IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution for CIDs related to Co-located BSSID | | | | |
| Date: September 15, 2019 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. |  |  | appatil@qti.qualcomm.com |
| Alfred Asterjadhi | Qualcomm Inc. |  |  | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. |  |  | gcherian@qti.qualcomm.com |

Abstract

This submission proposes resolutions for comments received for TGax LB238 (5):

20445, 21288, 21287, 21286, 20382

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Updated based on feedback received after the doc was presented during PM2 9/16/19
* Rev 2: on-the-fly updates when the doc was presented during PM3 9/16/19

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. This introduction is 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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 20445 | Mark Hamilton | 38.01 | 3.2 | The definition co-located BSSID set does not appear to ever be used, except in the defintions of co-hosted BSSID set and multple BSSID set. Further, since those latter two defintions both explicilty require a shared antnenna connector, they must already be operating on the same physical device, so including co-located BSSID set in those definitions is superfluous. And, yet further, it is confusing whether there is a concept of a collection of APs operating in the same device that do \_not\_ share an antenna connector (which certainly seems possible, for a device with band-tuned antennas). This then confuses what is meant by "co-located AP" in legacy usage such as Neighbor Report. It's best to just not add this definition and confuse things. | Delete the definition "co-located BSSID set", and change the defintions of "co-hosted BSSID set" and "multple BSSID set" by replacing "A type of co-located BSSID set" with "A set of APs". In the MIB DESCRIPTION of dot11ColocatedRNRImplemented, change "co-located BSSs" to "co-located APs' ". Also, correct the typo in the MIB DESCRIPTION: "Reduced Neighbor List" to "Reduced Neighbor Report". | **Revised**  Agree with the comment.  Deleted the definition of co-located BSSID set, updated the definitions of co-hosted BSSID and reverted to baseline text in the definition of multiple BSSID set. Fixed error in MIB description for dot11ColocatedRNRImplemented. Also please see resolution to CID 21288.  **TGax editor please make changes as showing doc 11-19/1150r2 with changes tagged as 20445.** |
| 21288 | Robert Stacey |  |  | The term "co-located" is used throughout draft without being defined. Colloqually, co-locate means "share a location or facility with someone (or something) else," which could be read as in the same building. Presumably that is not the intent. Since we can't redefine the word "co-located" to mean something technical (we may need it in its more genereal sense), define a new term that applies to the specific use in the standard and use that term throughout. | Define a new term "co-located BSS set: two or more BSSs operated by APs in the same device under a single SME." At 152.64: "...if every AP in this Neighbor AP Information field is in the same co-located BSS set." At 275.62, 276.6, 276.15: "...of an AP operating a BSS in the same co-located BSS set as the BSS of which the STA is a member..." At 431.7 "An AP that operates a BSS that is part of a co-located BSS set that includes a BSS in the 6 GHz band shall..." At 431.18: "An AP operating a BSS in the 6 GHz band that is not part of a co-located BSS set that includes a BSS in the 2.4 GHz or 5 GHz bands is referred to..." At 433.13: "An AP that operates a BSS in the 2.4 GHz or 5 GHz bands that is part of a co-located BSS set that includes a BSS in the 6 GHz band shall..." | **Revised**  Added a new definition for co-located AP set and updated many references in the spec to align with the new terminology.  **TGax editor please make changes as showing doc 11-19/1150r2 with changes tagged as 21288.** |
| 21287 | Robert Stacey | 38.01 | 3.2 | The term co-located BSSID set is defined but never used (except in the definition directly below it). As defined the term has nothing to do with BSSIDs, another indication that it is useless. | Remove this definition or change the term to "co-located AP" (which is used in the draft) | **Revised**  Deleted the definition of co-located BSSID set and updated the definitions for co-hosted BSSID set and multiple BSSID set (see resolution for CID 20445). Added a new definition for co-located AP set and updated many references in the spec to align with the new terminology.  **TGax editor please make changes as showing doc 11-19/1150r2 with changes tagged as 21287.** |
| 21286 | Robert Stacey | 431.07 | 26.17.2.3.1 | The requirement on co-located APs is not testable without a definition of "co-located". Co-located, in lay terms, could mean in the same buidling. | Change to "An AP in the same device as an AP operating in the 6 GHz band shall set..." | **Revised**  Added a new definition for co-located AP set and updated many references in the spec to align with the new terminology.  **TGax editor please make changes as showing doc 11-19/1150r2 with changes tagged as 21286.** |
| 20382 | Laurent Cariou | 431.07 | 26.17.2.3.1 | There is no definition for co-located AP | Add a definition for Co-located AP | **Revised**  Added a new definition for co-located AP set and updated many references in the spec to align with the new terminology.  **TGax editor please make changes as showing doc 11-19/1150r2 with changes tagged as 20382.** |

**3.2 Definitions specific to IEEE 802.11**

**TGax Editor: *Please make changes to the following definitions in this subclause as follows (note, the strikethrough in the definition of multiple BSSID set is removed):***

**multiple basic service set identifier (BSSID) set:** A collection of ~~cooperating~~ access points (APs), such that all ~~of the~~ APs use a common operating class, channel, and antenna connectors and advertises information for multiple BSSIDs using Beacon or Probe Response frames sent by the AP corresponding to the transmitted BSSID.[20445]

**co-hosted basic service set identifier (BSSID) set:** A collection of access points (APs) such that all the APs use a common operating class, channel, and antenna connectors and each AP advertises information for its BSSID using Beacon or Probe Response frames.[20445]

**TGax Editor: *Please delete the following definition in this subclause as follows:***

[20445, 21288]

**TGax Editor: *Please insert the following definition while maintaining the alphabetical order:***

**co-located access point (AP) set:** A set of two or more APs in the same physical device.[21288]

NOTE 1 – APs in the co-located set might be operating on the same or different channel.

NOTE 2 – The APs that are part of a co-located AP set when operating on the same channel might form a co-hosted BSSID set or multiple BSSID set.

**TGax Editor: *Please make the changes as shown below for the text on page number (Pxxx) and line numbers (Lxx) in D4.3:*** [21288, 21287, 21296, 20382]

P158L58: The Co-located AP subfield is set to 1 to indicate that the AP reported in this Neighbor Report element is in the same co-located AP set as the AP sending the Neighbor Report element.

P159L05: The Member of ESS with 2.4/5GHz Co-located AP subfield is set to 1 if the reported AP is part of an ESS where each AP within the ESS and operating in the same band as the reported AP (irrespective of the operating channel within that band) that might be detected by a STA receiving this frame has dot11MemberOfColocatedESSOptionImplemented 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.

P159L27: The Co-located With a 6 GHz AP subfield is set to 1 to indicate that the AP reported by the Neighbor Report element is in the same co-located AP set as a 6 GHz AP, and that the 6 GHz AP can be discovered by Management frames sent by the reported AP. It is set to 0 otherwise.

P164L56: 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, or if the information is unknown.

P166L53: The Member of ESS with 2.4/5GHz Co-located AP subfield is set to 1 if the reported AP is part of an ESS where each AP within the ESS and operating in the same band as the reported AP (irrespective of the operating chan­nel within that band) that might be detected by a STA receiving this frame has dot11MemberOfColocat­edESSOptionImplemented equal to true and has a corresponding AP operating in the 2.4 GHz or 5 GHz bands that is in the same co-located AP set as the 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.

P301L36:

* allows a STA of a multi-band capable device or a STA that is in the same device as another STA to transmit or for­ward an MMPDU that was constructed by, addressed by or addressed to a different STA in the same device

P302L38: In Beacon and Probe Response frames, a Reduced Neighbor Report element may be transmitted by an AP with dot11TVHTOptionImplemented or dot11FILSActivated true. In FILS Discovery frames, a Reduced Neighbor Report element is optionally sent by a FILS AP. An AP that operates in the 2.4 GHz or 5 GHz band and that is in the same co-located AP set as one or more 6 GHz APs shall follow the rules defined in 26.17.2.4 (Out of band discovery of a 6 GHz BSS) for including a Reduced Neighbor Report element in Beacon and Probe Response frames. A Reduced Neighbor Report element contains information on neighbor APs. A Reduced Neighbor Report element might not be exhaustive either by choice or by the fact that there may be neighbor APs not known to the AP.

P452L28: A 6 GHz AP may set dot11ColocatedRNRImplemented to true and shall set dot11ShortSSIDListImplemented to true. An AP that is in the same co-located AP set as a 6 GHz AP shall set dot11ColocatedRNRImplemented to true and dot11ShortSSIDListImplemented to true.

P452L43: A 6 GHz AP that does not share the same co-located AP set as an AP operating in the 2.4 GHz band or 5 GHz band is referred to as a 6 GHz-only AP.

P452L55:

* The transmission of FILS Discovery frames may be omitted if a BSSID, and SSID (or short SSID) indication of the AP is advertised in a Reduced Neighbor Report element in Beacon and Probe Response frames transmitted on a 2.4 GHz or 5 GHz channel by an AP that is in the same co-located AP set as the 6 GHz AP, or if a broadcast Probe Response frame or a Beacon frame is scheduled for transmission at that target transmit time instead of the FILS Discovery frame, or if the AP is a 6 GHz-only AP that does not intend to be discovered by STAs.
* **Criteria for sending a response**

***Change item g) in the first paragraph as follows:***

**TGax Editor: *Please make changes to the paragraphs in this subclause as shown below:*** [21288, 21287, 21296, 20382]

A STA that receives a Probe Request frame shall not respond if any of the following apply:

* The STA is not a mesh STA and none of the following criteria are met:
* The SSID in the Probe Request frame is the wildcard SSID.
* The SSID in the Probe Request frame matches the SSID of the STA’s.
* The STA is an AP that is in the same co-located AP set as a 6 GHz AP, the SSID in the Probe Request frame matches the SSID of the 6 GHz AP, and the STA reports the co-located 6 GHz AP in Beacon and Probe Response frames, see 26.17.2.4 (Out of band discovery of a 6 GHz BSS).
* The STA is a member of a multiple BSSID set and the SSID in the Probe Request frame matches any of the SSIDs of the members of that multiple BSSID set.
* ~~The~~ dot11SSIDListImplemented is true, the SSID List element is present in the Probe Request frame and includes the SSID of the STA’s BSS.
* dot11SSIDListImplemented is true, the STA is an AP that is in the same co-located AP set as a 6 GHz AP, the SSID List element is present in the Probe Request frame and includes the SSID corresponding to the co-located 6 GHz AP,and the AP reports the co-located 6 GHz AP in Beacon and Probe Response frames, see 26.17.2.4 (Out of band discovery of a 6 GHz BSS).
* dot11ShortSSIDListImplemented is true, the Short SSID List element is present in the Probe Request frame and includes the Short SSID field corresponding to the SSID of the STA's BSS.

1. dot11ShortSSIDListImplemented is true, the STA is an AP that is in the same co-located AP set as a 6 GHz AP, the Short SSID List element is present in the Probe Request frame and includes the Short SSID field corresponding to the SSID of the 6 GHz AP and the AP reports this 6 GHz AP in its Beacon and Probe Response frames, see 26.17.2.4 (Out of band discovery of a 6 GHz BSS).

* **Out of band discovery of a 6 GHz BSS**

**TGax Editor: *Please make changes to the paragraphs in this subclause as shown below:*** [21288, 21287, 21296, 20382]

An AP that operates in the 2.4 GHz or 5 GHz bands and that is in the same co-located AP set as one or more 6 GHz APs shall include in Beacon and Probe Response frames that it transmits a Reduced Neighbor Report element with the Co-Located AP subfield in the TBTT Information Header subfield set to 1 to pro­vide at least the operating channels and operating classes of those 6 GHz APs.

NOTE—The Reduced Neighbor Report element might contain information on 6 GHz APs that are not in the same co-located AP set as the transmitting AP. In this case the Co-Located AP subfield is set to 0.

An AP responds to a probe request by following the rules defined in 11.1.4.3.4 (Criteria for sending a response).

If neither of the following conditions is met:

* the AP transmits an individually addressed Probe Response frame to a STA that has signaled that it does not support operating in the 6 GHz band (see 9.4.2.53 (Supported Operating Classes element))
* the AP operating in the 6 GHz band does not intend to be discovered by STAs

then the following applies:

* If an AP operating in the 2.4 GHz or 5 GHz bands is in the same co-located AP set as one or more 6 GHz APs and has the same SSID as those 6 GHz AP(s), then the Beacon frames and Probe Response frames transmitted by the AP or by the transmitted BSSID of the same Multiple BSSID set as the AP shall include, for each of these 6 GHz APs, a TBTT Information field in a Reduced Neighbor Report element with the BSSID field set to the BSSID of the 6 GHz AP, and with either the Short SSID field set to the short SSID of the 6 GHz AP or the Same SSID subfield in the BSS Parameters subfield set to 1
* If an AP operating in the 2.4 GHz or 5 GHz bands is in the same co-located AP set as a 6 GHz AP and has a different SSID, and no other AP from the same co-located AP set and operating in the 2.4 GHz or 5 GHz bands is indicating the 6 GHz AP in a Reduced Neighbor Report element of the Beacon and Probe Response frames they transmit, then Beacon and Probe Response frames transmitted by the AP (or by the transmitted BSSID of the same Multiple BSSID set as the AP) shall include a TBTT Information field in a Reduced Neighbor Report element with the BSSID field and the Short SSID field set to the BSSID and short SSID of the 6 GHz AP respectively.

If the AP reported in the TBTT Information field in the Reduced Neighbor Report is a 6 GHz AP, the reporting AP shall include the BSS Parameters subfield in the TBTT Information field, and shall follow the rules defined in 11.50 (Reduced neighbor report) to set the Multiple BSSID subfield, the Transmitted BSSID subfield, the Co-Located AP subfield and the OCT recommended subfield.

A STA receiving a frame containing a Reduced Neighbor Report element describing a reported AP operating at 6 GHz with the OCT Recommended subfield set to 1 in the BSS Parameters subfield shall follow the rules defined in 11.50 to perform active scanning, authentication and/or association with the reported AP.

An AP that operates in the 2.4 GHz or 5 GHz bands and that is in the same co-located AP set as one or more 6 GHz APs shall include the Advertisement Protocol element in Beacon and Probe Response frames that it transmits and shall support responding with a Neighbor Report ANQP element (9.4.5.19 Neighbor Report ANQP element) carrying one or more Neighbor Report elements (see 9.4.2.36 (Neighbor Report element)) that include at least the SSID information of all the 6 GHz APs in the same co-located AP set, except the 6 GHz APs that don't intend to be discovered.

NOTE 1—The Neighbor Report ANQP-element can also carry Neighbor Report elements containing information on 6 GHz APs that are not in the same co-located AP set.

NOTE 2—It is recommended that the AP responds with a GAS comeback delay of zero.

NOTE 3—If the Same SSID subfield is set to 0 in the BSS Parameters of a reported 6 GHz AP, a non-AP STA might:

* Use the OCT procedure described in 11.32.5 (On-channel Tunneling (OCT) operation) to send a Probe Request frame to the reported AP through over-the-air transmissions with the reporting AP, if the OCT Recommended subfield is set to 1 in the Neighbor AP Information field describing the reported AP.
* Use the ANQP procedure described in 11.23.3.3 (ANQP Procedure) to send an ANQP request with a Query ID corresponding to Neighbor Report to the reporting AP to retrieve the SSID of the 6 GHz APs, including the reported AP.
* Send a Probe Request frame to the reported AP including the BSSID of the reported AP.
* Send a Probe Request frame to the reported AP including the short SSID of the reported AP.
* Perform passive scanning in the operating channel of the reported AP.

An AP may set the 20 TU Probe Response Active subfield to 1 in a Reduced Neighbor Report element or Neighbor Report element it transmits if all 6 GHz APs of the same ESS that operate in the corresponding channel and that might be detected by a STA receiving this frame have dot1120TUProbeResponseOptionImplemented equal to true and so are transmitting unsolicited Probe Response frames every 20 TUs (see 26.17.2.3.2 (AP behavior for fast passive scanning)).

NOTE—An AP might be detected by a STA if the STA and the AP are on the same channel and in range.

An AP may set the Member of ESS with 2.4/5GHz Co-located AP subfield to 1 in a Reduced Neighbor Report element, if the reported AP operates in the 6 GHz band and is part of an ESS where each AP with the ESS, that is operating in the same band as the reported AP and that might be detected by a STA receiving this frame (irrespective of the operating channel), has dot11MemberOfColocatedESSOptionImplemented 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.

NOTE—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 5 GHz bands.

* MIB Detail

**TGax Editor: *Please make changes to the following entries in this subclause as follows:***

dot11ColocatedRNRImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable. Its value is determined by device capabilities.

This attribute, when true, indicates that the STA implementation is capable of transmitting or receiving Reduced Neighbor Report element carrying information of AP(s) that are in the same co-located AP set as the reporting AP in Probe Response, Beacon and FILS Discovery frames. The capability is disabled otherwise." [20445, 21288, 21287, 21296, 20382]

DEFVAL { false }

::= { dot11HEStationConfigEntry 28}

dot11MemberOfColocatedESSOptionImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates that the station implementation is an AP that operates in the 6 GHz band and is part of an ESS where each AP has a corresponding AP operating in the 2.4 GHz or 5 GHz bands which is in the same co-located AP set as that AP (see 26.17.2.4 (Out of band discovery of a 6 GHz BSS)). The capability is disabled otherwise."[21288, 21287, 21296, 20382]

::= { dot11HEStationConfigEntry <ANA>}

* **ER beacon generation in an ER BSS**

**TGax Editor: *Please make changes to the paragraph in this subclause as shown below:*** [21288, 21287, 21296, 20382]

An ER beacon is a Beacon frame carried in HE ER SU PPDU using a 242-tone RU and transmitted in the primary 20 MHz channel. An ER beacon provides additional link budget for downlink transmissions to compensate for the link budget imbalance between downlink and uplink due to introduction of UL OFDMA transmission. An HE AP may operate an ER BSS in addition to a non-ER BSS operated by another AP that is in the same co-located AP set. An ER BSS, if present, shall operate independently of the non-ER BSS that is in the same co-located AP set and the AP operating the ER BSS shall have a BSSID different from the AP operating the non-ER BSS.

**TGax Editor: *Please update all instances of the MIB variable dot11MemberOfColocatedESSOptionImplemented to dot11MemberOfColocated6GHzESSOptionImplemented***

***TGax Editor: Please update all instances of a field/subfield name containing the term ‘co-located’ to upper case C and upper case L as: ‘Co-Located’ – e.g., change ‘Co-located AP’ to ‘Co-Located AP’.***