IEEE P802.11
Wireless LANs

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| TGaq – ANQP Service Discovery Elements Alternative |
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Abstract

This document proposes to re-use ANQP for the PADP request/response messages.

This uses Draft P802.11REVmc\_D3.3.pdf and Draft P802.11aq\_D0.05 as baselines.

***Modify the following clause changes:***

#### 8.4.2.92 Advertisement Protocol element

***<Insert the following row (ignoring the header row) in*** [***Table 8-219***](#Table_8_219)***, after the ‘Registered location query protocol (RLQP)’ table entry>***

|  |
| --- |
| Table 8-219 - Advertisement protocol ID definitions |
| Name | Value |
| Registered location query protocol (RLQR) | 4 |
| Access Network Query Protocol for service discovery (ANQP-SD) | 5 |
| Reserved  |  6-220{need to correct the error in REVmc D3.3} |

***<Insert dashed list item text after Registered location query protocol (RLQP, shown in red below)>***

— The RLQP supports information retrieval from a RLSS. RLQP is a protocol used by a requesting STA to query another STA (i.e., the receiving STA can respond to queries with and without proxying the query to a server in an external network). See [10.25](#Section_10_25) (WLAN interworking with external networks procedures) for information on RLQP procedures.

—The ANQP-SD supports service information retrieval using ANQP-elements. It is used by a requesting STA to query another STA (i.e., the receiving STA can respond to queries with and without proxying the query to a server in an external network). The use of an alternative Advertisement protocol ID allows the receiving STA to proxy the query to an alternaitve server in an external network. See [10.25](#Section_10_25) (WLAN interworking with external networks procedures) for information on ANQP-SD procedures.

***Modify the table in the following clause:***

* Access Network Query Protocol (ANQP) elements(11u)

|  |
| --- |
| * ANQP-element definitions (11u)
 |
| ANQP-element name | Info ID | ANQP- (Ed)element (clause) |
| Reserved | 0 – 255 | n/a |
| Query List | 256 | 8.4.4.1 (Query List ANQP-element (11u)) |
| Capability List | 257 | 8.4.4.2 (Capabililty List ANQP-element (11u)) |
| Venue Name | 258 | 8.4.4.3 (Venue Name ANQP-element (11u)) |
| Emergency Call Number | 259 | 8.4.4.4 (Emergency Call Number ANQP-element (11u)) |
| Network Authentication Type | 260 | 8.4.4.5 (Network Authentication Type ANQP-element (11u)) |
| Roaming Consortium | 261 | 8.4.4.6 (Roaming Consortium ANQP-element (11u)) |
| IP Address Type Availability | 262 | 8.4.4.8 (IP Address Type Availability ANQP-element (11u)) |
| NAI Realm | 263 | 8.4.4.9 (NAI Realm ANQP-element(11u)) |
| 3GPP Cellular Network | 264 | 8.4.4.10 (3GPP Cellular Network ANQP-element(11u)) |
| AP Geospatial Location | 265 | 8.4.4.11 (AP Geospatial Location ANQP-element(11u)) |
| AP Civic Location | 266 |  8.4.4.12 (AP Civic Location ANQP-element(11u)) |
| AP Location Public Identifier URI | 267 |  8.4.4.13 (AP Location Public Identifier URI ANQP-element(11u)) |
| Domain Name | 268 | 8.4.4.14 (Domain Name ANQP-element(11u)) |
| Emergency Alert Identifier URI | 269 | 8.4.4.15 (Emergency Alert URI ANQP-element(11u)) |
| TDLS Capability(#13018) | 270 | 8.4.4.17 (TDLS Capability ANQP-element(#13018)) |
| Emergency NAI | 271 | 8.4.4.16 (Emergency NAI ANQP-element(11u)) |
| Neighbor Report | 272 | 8.4.4.18 (Neighbor Report ANQP-element) |
| Service Information Request | ANA | 8.4.4.20 (Service Information Request ANQP-element) |
| Service Information Response | ANA+1 | 8.4.4.21 (Service Information Response ANQP-element) |
| PAD Encapsultation | ANA+2 | 8.4.4.23Encapsulation PAD ANQP-element) |
| Reserved | ANA+3 – 56796 | n/a |
| Vendor Specific | 56797 | 8.4.4.7 (Vendor Specific ANQP-element (11u)) |
| Reserved | 56798 – 65535 | n/a |

***Insert the following new subclauses***

**8.4.4.20 Service Information Request**

The Service Information Request ANQP-element is used to request service information between STAs. The Service Information Request ANQP-element is included in a GAS Query Request.

The format of the Service Information Query Request element is shown in [Figure 8-576h](#Figure_8_576h).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Info ID | Length | Service Name Length | Service Name | Service Information Query Request Length | Service Information Query Request |
| Octets: | 2 | 2 | 1 | variable | 1 | variable |

**Figure 8-576h – Service Information Request ANQP-element format**

The Service Information QueryRequest field contains service specific query such as key-value query.

***<other fields need to be described. SM: What is the service information query request? That’s the Service Name?>***

The procedure used for this element is described in clause 10.25.3.2.11.

**8.4.4.21 Service Information Response**

The Service Information Response ANQP-element is used to provide service information between STAs in response to a Service Information Request ANQP-element. The Response ANQP-element is used in a GAS Query Response.

The format of the service information response ANQP-element is shown in [Figure 8-576i.](#Figure_8_576i)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Info ID | Length | one or more Detailed Service Information Descriptors |
| Octets | 2 | 2 | variable |

**Figure 8-576i - Service Information Response ANQP-element format**

The format of the Detailed Service Information Descriptor field is shown in Figure [8-576j](#Figure_8_576j)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Basic Service Information Descriptor | Service Information Query Response Length | Service Information Query Response |
| Octets | variable  | 2 | variable |

**Figure 8-576j – Detailed Service Information Descriptor field format**

The Service Information Query Response field is a variable length field. The format of the Service Information Query Response is service specific that contains requested service information.

***<other fields need to be described>***

The procedure used for this element is described in clause 10.25.3.2.12.

**8.4.4.23 Encapsulation PAD ANQP-element**

The Encapsulation PAD ANQP-element is used to exchange upper layer protocol (ULP) frames between STAs using the GAS protocol. The Encapsulation PAD ANQP-element is used as a request included in a GAS Query Request or returned as a response in the GAS Query Response.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Info ID | Length | Payload |
| Octets: | 2 | 2 | variable |

**Figure 8-409aq – Encapsulation PAD ANQP-element format**

The Length and Token fields are defined in 8.4.6.1 (General).

The format of the Payload sub-field is an encapsulated upper layer protocol (ULP) frame and relates to the ULPs defined in Table 8-402aq.

The procedure used for this element is described in clause 10.25.3.2.13.

***Modify the text and table in the following clause:***

* + - 1. ANQP procedures(11u)

10.25.3.2.1 General(Ed)

In this clause, ANQP refers to the Advertisement Protocols indicated by the Advertisement Protocol IDs 0 and 5.

A STA may use ANQP to retrieve information as defined in Table 8-184 from a peer STA. The ANQP requests use ANQP-elements that include the ANQP-element type of Q in Table 10-10. The ANQP query request uses the Query List ANQP-element comprised of ANQP-elements Info IDs from Table 8-184.

These ANQP requests are transported in the Query Requst field of GAS Request frames as per 10.25.3.1.4. The ANQP responses are transported in the Query Response field of GAS Response frames, as per 10.25.3.1.4.

(see REVmc 3.3)

|  |  |
| --- | --- |
| * ANQP usage (11u)
 |  |
|  |  | BSS | IBSS | Advertisment Protocol ID |
| ANQP-element Name | ANQP-element (subclause)(Ed) | ANQP-element Type | AP | Non-AP STA | STA |  |
| Query List | 8.4.4.1 (Query List ANQP-element (11u)) | Q | T, R | T, R | T, R | 0 |
| Capabililty List | 8.4.4.2 (Capabililty List ANQP-element(11u)) | S | T, R | T, R | T, R | 0 |
| Venue Name | 8.4.4.3 (Venue Name ANQP-element (11u)) | S | T | R | — | 0 |
| Emergency Call Number | 8.4.4.4 (Emergency Call Number ANQP-element (11u)) | S | T | R | — | 0 |
| Network Authentication Type | 8.4.4.5 (Network Authentication Type ANQP-element(11u)) | S | T | R | — | 0 |
| Roaming Consortium | 8.4.4.6 (Roaming Consortium ANQP- element(11u)) | S | T | R | — | 0 |
| Vendor Specific | 8.4.4.7 (Vendor Specific ANQP-element(11u)) | Q, S | T, R | T, R | T, R | 0 |
| IP Address Type Availability | 8.4.4.8 (IP Address Type Availability ANQP-element (11u)) | S | T, R | T, R | T, R | 0 |
| NAI Realm | 8.4.4.9 (NAI Realm ANQP-element(11u)) | S | T | R | T, R | 0 |
| 3GPP Cellular Network | 8.4.4.10 (3GPP Cellular Network ANQP-element(11u)) | S | T | R | — | 0 |
| AP Geospatial Location | 8.4.4.11 (AP Geospatial Location ANQP-element(11u)) | S | T | R | T, R | 0 |
| AP Civic Location | 8.4.4.12 (AP Civic Location ANQP-element(11u))  | S | T | R | T, R | 0 |
| (#13006)AP Location Public Identifier URI | 8.4.4.13 (AP Location Public Identifier URI ANQP-element(11u))  | S | T | R | T, R | 0 |
| Domain Name | 8.4.4.14 (Domain Name ANQP-element(11u)) | S | T | R | — | 0 |
| Emergency Alert Identifier URI | 8.4.4.15 (Emergency Alert URI ANQP-element(11u)) | S | T | R | T, R | 0 |
| TDLS Capability (#13018) | 8.4.4.17 (TDLS Capability ANQP-element(#13018)) | Q, S | T,R | T,R | T, R | 0 |
| Emergency NAI | 8.4.4.16 (Emergency NAI ANQP-element(11u)) | S | T | R | — | 0 |
| Neighbor Report | 8.4.4.18 (Neighbor Report ANQP-element) | S | T | R | - | 0 |
| Service Information Request | 8.4.4.20 (Service Information Request ANQP-element) | Q | T, R | T,R | T, R | 5 |
| Service Information Response | 8.4.4.21 (Service Information Response ANQP-element) | S | T, R | T, R | T, R | 5 |
| Encapsulation PAD | 8.4.4.23 (Encapsulation PAD ANQP-element | Q, S | T,R | T,R | T, R | 5 |
| **Symbols**Q element is an ANQP queryS element is an ANQP responseT ANQP-element may be transmitted by MAC entityR ANQP-element may be received by MAC entity— ANQP-element is neither transmitted nor received by MAC entity |  |

***Insert the following new subclauses***

**10.25.3.2.11 ANQP-SD procedures**

ANQP-SD uses an alternative Advertisment Protocol ID (i.e. 5) as opposed to the non service discovery ANQP (i.e. using Advertisment Protocol ID equal to 0). This is to allow the receiving STA to proxy ANQP-SD queries an alternative server in an external network, if required. The receiving STA may also directly respond to ANQP-SD queries.

Since a GAS query only has a single Advertisment Protocol ID, a requesting STA shall not send a mixture of ANQP and ANQP-SD queries simultaneously. If the receiving STA or server in an external network receives an ANQP-element that is not supported, it is discarded.

**10.25.3.2.11.1 Service Information Request procedure**

The Service Information Request ANQP-element is used by a requesting STA to perform an ANQP-SD request using the procedures defined in 10.25.3.2.1.

The Service Information Request ANQP-element is used to discover available services within the BSS. A Service Name may be placed within the request. The Service Name is used within the BSS to assist with discovering services, as described in Annex AQ.

The Service Discovery Request ANQP-element is re-directed to the proxy as described in Annex AQ, as this query is directed to the Service Information Server, as opposed to an ANQP Advertisement Server.

If no Service Name value is present, the BSS will return all known services within the response.

**10.25.3.2.11.2 Service Information Response procedure**

The Service Information Response ANQP-element is returned in response to a Service Information Request ANQP-element. It contains a list of Service Information Descriptors resulting from the service discovery as described in Annex AQ

**10.25.3.2.11.3 Encapsulation PAD procedure**

The Encapsultation PAD ANQP-element is used by STAs to allow the transmission of upper layer protocol frames using ANQP-SD request and responses using the procedures defined in 10.25.3.2.1.

The Encapsultation PAD ANQP-element is re-directed to the proxy as described in Annex AQ, as this query is directed to the Service Information Server, as opposed to an ANQP Advertisement Server.

The Encapsulation PAD ANQP-element provides a means to exchange service discovery information between STAs. The elements support multiple service discovery protocols.

***Modify the following clauses:***

#### 10.25.3.3a Pre-association discovery (PAD) protocol procedures

##### 10.25.3.3a.1 General

PAD provides functionality that enables STAs to discover the availability of services offered by an AP, before they associate with the wireless LAN. While the specification of service specific information is outside the scope of this standard, the AP can act as a proxy to the services offered by an external network or services offered by non-AP STAs associated with the AP.

There are two types of PAD: unsolicited and solicited.
In the unsolicited PAD, basic service information is included in the Beacons transmitted by the AP. Upon receiving the Beacon frames, the non-AP STAs can make an informed decision to associate with the AP, or query for more detailed service information, using ANQP as described in 8.4.4.20 before association.

In the solicited PAD, basic service information is included in the Probe Request transmitted by the non-AP STA. Upon receiving the Probe Request, the AP responds with a Probe Response only if there is a service match between the non-AP STA and the AP. The non-AP STAs can make an informed decision; to associate with the AP, or query for more detailed service information, using ANQP as described in 8.4.4.20 before association

{Editor’s note: do we need to clarify how the PAD procedures work in a multi-AP environment deployed near each other?}

##### 10.25.3.3a.2 Unsolicited PAD

An AP having dot11UnsolictedPADActivated equals to true shall include a Service Hint Information element or Service Advertisement Information element or both in Beacon frames.

The non-AP STA may associate with the AP based on the received Service Hint Information element or may use a Service Information Request ANQP-element to request more detailed information as defined in Table 8-184 prior to association. The receiving AP shall respond to the Service Information Request ANQP-element with a Service Information Response ANQP-element.

##### 10.25.3.3a.3 Solicited PAD

A non-AP STA having dot11PADActivated equals to true may send Probe Request containing Service Hash element

An AP having dot11SolictedPADActivated equals to true shall include Service Advertisement Information element in Probe Response frame, if there is one or more Service Hashes matching with the received Probe Request containing the Service Hash element sent by the non-AP STA.

The non-AP STA may associate with the AP based on the received Service Advertisement Information element or may use a Service Information Request ANQP-element to request more detailed information as defined in Table 8-184 prior to association. The receiving AP shall respond to the Service Information Request ANQP-element with a Service Information Response ANQP-element.