear to be a DMG thing. First see P1006 L41 and Fig 8-506.

**8.4.2.128 DMG Operational element**



“The MinBHIDuration subfield indicates the minimum duration of the BHI, which can include the BTI, ABFT, and ATI and is specified in microseconds. While associated with an AP or PCP, a STA overrides the value of dot11MinBHIDuration variable with the value of this subfield when it receives this element from its AP or PCP.

There is no other mention of MinBHIDuration in the Standard. Note however that “a STA” is used, and “AP” so so did the DMG writers intended that this parameter was recived and used by legacy STAs? I don’t think so. In this context

OK I read that “A DMG STA acting as an AP transmits DMG Beacon frames.” (P1531 L44 Beacon Generation in a DMG infrastructure BSS and…). So it looks as though the term “AP” is OK and does, in this context mean a “DMG” AP. BUT does this also mean STA receiving DMG Beacons is by definition a “DMG” STA?

Back to the Cited Section

**10.1.3.7 Beacon Reception**

An active STA operating in a BSS shall be ready to receive a DMG Beacon frame or a frame from the AP or PCP for a period of time of at least dot11MinBHIDuration following the TBTT or expected ATI start time as specified in the last Next DMG ATI element (8.4.2.134 (Next DMG ATI element)) transmitted by the AP or PCP.

This does seems to say that any STA can receive a DMG Beacon? But I am pretty sure that DMG Beacons are not transmitted in the 2.4 and 5GHz bands? I seem to remember something about a DMG STA falls back to 5GHz – but does it still use DMG beacons? Does this mean that DMG Beacons are transmitted in a band where an 11a/n/ac STA hears them or has DMG just used the term STA when it really meant DMG STA? I suspect the latter.

Hence, I certainly agree with the commentor but I suspect there are other similar places.

Proposed resolution:

REVISED

In Clause 8.4.2.128 replace “STA” with “DMG STA” throughout. i.e. in the following locations:

Page 1006, Lines 36, 42, 48, 49, 54, 61

Page 1007 Lines 1 2 in two places, 8

Page 1536 Line 14replace “STA” with “DMG STA”

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| Identifiers | Comment | Proposed change |
| CID 5201Stephens, Adrian10.1.3.81536.46 | I can think of no good reason for a PCP to support multiple BSSID. I suspect multiple BSSID operation is incomplete when PBCC power saving is considered. | Change this subclause to exclude a PCP from supporting multiple BSSID operation. |

Discussion:

**Clause 10.1.3.8 Multiple BSSID Procedure**

“Implementation of the Multiple BSSID capability is optional for a WNM STA and for a DMG STA.”

I need to keep reminding myself what a PCP is, it is a PBBS (personal basic service set) Control Point. So what is a PBSS?

“Similar to the IBSS, the PBSS is a type of IEEE 802.11 LAN in which STAs communicate directly with each other. In contrast to the IBSS, in the PBSS one STA assumes the role of the PBSS control point (PCP).”

So can a WNM STA be a PCP? I don’t think so because a PCP by definition is not a managed network but a point to point network and I can’t see that the 11k stuff would be of any real use.

So I agree with the comment.

Proposed resolution:

REVISED

Make following changes at Page 1536 Line 43

“The nontransmitted BSSID profile shall include the SSID element (see 8.4.2.2 (SSID element)) and Multiple BSSID-Index element (see 8.4.2.73 (Multiple BSSID-Index element)) for each of the supported BSSIDs. The AP may include all other elements in the nontransmitted BSSID profile. The AP may include two or more Multiple BSSID elements containing elements for a given BSSID index in one Beacon frame or DMG Beacon frame. If two or more are given, the profile is considered to be the complete set of all elements given in all such Multiple BSSID elements sharing the same BSSID index. Since the Multiple BSSID element is also present in Probe Response frames, an AP may choose to advertise the complete or a partial profile of a BSS corresponding to a nontransmitted BSSID only in the Probe Response frames. In addition, the AP may choose to include only a partial list of nontransmitted BSSID profiles in the Beacon frame or DMG Beacon frame or to include different sets of nontransmitted BSSID profiles in different Beacon frames or DMG Beacon frames.”

Make following change at Page 1537 Line 3:

“…Multiple BSSID element of the Probe Response frame, the AP shall include all elements that are…”

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| Identifiers | Comment | Proposed change |
| CID 5202Stephens, Adrian10.1.3.91537.58 | "When an STA is associated to a BSS with a nontransmitted BSSID, it shall use the TSF from the transmitted BSSID Beacon frame" -- this shouldn't live in 10.1.3.9 | Move to a more appropriate subclause, such as 10.1.3.8. |

Discussion:

P1537 L30

**10.1.3.9 TSF timer accuracy**

L38

Upon receiving a Beacon, a DMG Beacon, or an Announce frame with a valid FCS and BSSID or SSID, as described in 10.1.3.7 (Beacon reception), a STA shall update its TSF timer according to the following algorithm:”

….

“In the case of an infrastructure BSS or a PBSS, the STA’s TSF timer shall then be set to the adjusted value of the timestamp.

Then at the end of this clause we get the cited sentence:

“When an STA is associated to a BSS with a nontransmitted BSSID, it shall use the TSF from the transmitted BSSID Beacon frame.”

So at line 39 we have “…with a valid …BSSID”, so what about when BSSID is nontransmitted is it still “valid”?

If the BSSID is not transmitted then it seems legitimate to cover that case here in this clause. The problem is what does it mean by “transmitted BSSID Beacon frame”.

Back to basics, 8.3.3.1 P618, is the format of a Management Frame and the 3 address fields. In the case of a Beacon (P 619 L13), we are referred to 10.1.3.7. Beacon Reception.

10.1.3.7 P1535

It starts off with

“A STA shall use information from the CF Parameter Set element of all received Beacon frames, without regard for the BSSID, to update their NAV as specified in 9.4.3.3 (NAV operation during the CFP).”

Hmm…as PCF is obsolete the CF Parameter Set Element is also obsolete, so ignore this.

Then we get:

“STAs in an infrastructure network or PBSS shall use information that is not in the CF Parameter Set element in received Beacon frames, DMG Beacon frames, or Announce frames only if the BSSID field is equal to the MAC address currently in use by the STA contained in the AP of the BSS or to the MAC address currently in use by the PCP of the PBSS”.

Is the “only” word here correct because at Line 60 we might have an exception?

 “A non-AP STA in which dot11MultiBSSIDActivated is true shall support frame filtering for up to two BSSIDs; one for the transmitted BSSID and one for the nontransmitted BSSID. The STA, when associated with a BSS corresponding to a nontransmitted BSSID, shall discard all Data and Management frames that use the transmitted BSSID as the transmit address, except for Beacon, Probe Response, and TIM broadcast frames.”

So now I am a bit confused. This says that in the case of a non transmitted BSSID, the Beacon can use, should use, may use, the “transmitted BSSID”? Anyway, it seems clear that the “nontransmitted BSSID” only exists in the case of a Multiple BSSID and is always accompanied by a “transmitted BSSID”. So which is transmitted in the Beacon, the “transmitted BSSID” or something else?

To find out let’s look at the next clause, **10.1.3.8 Multiple BSSID procedure**. P1536 L31

Line 43

“The nontransmitted BSSID profile shall include the SSID element (see 8.4.2.2 (SSID element)) and Multiple BSSID-Index element (see 8.4.2.73 (Multiple BSSID-Index element)) for each of the supported BSSIDs.”

“The AP or PCP may include two or more Multiple BSSID elements containing elements for a given BSSID index in one Beacon frame or DMG Beacon frame.

Line 53

“…the AP or PCP may choose to include only a partial list of nontransmitted BSSID profiles in the Beacon frame or DMG Beacon frame or to include different sets of nontransmitted BSSID profiles in different Beacon frames or DMG Beacon frames/”.

So what is sent in a Beacon?

Eventually we find **8.4.2.45 Multiple BSSID element**.(P867 L 46)

We read that this is transmitted in a Beacon. (P868 L14)

P868 L54 we read

“For each nontransmitted BSSID, the Nontransmitted BSSID Capability element (see 8.4.2.71 (Nontransmitted BSSID Capability element)) is the first element included, followed by a variable number of elements, in the order defined in 8-27 (Beacon frame body).”

What is the “first element”? Take a look at 8.27 (P620 L48), I assume it is the Capability information at Order 3? Is this right? Is it in place of the Capability Element?

So in **8.4.2.71 Nontransmitted BSSID Capability element** (P935 L23)

L47

“The Nontransmitted BSSID Capability field contains the Capability information field of the BSS when transmitted by a non-DMG STA.

“The Nontransmitted BSSID Capability element is included in the Nontransmitted BSSID profile subelement of the Multiple BSSID element defined in 8.4.2.45 (Multiple BSSID element).”

So after all that, in the beacon, I think that the Nontransmitted BSSID Capability element is transmitted in place of the Capability element but nothing about the BSSID and I assume the SSID is correct.

So if the SSID is correct then we don’t need to mention non transmitted BSSID do we?

**10.1.3.9 TSF timer accuracy**

L38

Upon receiving a Beacon, a DMG Beacon, or an Announce frame with a valid FCS and BSSID or **SSID**, as described in 10.1.3.7 (Beacon reception), a STA shall update its TSF timer according to the following algorithm:”

So, as ‘transmitted BSSID beacon frame’ is ambiguous (is a transmitted Beacon, or is it a transmitted BSSID?) and the SSID is included and correct, then deleting the cited sentence seems the best thing to do.

(Having said all that I am still unconvinced I have understood this “nontransmitted BSSID” thing at all. Having read all the above I am still confused as per some of my comments on the way. Maybe someone else would like to tackle this subject as a whole?

Proposed resolution:

REVISED

P1537L58 Delete “When an STA is associated to a BSS with a nontransmitted BSSID, it shall use the TSF from the transmitted BSSID Beacon frame.”

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| Identifiers | Comment | Proposed change |
| CID 5204Stephens, Adrian10.1.4.11538.65 | "The MAC of a STA receiving an MLME-START.request primitive shall use the regulatory domain information it has to process the request and shall return a result code of NOT\_SUPPORTED to the request if regulatory domain information indicates starting the IBSS is illegal." This is underspecified and probably unnecessary. A "shall use regulatory domain information" is insufficiently explicit. Exactly what fields of what structures obtained in what way?An instruction not to do something illegal should be out of scope of the standard. It is up to the implementer to avoid doing illegal things. | Reword to remove the shalls or delete. |

Discussion:

Also in same Clause at P1538L11 we have

“Active scanning is prohibited in some frequency bands and regulatory domains. The MAC of a STA receiving an MLME-SCAN.request primitive shall use the regulatory domain information it has to process the request and shall return a result code of NOT\_SUPPORTED to a request for any active scan if regulatory domain information indicates an active scan is illegal.”

Clause 9.21.2 **Operation upon entering a regulatory domain**

When a STA with dot11MultiDomainCapabilityActivated true enters a regulatory domain, before transmitting, it shall passively scan to learn at least one valid channel, i.e., a channel upon which it detects IEEE Std 802.11 frames. The Beacon frame transmitted by non-DMG STAs and the DMG Beacon or Announce frame transmitted by DMG STAs contains information on the country code, the maximum allowable transmit power, and the channels that may be used for the regulatory domain. Etc.

The point appears to be that only passive scanning may take place so presumeably the sentences in question are referring to an ‘illegal’ active scan. It has to be assume however, that such ‘illegal’ scans will take place and hence we need to specify what a STA does in this case. Clearly it returns a result code of NOT\_SUPPORTED. So let’s just say that.

Proposed resolution:

REVISED

At P1538L11, edit as follows:

Active scanning is prohibited in some frequency bands and regulatory domains. If regulatory domain information indicates an active scan is prohibited, the MAC of a STA receiving an MLME-SCAN.request primitive shall use shall return a result code of NOT\_SUPPORTED to the request..

At P1538L65, edit as follows:

“If regulatory domain information indicates an active scan is prohibited, the MAC of a STA receiving an MLME-START.request primitive shall return a result code of NOT\_SUPPORTED to the request.."

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| Identifiers | Comment | Proposed change |
| CID 5205Stephens, Adrian10.1.4.11539.14 | "IEEE MAC address as defined in 9.2 of IEEE Std 802-2001" - this has been superseded. | Replace with a reference to Std 802-2014, or remove the year entirely. |

Discussion:

I seem to recall this has been discussed before and resolved??

Proposed resolution:

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| Identifiers | Comment | Proposed change |
| CID 5206Stephens, Adrian10.1.4.3.21540.16 | "When the SSID List is present in the invocation of the MLME-SCAN.request primitive, send zero" -- if the list is present, at least one probe request will be sent. | change "zero" to "one" |

Discussion:

“When the SSID List is present in the invocation of the MLME-SCAN.request primitive, send zero or more Probe Request frames, to the broadcast destination address.”

As the heading for the list is “For each channel to be scanned”, the sending of zero probes is not pertinent. Hence I agree with the comment.

Proposed resolution:

ACCEPT

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| Identifiers | Comment | Proposed change |
| CID 5207Stephens, Adrian10.1.4.3.21541.23 | "In all these cases," - it is unclear what "all" means, given there are just two cases listed above. | Replace "all these cases" with an unimbiguous identification of cases, either by lettering the list items or creating names for the cases and referencing them here. |

Discussion

Ful text is

f) If an SSW-Feedback frame is transmitted or received in step d), then:

1) Send a probe request to the broadcast destination address

— Following the transmission of an SSW-Feedback frame, send a probe request to the MAC address of the STA addressed by the SSW-Feedback frame.

— Optionally, following the reception of an SSW-Feedback frame, send a probe request to the MAC address of the STA that transmitted the SSW-Feedback frame.

In all these cases, the probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive and includes the DMG Capabilities element. The basic access procedure (9.3.4.2 (Basic access)) is performed prior to the probe request transmission.

It seems to be clear that the ‘all” is referring to the two cases. I am not sure why indenting was used in this case. It would be clearer if it were not.

Proposed resolution:

REVISED

At P1541.23 replace

“1) Send a probe request to the broadcast destination address

— Following the transmission of an SSW-Feedback frame, send a probe request to the MAC address of the STA addressed by the SSW-Feedback frame.

— Optionally, following the reception of an SSW-Feedback frame, send a probe request to the MAC address of the STA that transmitted the SSW-Feedback frame.

In all these cases, the probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive and includes the DMG Capabilities element. The basic access procedure (9.3.4.2 (Basic access)) is performed prior to the probe request transmission.”

With

1) Following the transmission of an SSW-Feedback frame, send a probe request to the MAC address of the STA addressed by the SSW-Feedback frame. Optionally, following the reception of an SSW-Feedback frame, send a probe request to the MAC address of the STA that transmitted the SSW-Feedback frame. In either case the probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive and includes the DMG Capabilities element. The basic access procedure (9.3.4.2 (Basic access)) is performed prior to the probe request transmission.

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| Identifiers | Comment | Proposed change |
| CID 5208Stephens, Adrian10.1.4.3.41542.43 | "The STA is a multi-band capable non-AP STA for which the last received probe request included a Multi-band element." -- this condition make no sense to me.The logic I infer underlying this list is that stations that can be expected to be awake are required to respond to probe requests and the protocol in the standard needs to be designed so that any station that is not required to be or known to be awake cannot be reasonably expected to respond to a probe request.Given that logic, a "multi-band element" places no requirement on the STA that it is awake, and so allowing for it to respond to a probe request in the protocol makes no sense. If there is any protocol that depends on its generating a response, that protocol will fail. | Remove cited text.Likewise condition c) at 1542.48 exists only because of a) 6) and should now be removed.Likewise condition d) at 1542.51 should be removed. |

Discussion

Here is the cited section:

**10.1.4.3.4 Criteria for sending a probe response**

A STA that receives a Probe Request frame shall not respond if any of the following apply:

a) The STA does not match any of the following criteria:

1) The STA is an AP.

2) The STA is an IBSS STA.

3) The STA is a mesh STA.

4) The STA is a DMG STA that is not a member of a PBSS and that is performing active scan as defined in 10.1.4.3.3 (Active scanning procedure for a DMG STA).

5) The STA is a PCP.

6) The STA is a multi-band capable non-AP STA for which the last received probe request included a Multi-band element.

This is a list what does not respond to a Probe Request. It is a double negative list which makes it difficult to read. For example, take 1) Do not respond if you are not an AP. So this list is actually those that shall respond.

Hence, 6) effectively says “a multi-band capable non-AP STA for which the last received probe request included a Multi-band element” SHALL respond.

Not quite sure why the commentor goes raving on about ‘awake’ but 6) is definitely referring to a multi-band capable non-AP STA and it does seems strange. Maybe it is meant to be a multi-band capable AP, if sop it is covered by 1)?

Let’s check up on the Multi-band element:

**“8.4.2.137 Multi-band element**

The Multi-band element indicates that the STA transmitting this element (the transmitting STA) is within a multi-band device capable of operating in a frequency band or operating class or channel other than the one in which this element is transmitted and that the transmitting STA is able to accomplish a session transfer from the current channel to a channel using another STA in the same device, in the other or same band.”

Nope, that does not make it any easier. I have no idea what this is meant to be but I agree with the commentor it does not make sense and hence should be deleted.

Commentor also cites conditions c) and d)

“c) The STA is a non-AP STA in an infrastructure BSS and the Address 1 field of the Probe Request frame contains the broadcast address.”

d) The STA is a non-PCP STA in a PBSS and the Address 1 field of the Probe Request frame contains the broadcast address.

Hmmm…would a non-AP STA in an infrastruscture BSS ever respond to a Probe Request irrespective of the Address 1? Similarly a non-PCP STA in a PBSS?

Again, condition a) 1) clearly states if not an AP don’t respond, so mentioning non-AP STAs seems superfluous. Agree delete c).

Similarly condition a) 5) clearly states if not a PCP don’t respond, so mentioning non-PCP STAs seems superfluous. Agree delete d).

Proposed resolution:

ACCEPT

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| Identifiers | Comment | Proposed change |
| CID 5495Stephens, Adrian10.1.2.11529.34 | "A STA contained in the AP or PCP shall initialize its TSF timer independently of any simultaneously started APs or PCPs, respectively in an effort to minimize the synchronization of the TSF timers of multiple APs or PCPs." This implies a model in which a single 802.11 logical entity known as an AP or a PCP includes multiple STAs.Try as I might, I can't find any support for this position in Clause 4. | Delete cited sentence, or replace it with a recommendation that if a device includes multiple APs or PCPs, it should use independent TSF values. |

Discussion

This is identical to CID 5195. Is 5495 a misprint? Which is correct?

Proposed changes:

Proposed resolution:

RESOLVED AS CID 5195

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| Identifiers | Comment | Proposed change |
| CID 5984TorabJahromi, Payam10.1.3.91537.32 | The paragraph and the following note seems to be confusing the tolerance on the clock frequency used to drive the TSF timer (frequency tolerance) with the maximum difference between two TSF timer values at a given point in time (phase tolerance). There is a frequency tolerance of +-100ppm for non-DMG and +-20ppm for DMG, but difference between TSF values (phases) depends on the time elapsed since the last point of synchronization, and could not be measured in relative (ppm) unit. For example, in a basic case, in a non-DMG infrastructure BSS with no beacons skipped or dropped, TSF values for two non-AP STAs can be different as much as 200 ppm \* BI duration; for a BI duration of 100ms, two typical TSF values could be X+100,000\*(1+100ppm) and X+100,000\*(1-100ppm), with an absolute difference of 100,000 \* 200ppm. Note that absolute error has a slope of 200ppm (not +-200ppm), and it is not even possible to define a relative difference (normalized, in ppm) between two TSF values (e.g., assume one is 12345678 and the other is 12346789; absolute difference is clear, but normalizing factor is undefined.). | TSF timer shall be driven with a clock that is accurate to within +-100ppm in non-DMG, and accurate to within +-20ppm in DMG.NOTE--The maximum drift between the TSF timer values of two STAs depends on the time elapsed since the last point of synchronization. For example, two non-DMG and non-AP STAs that receive the beacon frame from the AP will have a maximum drift of 200 ppm x BI duration at the end of the beacon interval. |

Discussion

I’m not sure the commentor is right.

Here is my maths:

Assume 1MHz clocks (keeps it simple), 1 us timing.

One clock A is +100ppm hence the actual frequency is 1,000,100 Hz

Other clock B is -100ppm, hence the actual frequency is 999,900 Hz

After one second,

* clock A has ticked off 1,000,100 us
* clock B has ticked off 999,900 us

The difference, or drift, is 200 us in 1second which is 200ppm.

Now assume 10 seconds has elapsed:

* clock A has ticked off 10,001,000 us
* clock B has ticked off 9,999,000 us

The difference is 2000 us in 10second which is still 200ppm.

Hence, the maximum error, or drift is 200ppm. It is NOT ±200 ppm.

Proposed resolution:

REVISED

The correct worsew case drifts are 200ppm and 40ppm, not ±200 ppm and ±40 ppm

P1537L33 and L34

Delete “±” in front of 200 ppm and 40 ppm.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 6209Mark Rison10.1.4.3.21540.25 | ""f) If aPHY-CCA.indication (BUSY) primitive is received before the timer reaches MinChannelTime, wait until the timer reaches MaxChannelTime and then process all received probe responses; otherwise, when the timer reaches MinChannelTime, proceed to step f)." is recursive. Also missing space after first "a" | Change "step f" to "step g" (and add space after first "a"). Actually, this is the default (i.e. by default you go to the next step). Better would be to break it up into two pieces:pre-e) If a PHY-CCA.indication (BUSY) primitive is not received before the timer reaches MinChannelTime, proceed to step g).f) Wait until the timer reaches MaxChannelTime and then process all received probe responses. |

Discussion

MinChannelTime is the minimum time (in TU) to spend on each channel when scanning

MaxChannelTime is the maximum time (in TU) to spend on each channel when scanning

**10.1.4.3.2 Active scanning procedure for a non-DMG STA**

Upon receipt of the MLME-SCAN.request primitive with ScanType indicating an active scan, a STA shall use the following procedure.

For each channel to be scanned:

……

f) If aPHY-CCA.indication (BUSY) primitive is received before the timer reaches MinChannelTime, wait until the timer reaches MaxChannelTime and then process all received probe responses; otherwise, when the timer reaches MinChannelTime, proceed to step f).

g) Set the NAV to 0 and scan the next channel.

Commentor is right that there should be a space after the ‘a’ in aPHY-CCA.

Again is correct that ‘proceed to step f) should be “proceed to step g)”.

It seems to me that the steps a) to g) are meant to be a sequence procedure and hence would be better to be 1) to 7). Step f) is the only “IF” step so the instruction to ‘proceed to step g) is correct.

Proposed resolution:

P1540 L7 edit as follows:

“For each channel to be scanned:

1) Wait until the ProbeDelay time has expired or a PHY-RXSTART.indication primitive has been received.

2) Perform the Basic Access procedure as defined in 9.3.4.2 (Basic access).

3) Send a probe request to the broadcast destination address. The probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive.

4) When the SSID List is present in the invocation of the MLME-SCAN.request primitive, send zero or more Probe Request frames, to the broadcast destination address. Each probe request is sent with an SSID indicated in the SSID List and the BSSID from the MLME-SCAN.request primitive. The basic access procedure (9.3.4.2 (Basic access)) is performed prior to each probe request transmission.

5) Initialize a timer to 0 and start it running.

6) If a PHY-CCA.indication (BUSY) primitive is received before the timer reaches MinChannelTime, wait until the timer reaches MaxChannelTime and then process all received probe responses; otherwise, when the timer reaches MinChannelTime, proceed to step 7).

7) Set the NAV to 0 and scan the next channel.”

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 6210Mark Rison10.1.3.91537.32 | It should be possible for a STA to indicate that its TSF timer accuracy is better than required. This would allow for smaller wakeup windows | Add an element (or extend an existing extensible one) to give a STA's TSF accuracy |

Discussion

“A non-DMG STA’s TSF timer shall be accurate to within ±100 ppm. A DMG STA’s TSF timer shall be accurate to within ±20 ppm.”

It is true that many implementations use better clocks than 100ppm. 20ppm is common. Every 100ms, the approx. time between beacons, the drif, for 100ppm can be 10us, comparable to SIFS.

A non-AP STA can easily measure its relative drift with the AP by checking the correction required each beacon. A STA in power save wants to wake up just in time for the next beacon based upon TBTT. As TBTT is defined by the AP clock, the non-AP STA should be compensating for the relative drift so as not to be late. Even if the AP advertised its perceived accuracy I would doubt if a non-AP STA would use that rather than the actual measurement. Hence I would reject this idea.

Proposed resolution:

REJECT

A non-AP STA is capable of measuring the relative drift between the clocks and to be able to accurately measure TBTT relative to the AP clock. Even if the AP advertised its accuracy, the non-AP STA would still be better to actually measure the relative drift.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 6779Mark Rison10.1.4.3.51543.43 | The stuff on RCPI in 10.1.4.3.5 Contents of a probe response is obvious and should not be there. At most a NOTE. | As it says in the comment |

Discussion

**“10.1.4.3.5 Contents of a probe response**

A STA that responds to a Probe Request frameaccording to 10.1.4.3.4 (Criteria for sending a probe response) shall transmit a Probe Response frame individually addressed to the STA that transmitted the Probe Request frame.”

First of all there is a space missing “frameaccording”. Has this been caught before?

It continues:

“If there was a Request element in the Probe Request frame, then:

…

— If dot11RadioMeasurementActivated is true and the RCPI element was requested, an RCPI element containing the RCPI of the Probe Request frame shall be included. If no measurement result is available, the RCPI value shall be set to indicate that a measurement is not available (see 8.4.2.37 (RCPI element) and Table 16-9 (RCPI values)).”

The identical words are in **10.30** **DMG BSS peer and service discovery** at P1809L41.

RCPI = received channel power indication.

Does seem to be as the commentor says - If requested, include it in the response, if not available, say not available. Pretty obvious.

So, leave it alone, a Note or delete? Does it do any harm leaving it alone? - not really. Does making it a note make it easier reading? – not sure. Delete it as obvious? – maybe.

I am inclined to leave it alone.

Proposed resolution:

REJECTED

Although it maybe obvious, it does not cause any confusion and it may help clarify a particular situation.