IEEE 802.11
Wireless LANs

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| Normative Text for CIDs Related to ANQP Sequence Number feature and AP-List Query-Section 8 |
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Abstract

This submission proposes normative text for the LB1 TGai (FILS) corresponding to the following CIDS: 2294,2295,2931,3041,3109,3287,3288,2297,2298,2299,2300,2818,3110,3111,3112,3289,3290,3292,2841,3265,3216,3266,3267,2334,2682,2904,2905,2937,3268

Define a new abbreviation

**CAG** Common ANQP Group represents a collection of ANQP attributes, whose values are shared among an AP and its neighbours

* Frame formats
* Beacon frame format

***Insert new rows/elements to Table 8-20 (note that this table is 8-21 in REVmc D1.0 and 8-24 in D1.1) as follows;***

|  |
| --- |
| * Beacon frame body
 |
| Order | Information | Notes |
| 203 | CAG Number (see  8.4.2.175 (CAG Number element))[13/0725r1 | [previous edits by CID #1102, 13/0573r3 deleted]CAG Number element is optionally present when dot11FILSActivated is true. [13/0725r1 |
| 204 | Reduced Neighbor Report | The Reduced Neighbor Report element is optionally present if dot11FILSActivated is true |
| 205 | FILS Indication  | The FILS Indication is present if dot11FILSActivated is true. |
| 206 | AP Configuration Change CountAP-CCC | The AP Configuration Change CountAP-CCC is optionally present if dot11FILSActivated is true. |
| 207 | Differentiated Initial Link Setup element  | The Differentiated Initial Link Setup element [CID #1101, 1181] is optionally present when dot11FILSActivated is true. |
| 207 | FILS Identity | The FILS Identity is present if dot11FILSActivated is true. [CID #1009, see 11-13/860r0 and CID 1382 |

* Probe Response frame format

***Change Table 8-27(note that table numbers will be changing) as follows, inserting 5 new rows and changing one existing row;***

E***ditor note: some amendments use “<ANA>” for inserted Orders, but the ANA database does not cover this table, so the numbers below increment from the last actual number used (67)***and ***considers those identified as ANAs, thus the next available number is 70***

|  |
| --- |
| * Probe Response frame body
 |
| Order | Information | Notes |
| 70 | CAG Number  8.4.2.175 (CAG Number element) [13/0735r1 | CAG Number element is optionally present when dot11FILSActivated is true. [13/0725r1 (replaces changes proposed by CID #1102, 13/0573r3 |
| 71 | Reduced Neighbor Report | The Reduced Neighbor Report element is optionally present if dot11FILSActivated is true |
| 72 | AP Configuration Change CountAP-CCC | The AP Configuration Change CountAP-CCC element is optionally present if dot11FILSActivated is true. |
| 73 | FILS Indication | The FILS Indication is present if dot11FILSActivated is true. |
| 74 | Differentiated Initial Link Setup element  | The Differentiated Initial Link Setup element, as specified in  8.4.2.187 (Differentiated Initial Link Setup element), is optionally present if[CID # 1262, 1264] dot11FILSActivated is true |
| 75 | FILS Identity | The FILS Identity is present if dot11FILSActivated is true. [CID #1009 |
| Last–n | Requested elements | Elements requested by the Request element of the Probe Request frame are present if dot11MultiDomainCapabilityActivated is true. See  10.1.4.3.7 (Criteria to respond to probe request) (Sending a probe response) ~~10.1.4.3.2~~. |

* Information elements
* General

***Insert the following new rows/Element IDs to Table 8-54:***

|  |
| --- |
| * Element IDs
 |
| Element | Element ID | Length of indicatedelement (in octets) | Extensible |
| CAG Number ( 8.4.2.175 (CAG Number element)) [13/0725r1 | <ANA> | 4 |  |
| Reduced Neighbor Report (see  8.4.2.176 (Reduced Neighbor Report element)) | <ANA> | 6 o 257 |  |
| FILS Request Parameters (see  8.4.2.177 (FILS Request Parameters element)) | <ANA> | 3 to 11 |  |
| Probe Response Reception Time (see  8.4.2.178 (Probe Response Reception Time element)) | <ANA> | 3 |  |
| FILS Identity [CID #1293, 1347(see  8.4.2.179 (FILS Identity element)) | <ANA> | 3 to 257 |  |
| FILS Key Confirmation (see  8.4.2.180 (FILS Key Confirmation element))  | <ANA> | Variable |  |
| FILS KDE Container (see  8.4.2.181 (FILS KDE container element))  | <ANA> | Variable |  |
| FILS Session (see  8.4.2.182 (FILS Session element))  | <ANA> | 10 |  |
| FILS Public Key (see 8 8.4.2.183 (FILS Public Key element)) | <ANA> | Variable |  |

***Insert the new subclause for GAS***CAG Number ***element:***

* CAG Number Element

The CAG number element provides the current version of the CAG. ***[CID 2994, 2298, 3289]*** The CAG number element is used by a STA to determine if a change in the CAG occurred from the last visit of the STA to a particular AP. The CAG Number element may be included as an optional information element (IE) in the Beacon or Probe Response frame to reduce ANQP exchanges when dot11InterworkingServiceActivated is true and dot11FILSActivated is true. ***[CID 2995]***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | CAG version | Scope |
| Octets:  | 1 | 1 | 1 | 1 |

* GAS *CID 3041, 3110]* CAG Number Element

The Element ID for this element is 1-octet field whose value is set to the value specified in Table 8-54.

The Length is 1-octet field whose value is equal to 2 [***CID 2297*** ].

The ***[CID 2931, 3109,3111, 3112]*** CAG version is a 1-octet field whose value is an unsigned positive integer that indicates the version of the CAG stored within the ANQP server. Changes with respect to a prior value in this sub-field indicate a change to the CAG[***CID 2818***]. The CAG version is incremented (modulo 256) every time when the InfoIDs of the ANQP-elements within the CAG change or any value of the ANQP-element attributes within the CAG change. An example of such change is a change in the Neighbour Report ***[CID 3288].*** GAG version number is always positive, therefore a value of zero in this field will be neglected by the receiving STA***.[CID 3292]***

[***CID 2300,*** ***2999, 3290]*** The Scope is a 1-octet field that indicates the valid scope of the information represented by the CAG version. A field value of 0 indicates that the CAG is only valid in the current BSS (identified by the BSSID value), a field value of 1 indicates that the CAG is only valid in the Homogeneous ESS (identified by the HSSID value), and a field value of 2 indicates that the CAG isvalid for the ESS (union of BSSs with the same SSID.) Field values of 3-255 are reserved.

* Access Network Query Protocol (ANQP) elements

*Change Table 8-184, inserting threefour new rows after “Neighbor Report” as follows:*

|  |
| --- |
| * ANQP-element definitions
 |
| ANQP-element name | Info ID | ANQP-element(subclause) |
| Neighbor Report  | 272 | 8.4.4.19 (NeighborReport ANQP-element) |
| Query AP List | 273 |  8.4.4.20 (Query AP List ANQP-element) |
| AP List Response | 274 |  8.4.4.21 (AP List Response ANPQ-element) |
| FILS Domain Information[13/0860r0 8.4.4.23 (Configuration Set)] | 275 |  8.4.4.22 (FILS Domain Information ANQP-element) |
| CAG  | 276 |  8.4.4.23 (CAG ANQP-element) |
| Reserved | 2767 - 56796 | n/a |

*Insert new Clause 8.4.4.20 (which should be the next available number)*

* Query AP List ANQP-element

***[CID 2841, 3265]*** The Query AP List ANQP-element provides a list of APs and a list of identifiers of ANQP-elements for which the requesting STA is querying. This element allows an optimization of the ANQP query procedure by having multiple queries in a single ANQP query list thus reducing the time necessary for network discovery and selection. Each ANQP-element may be returned in response to Query AP List ANQP-element using the procedures in 10.25.3.2.11 (Query AP List procedure).

The format of the Query AP List ANQP-element is provided in Figure 8-431n (Query AP List ANQP-element field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Info ID | Length | AP List | ANQP Query ID #1 | ,,,, | ANQP Query ID #n(optional) |
| Octets: | 2 | 2 | variable | 2 |  | 2 |
| * Query AP List ANQP-element field format
 |

The Info ID is a 2-octet field whose value is drawn from Table  8-192 (ANQP-element definitions) corresponding to the Query AP List ANQP-element.

'The Length is a 2-octets field whose value is an unsigned positive integer that indicates the length of the remaining frame fields in octets***.[CID 3216***]

The AP List is a variable length field defined in Figure 8-431o (AP List field format) that contains the list of AP IDs for requested information.

The AP List Length subfield (Figure 8-431o (AP List field format)) is a 1-octet field whose value is an unsigned positive integer that is equal with 6 times the number of AP identifier subfields and it is equal to the number of APs in the AP List

 Each AP identifier subfield takes 6 octets to indicate the BSSID of an AP that the requesting STA wants to query.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | AP List length | AP1 identifier | ..... | AP n identifier |
| Octets: | 1 | 6 |  | 6 |
| * AP List field format
 |

Each ANQP Query ID field value is an Info ID drawn from Table 8-192 (ANQP-element definitions). Including an Info ID in the Query

List ANQP-element declares that the STA performing the ANQP query is requesting the ANQP-element corresponding to that Info ID be returned in the ANQP query response. The Info IDs included in the Query AP List ANQP-element are ordered by increasing Info ID value. The ANQP query response is defined in 10.24.3.2.1.

***Change the clause 8.4.4.21 as follows:***

* AP List Response ANPQ-element

The AP List Response ANQP-element provides the response to the Query AP list ANQP-element request. The frame format of the response frame is defined in Figure 8-456a (AP List Response ANQP-element field format).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Info ID | Length | AP1 Identifier | AP1 Response Length | AP1 Query Response | ...... | AP N Identifier | AP N Response Length | AP N[CID #1269Query Response |
| oOctets or bits? | 2 | 2 | 6 | 2 | variable |  | 6 | 2 | Variable |
| * AP List Response ANQP-element field format
 |

The Info ID is a 2-octet field whose value is drawn from Table  8-192 (ANQP-element definitions) corresponding to the AP List Response ANQP-element.

The Length is a 2-octet unsigned positive integer number that indicates the length of the remaining frame fields in octets and the value is variable. [CID 3216]

The AP Identifier subfield takes 6 octets to indicate the BSSID of the AP that the requesting STA queries.

The AP Response Length field is a 2-octet field whose value is the number of octets in the following AP Query Response subfield.

The AP Query Response subfield is a generic container, which contains one or multiple ANQP elements (Figure 8-403) that correspond to the AP ANQP response to the received Query AP List ANQP-element as specified in 8.4.4.20. This field is also formatted in accordance with ANQP. This field could contain one or more values of the ANQP attributes, which are specific for a particular AP and were requested by a STA via the Query AP List ANQP-element. Such an approach allows the responding AP to provide, in a single response, ANQP information for several (neighbouring) APs simultaneously, thus reducing the complexity of the network selection procedure and reducing the delay of FILS. [***CID3266,*** ***CID 3267]***

*Insert new clause as follows:*

*Change the clause 8.4.4.23 as follows:*

* CAG ANQP-element [CID 2904]

[***CIDs*** ***2905***, ***2334***, **3268**, ***3288***] The CAG ANQP-element provides the Info IDs for the ANQP-elements contained within aCAG and the current value of the CAG version, which indicates the version of information within the CAG. The selection of the specific number of InfoIDs and the specific values of InfoIDs in CAG is left to the implementation and it is beyond the scope of this document

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Info ID | Length | CAG version  | Info ID 1 | ...... | Info ID n  |
| oOctets or bits? | 2 | 2 | 1 | 2 |  | 2 |
| * CAG [13/725r1ANQP-element
 |

The Info ID is 2 octets field whose value is equal to the value in Table 8-184.

***[CID 2682]*** The Length field is 2 octets unsigned positive number whose value is set to the length in octets of remaining fields.

The CAG version is a 1-octet field and it indicates the current version of the CAG. The CAG version changes when the CAG changes (either the Info IDs of the ANQP-elements contained in the CAG or any value of the attributes and information within those ANQP-elements.

***[CID 2937]*** The Info ID field is 2 octets filed whose value represents an ANQP-element Info ID specified in Table 8-184