IEEE P802.11
Wireless LANs

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| Resolutions for CIDs 20082, 20160, 20169 and 20080 on 11ai/D7.0 |
| Date: 2016-05-13 |
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Abstract

This submission contains proposed resolutions to comments on TGai D7.0, related to Multiple BSSID, MaxChannelTime and MinChannelTime support.

References herein are to TGai Draft 7.0.

R0 – initial version, with CIDs: 20082, 20160, 20169, 20080, 20162, and 20170.

R1 – added correction of Max Channel Time field’s units to match MaxChannelTime parameter to MLME-SCAN.request.

R2 – added resolution for CID 20142. Updated other proposed resolutions, per comments received at F2F session.

R3 – For CID 20162 added a paragraph to insert text into section 11.1.4.3.4.

**CIDs 20169, 20160, 20082, 20080:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 20169 | 98.39 | 11.1.4.3.2 | FILS provides mechanisms to prevent wasting bandwidth with unnecessary Probe Requests, and Probe Responses that won't be useful to the client STA due to varying criteria. Large bandwidth savings can also be achieved by eliminating useless Probe Responses that come too late to be useful. | Change "may" to "shall". Throughout the rest of the document, make it mandatory to include Max Channel Time field in Probe Requests for FILS STAs. The onerous implementation costs for Max Channel Time are on the AP, and that has been resolved by making the AP response to Max Channel Time a "should" requirement in the last ballot cycle. |
| 20160 | 98.39 | 11.1.4.3.2 | Max Channel Time:Comment: FILS provides mechanisms to prevent wasting bandwidth with unnecessary Probe Requests, and Probe Responses that won't be useful to the client STA due to varying criteria. Large bandwidth savings can also be achieved by eliminating useless Probe Responses that come too late to be useful. | Change FILS Stay from MAY to SHALL:Make it mandatory to include Max Channel Time field in Probe Requests for FILS STAs. The onerous implementation costs for Max Channel Time are on the AP, and that has been resolved by making the AP response to Max Channel Time a "should" requirement in the last ballot cycle.Align this position throughout the rest of the document. |
| 20082 | 96.30 | 11.1.4.3.2 | CIDs 10651-10653 were rejected on the basis that "If the MaxChannelTime is advertised to the AP, then the AP can 100% sure that the STA is not on the channel after MaxChannelTime and unnecessary Probe Responses can be avoided by stopping the transmission of Probe Response by the AP after MaxChannelTime.The AP should transmit Probe Response after MinChannelTime since the STA may be on the channel after MinChannelTime.So, indicating MaxChannelTime is more useful for preventing unnecessary Probe Responses". However, the STA may also not be on the channel after MinChannelTime. In that case indicating MinChannelTime would be more useful for preventing unnecessary probe responses | Indicate both Min and Max, and let the AP decide whether to be pessimistic or optimistic (a decision that is outside the scope of the standard) |
| 20080 | 99.41 | 11.1.4.3.4 | "When the Max Channel Time field of the FILS Request Parameters element of the Probe Request frame is present" -- well, when is it present, in fact? Nothing seems to ever require its presence | Add some words to explain when it ought to be present |

**Discussion:**

**CIDs 20169 and 20160:**

See 11-16/0587.

Also, note that while P98.39 says:

A FILS STA may indicate its MaxChannelTime in the Max Channel Time field of the FILS Request Parameters element of the Probe Request frame to prevent the responding STA from transmitting the Probe Response after the time indicated by the MaxChannelTime has elapsed.

P98.44 has the following statement:

The Max Channel Time field shall be set to the MaxChannelTime of the MLME-SCAN.request primitive as defined in 9.4.2.177 (FILS Request Parameters element).

The MaxChannelTime parameter is not optional in the MLME-SCAN.request in the REVmc baseline, nor made optional in TGai. Thus, the two sentences are contradictory, anyway.

**CID 20080:**

By making the inclusion of MaxChannelTime mandatory in the FILS Request Parameters element of Probe Requests, there is no longer any need for the conditional (or to list the conditions).

**CID 20082:**

By making the inclusion of MaxChannelTime mandatory, we have enabled one mechanism so that the AP \_knows\_ that transmitting a Probe Response beyond that time is not useful. Adding a second mechanism with a “hint” to the AP that it \_might not\_ be useful between MinChannelTime and MaxChannelTime is not going to significantly advance interoperability performance. Generally, the features of TGai are an attempt to give more information to the STA to allow it to operate as efficiently as possible. Similarly, an AP is probably going to decide to send a Probe Response to a STA that \_might\_ be gone off channel, in case it has not actually gone off channel and it could use the information. Adding new/additional ambiguity to the Standard does not seem to be sufficiently helpful.

**Related, but aside:**

At 63.47, TGai currently has the following statement:

The Max Channel Time field (see 11.1.4.3.5 (Contents of a probe response)) contains the value of MaxChannelTime parameter of the MLME-SCAN.request primitive represented in an unsigned integer of units of 200 μs.

However, the MaxChannelTime parameter to the MLME-SCAN.request primitive is in units of TUs. A granularity in the frame format that is finer than the values to which it can be set, is not an efficient use of protocol. So, the frame format should be changed to encode this field in TUs.

**Proposed Resolutions:**

CID 20169: REVISED. At P98.39, change “may indicate” to “shall indicate”.

CID 20160: REVISED. At P98.39, change “may indicate” to “shall indicate”.

CID 20080: REVISED.

At P99.41, change as follows:

If the ~~Max Channel Time field of the~~ FILS Request Parameters element is present in the Probe Request frame, the responding FILS STA should discard ~~the~~ any Probe Response frame that has not been transmitted as a response to the Probe Request frame when the elapsed time measured from the end of the reception of the Probe Request frame by the MAC entity of the responding STA exceeds the time indicated by value of the Max Channel Time field of the FILS Request Parameters element of the Probe Request frame. If the ~~Max Channel Time field~~ FILS Request Parameters element is not present in the Probe Request frame, transmission time of the Probe Response frame to the Probe Request frame by the responding STA is only limited by the retransmission procedure in 10.22.2.10 (Retransmit Procedures).

NOTE—It is possible for the STA to leave the channel on which it sent the Probe Request frame prior to MaxChannelTime. Should this occur the STA might not receive some of the Probe Response frames transmitted.

In 9.4.2.177, change Figures 9-586d and 9-586e, and associated text as follows:

**9.4.2.177 FILS Request Parameters element**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Element ID | Length | Element ID Extension | Parameter Control Bitmap | Max ChannelTime | FILS Criteria | Max Delay Limit |

Octets: 1 1 1 1 1 0 or 1 0 or 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MinimumDataRate | RCPILimit | OUIResponseCriteria | ~~Max Channel~~~~Time~~ |  |

Octets: 0 or 3 0 or 1 0 or 2 ~~0 or 1~~

**Figure 9-586d—FILS Request Parameters element format**

 B0 B1 B2 B3

|  |  |  |  |
| --- | --- | --- | --- |
| FILS Criteria Present | Max Delay Limit Present | Minimum DataRate Present | RCPI Limit Present |

Bits: 1 1 1 1

B4 B5 B6 B7

|  |  |  |  |
| --- | --- | --- | --- |
| OUI ResponseCriteria Present | ~~Max Channel Time Present~~ |  | Reserved |

Bits: 1 ~~1~~ 1 1

**Figure 9-586e—Parameter Control Bitmap field**

Bits 0 to ~~6~~4 of the Parameter Control Bitmap field correspond to the Parameter fields that are conditionally present in the element. A value of 1 in a bit indicates the corresponding parameter is present, and the value of 0 indicates the corresponding parameter is not present.

At 63.47, change as follows:

The Max Channel Time field (see 11.1.4.3.5 (Contents of a probe response)) contains the value of MaxChannelTime parameter of the MLME-SCAN.request primitive represented in an unsigned integer of units of ~~200μs~~ TUs. A Max Channel Time field value of 255 is used to indicate any duration of more than 254 TUs, or an unspecified or unknown duration.

<End of CID 20080 changes.>

CID 20082: REJECTED. This just adds ambiguity in expected AP behavior, and does not seem to significantly help the problem of useless Probe Responses, due to leaving the choice up to the AP implementation.

**CIDs 20162, 20170:**

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| --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 20162 | 84.27 | 9.6.8.36 | Non-Transmitted BSS:FILS DiscoveryComment: In typical high density deployments, there are 4 or more SSIDs configured and beaconed per AP, in practice. Thus there can be a significant bandwidth savings from combining these, using Multiple BSSID support. The bandwidth gain accrues not just from use of Multiple BSSIDs in Beacon Frames but there is also significant gain available through the use of the Multiple BSSID feature in Probe Responses. The Probe Response gain is available even when not all devices on the network support the Multiple BSSID feature. This feature has been in 802.11 since 802.11v (2011); it needs a push to get traction to get it implemented and used. | Remove the Multiple BSSIDs Presence Indicator. Instead, make Multiple BSSID support mandatory for TGai devices. |
| 20170 | 84.27 | 9.6.8.36 | In typical high density deployments, there are 4 or more SSIDs configured and beaconed per AP, in practice. Thus there can be a significant bandwidth savings from combining these, using Multiple BSSID support. This feature has been in 802.11 since 802.11v (2011); it needs a push to get traction to get it implemented and used. | Remove the Multiple BSSIDs Presence Indicator. Instead, make Multiple BSSID support mandatory for TGai devices. |

**Discussion:**

See 11-16/0586.

**Proposed Resolutions:**

CID 20169, 20170: REVISED. Add the following editing instructions to the TGai Draft:

***Change the following row in the table in 6.3.11.2.2:***

**6.3.11.2 MLME-START.request**

**6.3.11.2.2 Semantics of the service primitive**

|  |  |  |  |
| --- | --- | --- | --- |
| MultipleBSSID | As defined inMultipleBSSIDElement in9.4.2.46(MultipleBSSIDelement) | As defined in MultipleBSSID Element in9.4.2.46 (MultipleBSSID element) | This element is optionally present whendot11RMMeasurementPilotActivated is avalue between 2 and 7 and the AP is amember of a Multiple BSSID Set (see11.11.14 (Multiple BSSID Set)) with two ormore members, or ifdot11MultiBSSIDActivated is true.This element is present when dot11FILSActivated is true and the AP is a member of a Multiple BSSID Set with two or more members. |

***Change the following text, as shown:***

**11.1.3.8 Multiple BSSID procedure**

Implementation of the Multiple BSSID capability is optional for a WNM STA and for a DMG STA. Implementation of the Multiple BSSID capability is mandatory for a FILS STA.

***Insert the following text in 11.1.4.3.4, at P99.51:***

If the Multiple BSSID bit is set in the Extended Capabilities element in the Probe Request frame, the FILS STA shall not respond to the Probe Request if its BSS information is present as a Nontransmitted BSSID Profile of a Multiple BSSID element in the response generated from another FILS STA.

***Change the following row in the table in Annex B.4.19:***

**B.4.19 WNM extensions *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \*WNM6 | Multiple BSSID Support | 11.1.3.8(MultipleBSSIDprocedure),11.1.4(Acquiringsynchronization, scanning),11.11.14(MultipleBSSID Set) | CFWNM:OCF32:M | Yes □ No □ N/A □ |

**CIDs 20142:**

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| --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 20142 | 103.1 | 11.1.4.3.7 | The phrase "with a matched BSSID" should not be removed, since it is essential that the AP-CSN is associated with the matched BSSID of the AP. The criteria in 11.1.4.3.4 for FILS scanning does not provide the essential matching BSSID criteria for an AP to respond, which will make the procedure function incorrectly. | Change " When a FILS AP receives a Probe Request frame with AP-CSN element and the criteria for responding to aProbe Request ( 11.1.4.3.4 (Criteria for sending a probe response)) are met" into "When a FILS AP receives a Probe Request frame with a matched BSSID containing an AP-CSN element and the criteria for responding to aProbe Request ( 11.1.4.3.4 (Criteria for sending a probe response)) are met" |

**Discussion:**

Resolution proposed earlier:

Rejected. Matching of BSSID is covered by the criteria listed in 11.1.4.3.4 baseline text (item (g), for example), which applies to both FILS and non-FILS APs.

Concern with this proposed resolution is that the original language (that included “matched BSSID” was intended to indicate that the BSSID must match exactly, e.g. could not be a broadcast BSSID. Relying on 11.1.4.3.4 does not filter as specifically, and would allow matching a broadcast BSSID for example. However, it is not useful to respond to an AP-CSN not associated with a specific BSSID.

**Proposed Resolutions:**

CID 20142: REVISED. Change the following text as shown:

When a FILS AP receives a Probe Request frame with AP-CSN element, an individually addressed BSSID matching this AP, and the criteria for responding to a Probe Request (11.1.4.3.4 (Criteria for sending a probe response)) are met, the AP sends a Probe Response frame according to comparison result, as follows: