IEEE P802.11 Wireless LANs

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| Proposed Changes in AP-CCC Related Text for TGai Comment Resolution |
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Abstract

This submission proposes changes in AP-CCC related text, as proposed resolutions to some comments of the TGai Working Group Technical Letter Ballot 198 on 802.11ai Draft 1.0.

# Introduction

As a response to IEEE 802.11 Working Group Technical Letter Ballot 198 for 802.11ai Draft 1.0[Ref-2], about 21 comments have been submitted on the AP-CCC related text, including Subclauses 8.4.2.184 and 10.1.4.3.10. Those comments were assigned to Lei Wang.

This contribution proposes resolutions to some of those assigned comments, as discussed in the contribution 13/1215r3 [Ref-5].

Please note that about 10 comments have been resolved in TGai 2012-September meeting, as shown in Motion #7 in the meeting motion file, 13/1186r0 [Ref-6]. This contribution also includes the changes of those resolved comments that are marked by Word Comment tool.

# Conventions

In this contribution, the proposed 802.11ai Specification Document text will be presented as changes to the current TGai draft specification, 11ai/D1.1[Ref-3]. The following format conventions are used:

1. The newly added text is marked as blue underline text;
2. The deleted text is marked as ~~red strikethrough text~~;
3. The unchanged text stays in black text;
4. The editorial instruction is marked as *italic text highlighted by Yellow*; and
5. The corresponding comments are included by square bracketed green text like [CID nnnn], where nnnn is the CID number as given in the TGai WGLB comment database, 11-13-1076-04-00ai-tgai-lb-198-comments-for-d1-0.

# Proposed Changes to 802.11ai/D1.1 Specification Text

*Instructions to the editor: Make the following Changes in subclause 10.1.4.3.10:*

**10.1.4.3.10 FILS active scanning procedure to preferred AP**

A non-AP STA with dot11FILSActivated equal to true may retain one or multiple AP ~~C~~configuration ~~I~~information ~~S~~sets. [CID 2308] These AP configuration information sets, one for each preferred AP, were previously obtained using a preferred AP determination process out of scope of this Standard. ~~one for each preferred AP which the STA previously obtained~~ [CID 3134, 3317] An AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308] is a set of ~~information~~ fields and ~~information~~ [CID 2361] elements of the Beacon frame or the Probe Response frame that include AP-CCC element, excluding the following dynamic information fields and elements.

* + - ~~Time Stamp~~ Timestamp field [CID 2685]
		- Time Advertisement element [CID 2685]
		- BSS AC ~~a~~Access Delay element [CID 2685]
		- BSS Average Access Delay element [CID 2685]
		- BSS Available Admission Capacity element [CID 2685]
		- TPC Report element [CID 2685]
		- Beacon Timing element [CID 2685]
		- BSS Load element [CID 2685]
		- ~~Extended BSS Load~~ [CID 2685]
		- TIM element [CID 2685]
		- Differentiated Initial Link Setup element [CID 2686, 2851, 2955, and 3341]
		- Vendor Specific element [CID 2685]

~~The AP may classify other elements (e.g., GAS Configuration Change Number, DILS parameters, etc.) as the dynamic elements.~~ [CID 2686, 2851, 2955, and 3341]

~~The~~ An [CID 2047] AP with dot11FILSActivated equal to true should retain an AP-CSN ~~CCC~~ [2784,3203, 3229] List which consists of the current AP-CSN ~~CCC~~ [2784,3203, 3229] value and zero or more previous AP-CSN ~~CCC~~ [2784,3203, 3229] values. For each retained previous AP-CSN ~~CCC~~ [2784,3203, 3229] value, the AP also retains ~~the information of the corresponding AP Configuration Information Set such that the AP can derive what information has changed since the corresponding previous AP Configuration Information Set, for example,~~ [CID 3135, 3318] the identifiers of the changed elements. ~~How the AP retains the information of the corresponding previous AP Configuration Information Set is beyond the scope of this standard.~~ [CID 3135, 3318] AP may store a limited number of AP-CSN ~~CCC~~ [2784,3203, 3229] values in the AP-CSN ~~CCC~~ [2784,3203, 3229] List.

~~The~~ An [CID 2047] AP retaining its current AP-CSN ~~CCC~~ [2784,3203, 3229] shall increase the current AP-CSN ~~CCC~~ value (modulo 128 ~~256~~) [2784,3203, 3229] by one if an update occurs to any of the ~~information~~ fields or ~~information~~ [CID 2361] elements within the AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308].

~~The~~ An [CID 2047] AP with dot11FILSActivated equal to true may provide ~~communicate with~~ the STAs with dot11FILSActivated equal to true the definition of ~~association between the AP-CCC value and~~ [CID 2784, 3203, 3229] the AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308] and its AP-CSN value by including in a Beacon frame or a Probe Response frame an AP-CCC element (as defined in 8.4.2.185) with the Full-Set Indicator set to 1 [CID 2784, 3203, 3229] and the complete set of information fields and elements within the AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308] ~~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-CCC element~~. [CID 2784, 3203, 3229]

~~The~~ A [CID 2047] non-AP STA with dot11FILSActivated equal to true identifies an AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308] by its associated AP-CSN ~~CCC~~ [2784,3203, 3229] value and the AP's BSSID.

A non-AP STA with dot11FILSActivated equal to true may send a Probe Request frame including an APCCC element (as defined in 8.4.2.185) if the STA has the AP ~~C~~configuration ~~I~~information ~~S~~set [CID 2308] associated with the AP-CCC of the preferred AP.

When an AP with dot11FILSActivated equal to true receives a Probe Request frame including a matched BSSID, if the Probe Request frame contains an AP-CCC information element and the AP retains the AP-CSN ~~CCC~~ [2784,3203, 3229] List, then the AP should compare the received AP-CSN ~~CCC~~ [2784,3203, 3229] with the AP-CSNs ~~CCC~~ [2784,3203, 3229] stored in its AP-CSN ~~CCC~~ [2784,3203, 3229] List. If the criteria for responding to a Probe Request (as defined in 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-CSN ~~CCC~~ [2784,3203, 3229] value matches with the current AP-CSN ~~CCC~~ [2784,3203, 3229] 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 element with the Full-Set indicator set to 0, [CID 2784, 3203, 3229] and any zero or more dynamic elements.
			2. If the received AP-CSN ~~CCC~~ [2784,3203, 3229] value matches with one of the previous AP-CSN ~~CCC~~ [2784,3203, 3229] values in AP-CCC List, the AP should send an optimized Probe Response frame including only mandatory fields, the current AP-CCC element with the Full-Set indicator set to 0, [CID 2784, 3203, 3229], the information elements which need to be updated at the STA, and zero or more dynamic elements.
			3. If the received AP-CSN ~~CCC~~ [2784,3203, 3229] value does not match with any of AP-CSN ~~CCC~~ [2784,3203, 3229] values in the AP-CSN ~~CCC~~ [2784,3203, 3229] List, the AP shall send a Probe Response frame with its current AP-CSN ~~CCC~~ with the Full-Set indicator set to 1 [CID 2784, 3203, 3229] and the information fields and elements as defined in Section 8.3.3.10.

When ~~the~~ an [CID 2047] AP receives a Probe Request frame including a matched BSSID and AP-CCC element from a STA, if the AP does not retain the AP-CSN ~~CCC~~ [2784,3203, 3229] List and the criteria for responding to a Probe Request (as defined in 10.1.4.3.5) are met, the AP shall send a regular Probe Response frame to the STA.

*Instructions to the editor: make the following changes in Subsection* ***8.4.2.184*** *in 11ai/D1.1 as follows:*

**8.4.2.184 AP Configuration Change Count element**

An AP-CCC element indicates the change of system information within a BSS. The format of the AP-CCC element is shown in Figure 8-401cy (AP-CCC element format).



**Figure 8-401cy—AP-CCC element format**

The Element ID is equal to the AP-CCC element value in Table 8-54 (Element IDs).

The value of the Length field is the length of the element and is 1.

The AP-CCC field is 1 octet in length and is defined in Figure 8-aaaa (AP-CCC field). [2784,3203, 3229]



**Figure 8-aaaa— AP-CCC field format** [2784,3203, 3229]

The Full-Set indicator subfield is 1 bit in length. It is used to indicate whether or not a full set of AP configuration information is contained in a Beacon frame or a Probe Response frame in which the AP-CCC element is included. It is set to 1 to indicate a full set of AP configuration information is contained, otherwise, it is set to 0. This subfield should be ignored when the AP-CCC element is included in Probe Request frame. [2784,3203, 3229]

The AP-CSN ~~CCC~~ [2784,3203, 3229] subfield is 7 bits ~~1 octet~~ in length and is defined as an unsigned integer initialized to ~~0~~  a random value in the range of [0, 127] at AP initialization. [CID 2933] [2784, 3203, 3229] The value of the AP- CSN ~~CCC~~ subfield [2784, 3203, 3229] ~~is the version number of the AP Configuration Information Set, which~~ [CID 3133, 3316] 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 10.1.4.3.10 (FILS active scanning procedure to preferred AP).

# References

1. IEEE Std 802.11mc/D1.5
2. IEEE Std 802.11ai/D1.0
3. IEEE Std 802.11ai/D1.1
4. 11-13-1076-04-00ai-tgai-lb-198-comments-for-d1-0
5. 11-13-1215-03-00ai-proposed-resolution-to-assigned-tgai-lb-198-comments
6. 11-13-1186-00-00ai-tgai-motion-deck