IEEE P802.11 Wireless LANs

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| Proposed 802.11ai Specification Text for Probe Referencing |
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Abstract

The submission proposes 802.11ai specification text for the active scanning enhancements. The detailed description of the enhancements, simulation results, and proposed text changes to the 802.11ai Specification Framework Document (SFD) have been provided in [Ref-1], [Ref-2].

The numbering of the clauses is taken from 2012 revision of IEEE802.11 standard [Ref-3].

# Background

To facilitate a fast initial link setup, a method for reducing signaling overhead during active scanning has been provided [Ref-1]. Some simulation results and proposed text changes to the 802.11ai Specification Framework Document (SFD) have been provided in [Ref-2].

As a response to the TGai Call-for-Contributions, this document proposes detailed text for TGaiSpecifiction Document, for the proposed enhancement to active scanning.

# 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-3]. 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

*Instructions to Editor: Modify Table 8-26 in section 8.3.3.9 as follows:*

|  |  |  |
| --- | --- | --- |
| **Order**  | **Information** | **Notes**  |
| … | … | …  |
| 13 | Mesh ID | The Mesh ID element is present if dot11MeshActivated is true. |
| 14 | Probe Request Reference | The Probe Request Reference element is optionally present if dot11FILSActivated equals to true. |
| Last | Vendor Specific | One or more vendor-specific elements are optionally present.These elements follow all other elements. |

*Instructions to Editor: Modify Table 8-27 in section 8.3.3.10 as follows:*

|  |  |  |
| --- | --- | --- |
| **Order**  | **Information** | **Notes**  |
| … | … | …  |
| 54 | Mesh Channel SwitchParameters | The Mesh Channel Switch Parameters element is present ifdot11MeshActivated is true and either Channel SwitchAnnouncement element or Extended Channel SwitchAnnouncement element is present. |
|  55 | Probe Response Reference | The Probe Response Reference element is optionally present if dot11FILSActivated equals to true. |
| Last-1 | Vendor Specific | One or more vendor-specific elements are optionally present.These elements follow all other elements. |
| … | …. | …. |

*Instructions to Editor: Insert a new subclause in section 8.4.2 as follows:*

# 8.4.2.122 Probe Request Reference element

The Probe Request Reference element provides the reference information related to the referenced Probe Request frame in the simplified Probe Request frames. The format of the Probe Request Reference element is shown in Figure 8-[xxx].

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | Referenced Source Address |
| Octets: | 1 | 1 | 6 |

Figure 8-[xxx].

The Element ID field is set to the value given in Table 8-54 for this element.

The Length field is set to 6.

The Referenced Source Address field contains the value of the Address 2 (Source Address) field in the MAC Header of the referenced Probe Request frame.

*Instructions to Editor: Insert a new subclause in section 8.4.2 as follows:*

# 8.4.2.123 Probe Response Reference element

The Probe Response Reference element provides the reference information related to the referenced Probe Response frame in the simplified Probe Response frames. The format of the Probe Response Reference element is shown in Figure 8-[yyy].

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | Referenced Sequence Control |
| Octets: | 1 | 1 | 2 |

Figure 8-[yyy].

The Element ID field is set to the value given in Table 8-54 for this element.

The Length field is set to 2.

The Referenced Sequence Control field contains the value of the Sequence Control field in the MAC Header of the referenced Probe Response frame.

*Instructions to Editor: add new subclauses in section 10 as follows:*

10.25 Fast Initial Link Setup (FILS) Procedures

….

10.25.[x] Simplified Probe Request Frame Generation and Usage

A non-AP STA with dot11FILSActivated equals to true, before transmitting its regular Probe Request frame to an AP, may receive other non-AP STAs’ regular Probe Request frame(s). After receiving other non-AP STA’s Probe Request frame(s), the non-AP STA may determine if any received Probe Request frame can be used as a reference. If the non-AP STA determines that a received Probe Request frame can be used as a reference, the non-AP STA may transmit a Simplified Probe Request frame with the Probe Request Reference IE which contains the Source Address field with the same value as in the referenced Probe Request frame. Thereby, the non-AP STA may omit, from its Simplified Probe Request frame, any redundant IEs that are in the referenced Probe Request frame and contain the same values.

A non-AP STA shall not reference a Probe Request frame that contains the Probe Request Reference IE.

A non-AP STA shall not reference a Probe Request frame if the time at the end of the transmission of the Simplified Probe Request frame substracts the time that the non-AP STA receives the to-be-referenced Probe Request frame is more than [TBD msec].

When an AP with dot11FILSActivated equals to true receives a Simplified Probe Request frame that contains the Probe Request Reference IE from a non-AP STA, if the AP also received the Probe Request frame being referenced, i.e. the Source Address field of which matches with the Referenced Source Address field in the Probe Request Reference IE in the Simplified Probe Request frame, the AP shall consider that the non-AP STA also implicitly sends the IEs in the refereneced Probe Request frame if those IEs are not explicitly contained in the Simplified Probe Request frame. An AP with dot11FILSActivated equals to true may not consider that the non-AP STA also implicitly sends the IEs in the refereneced Probe Request frame if the refereneced Probe Request frame was received more than [TBD msec] before the Simplified Probe Request frame was received.

 10.25.[y] Simplified Probe Response Frame Generation and Usage

An AP with dot11FILSActivated equals to true, before transmitting its regular Probe Response frame, may determine if any previously transmitted Probe Response frame can be used as a reference. If the AP determines that a previously transmitted Probe Response frame can be used as a reference, the AP may transmit a Simplified Probe Response frame with the Probe Response Reference IE which contains the Sequence Control field with the same value as in the referenced Probe Response frame. Thereby, the AP may omit, from its Simplified Probe Response frame, any redundant IEs that are in the referenced Probe Response frame and contain the same values.

An AP shall not reference a Probe Response frame that contains the Probe Response Reference IE.

An AP shall not reference a Probe Response frame if the time at the end of the transmission of the Simplified Probe Response frame substracts the time at the end of the transmission of the to-be-referenced Probe Response frame is more than [TBD msec].

When a non-AP STA with dot11FILSActivated equals to true receives a Simplified Probe Response frame that contains the Probe Response Reference IE from the AP, if the non-AP STA also received the Probe Response frame being referenced, i.e. the Sequence Control field of which matches with the Referenced Sequence Control field in the Probe Response Reference IE in the Simplified Probe Response frame, the non-AP STA shall consider that the AP also implicitly sends the IEs in the refereneced Probe Response frame if those IEs are not explicitly contained in the Simplified Probe Response frame. A non-AP STA with dot11FILSActivated equals to true may not consider that the AP also implicitly sends the IEs in the refereneced Probe Response frame if the refereneced Probe Response frame was received more than [TBD msec] before the Simplified Probe Response frame was received.

# References:

1. IEEE 802.11-12/0791r3 Reducing-active-scanning-overhead.
2. IEEE 802.11-12/1049r0 Reducing-active-scanning-overhead-with-simulation-results.
3. IEEE Std 802.11 – 2012