IEEE P802.11
Wireless LANs

|  |
| --- |
| 802.11bc LB257 – Resolution for 2074, part 2 |
| Date: March, 2022 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Antonio de la Oliva | Interdigital Ltd, UC3M |  |  | aoliva@it.uc3m.es |
| Xiaofei Wang | Interdigital Ltd |  |  |  |

Abstract:

This contribution addresses the discovery of available services from APs.

**9.4.2.170 Reduced Neighbor Report element**

**9.4.2.170.1 General**

The Reduced Neighbor Report element contains channel and other information related to neighbor APs. The format of the Reduced Neighbor Report element is shown in Figure 9-706 (Reduced Neighbor Report element format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | Neighbor AP Information Fields |
| Octets: | 1 | 1 | variable |

**Figure 9-706 -- Reduced Neighbor Report element format**

The Element ID and Length fields are defined in 9.4.2.1 (General).

The Neighbor AP Information Fields field contains one or more of the Neighbor AP Information field described in 9.4.2.170.2 (Neighbor AP Information field).

**9.4.2.170.2 Neighbor AP Information field**

The Neighbor AP Information field specifies TBTT and other information related to a group of neighbor APs on one channel. See Figure 9-707 (Neighbor AP Information field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TBTT Information Header | Operating Class | Channel Number | TBTT Information Set |
| Octets: | 2 | 1 | 1 | variable |

**Figure 9-707 Neighbor AP Information field format**

The format of TBTT Information Header subfield is defined in Figure 9-708 (TBTT Information Header subfield format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B1 | B2 | B3 | B4 B7 | B8 B15 |
|  | TBTT  Information Field Type | Filtered  Neighbor AP | Reserved | TBTT  Information Count | TBTT  Information Length |
| Bits: | 2 | 1 | 1 | 4 | 8 |

**Figure 9-708 TBTT Information Header subfield format**

The TBTT Information Field Type subfield identifies, together with the TBTT Information Length subfield, the format of the TBTT Information field. It is set to 0 or 1.(#2218) Values ~~1,~~ 2, and 3 are reserved.

The Filtered Neighbor AP subfield is reserved except when the Reduced Neighbor Report element is carried in a Probe Response frame transmitted by a TVHT AP.

In a Probe Response frame transmitted by a TVHT AP, the Filtered Neighbor AP subfield is set to 1 if the specific SSID corresponding to every BSS of the APs in this Neighbor AP Information field matches the SSID in the corresponding Probe Request frame; otherwise it is set to 0.

The TBTT Information Count subfield contains the number of TBTT Information fields included in the TBTT Information Set field of the Neighbor AP Information field, minus one.

The TBTT Information Length subfield indicates the length of each TBTT Information field included in the TBTT Information Set field of the Neighbor AP Information field. If the TBTT Information Field Type subfield is 0, the TBTT Information Length subfield(11ax)

Contains the length in octets of each TBTT Information field that is included in the TBTT Information Set field of the Neighbor AP Information field.

Is set to 1, 2, 5, 6, 7, 8, 9, 11, 12, or 13; other values are reserved.(11ax)

Indicates the TBTT Information field contents as shown in Table 9-321 (TBTT Information field contents).

A TVHT AP sets the TBTT Information Length subfield to 1.

The TBTT Information Length subfield, when the TBTT Information Field Type subfield is set to 0, is interpreted as shown in Table 9-321 (TBTT Information field contents for TBTT Information Field Type subfield set to 0).

|  |  |
| --- | --- |
| **TBTT Information field contents** |  |
| **TBTT Information Length subfield value** | **TBTT Information field contents** |
| 1 | The Neighbor AP TBTT Offset subfield |
| 2(11ax) | The Neighbor AP TBTT Offset subfield and the BSS Parameters subfield  |
| 5 | The Neighbor AP TBTT Offset subfield and the Short SSID subfield  |
| 6(11ax) | The Neighbor AP TBTT Offset subfield, the Short SSID subfield, and the BSS Parameters subfield |
| 7 | The Neighbor AP TBTT Offset subfield and the BSSID subfield |
| 8(11ax) | The Neighbor AP TBTT Offset subfield, the BSSID subfield, and the BSS Parameters subfield |
| 9(11ax) | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the BSS Parameters subfield, and the 20 MHz PSD subfield |
| 11 | The Neighbor AP TBTT Offset subfield, the BSSID subfield and the Short SSID subfield |
| 12(11ax) | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short SSID subfield, and the BSS Parameters subfield |
| 0, 3, 4, 10(11ax) | Reserved |
| 13(11ax) | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short SSID subfield, the BSS Parameters subfield, and the 20 MHz PSD subfield |
| 14–255(11ax) | The first 13 octets of the field contain the Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short SSID subfield, the BSS Parameters subfield, and the 20 MHz PSD subfield (i.e., same contents as when the length of the TBTT Information field is 13). The remaining octets are reserved. |

The Operating Class field indicates a channel starting frequency that, together with the Channel Number field, indicates the primary channel of the BSSs of the APs in this Neighbor AP Information field.

NOTE 1—The Operating Class field and Channel Number tuple indicate the primary channel in order to assist with passive scanning.

The Channel Number field indicates the last known primary channel of the APs in this Neighbor AP Information field. Channel Number is defined within an Operating Class as shown in Table E-4 (Global operating classes).

The TBTT Information Set field contains one or more TBTT Information fields. The TBTT Information field is defined in Figure 9-709 (TBTT Information field format(11ax)).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Neighbor AP TBTT Offset | BSSID (optional) | Short SSID (optional) | BSS parameters | 20 MHz PSD |
| Octets: | 1 | 0 or 6 | 0 or 4 | 0 or 1 | 0 or 1 |

**Figure 9-709 TBTT Information field format(11ax)**

(11ax)The Neighbor AP TBTT Offset subfield indicates the offset in TUs, rounded down to nearest TU, to the following:

The next TBTT of the reported AP from the immediately prior TBTT of the AP that transmits this element if the reported AP is not part of a multiple BSSID set or is the transmitted BSSID of a multiple BSSID set.

The next TBTT of the transmitted BSSID of the multiple BSSID set of the reported AP from the immediately prior TBTT of the AP that transmits this element if the reported AP is part of a multiple BSSID set and is a nontransmitted BSSID.

(11ax)The value 254 indicates an offset of 254 TUs or higher. The value 255 indicates an unknown offset value.

The BSSID field is defined in 9.2.4.3.4 (BSSID field).

The Short SSID subfield is calculated as given in 9.4.2.170.3 (Calculating the short SSID).

(11ax)The format of the BSS Parameters subfield is defined in Figure 9-709a (BSS Parameters subfield format(11ax)).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|  | OCT Recommended | Same SSID | Multiple BSSID | Transmitted BSSID | Member Of ESS With 2.4/5 GHz Co-Located AP | Unsolicited Probe Responses Active | Co-Located AP | Reserved |
| Bits:  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Figure 9-709a -- BSS Parameters subfield format(11ax)**

(11ax)The OCT Recommended subfield is set to 1 to indicate that OCT is recommended to exchange MMPDUs with the AP identified in the TBTT Information field (see 11.31.5 (On-channel Tunneling (OCT) operation), through over-the-air transmissions with the AP sending the Reduced Neighbor Report element. It is set to 0 otherwise.

(11ax)The Same SSID subfield is set to 1 to indicate that the reported AP has the same SSID as the reporting AP. It is set to 0 otherwise.

(11ax)The Multiple BSSID subfield is set to 1 to indicate that the reported AP is part of a multiple BSSID set. It is set to 0 otherwise.

(11ax)The Transmitted BSSID subfield is set to 1 to indicate that the reported AP is a transmitted BSSID. It is set to 0 if the reported AP is a nontransmitted BSSID. It is reserved if the Multiple BSSID subfield is set to 0.

(11ax)The Member Of ESS With 2.4/5 GHz Co-Located AP subfield is set to 1 if the reported AP is part of an ESS where each AP in the ESS and operating in the same band as the reported AP (irrespective of the operating channel in that band) that might be detected by a STA receiving this frame [see the definition of “detected access point (AP)” in 3.2 (Definitions specific to IEEE Std 802.11)] has dot11MemberOfColocated6GHzESSOptionActivated equal to true and also has a corresponding AP operating in the 2.4 GHz or 5 GHz bands that is in the same co-located AP set as that AP. It is set to 0 otherwise or if the reporting AP does not have that information. It is reserved if the reported AP is operating in the 2.4 GHz or 5 GHz bands.

NOTE 2—This subfield indicates that the reported AP is part of an ESS that has no 6 GHz-only APs that might be detected by a STA receiving this frame. This means that all APs operating in the 6 GHz band that are part of that ESS that might be detected by a STA receiving this frame can be discovered in the 2.4 GHz and/or 5 GHz bands.

(11ax)The Unsolicited Probe Responses Active subfield is set to 1 if the reported AP is part of an ESS where all the APs that operate in the same channel as the reported AP and that might be detected by a STA receiving this frame [see the definition of “detected access point (AP)” in 3.2 (Definitions specific to IEEE Std 802.11)] have dot11UnsolicitedProbeResponseOptionActivated equal to true and are transmitting unsolicited Probe Response frames every 20 TUs or less (see 26.17.2.3 (Scanning in the 6 GHz band)). It is set to 0 otherwise or if the reporting AP does not have that information.

(11ax)The Co-Located AP subfield is set to 1 if every AP in this Neighbor AP Information field is in the same co-located AP set as the transmitting AP. It is set to 0 otherwise.

(11ax)The 20 MHz PSD subfield, if present, indicates a maximum transmit power for the Default category, with unit interpretation of PSD EIRP in dBm/MHz (see 9.4.2.161 (Transmit Power Envelope element) and 11.7.5), corresponding to the primary 20 MHz channel of the reported AP. The maximum transmit power is encoded as a 2s complement signed integer. The value –128 is reserved. The value +127 indicates that no maximum transmit power is specified for the corresponding 20 MHz channel. For all other values *Y* of the subfield (i.e., –127 to +126), the maximum transmit power in the 20 MHz channel is *Y*/ 2 dBm/MHz (i.e., ranging from –63.5 to +63 dBm/MHz).

NOTE 3—For example, suppose the reported AP transmits, in Beacon and Probe Response frames, one Transmit Power Envelope element with the Maximum Transmit Power For 20 MHz subfield indicating 20 dBm (regulatory client EIRP), then the 20 MHz PSD subfield indicates the equivalent PSD limit of 7 dBm/MHz with the value 14.

The TBTT Information Length subfield, when the TBTT Information Field Type subfield is set to 1, is interpreted as shown in Table 9-XX (TBTT Information field contents for TBTT Information Field Type subfield set to 1).

Table 9-XXX -- TBTT Information field contents for TBTT Information Field Type subfield set to 1

|  |  |
| --- | --- |
| **TBTT Information Length subfield value** | **TBTT Information field contents** |
| 0-1 | Reserved |
| 2 | The EBCS Info Frame Tx Countdown subfield. |
| 3-255 | Reserved |

For the case of TBTT Information Field Type subfield set to 1, the TBTT Information Set field contains one or more TBTT Information fields (Figure 9-XXX TBTT Information field format for TBTT Information Field Type subfield set to 1). The TBTT Information field is defined in Figure 9-XXX.

|  |  |
| --- | --- |
|  | EBCS Info Frame TX Countdown |
| Octets | 2 |

Figure 9-XXX – TBTT Information field format for TBTT Information Field Type subfield set to 1

The EBCS Info Frame TX Countdown subfield indicates the number of TBTTs until the transmission of the next EBCS Info frame. The value 1 indicates that the frame is transmitted following the next TBTT. The value 0 is reserved.