IEEE P802.11  
Wireless LANs

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| --- | --- | --- | --- | --- |
| LB 200 cluase 8 miscellaneous comment resolution | | | | |
| Date: 2014-02-26 | | | | |
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Abstract

This submission proposes miscellaneous comment resolutions of the clause 8 from TGah Draft 1.0.

* CIDs: 1132, 1133, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1426, 1427, 1703, 2091, 2124, 2202, 2230, 2412, 2417, 2418, 2598, 2599, 2602, 2792, 2938, 2939

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 TGah Draft. This introduction is not part of the adopted material.

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1132 | 91.54 | 8.4.2.170d | "The Element ID field is set to the value for AID Request element defined in Table 8-55 (Element IDs). The Length field is a 1-octet field whose value is 1 plus the sum of the lengths of each optional field present in the element."  There really is no need for these statements at all, unless the Length field carries some semantics beyond "the sum of all the bits", such as "is a multiple of 3". | See REVmc. Replace this statement with "The Element ID and Length fields are defined in 8.4.2.1 (General)."  Do this for all elements defined in the draft. | Accepted-  Agree with the comment. |
| 1133 | 92.10 | 8.4.2.170d | The format of this figure doesn't follow WG11 style. | Remove "Bits" label. Add new row below figure with "Bits:" label that indicates the size of each field in bits.  Review all figures in the Clause 8, and adjust any bit oriented figures to this format as necessary. | Accepted-  Agree with the comment. |
| 1158 | 129.16 | 8.5.24.1 | Why are some of the entries in the "Time Priority" column blank? Why have this column if none of the entries are "yes". The column has no introductory/explanatory text. | Remove "Time Priority" column.  Or: 1. Set at least one entry to "yes". 2. Leave no blank entries (except for reserved). 3. Explain the column in the introduction. | Accepted-  Agree with the comment. |
| 1159 | 129.48 | 8.5.24.2 | "changing its device characteristic"  Nowhere is this term defined. This statement is about as useful as saying "changing its socks". | Define a term that encompases the things that are an S1G STA's "device characteristic". Then use the term here and wherever this phrase occurs. | Revised-  Agree in principle.  The device characteristic is too broad. Add the reference of the AID Request element defining the device characteristic. |
| 1160 | 130.57 | 8.5.24.2 | " to enable or disable the synch frame transmission for uplink or downlink traffic." - too many articles | remove "the" | Accepted-  Agree with the comment. |
| 1161 | 131.17 | 8.5.24.5 | "Also, it is used for a relay station" - wrong preposition | for -> by | Accepted-  Agree with the comment. |
| 1162 | 131.24 | 8.5.24.5 | "STA Information Announcement frame format" -- no it's not.  The tables the format of the action field. | Change caption accordingly. | Revised-  Change the capitation from  “STA Information Announcement frame format”  STA Information Announcement frame action field format”  Also, check the captions of the other table.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 1162. |
| 1163 | 133.43 | 8.5.24.10 | "When a STA receives such frame, the group IDs associated to Group ID Type field are replaced/initialized to the list of groupIDs provided by this frame" This is a description of behaviour, not structure. | Move cited text to Clause 9 or 10. | Revised-  Agree in principle.  Remove this sentence. |
| 1164 | 134.07 | 8.5.24.11 | "The Sector ID Feedback frame" - doesn't agree with subclause heading. | Make them consistent. I prefer the more specific name. | Revised-  Agree in principle.  Change the heading from  “S1G Sector ID Feedback frame" to  “Sector ID Feedback frame". |
| 1426 | 102.53 | 8.4.2.170k.2 | Maximum A-MSDU length, Maximum A-MPDU Length Exponent are included in the S1G Capabilities field but their values are currently not set. Regarding the Maximum A-MSDU length it makes more sense to limit the Maximum MPDU length (which consequently limits the Maximum A-MSDU length as well) similar to 11ac. This limitation is more useful considering the sensor case scenario. | Replace "Maximum A-MSDU Length" with Maximum MPDU Length and add descriptions in the S1G Capabilities field. Add length limits for S1G and add a row in 8.13c of D5.0 of 11ac for S1G PPDUs as well. | Revised-  Agree in principle.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 1426. |
| 1427 | 108.57 | 8.4.2.170k.3 | There are some TBDs in page 108 lines from 57 to 62. | Fix the TBDs. | Revised-  Agree in principle.  See the proposed resolution of CID 2018 shown on the IEEE 802.11-13/1379r0. Since it was already approved in Nov 2013 meeting, no draft change is needed. |
| 1703 | 105.46 | 8.4.2.170k.2 | "non-TIM mode" is not defined. | Define "non-TIM mode" in the main body text of this amendment. | Revised-  Agree in Principle.  In Clause 3, add the definition of the non-TIM mode.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 1703. |
| 2091 | 107.34 | 8.4.2.170k.3 | The description of the Max S1G-MCS for n SS subfield is confusing. The first sentence of the subclause implies that the field indicates the number of spatial streams supported for both transmit and receive, without exception. Only later in the section (P108 L57 and the rest of that page) is it mentioned that in fact there is a host of other requirements and exceptions. | Rewrite the first sentence of the section for clarity, e.g., "The Supported S1G MCS and NSS Set field is used to convey, for each number of supported spatial streams, the maximum MCS that is supported for reception (resp. transmisison) over any bandwidth." | Rejected-  “The Supported S1G-MCS and NSS Set field is used to convey the combinations of S1G-MCSs and spatial streams that a STA supports for reception and the combinations that it supports for transmission.”  The first sentence does not say that there is other exceptional requirement. But, the first sentence only describes the general purpose for this information element. Also, the same wording for the VHT Capabilities element is used. |
| 2124 | 103.19 | 8.4.2.170k.2 | HT variant HT Control field may be used for sector training, so it's necessary to use one bit to indicate whether or not the STA supports receiving a HT variant HT Control field in S1G Capability Element in Table 8-191d . | as the comments | Revised-  Agree in principle. But, Sector training operation also needs one bit in S1G Capabilities element for indicating its support. And, Sector training operation is coupled with a support of HT variant HT Control field.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 2124. |
| 2202 | 132.48 | 8.5.24.8 | There is no "TWT Request frame" in S1G Sction field values table. Should it be "TWT Setup frame" here? | in line 48 page 132, change "TWT Request frame" to "TWT Setup frame" | Accepted-  Agree with the comment. |
| 2230 | 132.62 | 8.5.24.9 | The Table 8-363i is about TWT Teardown frame, not the TWT Setup frame. A typo? | Change the sentence in line 63 page 132 to the following: The action field of the TWT Teardown frame contains the information shown in Table 8-363i (TWT Teardown frame action field format). | Accepted-  Agree with the comment. |
| 2412 | 102.36 | 8.4.2.170k.2 | Some fields are not described (e.g. Maximum A-MSDU Length, Maximum A-MPDU, Length Exponent, Minimum MPDU Start Spacing) | Define all fields | Revised-  Agree in pricinple.  Please define the description of the Maximum MPDU Length (see CID 1426), Maximum A-MPDU Length Exponent, Minimum MPDU Start Spacing in Table 8-191d.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 2412. |
| 2417 | 129.13 | 8.5.24.1 | Some "Time Priority" cells are empty | Fill them with "Yes"es | Revised-  See the proposed resolution of CID 1158. |
| 2418 | 134.62 | 8.5.24.11 | "db" | "dB" | Accepted-  Agree with the comment. |
| 2598 | 130.00 | 8.5.24.3 | The text "Also, it is sent by an AP to assign an AID for the request multicast group from the requesting STA." is confusing. | Change the sentence to "Also, it is sent by an AP to assign the Multicast ID for the requesting STA." | Accepted-  Agree with the comment. |
| 2599 | 129.00 | 8.5.24.2 | The text "Also, it is used to request an AID for the multicast group from the responding STA." is not clear | Change the sentence to "Also, it is used to request the Multicast ID from AP." | Accepted-  Agree with the comment. |
| 2602 | 93.16 | 8.4.2.170d | Clarify the usage of Group Address field | Add a sentence "When Group Address field is present in AID Request element, the AID Switch Request frame is used to request Multicast ID." | Accepted-  Agree with the comment. |
| 2792 | 112.33 | 8.4.2.170n | TSF Timer Accuracy field should be able to include a flag indicating if the field carry the (absolute) TSF accuracy better than +/-100ppm or the drift rate (stability) of TSF timer. Please refer to "11-13-1197-00-00ah-cc9-resolution-cid773+774-TSF-stability" and "11-13-1035-01-00ah-cc9-possible-integration-regarding-cid773&774" | The TSF Timer Accuracy field is a 1 octet signed integer information that specifies the accuracy of the TSF timer of transmitting STA if Bit 7 equal to 0, and the stability of TSF timer excluding frequency offset for the duration until next DTIM if Bit 7equal to 1 and Bit 6 equal to 0, as shown in Table 8-191f. The condition both Bit 7 and Bit 6 are equal to 1 is reserved for future extention. The unit of the TSF Timer Accuracy field is PPM. The range of TSF timer accuracy and stability are 1 to 100 ppm and 1 to 63 ppm, respectively. | Rejected-  From 11-13/1035r0,  “TSF accuracy related information includes an absolute accuracy of initial tolerance and a relative stability which is the sum of aging rate and worst temperature drift after peer TSF timer has synchronized with it, and maybe some other useful parameter in future.”  The drift rate (stability) of TSF timer is unclear. The benefit of indicating the drift rate has to be clearly provided. |
| 2938 | 92.41 | 8.4.2.170d | The unit of AID Request Interval is unspecified. | Specify the unit for the AID Request Interval subfield. | Revised-  The unit of The AID Request Interval is the Beacon Interval.  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 2938. |
| 2939 | 93.55 | 8.4.2.170e | The AID response may also point a STA to the Segment Count element, if TIM segmentation is implemented. | Also specify that the AID Response Interval field may indicate to TIM STA for listening to Beacon frame having the Segment Count element of its corresponding page. | Revised-  Agree in principle.  When dot11PageSlicingSupported is set to true, the AID Response Interval field may indicate to Beacon frame having the Page Slice element  TGah editor to make changes shown in 11-14-0257r0 under the heading for CID 2939. |

**Propose:**

Revised for CID 1132, 1133, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1426, 1427, 1703, 2124, 2202, 2230, 2412, 2417, 2418, 2598, 2599, 2602, 2938, 2939, per discussion and editing instructions in 11-14/0257r0.

* 1. Definitions specific to IEEE 802.11

***TGah editor: Insert*** the following definitions (maintaining alphabetical order):

**paged association identifier (AID)**: The paged AIDs refer to those AIDs with their corresponding bits being set to ‘1’ if encoded by partial virtual bitmap. (#587)

**non-traffic indication map (TIM) mode**: The power save mode for Sub 1 GHz (S1G) non-access point (non-AP) stations (STAs) whereby a S1G non-AP STA need not listen for traffic indication map (TIM) Beacon frame.

**non-traffic indication map (TIM) station (STA)**: The Sub 1 GHz (S1G) non-access point (non-AP) stations (STAs) that entered the non-TIM mode ~~The STA which does not require reception of TIM.~~

**sensor type station (STA)**: The STA characterized as small data size, low traffic, limited available power, and large number of STAs per AP.

***TGah editor: Modify the clause 8 as the following:***

**8.2.4.7 Frame Body field**

**8.2.4.7.1 General**

The Frame Body is a variable-length field that contains information specific to individual frame types and subtypes. The minimum length of the frame body is 0 octets. The maximum length of the frame body is constrained or affected by the following:

— The maximum MMPDU, MSDU, A-MSDU, and MPDU sizes supported by the recipient(s) for the PPDU format in use, as specified in Table 8-13c

— The maximum PPDU duration (e.g., HT\_MF L-SIG L\_LENGTH, HT\_GF, VHT, S1G or DMG aPPDUMaxTime (see Table 8-13c); any nonzero TXOP Limit; any regulatory constraints (e.g., CS4-msBehavior))

— The fields present in the MAC header (e.g., QoS Control, Address 4, HT Control)

— The presence of security encapsulation (e.g., TKIP, CCMP or GCMP Header and MIC)

— The presence of Mesh Control fields (see 8.2.4.7.2)

**Table 8-13c—Maximum data unit sizes (in octets) and durations (in microseconds)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Non-HT non-VHT**  **non-DMG PPDU**  **and non-HT**  **duplicate PPDU** | **HT PPDU** | **VHT PPDU** | **S1G PPDU** | **DMG PPDU** |
| MMPDU size | 2304 | 2304 | See NOTE 1 | See NOTE 1 | 2304 |
| MSDU size | 2304 | 2304 | 2304 | 2304 | 7920 |
| A-MSDU size | 3839 or 4065 (see NOTE 2) or 7935 (HT STA, see also Table 8-124) or N/A (non-HT STA, see also 9.11) | 3839 or 7935 (see also Table 8-124) | See NOTE 3 | See NOTE 3 | 7935 |
| MPDU size | See NOTE 4 | See NOTE 5 | 3895 or 7991 or 11 454 (see also Table 8-183v) | 3895 or 7991 (see also Table 8-191d) | See NOTE 5 |
| PSDU size (see  NOTE 7) | 213–1 (Clause 16, see Table 16-2) 212–1 (others, see Table 17-5, Table 18- 7, Table 19-8) | 216–1  (see Table 20-25) | 4 692 480 (~222.16)  (see Table 22-29) | 797 160 (~219.60)  (see Table 24-37) | 218–1  (see Table 21-17) |
| PPDU duration  (see NOTE 7) | See NOTE 6 | 5484 (HT\_MF; see 9.23.4) or 10 000 (HT\_GF; see Table 20-25) | 5484  (see Table 22-29) | 27840  (see Table 24-37) | 2000  (see Table 21-31) |

* Resource Allocation frame format

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ~~Bits:~~ | ~~1~~ | ~~6~~ | ~~16~~ | ~~1~~ |
|  | EOM | Group ID | Slot Start Offset | Reserved |
| Bits: | 1 | 6 | 16 | 1 |
| * Slot Assignment field when the Group Indicator field is set to 1 | | | | |
| ~~Bits:~~ | ~~1~~ | ~~9~~ | ~~16~~ | ~~6~~ |
|  | UL/DL | Partial AID | Slot Start  Offset | Reserved |
| Bits: | 1 | 9 | 16 | 6 |
| * Slot Assignment field when the Group Indicator field is set to 0 | | | | |

(#149)

* Open-Loop Link Margin Index element

The Open-Loop Link Margin Index element contains the link margin information. The Open-Loop Link Margin Index element is included in a Beacon frame or Probe Response frame without a corresponding request. The format of the Open-Loop Link Margin Index element is shown in Figure 8-401cj (Open-Loop Link Margin Index element format).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element  ID | Length | Open-Loop Link Margin Index |
| Octets: | 1 | 1 | 1 |
| * Open-Loop Link Margin Index element format | | | |

~~The Length field is set to 1.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* RPS element

The RPS element contains the set of parameters necessary for restricted medium access only to one or multiple groups of STAs within one or multiple RAWs. The Information field contains the RAW Assignment fields for one or multiple groups of STAs. ~~The total length of the Information field is variable octets.~~ The frame format of the RPS element is defined in Figure 8-401ck (RPS element format).

(#42,44,480,481,789,790,468,469,470,157,472,474,477)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  | Element ID | Length | RAW  Assignment | RAW  Assignment | ... | RAW  Assignment |
| Octets: | 1 | 1 | variable | variable |  | variable |
| * RPS element format | | | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Segment Count element

The Segment Count element contains the list of Page segments included in TIM segments that will be served during the TIM intervals within a Page Period (see 9.45 (TIM and Page segmentation). The Information field contains Page Period, Page Index, Page Segment Length, Page Segment Count, Page Offset, TIM Offset, and Page Bitmap fields. ~~The total length of the Information field is 6-10 octets (#148).~~ The frame format of the Segment Count element is defined in Figure 8-401cq (Segment Count element format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: |  |  |  | 2 | 5 | 5 | 5 | 4 | 3 |  |
|  | Element  ID | Length | Page  Period | Page  Index | Page Segment Length | Page  Segment  Count | Page  Offset | TIM  Offset | Reserved | Page  Bitmap |
| Octets: | 1 | 1 | 1 | 3 | | | | | | 0-4 |
| * Segment Count element format | | | | | | | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General). (#267, 927, 148)

* AID Request element

The AID Request element defines information about the device characteristic of the non-AP STA requesting AID assignment to the AP. The format of AID Request element is shown in Figure 8-401cr (AID request element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  | Element  ID | Length | AID  Request  Mode | AID Request  Interval  (Optional) | Peer STA  Address  (Optional) | Service  Type  (Optional) | Group  Address  (Optional) |
| Octets: | 1 | 1 | 1 | 0 or 2 | 0 or 6 | 0 or 1 | 0 or 6 |
| * AID request element format | | | | | | | |

(#409)

~~The Element ID field is set to the value for AID Request element defined in Table 8-55 (Element IDs).~~

~~The Length field is a 1-octet field whose value is 1 plus the sum of the lengths of each optional field present in the element.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The format of AID Request Mode field is shown in Figure 8-401cs (AID Request Mode field format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ~~Bits:~~ | ~~B0~~ | ~~B1~~ | ~~B2~~ | ~~B3~~ | ~~B4~~ | ~~B5~~ | ~~B6 B7~~ |
|  | AID Request Interval Present | Peer STA Address  Present | Service Type  Present | Non-TIM Mode  Switch | TIM Mode  Switch | Group Address Present | Reserved |
| Bits: | B0 | B1 | B2 | B3 | B4 | B5 | B6 B7 |
| * AID Request Mode field format | | | | | | | |

Bit 0 is AID Request Interval Present field. It is set to 1 if the AID Request Interval field is present in the AID Request element and set to 0 if no AID Request Interval field is present.

Bit 1 is Peer STA Address Present field. It is set to 1 if the Peer STA Address field is present in the AID Request element and set to 0 if no Peer STA Address field is present.

Bit 2 is Service Type Present field. It is set to 1 if the Service Type field is present in the AID Request element and set to 0 if no Service Type field is present.

Bit 3 is Non-TIM Mode Switch field. It is set to 1 if the non-AP STA requests to switch from the TIM mode to non-TIM mode. Otherwise, it is set to 0.

Bit 4 is TIM Mode Switch field. It is set to 1 if the non-AP STA requests to switch from the non-TIM mode to TIM mode. Otherwise, it is set to 0.

Bit 5 is Group Address Present field. It is set to 1 if the Group Address field is present in the AID Request element and set to 0 if no Group Address field is present.

Bit 6 and 7 are reserved.

The AID Request Interval field indicates to the AP how often a non-AP STA with dot11NonTIMModeActivated set to false wakes to receive Beacon frames defined as the number of Beacon intervals, when the Non-TIM Mode Switch field and the Group Address Present field are set to 0. (#409)

The AID Request Interval field indicates to AP the duration during which a non-AP STA with dot11NonTIMModeActivated set to true is required to transmit at least one PS-Poll or trigger frame, defined as the number of Beacon intervals, when the Non-TIM Mode Switch field is set to 1.

The AID Request Interval field indicates to AP how often the non-AP STA listens to the DTIM Beacon for group addressed BUs with Group Address Present field set to 1, defined as the number of DTIM intervals, when the Group Address Present field is set to 1.

The first two MSBs of the AID Request Interval field indicate the Scaling Factor (see Table 8-36a (Unified scaling factor)) and the remaining 14 bits indicate the actual value (see Figure 8-43a (Bit encoding)). The AID Request Interval field is calculated as the value multiplied by the Scaling Factor.

The Peer STA Address field indicates the MAC address of the peer STA for STA-to-STA communication.

The Service Type field indicates the service type of a non-AP STA. The format of the Service Type field is shown in Figure 8-401ct (Service Type field format). (#592)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ~~Bits~~ | ~~B0~~ | ~~B1~~ | ~~B2~~ | ~~B3~~ |  |  |  | ~~B7~~ |
|  | Sensor | Offload | Critical Service | Reserved | | | | |
| Bits | B0 | B1 | B2 | B3 |  |  |  | B7 |
| * Service Type field format | | | | | | | | |

A non-AP STA sets a bit from B0-B2 to 1 to indicate to the AP its service type. When it sets B0 to 1, it indicates to the AP that it is a sensor or a meter. When it sets B1 to 1, it is a traffic offloading device. When it sets B2 to 1, it is a health care, home, industrial, alarm monitoring or emergency servicing device.

The Group Address field indicates the group MAC address of the requesting STA. When Group Address field is present in AID Request element, the AID Switch Request frame is used to request Multicast ID.

* AID Response element

The AID Response element defines information about the AID assignment. The format of AID Response element is shown in Figure 8-401cu (AID Response element format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  | Element ID | Length | AID/Multicast ID | AID Switch  Count | AP Response Interval |
| Octets: | 1 | 1 | 2 | 1 | 2 |
| * AID Response element format | | | | | |

(#409)

~~The Element ID field is set to the value for AID Response element defined in Table 8-55 (Element IDs).~~

~~The Length field is set to 5.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The AID/Multicast ID field is set to a new AID or Multicast ID assigned to the non-AP STA depending on whether there is a group MAC address in the AID Switch Request frame. If AP does not change the AID of the STA, the AID field is set to the current AID assigned to the non-AP STA.

The AID Switch Count field is set to the number of Beacon intervals until the non-AP STA switches to the new AID.

The AID Response Interval field indicates the wakeup interval of a non-AP STA with dot11NonTIMModeActivated set to false for listening to Beacon frame either having TIM segment of new AID or having Page Slice element indicating the assignment of new AID in the corresponding page slices, defined as the number of Beacon intervals, when the AID Response element is transmitted to the non-AP STA with a dot11NonTIMModeActivated set to false.

The AID Response Interval field indicates the duration during which a non-AP STA with dot11NonTIMModeActivated set to true is required to transmit at least one PS-Poll or trigger frame, defined as the number of Beacon intervals, when the AID Response element is transmitted to a non-AP STA with the dot11NonTIMModeActivated set to true.

The first two MSBs of the AID Response Interval field indicate the Scaling Factor (see Table 8-36a (Unified scaling factor)) and the remaining 14 bits indicate the actual value (see Figure 8-43a (Bit encoding)). The AID Response Interval is calculated as the value multiplied by the Scaling Factor.

* Sector Operation element

The Sector Operation element includes the information necessary for a receiving STA to determine the type of sector operation, if it is allowed to transmit during a specified sector time interval and if it can perform sector training. The Sector Operation element can be provided in Probe Response, Beacon or Association Response frames.

The format of the Sector Operation element is presented in Figure 8-401cv (Sector Operation element (Sectorization Type is group sectorization)).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Element  ID | Length | Sectorization  Type | Period | Omni | Sector  ID | Number of Groups | GrpID | ... | GrpID | Sector Duration |
| Bits: | 8 | 8 | 1 | 6 | 1 | 3 | 4 | 6 |  | 6 | 6 |
| * Sector Operation element (Sectorization Type is group sectorization) | | | | | | | | | | | |

~~The Element ID has one octet length and specifies the corresponding value of the Sectorization Operation element specified in Table 8-55 (Element IDs).~~

~~The Length field is one octet length specifies the length of Sectorization Operation element in octets~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Short Beacon Compatibility element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Capability | Beacon Interval | TSF Completion |
| Octets | 1 | 1 | 2 | 2 | 4 |
| * Short Beacon Compatibility element format | | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Capability field in the element is identical to the capability field defined in clause 8.4.1.4.

The Beacon Interval field in the element is identical to the Beacon Interval field defined in 8.4.1.3.

The TSF Completion field carries the 4 MSBs of the TSF at the AP at the time of transmission.

* Short Beacon Interval element

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element  ID | Length | Short Beacon  Interval |
| Octets | 1 | 1 | 2 |
| * Short Beacon Interval element format | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Short Beacon Interval element carries the short beacon interval expressed in TUs

.

* Change Sequence element

A Change Sequence element indicates the change of system information within a BSS. The format of the Change Sequence element is shown in Figure 8-401cz (Change Sequence element format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element  ID | Length | Change Sequence |
| Octets: | 1 | 1 | 1 |
| * Change Sequence element format | | | |

~~The Element ID is equal to the Change Sequence element value in Table 8-55 (Element IDs).~~

~~The value of the Length field is the length of the element and set to 1.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Change Sequence field is 1 octet in length and is defined as an unsigned integer initialized to 0, that increments when a critical update occurs to any of elements inside Beacon frame; see 10.46.1.

* TWT element

The TWT element is shown in Figure 8-401da (TWT element format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Element  ID | Length | Control | Request  Type | Target  Wake  Time | TWT  Group  Assignment | Nominal  Minimum  Wake  Duration | Wake  Interval  Mantissa | TWT  Channel | NDP  Paging  (optional) |
| Octets: | 1 | 1 | 1 | 2 | 8 | 3 | 1 | 2 | 1 | 4 |
| * TWT element format | | | | | | | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

* S1G Capabilities element
* S1G Capabilities element structure

An S1G STA declares that it is an S1G STA by transmitting the S1G Capabilities element.

The S1G Capabilities element contains a number of fields that are used to advertise S1G capabilities of an S1G STA. The S1G Capabilities element is defined in Figure 8-401df (S1G Capabilities element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| . |  |  |  |  |
|  | Element ID | Length | S1G Capabilities Info | Supported S1G MCS and NSS Set |
| Octets: | 1 | 1 | 7 | 5 |
| * S1G Capabilities element format | | | | |

~~The Element ID and Length fields are set to the value for S1G Capabilities element defined in Table 8-55 (Element IDs).~~

~~The Length field of the S1G Capabilities element is set to 12.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* S1G Capabilities info field

The structure of the S1G Capabilities Info field is defined in Figure 8-401dg (S1G Capabilities Info field).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|  | Traveling Pilot Support | Short GI for  1 MHz | Short GI for  2 MHz | Short GI for  4 MHz | Short GI for  8 MHz | Short GI for 16 MHz | Supported Channel Width | |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
|  | B8 | B9 | B10 | B11 | B12 | B13 |  | B15 |
|  | Rx LDPC | Tx STBC | Rx STBC | SU Beamformer Capable | SU Beamformee Capable | Beamformee STS Capability | | |
| Bits: | 1 | 1 | 1 | 1 | 1 | 3 | | |
|  | B16 |  | B18 | B19 | B20 | B21 | B22 | B23 |
|  | Number Of Sounding Dimensions | | | MU Beamformer Capable | MU Beamformee Capable | +HTC-VHT Capable | VHT Link Adaptation Capable | 2 MHz Long Format |
| Bits: | 3 | | | 1 | 1 | 1 | 1 | 1 |
|  | B24 | B25 | B26 | B27 | B28 | B29 |  | B31 |
|  | RD Responder | HT-Delayed Block Ack | ~~Maximum A-MSDU Length~~  Maximum MPDU Length | Maximum A-MPDU Length Exponent | | Minimum MPDU Start Spacing | | |
| Bits: | 1 | 1 | 1 | 2 | | 3 | | |
|  | B32 | B33 | B34 | B35 | B36 | B37 | B38 | B39 |
|  | Uplink  Synch  Capable | Dynamic  AID | BAT  Support | TIM ADE  Support | Non-TIM  Support | TWT  Support | STA  Type  Support | |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
|  | B40 | B41 | B42 | B43 | B44 | B45 | B46 | B47 |
|  | Centralized  Authentication  Control(#482) | Distributed  Authentication  Control(#482) | A-MSDU  Supported(#10) | A-MPDU  Supported(#10,321) | Asymmetric Block Ack Supported | STA Sectorized Beam-Capable | AP Sectorized Beam-Capable | |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
|  | B48 | B49 | B50 | B51 | B52 | B53 | B54 | B55 |
|  | OBSS Mitigation Support | Fragment BA Support | NDP PS-Poll Supported | RAW Operation Support | TIM Segmentation Support | TXOP Sharing Implicit ACK support | Multicast ID Support | Sector Training Operation Support |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| * S1G Capabilities Info field | | | | | | | | |

The subfields of the S1G Capabilities Info field are defined in Table 8-191d (Subfields of the S1G Capabilities Info field).

|  |  |  |
| --- | --- | --- |
| * Subfields of the S1G Capabilities Info field (continued) | | |
| Subfield | Definition | Encoding |
| Traveling Pilot Support | Indicates support for the reception of PPDUs with a traveling pilots.  See 24.3.9.10 (Pilot subcarriers). | Set to 1 if dot11TravelingPilotCapability is true.  Set to 0 otherwise. |
| Short GI for 1 MHz | Indicates short GI support for the reception of packets transmitted with TXVECTOR parameters FORMAT equal to S1G and CH\_BANDWIDTH equal to CBW1. | Set to 0 if not supported.  Set to 1 if supported. |
| Short GI for 2 MHz | Indicates short GI support for the reception of packets transmitted with TXVECTOR parameters FORMAT equal to S1G and CH\_BANDWIDTH equal to CBW2. | Set to 0 if not supported.  Set to 1 if supported. |
| Short GI for 4 MHz | Indicates short GI support for the reception of packets transmitted with TXVECTOR parameters FORMAT equal to S1G and CH\_BANDWIDTH equal to CBW4. | Set to 0 if not supported.  Set to 1 if supported. |
| Short GI for 8 MHz | Indicates short GI support for the reception of packets transmitted with TXVECTOR parameters FORMAT equal to S1G and CH\_BANDWIDTH equal to CBW8. | Set to 0 if not supported.  Set to 1 if supported. |
| Short GI for 16 MHz | Indicates short GI support for the reception of packets transmitted with TXVECTOR parameters FORMAT equal to S1G and CH\_BANDWIDTH equal to CBW16. | Set to 0 if not supported.  Set to 1 if supported. |
| Supported Channel Width | Indicates the channel widths supported by the STA.  See 10.47 (S1G BSS operation). | Set to 0 if the STA supports 1 MHz and 2 MHz operation.  Set to 1 if the STA supports 1 MHz, 2 MHz and 4 MHz operation.  Set to 2 if the STA supports 1 MHz, 2 MHz, 4 MHz and 8 MHz operation.  Set to 3 if the STA supports 1 MHz, 2 MHz, 4 MHz 8 MHz and 16 MHz operation. |
| Rx LDPC | Indicates support for receiving LDPC encoded packets. | Set to 0 if not supported.  Set to 1 if supported. |
| Tx STBC | Indicates support for the transmission of at least 2x1 STBC. | Set to 0 if not supported.  Set to 1 if supported. |
| Rx STBC | Indicates support for the reception of PPDUs using STBC. | Set to 0 if not supported.  Set to 1 if supported. |
| SU Beamformer Capable | Indicates support for operation as an SU beamformer (see 9.31.5 (VHT sounding protocol)). | Set to 0 if not supported.  Set to 1 if supported. |
| SU Beamformee Capable | Indicates support for operation as an SU beamformee (see 9.31.5 (VHT sounding protocol)). | Set to 0 if not supported.  Set to 1 if supported. |
| Beamformee STS Capability | The maximum number of space-time streams that the STA can receive in an S1G NDP, the maximum value for N*STS,total* that can be sent to the STA in an S1G MU PPDU if the STA is MU beamformee capable and the maximum value of *Nr* that the STA transmits in an S1G Compressed Beamforming frame. | If SU beamformee capable, set to maximum number of space-time streams that the STA can receive in an S1G NDP minus 1.  Otherwise reserved. |
| Number Of Sounding Dimensions | Beamformer's capability indicating the maximum value of the TXVECTOR parameter NUM\_STS for an S1G NDP. | If SU beamformer capable, set to the maximum supported value of the TXVECTOR parameter NUM\_STS minus 1.  Otherwise reserved. |
| MU Beamformer Capable | Indicates support for operation as an MU beamformer (see 9.31.5 (VHT sounding protocol)). | Set to 0 if not supported or if SU Beamformer Capable is set to 0 or if sent by a non-AP STA.  Set to 1 if supported and SU Beamformer Capable is set to 1. |
| MU Beamformee Capable | Indicates support for operation as an MU beamformee (see 9.31.5 (VHT sounding protocol)). | Set to 0 if not supported or if SU Beamformee Capable is set to 0 or if sent by an AP.  Set to 1 if supported and SU Beamformee Capable is set to 1. |
| +HTC-VHT Capable | Indicates whether or not the STA supports receiving a VHT variant HT Control field. | Set to 0 if not supported.  Set to 1 if supported. |
| VHT Link Adaptation Capable | Indicates whether or not the STA supports link adaptation using VHT variant HT Control field. | If +HTC-VHT Capable is 1:  Set to 0 (No Feedback) if the STA does not provide VHT MFB.  Set to 2 (Unsolicited) if the STA provides only unsolicited VHT MFB.  Set to 3 (Both) if the STA can provide VHT MFB in response to VHT MRQ and if the STA provides unsolicited VHT MFB.  The value 1 is reserved.  Reserved if +HTC-VHT Capable is 0. |
| 2 MHz Long Format | Indicates support for the reception of PPDUs with 2MHz Long Format.  See 24.3.2 (S1G PPDU format). | Set to 0 if not supported.  Set to 1 if supported. |
| RD Responder | Indicates support for acting as a reverse direction responder, i.e., the STA may use an offered RDG to transmit data to an RD initiator using the reverse direction protocol described in 9.26 (Reverse direction protocol). | Set to 0 if not supported.  Set to 1 if supported. |
| HT-Delayed Block Ack | Indicates support for HTdelayed Block Ack operation.  See 9.22.8 (HT-delayed Block Ack extensions). | Set to 0 if not supported.  Set to 1 if supported.  Support indicates that the STA is able to accept an ADDBA request for HT-delayed Block Ack. |
| Maximum MPDU Length | Indicates the maximum MPDU length (see 9.11). | Set to 0 for 3895 octets.  Set to 1 for 7991 octets. |
| Maximum A-MPDU Length Exponent | Indicates the maximum length of A-MPDU that the STA can receive. EOF padding is not included in this limit. | This field is an integer in the range 0 to 3.  The length defined by this field is equal to  2(13+Maximum A-MPDU Length Exponent) -1 octets. |
| Minimum MPDU Start Spacing | Determines the minimum time between the start of adjacent MPDUs within an A-MPDU that the STA can receive, measured at the PHY-SAP. See 9.12.3 (Minimum MPDU Start Spacing field). | Set to 0 for no restriction  Set to 1 for 1/4 us  Set to 2 for 1/2 us  Set to 3 for 1 us  Set to 4 for 2 us  Set to 5 for 4 us  Set to 6 for 8 us  Set to 7 for 16 us |
| Uplink Synch Capable | If sent by an AP STA, this subfield indicates support for synch frame transmission for uplink.  If sent by a non-AP STA, this subfield indicates request for synch frame transmission for uplink.  (see 9.43.1 (Synch frame transmission procedure for uplink traffic  ) | If sent by an AP STA:  Set to 0 if not supported.  Set to 1 if supported.  If sent by a non-AP STA:  Set to 0 if not requested.  Set to 1 if requested. |
| Dynamic AID | The STA sets the Dynamic AID field to 1 when dot11DynamicAIDActivated is true, and sets it to 0 otherwise. See 10.45 (Dynamic AID assignment operation). | Set to 1 if dot11DynamicAIDActivated is true.  Set to 0 otherwise. |
| BAT Support | The BAT Support subfield indicates support for the use of the BAT frame in Block Agreements. When dot11BATImplemented is true, this field is set to 1 to indicate support for BAT frames as both originator and recipient. | Set to 1 if dot11BATImplemented is true.  Set to 0 otherwise. |
| TIM ADE Support | This bit indicates support of the ADE mode of TIM bitmap encoding as described in 8.4.2.6.1.4 (ADE mode  ). | Set to 1 if a STA supports the ADE mode of TIM bitmap encoding as described in 8.4.2.6.1.4 (ADE mode  ).  Set to 0 otherwise. |
| Non-TIM Support | This bit indicates support of Non-TIM mode. | For a non-AP STA:  Set to 0: the non-AP STA does not support Non-TIM mode, it needs TIM entry as in legacy PS mode  Set to 1: the non-AP STA supports Non-TIM mode and it does not need TIM entry when in Non-TIM mode  For an AP STA:  Set to 0: the AP STA does not support STA's Non-TIM mode  Set to 1: the AP STA supports STA's Non-TIM mode |
| TWT Support | This bit indicates support of TWT described in 9.41 (Target Wake Time  (TWT)). | Set to 1 if dot11TWTOptionActivated is true.  Set to 0 otherwise. |
| STA Type Support | If sent by an AP STA, this subfield indicates STA types that are supported by the AP STA.  If sent by a non-AP STA, this subfield indicates STA types of the non-AP STA. | If sent by an AP STA:  Set to 0 if the AP STA supports both a Sensor type and a non-Sensor type STA.  Set to 1 if the AP STA supports only a Sensor type STA.  Set to 2 if the AP STA supports only a non-Sensor type STA.  3 is reserved.  If sent by a non-AP STA:  Set to 1 if the STA is a Sensor type STA.  Set to 2 if the STA is a non-Sensor type STA.  0 and 3 are reserved. |
| Centralized Authentication Control(#482) | This field indicates support of the centralized authentication control defined in 10.3.8.1. | Set to 1 if dot11S1GCentralizedAuthenticationControlActivated is true. Set to 0 otherwise. |
| Distributed Authentication Control(#482) | This field indicates support of the distributed authentication control defined in 10.3.8.2. | Set to 1 if dot11S1GDistributedAuthenticationControlActivated is true. Set to 0 otherwise. |
| A-MSDU Supported(#10) | This bit indicates support of Aggregated MSDU | Set to 1 if dot11AMSDUSupport is true.  Set to 0 otherwise. |
| A-MPDU Supported(#10,321) | This bit indicates support of Aggregated MPDU | Set to 1 if dot11AMPDUSupport is true.  Set to 0 otherwise. |
| Asymmetric Block Ack Supported(#814) | This bit indicates support of Asymmetric Block Ack | Set to 1 if dot11AsymmetricBlockAckSupport is true.  Set to 0 otherwise. |
| STA Sectorized Beam-Capable | The STA Sectorized Beam-Capable indicates whether the STA supports the sectorized operation. | Set to 0 if not supported,  Set to 1 if supported  When set to 1, a STA supports both group sectorization and TXOP-based sectorization operation. |
| AP Sectorized Beam-Capable | The AP Sectorized Beam-Capable subfield indicates which type of sectorization operation is supported by AP. | Set to 0 if sectorization operation is not supported,  Set to 1 if only TXOP-based sectorization operation is supported,  Set to 2 if only group sectorization operation is supported,  Set to 3 if both group sectorization and TXOP-based sectorization operations are supported. |
| OBSS Mitigation Support(#883,75,247) | The OBSS Mitigation Support subfield indicates whether the STA supports a usable channel indication mechanism for OBSS Mitigation. | The field is set to 1 to indicate that  the STA supports a usable channel indication mechanism and set to 0 to indicate that the STA does not support a usable channel indication mechanism. |
| Fragment BA Support | This bit indicates support of Fragment BA procedure. | Set to 1 if dot11FragmentBAOptionImplemented is true.  Set to 0 otherwise. |
| NDP PS-Poll Supported | This bit indicates support for NDP PS-Poll frames | Set to 1 if dot11NDPPSPollSupport is true.  Set to 0 otherwise. |
| RAW Operation Support | This bit indicates support of RAW Participating as described in section 9.20.5.1 (General  ). | Set to 1 if dot11RAWOperationSupported is true.  Set to 0 otherwise. |
| TIM Segmentation Support | This bit indicates support of TIM Segmentation as described in section 9.45 (TIM and Page segmentation). | Set to 1 if dot11TIMSegmentationCapability is true.  Set to 0 otherwise. |
| TXOP Sharing Implicit ACK Support | This bit indicates support of TXOP Sharing. | Set to 1 if dot11TXOPSharingImplicitACKSupport is true.  Set to 0 otherwise. |
| Multicast ID Support | This bit indicates support of Flexible Multicast described in 9.51 (  Flexible Multicast). | Set to 1 if dot11MulticastIDActivated is true. Set to 0 otherwise. |
| Sector Training Operation Support | This bit indicates support of Sctor training operation described in 9.47.5 (Sector training operation).  . | Set to 0 if not supported,  Set to 1 if supported  When set to 1, a STA supports Sector training operation.  . |

* Subchannel Selective Transmission element

The Subchannel Selective Transmission element is shown in Figure 8-401dj (Subchannel Selective Transmission element format).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element ID | Length | Channel Activity Schedule |
| Octets: | 1 | 1 | N×4 |
| * Subchannel Selective Transmission element format | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Authentication Control element(#482)

The Authentication Control element contains the information required to mitigate contention among Authentication Request frames (see 10.3.8).

When the Control subfield is set to 0, the Authentication Control element format is as shown in Figure 8-401dm (Authentication Control element format (Control subfield = 0)). The Authentication Control element indicates to STA whether it may transmit an Authentication Request to the AP which sends the element. The Information field contains only one field, the Authentication Control Threshold. ~~The total length of the Information field is 2 octets.~~ See Figure 8-401dm (Authentication Control element format (Control subfield = 0)).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bits: |  |  | B0 | B1 B5 | B6 B15 |
|  | Element ID | Length  (=2) | Control  (0) | Reserved | Authentication Control Threshold |
| Octets: | 1 | 1 | 2 | | |
| * Authentication Control element format (Control subfield = 0) | | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

* TSF Timer Accuracy element

The TSF Timer Accuracy element, shown in Figure 8-401do (TSF Timer Accuracy element format), specifies fields describing the accuracy of TSF timer. This information is used by a receiving STA to estimate the clock accuracy of the transmitting STA and to schedule wake-up time for beacon reception by taking this clock accuracy into account.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element ID | Length | TSF Timer Accuracy |
| Octets: | 1 | 1 | 1 |
| * TSF Timer Accuracy element format | | | |

~~The Element ID field is set to the value for TSF Timer Accuracy element defined in Table 8-55 (Element IDs).~~

~~The Length field is set to 1.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The TSF Timer Accuracy field is a 1 octet signed integer that specifies the accuracy of the TSF timer of transmitting STA. The unit of the TSF Timer Accuracy field is PPM.

* Relay element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | Element ID | Length | Relay Control | RootAP BSSID |
| Octets: | 1 | 1 | 1 | 0 or 6 |
| * Relay element format | | | | |

The Relay element contains parameters necessary to support the Relay operation.

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Reachable Address element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | Element  ID | Length | Address Count  Field | Reachable Addresses |
| Octets: | 1 | 1 | 1 | variable |
| * Reachable Address element format | | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

Address Count field is an integer representing the number of addresses in the Reachable Addresses field.

The Reachable Addresses field is n × 6 octets in length, where n is specified in the Address Count field. The Reachable Addresses field indicates the MAC addresses that can be reached through the Relay STA.

* Relay Discovery element

The Relay Discovery element is shown in Figure 8-401dr (Relay Discovery element format).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Element ID | Length | Relay  Discovery Info | UL Min Data Rate | UL Mean Data Rate | UL Max Data Rate | DL Min Data Rate | DL Mean Data Rate | DL Max Data Rate | Delay Bound Requirement/ Channel Utilization | Min  PHY  Rate Requirement/ Relay Station Count |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 or 1 | 0 or 1 |
| * Relay Discovery element format | | | | | | | | | | | |

~~The Element ID field is set to the value for Relay Discovery element defined in Table 8-55 (Element IDs).~~

~~The Length field is one octet in length and specifies the length of the Relay Discovery element in octets.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* AID Announcement element

The AID Announcement element is used to provide the mapping table between STA MAC Address and STA AID.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | One or more entries |
|  | Element ID | Length | AID Entry |
| Octets: | 1 | 1 | 8*n* |
| * AID Announcement element format | | | |

~~The Element ID field is set to the value for AID Announcement element defined in Table 8-55 (Element IDs).~~

~~The Length field is 8n, where n indicates the total number of AID Entry fields contained in the element.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

(#520)

* AP Power Management element

The AP Power Management element is shown in Figure 8-401dv (AP Power Management element).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | AP PM Mode |
| Octets: | 1 | 1 | 1 |
| * AP Power Management element | | | |

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Probe Response Option element

The Probe Response Option element is included in the Probe Request frame to indicate which optional information is requested to be included in the Short Probe Response frame that is transmitted by the responding STAs.

The optional information requested by the STA is indicated as bitmaps in the Probe Response Option element. It is also indicated that which bitmap is included in the Probe Response Option element.

The format of the Probe Response Option element is shown in Figure 8-401dx (Probe Response Option element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element  ID | Length | Probe Response  Group bitmap | Probe Response  Option bitmap 0 | Probe Response  Option bitmap 1 | ... | Probe Response  Option bitmap n |
| Octets: | 1 | 1 | 1 | 1 | 1 |  | 1 |
| * Probe Response Option element format | | | | | | | |

~~The Element ID field is set to the value for Probe Response Option element defined in Table 8-55 (Element IDs).~~

~~The value of the Length field is the total length of the Probe Response Group bitmap field and Probe Response Option bitmap fields and set to value between 1 and 9 depending on the number of Probe Response Option bitmaps included in the Probe Response Option element.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* Activity Specification element

The Activity Specification element is used by a STA to inform the associated AP or peer TDLS STA about operating limitations of the STA, in terms of the maximum continuous time the STA is capable of being in the Awake state, and the minimum continuous time the STA must stay in Doze state in between Awake periods.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element  ID | Length | Max Awake  Interval | Recovery  Time |
| Octets: | 1 | 1 | 4 | 4 |
| * Activity Specification element format | | | | |

~~The Length field is set to 8.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Max Awake Interval field indicates a time in units of µs, used as defined in 9.50 (

Support for energy limited STAs); a value 0 indicates that no limit applies.

The Recovery time indicates a time in units of µs, used as defined in 9.50 (

Support for energy limited STAs).

* Group ID List element

The Group ID List element includes the information necessary for a receiving STA to determine its group membership. A station could belong to one or more groups. An example of group use is the sector operation. In Sector operation, only a set of STA groups is allowed to transmit during the sector duration. The Group ID List element can be provided in Probe Response or Association Response.

The format of the Group ID List element is presented in Figure 8-401dz (Group ID List element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element  ID | Length | Group ID  Type | Group ID | ... | Group ID | Group ID |
| Bits: | 8 | 8 | 4 | 4 |  | 4 | 4 |
| * Group ID List element format | | | | | | | |

~~The Element ID has one octet length and specifies the corresponding value of the Group ID List element specified in Table 8-55 (Element IDs).~~

~~The Length field is one octet length specifies the length of Group ID List element in octets.~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Group ID Type field is a 4 bit field and indicates the group IDs usage. Group 0000 indicates that the group IDs list refers to sectorization use.

The Group ID field is a 4 bit field and it indicates a new group ID that it is associated to the receiver stations.

* S1G Operation element(#863,866)

The operation of S1G STAs in the BSS is controlled by the S1G Operation element. The format of the S1G Operation element is defined in Figure 8-401ea (S1G Operation element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element  ID | Length | S1G Operation  Information | Basic S1G-MCS  and NSS Set |
| Octets: | 1 | 1 | TBD | TBD |
| * S1G Operation element format | | | | |

~~The Element ID field is set to the value for S1G Operation element defined in Table 8-55 (Element IDs).~~

The Element ID and Length fields are defined in 8.4.2.1 (General).

* S1G Action frame details
* S1G Action field

Several Action frame formats are defined to support S1G functionality. An S1G Action field, in the octet immediately after the Category field, differentiates the S1G Action frame formats. The S1G Action field values associated with each frame format within the S1G category are defined in Table 8-363a (S1G Action field values).

|  |  |  |
| --- | --- | --- |
| * S1G Action field values | | |
| Value | Meaning | Time Priority |
| 0 | AID Switch Request | No |
| 1 | AID Switch Response | No |
| 2 | Synch Control | No |
| 3 | STA Information Announcement | No |
| 4 | EDCA Parameters Set | No |
| 5 | Activity Specification | No |
| 6 | TWT Setup | No |
| 7 | TWT Teardown | No |
| 8 | Group ID List | No |
| 9 | Sector ID Feedback | No |
| 10 – 255 | Reserved |  |

* AID Switch Request frame format

The AID Switch Request frame is an Action frame of category S1G. It is used to notify the responding STAs that the transmitting STA is changing its device characteristic defined in 8.4.2.170d (AID Request element). Also, it is used to request the Multicast ID from AP. ~~an AID for the multicast group from the responding STA.~~ The Action field of the AID Switch Request frame contains the information shown in Table 8-363b (AID Switch Request frame action field format).

|  |  |
| --- | --- |
| * AID Switch Request frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Dialog Token |
| 4 | AID Request Element (see 8.4.2.170d) |

The Category field is set to the value for S1G, specified in Table 8-38 (Category values).

The S1G Action field is set to the value for AID Request, specified in Table 8-363a (S1G Action field values).

The Dialog Token field is a value chosen by the non-AP STA sending the AID Switch Request frame to identify the request/response transaction.

The AID Request Element field contains an AID Request element as specified in 8.4.2.170d (AID Request element).

* AID Switch Response frame format

The AID Switch Response frame is an Action frame of category S1G. It is sent by an AP in response to an AID Switch Request frame, or sent by the AP to the STA to instruct the non-AP STA to change the AID or the wakeup interval. Also, it is sent by an AP to assign the Multicast ID for the requesting STA. ~~an AID for the request multicast group from the requesting STA.~~ The Action field of the AID Switch Response frame contains the information shown in Table 8-363c (AID Switch Response frame action field format).

|  |  |
| --- | --- |
| * AID Switch Response frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Dialog Token |
| 4 | AID Response (see 8.4.2.170e) |

The Category field is set to the value for S1G, specified in Table 8-38 (Category values).

The S1G Action field is set to the value for AID Switch Response, specified in Table 8-363a (S1G Action field values).

The Dialog Token field is the value in the corresponding AID Switch Request frame. If the AID Switch Response frame is not being transmitted in response to an AID Switch Request frame, then the Dialog token is set to 0.

The AID Response field contains an AID Response element as specified in 8.4.2.170e (AID Response element

).

* Synch Control frame format

The Synch Control frame is an Action frame of category S1G. It is transmitted by a non-AP STA to a UL-Synch capable AP to enable or disable ~~the~~ synch frame transmission for uplink or downlink traffic. The Action field of a Synch Control frame contains the information shown in Table 8-363d (Synch Control frame action field format).

|  |  |
| --- | --- |
| * Synch Control frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Synch Control (see 8.4.1.53) |

The Category field is set to the value for S1G, specified in Table 8-38 (Category values).

The S1G Action field is set to the value for Synch Control, specified in 8.5.24.1 (S1G Action field).

* STA Information Announcement frame format

The STA Information Announcement frame is an Action frame of category S1G. It is used to inform the peer STAs of the updated AID information when a STA's AID is changed. Also, it is used by ~~for~~ a relay station to indicate an associated STA's AID to the AP when the STA becomes associated or the STA's AID is changed. The Action field of the STA Information Announcement frame contains the information shown in Table 8-363e (STA Information Announcement frame format).

|  |  |
| --- | --- |
| * STA Information Announcement frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | AID Announcement element (8.4.2.170r) |

The Category field is set to the value for S1G, specified in Table 8-38 (Category values).

The S1G Action field is set to the value for STA Information Announcement, specified in Table 8-363a (S1G Action field values).

* EDCA Parameters Set frame format

The EDCA Parameters Set frame is used to update the EDCA Parameter Set at the recipient STA, as defined in 9.2.4.2 (HCF contention-based channel access (EDCA)).

|  |  |
| --- | --- |
| * EDCA Parameters Set frame action ~~Action~~ field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | EDCA Parameter Set (8.4.2.28)(#485) |

* Activity Specification frame format

The Activity Specification frame is used to carry the Activity Specification element (8.4.2.170u (Activity Specification element)).

|  |  |
| --- | --- |
| * Activity Specification Action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Activity Specification element (8.4.2.170u) |

* TWT Setup frame format

The TWT Setup frame is an Action frame of category S1G. It is sent by a STA to request the setup of a TWT SP and it is sent by a responding STA to indicate the status of a requested TWT SP. The action field of the TWT Setup frame contains the information shown in Table 8-363h (TWT Setup frame action field format).

|  |  |
| --- | --- |
| * TWT Setup frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Dialog Token |
| 4 | TWT element (8.4.2.170j) |

The category field is set to the value for S1G specified in Table 8-38 (Category values).

The S1G Action field is set to the value for TWT Setup ~~Request~~ frame specified in Table 8-363a (S1G Action field values).

In a TWT Setup frame with a TWT Request field that has a value of 1, the Dialog Token field is set to a value chosen by the transmitting STA to identify the request/response transaction. In a TWT Setup frame with a TWT Request field that has a value of 0, the Dialog Token field is set to the value copied from the corresponding received TWT Setup frame with a TWT Request field that had a value of 1.

* TWT Teardown frame format

The TWT Teardown frame is an Action frame of category S1G. It is sent by a STA to request the teardown of a TWT agreement and is transmitted by either STA of an existing TWT agreement. The action field of the TWT Teardown ~~Setup~~ frame contains the information shown in Table 8-363i (TWT Teardown frame action field format).

|  |  |
| --- | --- |
| * TWT Teardown frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | TWT Flow Field |

The category field is set to the value for S1G specified in Table 8-38 (Category values).

The S1G Action field is set to the value for TWT Teardown frame specified in Table 8-363a (S1G Action field values).

The TWT Flow Field contains the TWT Flow Identifier field and 5 reserved bits as shown in Figure 8-628a (TWT Flow Field format):

|  |  |  |
| --- | --- | --- |
|  | B0 B2 | B3 B7 |
|  | TWT Flow Identifier | Reserved |
| Bits: | 3 | 5 |
| * TWT Flow Field format | | |

The TWT Flow Identifier field is defined in 8.4.2.170j (TWT element). In a TWT Teardown frame, the TWT Flow Identifier field is set to the value of the TWT Flow Identifier of the TWT element in the frame that successfully concluded the setup of the TWT that is the subject of the teardown request.

* Group ID List frame format

The Group ID List frame is an Action or Action No Ack frame of category S1G Action. The frame is used to allocate/change group IDs to a station. ~~When a STA receives such frame, the group IDs associated to Group ID Type field are replaced/initialized to the list of group IDs provided by this frame.~~ The format of its Action field is defined in Table 8-363j (Group ID List frame action field format).

|  |  |
| --- | --- |
| * Group ID List frame action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Group ID List element (8.4.2.170v) |

The Category field is set to the value for S1G Action, specified in Table 8-38 (Category values).

The S1G Action field is set to the value for the Group ID List frame specified in Table 8-363a (S1G Action field values).

* ~~S1G~~ Sector ID Feedback frame format

The Sector ID Feedback frame is an Action or Action No Ack frame of category S1G. The format of its Action field is defined in Table 8-363k (Sector ID Feedback frame Action field format).

|  |  |
| --- | --- |
| * Sector ID Feedback frame Action field format | |
| Order | Information |
| 1 | Category |
| 2 | S1G Action |
| 3 | Sector ID Index |

The Category field is set to the value for S1G, specified in Table 8-38 (Category values).

The S1G action is set to TBD (3 or higher) and the Sector ID index is shown in Figure 8-628b (Sector ID Index format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Preferred  Sector ID | SNR | Receive Sector Bitmap |
| Bits: | 3 | 5 | 8 |
| * Sector ID Index format | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | I0 | I1 | I2 | I3 | I4 | I5 | I6 | I7 |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| * Receive Sector Bitmap format | | | | | | | | |

The Preferred Sector ID field is 3 bits in length and indicates the sector in which highest quality of AP signal is received by the STA. The method in which a STA determines the high quality AP signal is out of the scope of this standard.

The SNR field is 5 bits in length and indicates the received SNR at the preferred Sector, 0 to 30 represents SNR values from -3 to 27 dB, respectively. If the SNR value is less than -3dB, set to 0. If the SNR value is greater than 27 dB ~~db~~, set to 30. 31 indicates no feedback.

The Receive Sector Bitmap field is 8 bits in length. A bit position set to 0 within the bit map indicates that the STA does not receive the AP signal in the corresponding Sector ID. A bit position set to 1 within the bit map indicates that the STA does receive the AP signal in the corresponding Sector ID. The position of the bit map (0 to 7) corresponding to the sector ID.

* Relay Action frame details
* Relay Action field

The Relay Action field values are specified in Table 8-363l (Relay Action field values).

|  |  |
| --- | --- |
| * Relay Action field values | |
| Relay Action field value | Description |
| 0 | Reachable Address Update |
| 1-255 | Reserved |

* Reachable Address Update frame format

The Reachable Address Update frame is used to update the addresses that can be reached through a Relay STA. The format of the Reachable Address Update frame Action field is shown in Table 8-363m (Reachable Address Update frame Action field format).

|  |  |
| --- | --- |
| * Reachable Address Update frame Action field format | |
| Order | Information |
| 1 | Category |
| 2 | Relay Action |
| 3 | Reachable Address element |

The Category field is 1 octet and is set to the value in Table 8-39 (Category values) for category Relay Action.

The Relay Action field is set to the value in Table 8-363l (Relay Action field values) representing Reachable Address Update.

The one or more Reachable Address elements specify the addresses that can be reached through the Relay STA.

* Flow Control Action frame details
* Flow Control Action field

The Flow Control Action field values are specified in Table 8-363n (Flow Control Action field format).

|  |  |
| --- | --- |
| * Flow Control Action field format | |
| Flow Control Action  field value | Description |
| 0 | Flow Suspend |
| 1 | Flow Resume |
| 2-255 | Reserved |

* Flow Suspend frame field

The Flow Suspend frame is used by a STA to suspend incoming transmissions for an amount of time indicated in the Suspend Duration field. The format of the Flow Suspend frame Action field is shown in Table 8-363o (Flow Suspend frame Action field format).

|  |  |
| --- | --- |
| * Flow Suspend frame action ~~Action~~ field format | |
| Order | Information |
| 1 | Category |
| 2 | Flow Control Action |
| 3 | Suspend Duration |

The Category field is 1 octet and is set to the value in Table 8-38 (Category values) for category Flow Control Action.

The Flow Control Action field is set to the value in Table 8-363n (Flow Control Action field format) representing Flow Suspend.

The Suspend Duration field denotes the amount of time that receiving STAs are not allowed to transmit data frames to the STA identified by the TA field of the Flow Suspend frame.

* Flow Resume frame field

The Flow Resume frame is used by the STA identified by the TA field of the frame to cancel any outstanding flow suspend time the STA had previously invoked through the transmission of a Flow Suspend frame. The format of the Flow Resume frame Action field is shown in Table 8-363p (Flow Resume frame Action field format).

|  |  |
| --- | --- |
| * Flow Resume frame action ~~Action~~ field format | |
| Order | Information |
| 1 | Category |
| 2 | Flow Control Action |

The Category field is 1 octet and is set to the value in Table 8-38 (Category values) for category Flow Control Action.

The Flow Control Action field is set to the value in Table 8-363p (Flow Resume frame Action field format)representing Flow Resume.

**9.11 A-MSDU operation**

***TGah Editor: insert the following after the last paragraph of 9.11***

The length of an A-MSDU transmitted in a S1G PPDU is limited by the maximum MPDU size supported by the recipient STA (see 9.12.5).

**9.47.2 Sector Capabilities Exchange**

***TGah Editor: insert the following after the third paragraph of 9.47.2.***

A sectorized beam-capable STA shall exchange its S1G Capabilities element with an AP. After the STA associated with a sectorized beam-capable AP, the AP can transmit through its sectorized beam to a sectorized beam-capable STA.

If dot11S1GSectorImplemented is true, a STA shall set the STA Sectorized Beam-Capable field in the S1G Capabilities element to 1 in the Association Request Frame. The sectorized beam-capable STA shall support both group sectorization and TXOP-based sectorization operations. If dot11S1GSectorImplemented is false, the STA shall set the STA Sectorized Beam-Capable field in the S1G Capabilities element to 0.

If dot11S1GSectorImplemented is true, an AP shall set the AP Sectorized Beam-Capable field in the S1G Capabilities element in accordance with whether it supports group and/or TXOP-based sectorization operation in the Association Response Frame. If dot11S1GSectorImplemented is false, the AP shall set the AP Sectorized Beam-Capable field in the S1G Capabilities element to 0.

If dot11S1GSectorTrainingOperationImplemented is true, a STA shall set the Sector Training Operation Support field in the S1G Capabilities element to 1 in the Association Request Frame. If dot11S1GSectorTrainingOperationImplemented is false, the STA shall set the Sector Training Operation Support field in the S1G Capabilities element to 0. A STA that has a value of true for dot11S1GSectorTrainingOperationImplemented shall set dot11HTControlFieldSupported to true.

If an AP is a sectorized beam-capable AP, it sets the AP Sectorized Beam-Capable field to 1, 2 or 3.

(The changes to the TCLAS definition has been removed based on CID#604, 754)