IEEE P802.11
Wireless LANs

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| Proposed802.11TGai Specification Text for enhanced active scanning procedure for FILS |
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Abstract

The submission contains normative text for enhancing active scanning procedure to preferred AP based on the Section 6.2.10 in Specification Frame for TGai [1]

# Background

Texts related to the active scanning procedure to preferred AP [3] were adopted in 11ai Specific framework document [1] at last meeting as follows.

* STA may send a probe request frame including the AP configuration change count of a preferred AP if the STA has the system information of the preferred AP during the active scanning procedure.
* AP may send an optimized probe response frame including only the parameters which need to be received by the STA when the AP receives the probe request frame including the AP configuration change count.

This contribution proposes the detailed texts related to it for TGai Specification Document.

# Conventions

In this contribution, the proposed 802.11ai Sepcification Document text will be presented as an amendment text based on the baseline 802.11 standard, 802.11-2012 [Ref-2]. The following format conventions are used:

1. The new added text is marked asblue 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.

# Proposed 802.11ai Specification Text

**6.3.3 Scan**

**6.3.3.2 MLME-SCAN.request**

**6.3.3.2.2 Semantics of the service primitive**

*Change the clause as shown*

The primitive parameters are as follows:

MLME-SCAN.request(

 BSSType,

 BSSID,

 SSID,

 ScanType,

 ProbeDelay,

 ChannelList,

 MinChannelTime,

 MaxChannelTime,

 RequestInformation,

 SSID List,

 ChannelUsage,

 AccessNetworkType,

 HESSID,

 MeshID,

 APConfigurationChangeCount,

 VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| APConfigurationChangeCount | As defined in 8.4.2.ai2 | As defined in 8.4.2.ai2 | When a specific BSSID is indicated in the MLME-SCAN.request, the AP ConfigurationChangeCount associated with the configuration of the AP may be provided. |

* + - 1. Probe Request frame format

*Add new element to Table 8-26 as shown*

The frame body of a management frame of subtype Probe Request contains the information shown in (#33)

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| --- |
| Table 8–26 Probe Request frame body   |
| Order | Information | Notes |
| 16 | AP Configuration Change Count | The AP Configuration Change Count is optionally present if dot11FILSActivated is true. |
|  Last | Vendor Specific | One or more vendor-specific (#1684)elements are optionally present(#29). These (#1684)elements follow all other (#1684)elements(#1221). |

*Add the following subclause at the end of Section 8.3.3 as shown*

8.3.3.ai1 Optimized Probe Response frame format

The frame body of a management frame of subtype Optimized Probe Response contains the information shown in See additional details and procedures in 10.1.4.3.8 and 10.1.4. (#33)

|  |
| --- |
| Table 8–27ai1 Optimized Probe Response frame body   |
| Order | Information | Notes |
| 1 | TimeStamp |  |
| 2 | Beacon interval |  |
| 3 | Capability |  |
| 4 | AP Configuration Change Count | The AP Configuration Change Count element is present if dot11FILSActivated is true. |
| 5 | BSS load | The BSS Load element is present if dot11QosOption-Implemented and dot11QBSSLoadImplemented are both true and AP Configuration Change Count is not incremented when this element changes. |
| 6 | TPC report | The TPC Report element is present if dot11SpectrumManagementRequired is true or dot11RadioMeasurementActivated is true and AP Configuration Change Count is not incremented when this element changes. |
| 7 | BSS Average Access Delay | The BSS Average Access Delay element is optionally present if dot11RMBSSAverageAccessDelayActivated is true and the value of the AP Average Access Delay field is not equal to 255 (measurement not available) and AP Configuration Change Count is not incremented when this element changes. |
| 8 | BSS Available Admission | The BSS Available Admission Capacity element is optionally present if AP Configuration Change Count is not incremented when this element changes and dot11RMBSSAvailableAdmissionCapacityActivated is true with the following exceptions: 1) when Available Admission Capacity Bitmask equals 0 (Available Admission Capacity Listcontains no entries), or 2) when the BSS Load element is present and the Available Capacity Bitmask equals 256 (Available Admission Capacity List contains only the AC\_VO entry).  |
| 9 | BSS AC Access Delay | The BSS AC Access Delay element is optionally present if dot11RMBSSAverageAccessDelayActivated is true and at least one field of the element is not equal to 255 (measurement not available) and AP Configuration Change Count is not incremented when this element changes |
| 10 | Time Advertisement | The Time Advertisement element is present if dot11MgmtOptionUTCTSFOffsetActivated is true and AP Configuration Change Count is not incremented when this element changes. |
| Last | Updated elements | Elements which need to be updated by a STA are present if there are one or more elements which need to be updated by the STA |

**8.4.2.ai6 AP Configuration Change Count element**

*Instructions to Editor: Add new element type to the element type list.*

An AP Configuration Change Count element indicates the change of system information within a BSS. The format of the AP Configuration Change Count element is shown in Figure 8-ai6.

|  |  |  |
| --- | --- | --- |
| Element Id | Length |  AP Configuration Change Count  |
| Octets: 1 | 1 | 1 |

**4 B5 B7e 8-ai2 CILS Cri refer to the same parameter defined in TSPEC.Figure 8-ai6—AP Configuration Change Count element**

The Element Id is equal to the AP Configuration Change Count element value in Table 8-54.

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

The AP Configuration Change Count field is 1 octet in length and is defined as an unsigned integer initialized to 0, that increments when an update has occurred to any of elements inside beacon frame or probe response frame. The AP Configuration Change Count may not be increased when the following information changes.

* TimeStamp
* BSS load
* Beacon timing
* Time advertisement
* BSS AC access delay
* BSS Average Access Delay
* BSS available admission capacity
* TPC Report element

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

*Instructions to Editor: Add the new Clause 10.1.4.3.5*

A non-AP STA with dot11FILSActivated equals to true may retain a BSS Information Set of the preferred AP which the STA was previously associated with. A BSS Information Set is the set of information inside beacon frame or probe response frame sent by an AP.

The AP with dot11FILSActivated equals to true may retain AP CCC List which consists of old AP Configuration Change Counts and the identifiers of the changed elements for each AP Configuration Change Count. AP may store the limited number of AP Configuration Change Counts in the AP CCC List.

A non-AP STA may send a probe request frame including the AP Configuration Change Count if the STA has the BSS Information Set of the preferred AP.

When an AP receives a probe request frame including an AP Configuration Change Count, the AP should compare the received AP Configuration Change Count with its current AP Configuration Change Count. If two values are the same, the AP shall send an Optimized Probe Response frame not including Updated elements. If two values are different each other, the AP shall send an Optimized Probe Response frame including Updated elements. When an AP receives the probe request frame with invalid AP Configuration Change Count, the AP shall send a regular probe response frame.

# References:

[1] IEEE 802.11-12/151r13 Specification Framework for TGai

[2] IEEE Std 802.11 – 2012

[3] IEEE 802.11-12/1034r4 Ehanced scanning procedure for FILS