IEEE P802.11
Wireless LANs

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| --- |
| Faster AP discovery |
| Date: 2012-01-DD |
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|  |  |  |  |  |

Abstract

This document is an amendment proposal for TGai based on Draft P802.11REVmb\_D9.1.

This amendment addresses the faster AP discovery mechanism for FILS.

### 8.3.3.2 Beacon frame format

*Instruction to Editor: Add new element to Table 8-19.*

Table 8-19---Beacon frame body

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| XX | Operating Channels | The Operating Channels element present if dot11FILSActivated is true and AP equipment is operating in multi-bands. |

### 8.3.3.10 Probe Response frame format

*Instruction to Editor: Add new element to Table 8-26.*

Table 8-26---Probe Response frame body

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| XX | Operating Channels | The Operating Channels element present if dot11FILSActivated is true and AP equipment is operating in multi-bands. |

### 8.4.2 Information elements

### 8.4.2.1 General

*Instruction to Editor: Add new element to Table 8-53.*

Table 8-53---Element IDs

|  |  |  |
| --- | --- | --- |
| **Information element** | **Element ID** | **Length (in octets)** |
| Operating Channels (see 8.4.2.2.XX) | XX | 7 |

### 8.4.2.X Operating Channels element

*Instruction to Editor: Add new section for new IE.*

The Operating Channels element specifies the operating channels when the AP equipment is operating in multi-bands. The format of the Operating Channels element is as Figure 8-XX.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | Operating Channels |
| Octets: | 1 | 1 | 5 |

Figure 8-XX---Operating Channels element format

The Length of the Operating Channels field is 5 octets.

The Operating Channels field is as Figure 8-XX. A non-AP STA can acknowledge the operating channels of the AP in 2.4GHz band by checking 14bits from the right side, the operating channels in 5170-5330MHz by checking 8bits after right-shifting 14bits, the operating channels in 5490-5710MHz by checking 11bits after right-shifting 8bits in addition and the operating channels in 5735-5835MHz by checking 5bits after right-shifting 11bits in addition.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 – B1 | B2 – B6 | B7 – B17 | B18 – B25 | B26 – B39 |
|  | Reserved | Operating Channels in 5735-5835MHz | Operating Channels in 5490-5710MHz | Operating Channels in 5170-5330MHz | Operating Channels in 2.4GHz Band |
| Bits: | 2 | 5 | 11 | 8 | 14 |

Figure 8-XX---Operating Channels field

Operating Channels in 5735-5835MHz field is as Figure 8-XX. A non-AP STA can acknowledge the operating channels of the AP in 5735-5835MHz band by checking what bits are true.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| B2 | B3 | B4 | B5 | B6 |
| CH165 | CH161 | CH157 | CH153 | CH149 |

Figure 8-XX---Operating Channels in 5735-5835MHz field

Operating Channels in 5490-5710MHz field is as Figure 8-XX. A non-AP STA can acknowledge the operating channels of the AP in 5490-5710MHz band by checking what bits are true.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B7 | B8 | B9 | B10 | B11 | B12 | B13 | B14 | B15 | B16 | B17 |
| CH140 | CH136 | CH132 | CH128 | CH124 | CH120 | CH116 | CH112 | CH108 | CH104 | CH100 |

Figure 8-XX---Operating Channels in 5490-5710MHz field

Operating Channels in 5170-5330MHz field is as Figure 8-XX. A non-AP STA can acknowledge the operating channels of the AP in 5170-5330MHz band by checking what bits are true.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| B18 | B19 | B20 | B21 | B22 | B23 | B24 | B25 |
| CH64 | CH60 | CH56 | CH52 | CH48 | CH44 | CH40 | CH36 |

Figure 8-XX---Operating Channels in 5170-5330MHz field

Operating Channels in 2.4GHz band field is as Figure 8-XX. A non-AP STA can acknowledge the operating channels of the AP in 2.4GHz band by checking what bits are true.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B26 | B27 | B28 | B29 | B30 | B31 | B32 | B33 | B34 | B35 | B36 | B37 | B38 | B39 |
| CH14 | CH13 | CH12 | CH11 | CH10 | CH9 | CH8 | CH7 | CH6 | CH5 | CH4 | CH3 | CH2 | CH1 |

Figure 8-XX Operating Channels in 2.4GHz Band field

### 8.5 Action frame format details

### 8.5.8.1 Public Action frames

*Instruction to Editor: Add new type of frame to Public Action frame as change histry:*

The Public Action frame is defined to allow the following:(Ed)

— Inter-BSS and AP to unassociated-STA communications

— Intra-BSS communication(11n)

— GAS(11u)

--- Sub-Beacon(11ai)

*Instruction to Editor: Add new value for Sub-Beacon frame in Table 8-202*

Table 8-202---Public Action field values

|  |  |
| --- | --- |
| **Public Action field value** | **Description** |
| X (11ai) | Sub-Beacon |

*Instruction to Editor: Add new section about Syb-Beacon.*

### 8.5.8.18 Sub-Beacon frame format (11ai)

The Sub-Beacon frame is used for faster Passive Scanning in FILS. It uses Action frame format and is transmitted by an AP to allow a STA to find the target SSID faster in Passive Scanning. The format of the Action frame is shown in Table 8-XX.

Table 8-XX---Information for Sub-Beacon frame

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| 0 | Category | The Category field is set to the value for Public Action frame, as defined in Table 8-37 (Category values) in 8.4.1.11 (Action field). |
| 1 | Action | The Action field is set to the value for Sub-Beacon frame, as defined in Table 8-202 (Public Action field values). |
| 2 | Service Set ID Length | The Service Set ID Length field is between 1 ro 32. |
| 3 | Service Set ID | The Service Set ID is copied from the corresponding Beacon frame. |

### 10.1.4 Acquiring synchronization, scanning

### 10.1.4.1 General

*Instruction to Editor: Add new paragraph after the second paragraph*

And also Active Scanning by Probe Request with wildcard SSID is prohibited when dot11FILSActivated is true.

### 10.1.4.X Faster passive scanning

*Instruction to Editor: Add new clause between 10.1.4.2 and 10.1.4.3*

Faster passive scanning is realized by introduction of the following items:

1. Sub-Beacon frame transmitted in shorter interval than Beacon frame.

The STA can shorten listening duration on each scanning channel than the duration defined by the MaxChannelTime parameter. When received a sub-beacon with desired SSID, the STA can wait for the beacon in the same channel.

1. Operating Channels element in the beacon and the probe response.

This element indicates all of the operating channels of the AP operating in multibands. The STA can know the operating channels other than the scanning channel and go directly to these channels and listen to.

### 10.1.4.3.2 Sending a Probe Response

*Instruction to Editor: Add new descriptions as specified in change history*

1. The SSID in the probe request is the wildcard SSID except when dot11FILSActivated is true, the SSID in the probe request is the specific SSID of the STA, or the specific SSID of the STA is included in the SSID List element,(11v)
2. The BSSID field in the probe request is the wildcard BSSID or the BSSID of the STA,
3. The DA field in the probe request is the broadcast address or the specific MAC address of the STA,
4. When dot11InterworkingServiceActivated is true and the Interworking field in the Capabilities element of the Probe Request is equal to 1,(#12041) the HESSID field, if present in the Interworking element, is the wildcard HESSID except when dot11FILSActivated is true or the HESSID of the STA, and
5. When dot11InterworkingServiceActivated is true and the Interworking field in the Capabilities element of the Probe Request is equal to 1,(#12041) the Access Network Type field in the Interworking element is the wildcard access network type(#13159) except when dot11FILSActivated is true, or the access network type(#13159) of the STA.

### 10.1.9 Operating Channels advertisement (11ai)

*Instruction to Editor: Add new this clause*

When a STA operates in multiband, an Operating Channels element shall be generated to specify the operating channel in each operating band if dot11FILSActivated is true. This element indicates operating channels in the band of 2.4GHz, 5170-5330MHz, 5490-5710MHz and 5735-5835MHz, and shall be included as the element of Beacon and Probe Response.

Note: This Operating Channels element advertises the operating channels just in 2.4 and 5GHz bands. Other operating bands like 60GHz or Sub-1GHz are not considered because of coverage range differencies.

**References:**

**doc.: IEEE 802.11-12/0013r0**