### IEEE P802.11Wireless LANs

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| 11ax D4.0 MAC Comment Resolution for Multiple BSSID Bug Fix |
| Date: 2019-03-10 |
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Abstract

This submission proposes resolutions for comments of TGax Draft D4.0 with the following CIDs:

21147, 21148, 21149, 21150, 21151, 21152, 21153, 21154, 21155, 21156, 21165, 20412, 20031

Revisions:

* Rev 0: Initial version of the document.

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 D4.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D4.0 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** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 21147 | Po-Kai Huang | 148.52 | 9.4.2.45 | There is a conflict for the text in 11.1.3.8 and 9.4.2.45. Specifically, in 9.4.2.45, it specifies that the nontransmitted BSSID profile subelement always contiains Nontransmitted BSSID capability element, SSID element, and multiple BSSID-index element. However, in 11.1.3.8, (page 273 line 51), it specifies that "If there is a need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements in a frame, an EMA AP shall not split an element in the profile into multiple Multiple BSSID elements, and it shall place the next element in the profile as the first subelement of the immediately following Multiple BSSID element."  | Believe that the text in 11.1.3.8 is the intention for the behaviors. Change the text in 9.4.2.45 "The Nontransmitted BSSID Profile subelement contains a list of elements for one or more APs or DMGSTAs that have nontransmitted BSSIDs, and is defined as follows:" to "A nontransmitted BSSID Profile carried in one or more theNontransmitted BSSID Profile subelements across one or more multiple BSSID elements in the same frame contains a list of elements for the AP or the DMG STA with the corresponding nontransmitted BSSID , and is defined as follows:" | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21147 |
| 21148 | Po-Kai Huang | 148.52 | 9.4.2.45 | Do we have one Nontransmitted BSSID Profile subelement for different BSSs with different nontransmitted BSSIDs or do we have separate Nontransmitted BSSID Profile Subelement for different BSSs with different nontransmitted BSSIDs? | Believe that the intention is to have separate Nontransmitted BSSID Profile Subelement for different BSSs with different nontransmitted BSSIDs. If we mix all the Nontransmitted BSSID Profiles in one subelement, it may take a long time for the STA to parse and get the expected information. | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21148 |
| 21149 | Po-Kai Huang | 273.40 | 11.1.3.8 | The following text "A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID andconsists of a set of elements that are carried in the Nontransmitted BSSID Profile subelement of the Multiple BSSID element." is not correct. Specficially, it is possible that not all the elements can be put in one Nontransmitted BSSID Profile subelement due to the size limit of the multiple BSSID element. | Modify the text as follows: "A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID and consists of a set of elements that are carried in one or more Nontransmitted BSSID Profile subelements across one or more multiple BSSID elements in the same frame." | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21149. |
| 21150 | Po-Kai Huang | 273.42 | 11.1.3.8 | For the texts from line 42 to line 48, it seems to be a repetiation of the texts in 9.4.2.45. | Add "as described in 9.4.2.45 Multiple BSSID element" at the end of the sentence. | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21150 |
| 21151 | Po-Kai Huang | 273.20 | 11.1.3.8 | Although 2.4 GHz/5GHz AP may not use multiple BSSID concept due to no support from legacy STA. An HE AP that only wants to support HE STA may still use it. In this case, if the HE AP is not an EMA AP and advertising a partial list of nontransmitted BSSID profiles, then we still have the issue of non-AP STA not being able to discover all the BSSs in the multiple BSSID set through active scanning using the probe request/response procedure. Further, since the non-EMA AP does not provide the period of advertising all the patterns, the unassociated STA does not know the number of active BSSs in the multiple BSSID set and how to discover all the BSSs in the multiple BSSID set through passive scanning.  | Propose to simply say that "An AP with dot11MultiBSSIDImplemented set to true and advertising a partial list of nontransmitted BSSID profiles shall operate as an EMA AP. | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21151 |
| 21152 | Po-Kai Huang | 274.23 | 11.1.3.8 | For a non-AP STA, it is desirable for the AP to have specific pattern of advertising BSS information in the Beacon frame most of the time except conditions that do not happen often like member change. As a result, the non-AP STA can quickly find out all the BSS parameters change without waiting for the DTIM Beacon. | Change "An EMA AP that includes a partial list of nontransmitted BSSID profiles in its Beacon frame, S1G Beaconframe, or DMG Beacon frame, should advertise a particular nontransmitted BSSID profile in a repeatingpattern such that the profile is present in at least one Beacon in a sequence of beacons indicated by theProfile Periodicity field of the Multiple BSSID Configuration element." to "An EMA AP that includes a partial list of nontransmitted BSSID profiles in its Beacon frame, S1G Beacon frame, or DMG Beacon frame, shall advertise a particular nontransmitted BSSID profile in a repeating pattern such that the profile is present in at least one Beacon in a sequence of beacons indicated by in the Profile Periodicity field of the Multiple BSSID Configuration element except when the member of BSSs in the multiple BSSID set changes." | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21152 |
| 21153 | Po-Kai Huang | 273.52 | 11.1.3.8 | The need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements shall not be a unique feature for EMA AP. This is the general requirement when the length of a multiple BSSID element is not enough. Further, the specfiic rule when this happens requires revision to clarify.  | Change "If there is a need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements in a frame, an EMA AP shall not split an element in the profile into multiple Multiple BSSID elements, and it shall place the next element in the profile as the first subelement of the immediately following Multiple BSSID element." to ". If there is a need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements in a frame, an AP shall not split an element in the profile into multiple Multiple BSSID elements, and it shall place the next element in the nontransmitted BSSID profile as the first element in the first nontransmitted BSSID profile subelement of the immediately following Multiple BSSID element." Add a Figure as an example to clarify the rule as well. | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21153 |
| 21154 | Po-Kai Huang | 273.52 | 11.1.3.8 | Is the length of the Nontransmitted BSSID Profile subelement in the first Multiple BSSID element set based on all the elements that is split across several multiple BSSID element, or just the part that is in the current multiple BSSID element? Based on the text in 9.4.3, it should be the second case otherwise, the parsing will not work. Add a note to clarify this.  | As in comment. | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21154 |
| 21155 | Po-Kai Huang | 273.48 | 11.1.3.8 | The following sentence is not necessary since we already have a definition in page 273 line 39. "A nontransmitted BSSID profile consists of all elements carried in all such Multiple BSSID elements sharing the same BSSID index". Further, it is not clear what does Multiple BSSID element sharing the same BSSID index means. Note that a multiple BSSID-index element with a specific index only appears once in one or more multiple BSSID elements. | Remove the sentence in page 273 line 48. Revise the sentence in 273 line 39 "A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID and consists of a set of elements that are carried in the Nontransmitted BSSID Profile subelement of the Multiple BSSID element." as "A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID and consists of a set of elements that are carried in the Nontransmitted BSSID Profile subelement of one or more Multiple BSSID elements." | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21155 |
| 21156 | Po-Kai Huang | 150.42 | 9.4.2.73 | It should be clarified that the definition of DTIM count and DTIM period is as defined in 9.4.2.5.1 General. As a result, DTIM period 0 is reserved as defined in 9.4.2.5.1. | As in comment.  | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21156 |
| 21165 | Po-Kai Huang | 274.1 | 11.1.3.8 | When an EMA AP advertises a partial list of profiles, Multiple BSSID Configuration element shall be included to help the STA understand the situation. However, the text here is not clear that the Multiple BSSID Configuration element will be always included in a probe response frame. | to"An EMA AP, when advertising a partial list of BSSID profiles, shall include Multiple BSSID Configuration element (see 9.4.2.237 (Active BSSID Count Multiple BSSID Configuration element)) in its Beacon frame, S1G Beacon frame, or DMG Beacon frame to indicate the configuration of the multiple BSSID set.An EMA AP, when advertising a partial list of BSSID profiles, shall include Multiple BSSID Configuration element (see 9.4.2.237 (Active BSSID Count Multiple BSSID Configuration element)) in its probe response frame to indicate the configuration of the multiple BSSID set." | Revised – Agree in principle with the commenter. TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 21165 |
| 20412 | Liwen Chu | 273.47 | 11.1.3.8 | TIM should be deleted. | As in comment | Revised – Agree in principle with the commenter. We note that FMS Descriptor element is only in Beacon frame. We simply remove FMS Descriptor from the description.TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 20412 |
| 20031 | Abhishek Patil | 274.64 | 11.1.3.8 | Encoding PVB with Method B is far more efficient and requires less number of octets. Per baseline spec clause 9.4.2.5.1, a STA that supports multiple BSSID feature is required to support Method B encoding of PVB in TIM element. Further, an AP is required to use Method B when it determines that each intended recipient supports multiple BSSID feature. | Add normative equivalent for text in 9.4.2.5.1 to the 5th paragraph. | Revised – Agree in principle with the commenter.TGax editor to make the changes shown in 11-19/0289r0 under all headings that include CID 20031 |

**Discussion:** *None.*

**Propose:** Revised for CID 21147, 21148, 21149, 21150, 21151, 21152, 21153, 21154, 21155, 21156, 21165, 20412, 20031 per discussion and editing instructions in 11-19/0289r0.

***TGax editor: Change 9.4.2.45 as follows: (Track change on)***

* Multiple BSSID element

***Insert the following after the 3nd paragraph (and equation):***

NOTE—If dot11MultiBSSIDImplemented(19/0028r4) is true, 1  n  8 since the BSSID Index field in 9.4.2.73 (Multiple BSSID-Index element) indicates the number of BSSIDs in a multiple BSSID set.

***Change the 7th paragraph as follows:***

 A nontransmitted BSSID Profile carried in one or more the Nontransmitted BSSID Profile subelements across one or more multiple BSSID elements in the same frame contains a list of elements for the AP or the DMG STA with the corresponding nontransmitted BSSID(#21147), and is defined as follows:

* T(#21147)he Nontransmitted BSSID Capability element (see 9.4.2.71 (Nontransmitted BSSID Capability element)) is the first element included, followed by a variable number of elements, in the order defined in Table 9-34 (Beacon frame body) for a non-DMG AP or Table 9-41 (DMG Beacon frame body) for a DMG AP.
* The SSID element (see 9.4.2.2 (SSID element)) and multiple BSSID-index ~~subelements~~ element (see 9.4.2.73 (Multiple BSSID-Index element)) are included.(#21147)
* The FMS Descriptor element (see 9.4.2.74 (FMS Descriptor element)) is included (#21147)if dot11FMSActivated is true for the BSS using this nontransmitted BSSID and if the Multiple BSSID element is included in a Beacon frame and if the TIM ~~field~~ element (see 9.4.2.6 (TIM element)) indicates there are buffered group addressed frames for this nontransmitted BSSID.
* The Timestamp and Beacon Interval fields, TIM, DSSS Parameter Set, IBSS Parameter Set, Country, Channel Switch Announcement, Extended Channel Switch Announcement, Wide Bandwidth Channel Switch, Transmit Power Envelope, Supported Operating Classes, IBSS DFS, ERP Information, HT Capabilities, HT Operation, VHT Capabilities, ~~and~~ VHT Operation, HE Capabilities, HE Operation, BSS Color Change Announcement, and Spatial Reuse Parameter Set elements are not included in the Nontransmitted BSSID Profile subelement; the values of these elements for each nontransmitted BSSID are always the same as the corresponding transmitted BSSID element values.
* T(#21147)he Non-Inheritance element (see 9.4.2.241 (Non-Inheritance element)) appears as the last element in the profile and carries a list of elements that are not inherited by this nontransmitted BSSID from the transmitted BSSID.
* Any element specific to the BSS or whose content is different from the transmitted BSSID.(#21147)

Each Nontransmitted BSSID Profile subelement only contains elements for a BSS with a nontransmitted BSSID. (#21148)

***TGax editor: Change 9.4.2.73 as follows: (Track change on)***

* Multiple BSSID-Index element

Change the 2nd, 3rd, and 4th paragraph as follows:

The BSSID Index field is a value between 1 and 2*n* – 1 that identifies the nontransmitted BSSID, where n is a nonzero, positive integer value (see MaxBSSID Indicator field in 9.4.2.45 (Multiple BSSID element)).

The DTIM Period field indicates the DTIM period for the BSSID as defined in 9.4.2.5.1 (General).(#21156) This field is not present when the Multiple BSSID-Index element is included in the Probe Response frame.

The DTIM Count field indicates the DTIM count for the BSSID as defined in 9.4.2.5.1 (General).(#21156) This field is not present when the Multiple BSSID-Index element is included in the Probe Response frame.

***TGax editor: Change 11.1.3.8 as follows: (Track change on)***

* Multiple BSSID procedure

Change the 1st paragraph as follows:

A STA that supports the Multiple BSSID capability has dot11MultiBSSIDImplemented equal to true and shall set to 1 the Multiple BSSID field of the Extended Capabilities elements that it transmits. Support for the Multiple BSSID capability is mandatory for a FILS STA and non-AP HE STA(#15054). An AP that supports enhancements related to the discovery and advertisement of a nontransmitted BSSID shall set the Enhanced Multi-BSSID Advertisement Support bit in the Extended Capabilities element to 1 and is referred to as an EMA AP.(#15056) An AP (#21151)with dot11MultiBSSIDImplemented set to true and advertising a partial list of nontransmitted BSSID profiles shall operate as an EMA AP.(19/0028r4)

Replace the 2nd paragraph with the following:

An AP with dot11MultiBSSIDImplemented(19/0028r4) equal to true does not belong to a co-hosted BSSID set(18/1814r2) (see 26.17.7 (Co-hosted BSSID set)) and shall not set the Co-Hosted BSS subfield(18/1814r2) in HE Operation element to 1 in the Management frames that it transmits.

The BSSID of the AP belonging to a multiple BSSID set is referred to as the transmitted BSSID if the AP includes the Multiple BSSID element in the Beacon frame that it transmits. In a multiple BSSID set, there shall not be more than one AP corresponding to the transmitted BSSID. The BSSID of an AP belonging to a multiple BSSID set is a nontransmitted BSSID if the AP's BSSID is derived according to 9.4.2.45 (Multiple BSSID element) and 9.4.2.73 (Multiple BSSID-Index element). Among all AP STAs in multiple BSSID set, only the AP corresponding to the transmitted BSSID shall transmit a Beacon frame.

A nontransmitted BSSID profile represents information about a particular nontransmitted BSSID and consists of a set of elements that are carried in one or more Nontransmitted BSSID Profile subelements across one or more multiple BSSID elements in the same frame.(#21149, 21155) Each nontransmitted BSSID profile, at a minimum, shall include the elements that are mandatory for that BSS (i.e., Nontransmitted BSSID Capability element (see 9.4.2.71 (Nontransmitted BSSID Capability element)), SSID element (see 9.4.2.2 (SSID element)), Multiple BSSID-Index element (see 9.4.2.73 (Multiple BSSID-Index element)), and the Non-Inheritance element (#20412)as described in 9.4.2.45 (Multiple BSSID element).(#21150) (#21155)A nontransmitted BSSID profile consists of all elements carried in all such Multiple BSSID elements sharing the same BSSID index. If there is a need to carry a nontransmitted BSSID profile across multiple Multiple BSSID elements in a frame, an AP shall not split an element in the profile into multiple Multiple BSSID elements, and it shall place the next element in the nontransmitted BSSID profile as the first element in the first nontransmitted BSSID profile subelement(#21153) of the immediately following Multiple BSSID element.(#15056)

An example of carrying a nontransmitted BSSID profile across two multiple Multiple BSSID elements in a frame is as follows.



Figure X - example of carrying a nontransmitted BSSID profile across two multiple Multiple BSSID elements in a frame(#21153)

NOTE - Based on the text in 9.4.3, the Length field of the nontransmitted BSSID profile subelement specifies the number of octets only in the Data field of the nontransmitted BSSID profile subelement.(#21154)An AP or PCP may choose to include only a partial list of nontransmitted BSSID profiles in the Beacon frame, S1G Beacon frame or DMG Beacon frame or to include different sets of nontransmitted BSSID profiles in different Beacon frames, S1G Beacon frames or DMG Beacon frames. An AP corresponding to the transmitted BSSID may choose to include only a partial list of nontransmitted BSSID profiles in an unsolicited broadcast Probe Response frame or a Probe Response frame sent in response to a Probe Request frame with Address 3 field set to wildcard BSSID and SSID set to wildcard.(19/0028r4) An AP advertising a complete list of nontransmitted BSSID profiles shall set the Complete List Of NonTxBSSID Profiles field of Extended Capabilities element to 1. An EMA AP, when advertising a partial list of BSSID profiles, shall include Multiple BSSID Configuration element (see 9.4.2.237 (Active BSSID Count Multiple BSSID Configuration element)) in its Beacon frame, S1G Beacon frame, or DMG Beacon frame to indicate the configuration of the multiple BSSID set. An EMA AP, when advertising a partial list of BSSID profiles, shall include Multiple BSSID Configuration element (see 9.4.2.237 (Active BSSID Count Multiple BSSID Configuration element)) in its Probe Response frame to indicate the configuration of the multiple BSSID set. (#21165)The BSSID Count field of the Multiple BSSID Configuration element indicates number of active BSSIDs in the multiple BSSID set while the Profile Periodicity field indicates the number of beacons a scanning STA is required to receive in order to discover all the active nontransmitted BSSIDs in the set. An AP corresponding to the transmitted BSSID shall send a Probe Response frame by following the rules in 11.1.4.3.4 (Criteria for sending a response), carrying Multiple BSSID element that includes, at a minimum, the nontransmitted BSSID profiles requested by the soliciting Probe Request frame.

Based upon its knowledge of the capability of associated stations to support the multiple BSSID capability, as indicated by the corresponding field in the Extended Capabilities element and the content of the traffic indication virtual bitmap, an AP encodes the Partial Virtual Bitmap and the Bitmap Control field of the TIM element using one of the three methods (Method A, Method B or Method C) defined in 9.4.2.5.1 (General). Specifically, a non-S1G AP shall use Method B when it determines that the bit for each associated non-AP STA in the traffic indication virtual bitmap that is reconstructed by each non-AP STA from the received TIM element encoded using Method B is set correctly. Otherwise, a non-S1G AP shall use Method A and an S1G AP shall use Method C. (#20031)(19/0028r4)

An unassociated non-AP STA may send a directed Probe Request frame containing a Known BSSID element (see 9.4.2.253 (Known BSSID element)) to an EMA AP that advertises partial list of nontransmitted BSSID profiles to gather information on nontransmitted BSSIDs it has not discovered. An EMA AP, when transmitting a Probe Response frame in response to a Probe Request frame containing Known BSSID element, should not include the nontransmitted BSSID profiles for BSSIDs listed in the Known BSSID element and shall, at a minimum, include the nontransmitted BSSID profiles requested by the soliciting Probe Request frame(19/0028r4).(#15056)

(18/1814r2)An EMA AP that includes a partial list of nontransmitted BSSID profiles in its Beacon frame, S1G Beacon frame, or DMG Beacon frame, shall advertise a particular nontransmitted BSSID profile in a repeating pattern such that the profile is present in at least one Beacon in a sequence of beacons indicated by the Profile Periodicity field of the Multiple BSSID Configuration element except when the member of BSSs in the multiple BSSID set changes.(#21152) If there is any change in a particular nontransmitted BSSID's profile (i.e., set of elements belong to the profile or the element values), the EMA AP shall include the profile in the next DTIM beacon of that BSS so that STAs with that BSS become aware of the change immediately.

NOTE—It is recommended that an AP selects the periodicity in which the profile repeats to be a multiple of the BSS's DTIM interval so that associated STAs in PS mode don't have to wake for additional beacons.

Change the 3rd paragraph as follows:

~~When a station receives a Beacon frame or DMG Beacon frame with a Multiple BSSID element that consists of a nontransmitted BSSID profile with only the mandatory elements, it may inherit the complete profile from a previously received Beacon frame, DMG Beacon frame, or Probe Response frame, or it may send a Probe Request frame to obtain the complete BSSID profiles. Each Beacon element not transmitted in a nontransmitted BSSID subelement is inherited from previous Beacon, DMG Beacon, or Probe Response frame in which the element is present, except for the Quiet element, which shall take effect only in the Beacon frame or DMG Beacon frame that contains it and not carry forward as a part of the inheritance. An AP or PCP is not required to include all supported nontransmitted BSSID profiles in a Probe Response frame, and may choose to only include a subset based on any criteria.~~ When a nontransmitted BSSID profile is present in the Multiple BSSID elements of the Probe Response frame or Beacon frame, the AP or PCP shall include all elements that are specific to this BSS. An element is considered to be specific to a BSS if its value is different from the corresponding element advertised by the transmitted BSSID or if the nontransmitted BSSID satisfies the condition as specified in the Table 9-34 (Beacon frame body) for a non-DMG AP or Table 9-47 (DMG Beacon frame body) for a DMG AP for that element to be present while the transmitted BSSID does not satisfy the corresponding condition. If any of the ~~optional~~ elements carried in the Probe Response frame, Beacon frame or DMG Beacon frame of the transmitted BSSID are not present in a nontransmitted BSSID profile, the corresponding values are the element values of the transmitted BSSID unless the element is listed in the Non-Inheritance element (if included) in the nontransmitted BSSID profile for that BSS.

Change the 5th paragraph as follows:(#16589)

The Partial Virtual Bitmap field of the TIM element carried in the Beacon, S1G Beacon, or DMG Beacon frame shall indicate the presence or absence of traffic to be delivered to all stations associated to a transmitted or nontransmitted BSSID. The first 2*n* bits of the bitmap are reserved for the indication of group addressed frame for the transmitted and all nontransmitted BSSIDs (see 9.4.2.5.1 (General)). The AID space is shared by all BSSs and the lowest AID value that shall be assigned to a non-S1G STA is 2*n* (see 9.4.2.5 (TIM element)). The decimal value of the 11 LSBs of the AID assigned to an S1G STA shall be greater than 2*n*. The Encoded Blocks that contain these first 2*n* AIDs (if any) shall precede the Encoded Blocks that contain AIDs for the S1G STAs in the S1G Partial Virtual Bitmap field of each page. Each BSS of the Multiple BSSID set may have a different DTIM interval which is signaled in the DTIM Period and DTIM Count fields that are present in the Multiple BSSID-Index element carried in the nontransmitted BSSID profile for that BSS.