IEEE P802.11 Wireless LANs

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| Proposed Resolution for Comments, CID 152, 180, and 182 |
| Date:2013-03-18 |
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Abstract

This submission proposes a resolution to the Comments, CID 152, 180, and 182, in the TGai/D0.2 review comments database, regarding the need of text rearrangement and clarifications in Section 10.1.4.1 and Section 10.1.4.3.8 about AP Configuration Change Count.

# Introduction

In TGai/D0.2 review comment database, 13/0036r9 [Ref-4], there are three comments about AP Configuration Change Count related text, including, CID 152, 280, and 282, which are as follows:

***Comment CID 152: page 53 (pdf page number), line 43; Yunsong Yang (11-13-0019r0)***

*Lines 43-60 are not quite related to the General subclause, but more specific to subclause 10.1.4.3.8. And the definition of BSS Information Set should be provided first for more clarity for the subsequent paragraghs..*

***Proposed change (CID 152):***

*Remove lines 43-60 here. Replace the first paragraph in subclause 10.1.4.3.8 with the following:*

*"A BSS Information Set is a set of informaiton elements in the Beacon or Probe Response frame, excluding the following dynamic information elements:*

*(- TimeStamp) [note: do we need TimeStamp here since TimeStamp is a non-IE field and is always present according to 10.1.4.3.8?]*

*- Time advertisement*

*- BSS AC access delay*

*- BSS Average Access Delay*

*- BSS Available Admission Capacity*

*- TPC Report element*

*- Beacon Timing*

*- BSS Load*

*- Extended BSS Load*

*The AP with dot11FILSActivated equals to true shall increment the value (modulo 256) of the AP Configuration Change Count when a change occurs to any of the elements in the BSS Information Set.*

*A non-AP STA with dot11FILSActivated equals to true may retain the BSS Information Set of the preferred AP and the associated AP Configuration Change Count, which the STA previously obtained."*

*Change the reference in line 60 of page 43 (8.4.2.185 AP Configuration Change Count element) from "10.1.4.1" to "10.1.4.3.8".*

*Change the reference of dyanmic IEs in line 25 of page 62 (10.1.4.3.8) from "as defined in 10.1.4.1" to " as defined above".*

*And change the reference of dyanmic IEs in line 44 of page 62 (10.1.4.3.8) from "(see 10.1.4.1)" to "(see above)".*

***Comment CID 280: page 62 (pdf page number), line 44; by Yunsong Yang (11-13-0019r0)***

*There is ambeguity of which AP CCC in the AP's AP CCC List that the AP puts in the optimized Probe Respsone.*

***Proposed change (CID 280):***

*Change "AP Configuration Change Count" to either "the current AP Configuration Change Count" or "the received AP Configuration Change Count".*

***Comment CID 282: page 62 (pdf page number, line 47; by Yunsong Yang (11-13-0019r0)***

*There is ambeguity of which AP CCC in the AP's AP CCC List that the AP puts in the optimized Probe Respsone..*

***Proposed change (CID 282):***

*Change "AP Configuration Change Count" to either "the current AP Configuration Change Count" or "the received AP Configuration Change Count"*

Note that the proposed changes contain a note / question and options, where the correct choice may depend on the conditions, i.e., the “if statements”, in the context, which needs to be discussed and answered. In addition, further clarifications and discussions are needed for a clear description of the AP configuration definition.

This contribution proposes a detailed resolution to address the three comments, CID 152, 280, and 282.

# Conventions

In this contribution, the proposed 802.11ai Specification Document text will be presented as modifications to the TGai draft specification 802.11ai/D0.3[Ref-3]. The following format conventions are used:

1. The new added text is marked as blue underline text;
2. The deleted text is marked as ~~red strikethrough text~~;
3. The unchanged baseline standard text stays in black text in the context of proposed TGai specification text;
4. The editorial instruction is marked as *italic text highlighted by Yellow*;
5. The quoted TGai SFD text is marked as *green italic text*; and
6. Any other text, e.g., discussions, proposed motions, etc., is in black text, but not in the context of proposed TGai specification text.

# Discussions

## Discussions about Comments, CID 280 and 282

Regarding Comments, CID 280 and 282, based on Section 10.1.4.3.8 in TGai Draft Specification Document, 802.11ai/D0.3 [Ref-3], when an AP receives a Probe Request with Configuration Change Count (CCC), there are multiple possibilities as listed below:

1. The CCC received in the Probe Request frame matches with the current CCC of the AP;
2. The CCC received in the Probe Request frame matches with one of the previous CCC of the AP when AP maintains a limited list of previous configurations and their CCCs;
3. The CCC received in the Probe Request frame does not match with the current CCC or any of the stored previous CCCs of the AP.

How AP responds to a Probe Request with CCC depends on the cases as listed above. The current text in Section 10.1.4.3.8 does identify those different cases. However, some detailed clarifications are needed regarding the AP’s Probe Response.

In addition, the current text have all those cases in one big paragraph, which certainly decreases the readability of the specification.

This contribution proposes some clarifications and also an itemized description of the different scenarios of the active scanning with AP Configuration Change Count (CCC).

## Discussions about Comment CID 152

The text in line 43 to 60 on page 53 (PDF page number) in Section 10.1.4.1 in 11ai/D0.2 is about the definition of AP configuration information and how AP Configuration Change Count (CCC) varies with the changes in AP configuration contents. The commenter has a valid point, i.e., it should be in Section 10.1.4.3.8, as Section 10.1.4.1 is about General active scanning, while Section 10.1.4.3.8 is about active scanning with using AP Configuration Change Count (CCC).

In addition, the current definition of AP configuration information needs clarifications, as it is implicitly defined as “*the elements inside a Beacon frame or a Probe Response frame with the exceptions of the following dynamic information: ......*.”. Note that it takes an approach of listing exceptions of elements of two existing messages, which certainly has some issues and ambiguities, e.g.,

1. How about different inclusions of “non-dynamic” information items in Beacon frames over time of the same AP, i.e., addition or removal of the non-dynamic IEs? Here, the “non-dynamic” information items refer to the information items not in the dynamic list as given in the current text, i.e., line 43 to 60 on page 53 (PDF page number) in Section 10.1.4.1 in 11ai/D0.2.
2. Do Beacon and Probe Response always have the same “non-dynamic” contents? If so, the Probe Request frame may only need one parameter, i.e., the minimum supported PHY rate, not a long list of other parameters.
3. How about “non-dynamic” information fields in Beacon or Probe Response, e.g., capability and beacon internal? In 802.11 spec, the two terms, information field and information element, have different specific encoding meanings. The current text about the AP configuration content definition only mentions “elements”.

This contribution proposes the following resolutions to address the issue identified by the comment CID 152 and also the issues identified above, as summarized as follows:

1. Move the text in line 43 to 60 on page 53 (PDF page number) in Section 10.1.4.1 in 11ai/D0.2 to Section 10.1.4.3.8. Please note that the proposed changes will be based on 11ai/D0.4.
2. Continue using the approach of “listing exceptions” of existing message for the definition of AP configuration, but with the following changes and/or clarifications:
	1. Any additions or removals of non-dynamic items will trigger AP configuration change count increments;
	2. The definition of the AP configuration information set and its corresponding AP-CCC value is mainly based on Beacon frame; and it can use Probe Response frame too when the Probe Response frame contains the same configuration information set as the Beacon frame;
	3. The use of CCC in Probe Response frame will based on its non-dynamic contents, the current AP configuration information contents, and the context of the use of Probe Response frame, i.e., whether or not as a response to a received Probe Request with an AP-CCC value; while any differences of its non-dynamic contents from the current AP configuration should be signalled.
3. Remove the limitation of elements by using information fields and information elements.

## Discussions about the AP-CCC Feature in General

It has been also pointed out by the Commenter of Comments of CID 152, 280, and 282 during the comment resolution discussions that the AP-CCC feature was accepted as an optional feature back to 2012-November meeting. However, the specification text in the current TGai draft has used the word “shall” in some places, e.g., the text “*The AP with dot11FILSActivated equals to true shall retain AP Configuration Change Count (CCC) List ......*”, in line 8 on page 52 in 802.11ai/D0.4 [Ref-3], which indicates it is mandatory for an 802.11ai-capable AP to support the AP-CCC feature.

This contribution also provides clarifications for this general requirement issue of the AP-CCC feature.

# Proposed 802.11ai Specification Text

The following proposed 802.11ai Specification Document text will be presented as modifications to the TGai draft specification 802.11ai/D0.4[Ref-3].

*Instructions to Editor: in Section 10.1.4.1, page 43, delete the text from line 40 to 61:*

~~The AP with dot11FILSActivated equals to true shall increase by one the value (modulo 256) of the AP~~

~~Configuration Change Count when a value change occurs to any of the elements inside a Beacon frame or a~~

~~Probe Response frame with the exceptions of the following dynamic information:~~

~~— TimeStamp~~

~~— Time Advertisement~~

~~— BSS AC access Delay~~

~~— BSS Average Access Delay~~

~~— BSS Available Admission Capacity~~

~~— TPC Report~~

~~— Beacon Timing~~

~~— BSS Load~~

~~— Extended BSS Load~~

*Instructions to Editor: in Section 10.1.4.3.8, page 52, line 3, change the text of entire Section10.1.4.3.8 as follows:*

A non-AP STA with dot11FILSActivated equals to true may retain one or multiple ~~a~~ ~~BSS~~ AP Configuration Information Sets, one for each ~~of the~~ preferred APs which the STA previously obtained. A ~~BSS~~ AP Configuration Information Set is a set of information fields and information elements of ~~inside~~ the Beacon frame or the Probe Response frame, excluding the following dynamic information fields and elements:~~, which excludes the dynamic information as described in 10.1.4.1.~~

~~—~~ TimeStamp

— Time Advertisement

— BSS AC access Delay

— BSS Average Access Delay

— BSS Available Admission Capacity

— TPC Report

— Beacon Timing

— BSS Load

— Extended BSS Load

The AP with dot11FILSActivated equals to true should ~~shall~~ retain an AP Configuration Change Count (CCC) List which consists of the ~~previous and~~ current AP Configuration Change Count~~s~~ value and zero or more previous AP Configuration Change Count values. For each retained previous AP CCC value, the AP also retains the information of the corresponding previous AP Configuration Information Set (e.g., identifiers of changed elements), such that the AP can derive what information has changed since the corresponding previous AP Configuration Information Set. How the AP retains the information of the corresponding previous AP Configuration Information Set is beyond the scope of this standard. ~~and~~ ~~the~~ ~~Identifiers of the changed information elements~~ ~~that are associated with each AP Configuration Change Count~~. AP may store a limited number of AP Configuration Change Count~~s~~ values in the AP CCC List.

If the AP with dot11FILSActivated equals to true retains its current AP Configuration Change Count, the AP shall increase by one the value (modulo 256) of the current AP Configuration Change Count under the following condition:

1. a value change occurs to any of the information fields or information elements within the AP Configuration Information Set; or
2. any information element is added to or removed from the AP Configuration Information Set.

The AP with dot11FILSActivated equals to true may communicate the association between the AP CCC value and the AP Configuration Information Set by including an AP Configuration Change Count element (as defined in Section 8.4.2.185) and the complete set of information fields and elements within the AP Configuration Information Set in a Beacon frame, a Probe Response frame that is sent with a broadcast receiver address (RA) or that is sent in response to a Probe Request frame that doesn’t contain an AP Configuration Chang Count element.

The non-AP STA with dot11FILSActivated equals to true identifies an AP Configuration Information Set by its associated AP CCC value and the AP’s BSSID.

A non-AP STA with dot11FILSActivated equals to true may send a Probe Request frame including an ~~the~~ AP Configuration Change Count element (as defined in Section 8.4.2.185), if the STA has the AP Configuration ~~BSS~~ Information Set associated with the AP Configuration Change Count of the preferred AP.

When an AP with dot11FILSActivated equals to true receives a Probe Request frame including a matched BSSID, if the Probe Request frame contains an AP Configuration Change Count (CCC) information element and the AP retains the AP CCC List, then the AP should compare the received AP Configuration Change Count with the AP Configuration Change Counts stored in its AP Configuration Change Count (CCC) List. If the criteria for responding to a Probe Request (as defined in Subclause 10.1.4.3.5) are met, the AP sends a Probe Response frame according to the comparison result, as follows:

1. If the received AP CCC value matches with the current AP CCC value of the AP, the AP should send an optimized Probe Response frame including only mandatory fields (i.e., Timestamp, Capability, Beacon Interval), the current AP CCC IE, and the needed dynamic IEs .
2. If the received AP CCC value matches with one of the previous AP CCC values in AP CCC List, the AP should send an optimized Probe Response frame including only mandatory fields, the current AP CCC IE, the information elements which need to be updated at the STA, and the needed dynamic IEs.
3. If the received AP CCC value does not match with any of AP CCC values in the AP CCC List, the AP shall send a Probe Response frame with its current AP CCC and the information fields and elements as defined in Section 8.3.3.10.

When the AP receives a Probe Request frame including a matched BSSID and AP CCC IE from a STA, if the AP does not retain the AP CCC List and the criteria for responding to a Probe Request (as defined in Subclause 10.1.4.3.5) are met, the AP shall send a regular Probe Response frame to the STA.

~~When an AP receives a Probe Request frame including a matched BSSID and an AP Configuration Change Count from a STA, the AP should compare the received AP Configuration Change Count with the AP Configuration Change Counts stored in its AP Configuration Change Count (CCC) List. If the received AP Configuration Change Count value matches with the current AP Configuration Change Count value, the AP should all send an optimized Probe Response frame including only mandatory fields (i.e., Timestamp, Capability, Beacon Interval), AP Configuration Change Count, and dynamic IEs(see 10.1.4.1). If the received AP Configuration Change Count value matches with one of the stored AP Configuration Change Count values but it is not the current value of AP Configuration Change Count, the AP should send an optimized Probe Response frame including only mandatory fields, AP Configuration Change Count, dynamic IEs, and the elements which need to be updated by the STA. When an AP receives the Probe Request frame with an invalid AP Configuration Change Count, the AP shall send a regular Probe Response frame instead of an optimized Probe Response frame.~~

*Instructions to Editor: in Section 8.4.2.185, make the following change in the paragraph in line 55 on page 31:*

The AP Configuration Change Count field is 1 octet in length and is defined as an unsigned integer initialized to 0.~~,~~ The value of the AP Configuration Change Count field is the version number of the AP Configuration Information Set, which ~~that~~ increments when an update has occurred to any of the non-dynamic information fields or elements inside a Beacon frame or a Probe Response frame as described in 10.1.4.3.8 ~~10.1.4.1~~.

# Straw-Polls and Motions

The following lists the draft straw-polls and motions that are intended to present to the TGai Group in next Face-to-Face meeting.

**Motion-1:**Accept the text proposed in Section 4 of this contribution (13/0209r2) as the resolution to Comments, CID 152, 180 and 182, in TGai review comment database (13/0036r9).

Yes: \_\_\_\_\_\_\_\_\_\_\_\_; No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; Abstain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Move:

Second:

# References:

1. 11-12-0151-15-00ai-Proposed-Specification-Framework-Document.docx
2. IEEE Std 802.11 – 2012
3. IEEE Std 802.11ai/D0.4
4. 11-13-0036-09-00ai-tgai-draft-review-combined-comments