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 5193  Stephens, Adrian  10.1.1  1529.9 | 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 5194  Stephens, Adrian  10.1.2.1  1529.31 | "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" |

MR - CID 5194: this is part of the wider "BSS network" thing; see CID 6536

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 5195  Stephens, Adrian  10.1.2.1  1529.34 | "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 independent and not set based upon anything. Also the comma before ‘respectively’ wrong.

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Proposed Resolution

REJECT

Cited sentence is correct in that the intention is to randomize the TSFs even when multiple APs may be started simultaneously, for example in an enterprise controller deployment.

NOTE: Editor to consider adding a comma after ‘respectively

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| Identifiers | Comment | Proposed change |
| CID 5196  Stephens, Adrian  10.1.2.2  1530.13 | "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 5198  Stephens, Adrian  10.1.3.5  1534.60 | "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:

At each TBTT the STA shall

a) Suspend the decrementing of the backoff timer for any pending transmission that is not a Beacon or DMG Beacon frame,

b) Calculate a random delay uniformly distributed in the range between zero and twice aCWmin  aSlotTime when the STA is a non-DMG STA, and between zero and the result of two multiplied by aCWminDMGIBSS multiplied by the duration of the STA’s following BTI when the STA is a DMG STA,

c) Wait for the period of the random delay, decrementing the random delay timer using the same algorithm as for backoff, except that SIFS + aSlotTime should be used as the initial medium idle period within the backoff procedure,

d) Cancel the remaining random delay and the pending Beacon frame transmission or BTI (DMG only), if a Beacon frame arrives from the IBSS of which the STA is a member before the random delay timer has expired,

e) Send a Beacon frame in a non-DMG BSS or DMG Beacon frame(s) in a DMG BSS if the random delay has expired and no Beacon frame in a non-DMG BSS or no DMG Beacon frame in a DMG BSS has arrived from the IBSS of which the STA is a member during the delay period,

f) If the ATIM Window in use within the IBSS is greater than 0, then

1) Resume decrementing the backoff timer for any pending transmission allowed inside the ATIM window and

2) At the end of the ATIM Window duration resume the backoff for any pending frames intended for transmission outside the ATIM Window,

g) If the ATIM Window in use within the IBSS is 0, then resume decrementing the backoff timer for any pending transmissions.

Figure 10-3 (Beacon transmission in an IBSS) illustrates beacon transmission in an IBSS.

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).

I read the 7 criteria listed above this cited sentence and I do not see anything with respect to ‘awake period’. Hence I agree that this does seem to be an extra requirement and leading the reader to look at 10.2. Not convinced it is that much out of context though as it certainly has something to do with Beacon transmission.

Having said that, the commentor is concerned with the “shall” here and I agree that it would be better as a note.

Discussions on presentation

Is the awake period covered by the 7 criteria? Confer with Adrian once have understood what this was all about.

So here is a further investigation:

I still do not see anything in the 7 criteria to do with IBSS awake period. Cirteria f) and g) seem to cover IBSS specifically.

NOW this is the ONLY occurance of “awake period” in the standard. The term that is used is “awake window” (154 instances).

I refer to section **10.2.3 Power Management in an IBSS** to see if I can learn anything.

STA in PS mode listen for the ATIM frame sent in an ATIM window, a STA needs to remain awake during the ATIM window and may doze except when a BU is to be transmitted to it. All is explained P1574.48.

The ATIM window starts with the target beacon time and hence STAs must be awake to hear the beacon and stay awake for the ATIM Window time. Hence, fundamentally ALL IBSS STAs are AWAKE for an IBSS Beacon. Then the obvious question is “how can an IBSS transmit anything if is not awake, let alone a Beacon?”

SO, to my mind, the cited sentence is superfluous, does not contain any useful information and is silly. I can only suppose that the author of this text was a true IBSS power save enthousiast, or else some previous comment said “What about IBSS when STAs are sleeping?”

Hence, my take on this is that the cited sentence should be deleted. (I agree with the first proposal of the comment)

*Adrian’s comment:*

*I did a little bit of research, and I think I now understand what the sentence it trying to say.*

*If you follow the logic of the steps on this page, but given a signal that generates CCA busy during the entire ATIM window, there is nothing to stop the Beacon being sent outside the beacon interval.*

*The issue is in step c) “Wait for the period of the random delay, decrementing the random delay timer using the same algorithm as for backoff,”*

*I take this to mean decrement the delay during CCA idle.*

*So step c) can be prolonged by CCA busy beyond the Wake Window. (My emphasis)*

*I would add to step c), something like.*

*“If the ATIM Window in use within the IBSS is greater than 0 and the end of the ATIM Window duration occurs before the random delay timer expires, cancel the remaining random delay and pending Beacon frame transmission and proceed to step f).”*

*Then the cited sentence can be deleted.*

This seems to make sense. My suggested text (using Adran’s suggestion)

c) Wait for the period of the random delay, decrementing the random delay timer using the same algorithm as for backoff, except that SIFS + aSlotTime should be used as the initial medium idle period within the backoff procedure. If the ATIM Window is greater than 0 and the end of the ATIM Window duration occurs before the random delay timer expires, cancel the remaining random delay and pending Beacon frame transmission and proceed to step f).

Proposed resolution:

REVISED

At P1534.38. Edit step c) as follows:

c) Wait for the period of the random delay, decrementing the random delay timer using the same algorithm as for backoff, except that SIFS + aSlotTime should be used as the initial medium idle period within the backoff procedure. If the ATIM Window is greater than 0 and the end of the ATIM Window duration occurs before the random delay timer expires, cancel the remaining random delay and pending Beacon frame transmission and proceed to step f).

At P1534L60

Delete:

“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).”

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| Identifiers | Comment | Proposed change |
| CID 5199  Stephens, Adrian  10.1.3.7  1535.42 | "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

Initial Proposed resolution:

REVISE

P1535 L 42 edit as shown:

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

Mark R comment: I think the existing text is correct.  "An X or Y in a Z or W respectively shall" = "An X in a Z shall" and "A Y in a W shall"

Actually I think I now agree with Mark because of the inclusion of the “respectively”.

Proposed resolution:

REVISE

The ‘respectively’ here does make the ‘or’ correct.

P1535 L 42 edit as shown:

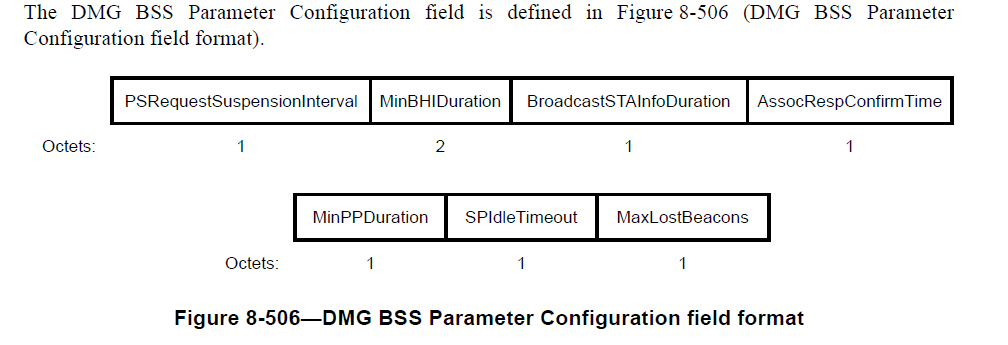
“A non-AP STA in an infrastructure BSS and a non-PCP STA in a PBSS …”

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| Identifiers | Comment | Proposed change |
| CID 5200  Stephens, Adrian  10.1.3.7  1536.14 | "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.

Proposed resolution:

REVISED

Change the cited sentence as follows:

“An active DMG STA operating in a BSS shall be ready to receive from its AP or PCP for a period of time of at least dot11MinBHIDuration…"

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| Identifiers | Comment | Proposed change |
| CID 5201  Stephens, Adrian  10.1.3.8  1536.46 | 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. BUT in discussion it immerged that there it can

Proposed resolution:

REJECTED

There are applications for multiple BSSID use in PBSSs. Example is different peer groups.

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| Identifiers | Comment | Proposed change |
| CID 5202  Stephens, Adrian  10.1.3.9  1537.58 | "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).”

The Multiple BSSID element is the 28th in order in the Beacon. If there is a nontransmitted BSSID then that is the first sub element transmitted. As far as I can see, if there is a nontransmitted BSSID then then must be a transmitted BSSID sub 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, we simply have the multiple BSSID element included, which includes a transmitted 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.

CID 5202: need to ask a multiple BSSID expert (Emily?  Dorothy?  Gabor?) but isn't the offending text basically saying "if you're in a situation where your BSS's BSSID is not the one present in Address 2 of the beacons/probe responses, you synchronise your TSF from the beacons/PRs which contain the BSSID which \*is\* transmitted"?

Proposed resolution:

REJECTED

The cited sentence is relevant to this section in that it describes use of the TSF and timer behaviour.

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| Identifiers | Comment | Proposed change |
| CID 5204  Stephens, Adrian  10.1.4.1  1538.65 | "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 assumed 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:

NOTE: Active scanning is restricted in some frequency bands and regulatory domains.

At P1538L65, edit as follows:

NOTE: Starting an IBSS is restricted in some frequency bands and regulatory domains.

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| Identifiers | Comment | Proposed change |
| CID 5205  Stephens, Adrian  10.1.4.1  1539.14 | "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:

REVISED

Replace with reference to 802-2014.

Note to editor, this change was also made in CID 6097

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| Identifiers | Comment | Proposed change |
| CID 5206  Stephens, Adrian  10.1.4.3.2  1540.16 | "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.”

Mark R - CID 5206: when we went through this last time, the argument which won the day was that the probe sent in step c satisfied the "active scan" classification, and so there was no requirement to send any additional probes in step d.

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Proposed resolution:

REJECT

The probe sent in step c satisfies the "active scan" classification, and so there is no requirement to send any additional probes in step d.

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| Identifiers | Comment | Proposed change |
| CID 5207  Stephens, Adrian  10.1.4.3.2  1541.23 | "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

Full 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 edit as shown:

1) Send a probe request to the broadcast destination address or(#5116)

— 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.(#3690)

— Optionally, following the reception of an SSW-Feedback frame, (#3692)send a probe

request to the MAC address of the STA that transmitted the SSW-Feedback frame.

In all probe requests sent under step f) 1), the probe request is sent with the SSID and BSSID from the received(#3680)

MLME-SCAN.request primitive (#3692)and includes the DMG Capabilities element. The

basic access procedure (9.3.4.2 (Basic access)) is performed prior to the probe request

transmission.(#3692)

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| Identifiers | Comment | Proposed change |
| CID 5208  Stephens, Adrian  10.1.4.3.4  1542.43 | "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 talks 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 sp 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).

CID 5208: worth asking some "Multi-band" expert (was this 11v or 11ad?)

Proposed resolution:

REJECT

It so happens that multi-band capable non-AP STAs can respond to Probe Requests, so criteria a) 6) is needed. Criteria c) and d) further qualify when a multi-band capable non-AP STA may respond.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 5495  David Hunter  10.1.4.3.2  1540.8 | "Wait until the ProbeDelay time has expired": but there is no such variable in the MLME. The only value of ProbeDelay available is that from the most recent invocation by the SME of one of the three primitives: MLME-SCAN.request, MLME-JOIN.request, or MLME-START.request. In the current context the appropriate primitive appears to be MLME-SCAN.request, so the text needs to specify that as the source of the value of the ProbeDelay parameter. | On line 6 and on page 1541 page 1 replace "Waiit until the ProbeDelay time has expired" with "Wait until the time indicated by the ProbeDelay parameter (from the most recent SME invocation of the MLME-SCAN.request) has expired" |

Discussion

Active scanning procedure.

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

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

This sentence appears twice, once as cited for a non-DMG STA and again in 10.1.4.3.3 for a DMG STA.

Page 146.40 “ProbeDelay’ is indeed included in the MLME-SCAN.request .

Page 147.14 we see that in the MLME-SCAN.request( ProbeDelay is

“Delay (in microseconds) to be used prior to transmitting a Probe frame during active scanning” - Which is effectively the same as the cited sentence says.

Note also that the opening sentence is “Upon receipt of the MLME-SCAN.request primitive…” So is it obvious that the ProbeDelay is in the MLME-SCAN.request? I tend to think it is.

“ProbeDelay” appears four times in text, the two above plus:

P1550.34 “A STA that is changing from doze to awake in order to transmit shall perform CCA until a frame sequence is detected by which it can correctly set its NAV, or until a period of time equal to the ProbeDelay has transpired.”

and P1649.2 “After moving into a new operating channel, the mesh STA shall perform CCA until a frame sequence is detected by which it can correctly set its NAV, or until a period of time equal to the ProbeDelay has transpired.”.

It is not specifically stated which primitive is in play in either of these, but they are the following:

MLME-JOIN.request,

ProbeDelay is “Delay (in microseconds) to be used prior to transmitting when changing from doze to awake, if no frame sequence is detected” (P159.24)

MLME-START.request

ProbeDelay is “Delay (in microseconds) to be used, while the STA is a member of this BSS, prior to transmitting when changing from doze to awake, if no frame sequence is detected by which the NAV can be set.” (P201.43)

NOTE: This description includes the NAV criteria whereas MLME-JOIN.request does not.

So the question is whether the term ProbeDelay is sufficient to stand on its own, or do we need to somewhere define it? Having said that, the description of ProbeDelay in each case sort of describes the same delay as per the text – i.e. Take the text and then define ProbeDelay.

If we follow the commenter’s proposal and refer to MLME-SCAN.request, we should also do similar in the other three places. Note, however, that in each case the ProbeDelay is defined.

So, the questions are

* Where is the value for ProbeDelay, do we need a value? We have dot11DMGProbeDelay, and we have dot11TDLSProbeDelay, but we do not have dot11ProbeDelay. Also note that the range for ProbeDelay is “N/A”, that don’t help.
* Is “ProbeDelay time” obvious, clear, unambiguous, etc.?
  + Should we define ProbeDelay? Would one definition work?
* What is the point of having ProbeDelay if there is no way of setting a value for it, or more to the point, no standard for what it should be set to?
* What value have vendors been using? What value makes sense? SIFS, DIFS, AIFS, more?

Oh dear, what started off simple has now become complicated – how is it that Wi-Fi has worked when there is no standardized value for ProbeDelay?

As far as this CID is concerned, I would say that as the preceeding sentence to the cited bullet talks about the MLME-SCAN.request then the reference to “ProbeDelay” is pretty obvious that it comes from the MLME-SCAN.request primitive and we need not say so.

Maybe someone would like to pursue the general question in the next round?

Note that CIDs 5501 and 5621 are similar.

Proposed resolution:

REJECT

It is clear from the context that the ProbeDelay referred to is in the MLME-SCAN.request primitive in that the introduction to bullet says “Upon receipt of the MLME-SCAN.request primitive …”

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| Identifiers | Comment | Proposed change |
| CID 5984  TorabJahromi, Payam  10.1.3.9  1537.32 | 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.

Proposed resolution:

REJECT

The stated maximum errors are correct.

Comment Mark R

CID 5984: exactly which line is line 34?  Are we talking about the first para (not the NOTE)? Thanks, corrected.

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| Identifiers | Comment | Proposed change |
| CID 6209  Mark Rison  10.1.4.3.2  1540.25 | ""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)”.

**Step f) is the only “IF” step so the instruction to ‘proceed to step g)’ is basically correct**.

I like the commentor’s proposal to split the steps and below tries to do this.

um

I originally felt that changing to numerical steps was better but Mark did not. Hence I revert to be as close as possible to Mark’s proposal.

Comment Mark R:

CID 6209: don't see the value in changing from letters to digits, and think my proposal is much better, as it only has a "proceed to step" when not just moving on to the next step.

Proposed resolution:

REVISED

At P 1540 L23

Replace

“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.”

WITH

f) If a PHY-CCA.indication (BUSY) primitive is not received before the timer reaches MinChannelTime, proceed to step h).

g) Wait until the timer reaches MaxChannelTime and process all received probe responses.

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

|  |  |  |
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| Identifiers | Comment | Proposed change |
| CID 6210  Mark Rison  10.1.3.9  1537.32 | 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 drift, 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.

Mark’s response:

CID 6210: if you're not associated with the AP (e.g. when you're doing FTM) you haven't been tracking it so you don't know its drift. Then an indication from the AP would be helpful

Proposed resolution:

REJECT

The comment fails to identify changes in sufficient detail so that the specific wording of the changes that will satisfy the commenter can be determined.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 6779  Mark Rison  10.1.4.3.5  1543.43 | 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 P1809 L41.

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 BUT I note that Table 16-9 (P2196.49) the value 255 is “Measurement not available”. This is obviously what should have been referred to.

So, make clear it is the actual value 255 as per the Table 16-9.

*Mark R comment*

*This subclause is a generic one about probe responses, and about responding to a Request element.  It's not about the minutiae of particular requested elements*

*- There is nothing special about the RCPI element compared with any other element which might be requested.  "If dot11RadioMeasurementActivated is true and the RCPI element was requested, an RCPI element containing the RCPI of the Probe Request frame shall be included" is exactly the same handling as for any other requested element (i.e. if you support it, and it is requested, you return it)*

*- It is obvious that if you don't have a measurement to provide, you use the "Measurement not available" value.  So "If no RCPI measurement result is available, the RCPI value is set to indicate “Measurement not available" adds no value*

*- If we do keep this, then I'm going to request that we include equivalent verbal diarrhoea for all the other elements, e.g.:*

*If dot11HighThroughputOptionImplemented is true and the Secondary Channel Offset element was requested, a Secondary Channel Offset element containing the Secondary Channel Offset of the BSS shall be included. NOTE---If no secondary channel is present, the secondary channel offset value shall be set to indicate that there is no secondary channel offset (see 8.4.2.19 (Secondary Channel Offset element)).*

*If dot11SomethingImplemented is true and the RSNI element was requested, an RSNI element containing the RSNI shall be included. NOTE---If no RSNI is available, the RSNI value shall be set to indicate that the RSNI is not available (see 8.4.2.40 (RSNI element)).*

*and 100 more statements of the obvious.*

**SO, if we consider that the statement is “stating the obvious” and by deleting it we do not delete any worthwhile information, then delete it.**

I am leaning towards Mark’s point of view,, but to play safe I feel a straw poll coming on

OPTION A:-

REVISED

At 1543.43 and at P1809 L42replace:

“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))”

With

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

OPTION B – (recommended)

At 1543.43 and at 1809.42 delete:

“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))”.