IEEE P802.11
Wireless LANs

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| CR for 6GHz – Out-of-band association |
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Abstract

This document provides CR for CIDs related to 6GHz association.

It is an evolution of contribution 11-18-1229

1. **Introduction**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 15826 | 27 | 253 | 6GHz APs will be multi-band APs operating also at 2.4/5GHz. Most STAs will also be tri-band capable. Load balancing/traffic steering between bands is the most powerful tool to limit the load at 6GHz and ensure QoS, high throughput or low latency. BTM requests, neighbor reports that are in the spec right now provide most of the tools to enable efficient load balancing. What is however missing is the description of the policy that a multi-band collocated AP is applying across it's different bands to inform the STAs of which traffic is recommended in which band, and to enable a very simple admission control per band. A policy should then be defined for a multi-band collocated AP, and this would define how a STA should operate with this AP, before association and after association. This policy could say that there are no restrictions (default for main deployments) or would enable specific modes where a realistic admission control for the 6GHz band is in place and where associaiton at 6GHz is allowed only after receiving a BTM request for instance, or is allowed only through pre-association at 6GHz through the collocated APs at 2.4 and 5GHz. | Define a multi-band collocated AP operation policy, which defines different modes for how to interact with this AP across different bands, before and after association (for instance association allowed only after receiving BTM request)... If this element is not included, interaction with the 6GHz AP should be exactly the same as today: no restrictions. | Revised – agree with the commenter. Apply the changes as proposed in doc 1959r0. |

1. **Proposed changes**

***11ax Editor: Modify 27.16.1 Basic HE BSS operation as follows***

27.16.1 Basic HE BSS operation

27.16.1.1 Basic HE BSS operation in the 6 GHz band

A device that has an HE AP operating in the 6 GHz band and one or more Multiband Collocated APs operating in the 2.4 and 5 GHz band may regulate association procedure to the HE APs operating in the 6GHz band by using the Out-of-band Association subfield:

* in Multi-band element and in Reduced Neighbor Report element present in Beacon, Probe Response and (Re)Association response frames,
* in Neighbor Report element present in BTM Request and ANQP Response frames
* and in FILS Discovery frame.
* Neighbor Report element sent by neighbor APs describing an AP that regulates association procedure should include the Multi-band Operation Policy element.

If the Out-of-band Association subfield is set to 0, unassociated STAs should perform scanning, authentication and association to the HE AP operating in the 6 GHz band in the AP’s operating channel.

If the Out-of-band Association subfield is set to 1, unassociated STAs should not perform scanning, authentication and association to the HE AP operating in the 6 GHz band in the AP’s operating channel, and should use the OCT procedure described in 11.31.5 (On-channel Tunneling (OCT) operation) to perform active scanning, authentication and/or association to the 6 GHz AP through over-the-air transmissions with the corresponding Multiband Collocated AP operating in the 2.4 or 5GHz band.

An AP may deny association to a non-AP STA upon reception of an association request in the AP’s operating channel with reason code DENIED\_OUT-OF-BAND\_ASSOCIATION. This indicates that the non-AP STA should perform association using an out-of-band mechanism.

***11ax Editor: Part highlighted in Red not part of the resolution:***

* Multi-band element

***11ax Editor: Modify 9.4.2.137 Multi-band element as follows***

[…]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B7 |
|  | Same SSID | MaxBSSID Indicator Present | Out-of-band Association | Reserved |
| Bits: | 1 | 1 | 1 | 5 |
|  |  | * BSS Parameters subfield format
 |

The Out-of-band Association subfield is set to 1 to indicate that association to the AP described in the Multi-band element is recommended to be done out-of-band with the Multiband Collocated APs as described in 27.16.1.1 (Basic HE BSS operation in the 6GHz band).

***11ax Editor: Modify 9.4.2.170 Neighbor AP information field element as follows:***

* Neighbor AP Information field

[…]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B7 |
|  | Same SSID | OCT supported | Out-of-band Association | Reserved |
| Bits: | 1 | 1 | 1 | 5 |
|  |  | * BSS Parameters subfield format
 |

The Same SSID subfield is set to 1 to indicate that the AP in this Neighbor AP Information field has the same SSID as the AP that sends the reduced neighbor report. Otherwise, the Same SSID subfield is set to 0.

The Out-of-band Association subfield is set to 1 to indicate that association to the AP described in the TBTT Information Set field in the Reduced Neighbor Report element is recommended to be done out-of-band with the Multiband Collocated APs as described in 27.16.1.1 (Basic HE BSS operation in the 6GHz band).

***11ax Editor: Modify 9.4.2.37 Neighbor Report element as follows:***

* Neighbor Report element

Change Figure 9-296 (BSSID Information field) as follows:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B1 | B2 | B3 | B4 B9 | B10 | B11 | B12 | B13 | B14 | B15 | B16 B17 | B18 | B19 B31 |
|  | AP Reachability | Security | Key Scope | Capabilities | Mobility Domain | High Throughput | Very High Throughput | FTM | High Efficiency | HE ER BSS(#11986) | Multiband Collocated AP | Out-of-band association | Reserved |
| Bits: | 2 | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 15 |
|  |  |  |

The Out-of-band Association subfield is set to 1 to indicate that association to the AP described in the Neighbor Report element is recommended to be done out-of-band with the Multiband Collocated APs as described in 27.16.1.1 (Basic HE BSS operation in the 6GHz band).

***11ax Editor: Modify 9.6.7.36 FILS Discovery frame as follows:***

* FILS Discovery frame format

[…]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B4 | B5 | B6 | B7 |  |
|  |  SSID Length  | Capability Presence Indicator | Short SSID Indicator | AP-CSN Presence Indicator |  |
| Bits: | 5 |  | 1 | 1 | 1 |  |
|  |  |  |  |  |  |  |  |  |
|  | B8 | B9 | B10 | B11 | B12 | B13 | B14 |  B15 |
|  | ANO Presence Indicator | Channel Center Frequency Segment 1 Presence Indicator  | Primary Channel Presence Indicator | RSN Info Presence Indicator | Length Presence Indicator | MD Presence Indicator  | Out-of-band Association | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| * FILS Discovery Frame Control subfield format(11ai)(#1616)
 |  |

[…]

A value of 1 for the MD Presence Indicator subfield indicates that the Mobility Domain subfield is present in the FILS Discovery frame. A value of 0 indicates that the Mobility Domain subfield is not present in the FILS Discovery frame.

The Out-of-band Association subfield is set to 1 to indicate that association to the AP that is transmitting the FILS Discovery frame is recommended to be done out-of-band with the Multiband Collocated APs as described in 27.16.1.1 (Basic HE BSS operation in the 6GHz band).

* Status Code field

***11ax Editor: Add the following line in Table 9-53 – status codes:***

|  |
| --- |
| * Status codes
 |
| Status code | Name | Meaning |
| 124 | DENIED\_OUT-OF-BAND\_ASSOCIATION | The association has been denied. The receiving STA is recommended to perform association to the AP with the OCT procedure with Multiband Collocated APs that are described in the included Multi-band elements or Reduced Neighbor Report elements.  |