the ANQP server, including the indication that the wireless device is associated with the access point device and the BSS query originated by the wireless device, in accordance with at least one embodiment of the present invention.

[0081] FIG. **3**C illustrates an example frame format of the backbone network frame for the BSS candidate list response message transmitted by the ANQP server to the access point device, in response to the BSS query originated by the wireless device (STA) that is associated to the access point device, in accordance with at least one embodiment of the present invention.

[0082] FIG. **3**D illustrates an example frame format of the wireless ANQP response message that includes the BSS candidate list identifying one or more candidate wireless networks, in response to the BSS query originated by the wireless device (STA) that is associated to the access point device, in accordance with at least one embodiment of the present invention.

[0083] FIG. **4**A illustrates an example frame format of the wireless ANQP request message that includes a BSS query originated by the wireless device (STA) that is unassociated to the access point device, requesting information on candidate wireless networks, in accordance with at least one embodiment of the present invention.

[0084] FIG. **4**B illustrates an example frame format of the backbone network frame for the BSS query forwarding message transmitted by the access point transmitting the to the ANQP server, including the BSS query originated by the wireless device (STA), and which does not include any indication of whether the wireless device is or is not associated with the access point, in accordance with at least one embodiment of the present invention.

[0085] FIG. **4**C illustrates an example frame format of the backbone network frame for the minimal or limited guidance to possible BSS message concerning candidate wireless networks, in response to the BSS query originated by the wireless device (STA) that is unassociated to the access point device, in accordance with at least one embodiment of the present invention.

[0086] FIG. **4**D illustrates an example frame format of the wireless ANQP response message that includes the minimal or limited guidance to possible BSS message concerning candidate wireless networks, in response to the BSS query originated by the wireless device (STA) that is unassociated to the access point device, in accordance with at least one embodiment of the present invention.

[0087] FIG. **5**A illustrates an example flow diagram of operational steps in the access point device, in accordance with at least one embodiment of the present invention.

[0088] FIG. **5**B illustrates an example flow diagram of operational steps in the ANQP server, in accordance with at least one embodiment of the present invention.

[0089] FIG. **6** illustrates an example network diagram and functional block diagram of the access point device and the ANQP server, in accordance with at least one embodiment of the present invention.

[0090] FIG. **7** illustrates an example embodiment of the invention, wherein examples of removable storage media are shown, based on magnetic, electronic and/or optical technologies, such as magnetic disks, optical disks, semiconductor memory circuit devices and micro-SD memory cards (SD refers to the Secure Digital standard) for storing data and/or computer program code as an example computer program product, in accordance with an example embodiment of the invention.

DISCUSSION OF EXAMPLE EMBODIMENTS OF THE INVENTION

[0091] This section is organized into the following topics:

[0092] A. WLAN Communication Technology

[0093] B. STA Identification and State Information to ANQP Server

[0094] A. WLAN Communication Technology

[0095] The IEEE 802.11 standard specifies methods and techniques of an exemplary wireless local area network (WLAN) operation. Examples include the IEEE 802.11b and 802.11g wireless local area network specifications, which have been a staple technology for traditional WLAN applications in the 2.4 GHz ISM band. The various amendments to the IEEE 802.11 standard were consolidated for IEEE 802.11a, b, d, e, g, h, i, j, k, n, r, s, u, v, and z protocols, into the base standard *IEEE* 802.11-2012, *Wireless Medium Access Control* (*MAC*) *and Physical Layer* (*PHY*) *Specifications*, February 2012. Since then, emerging broadband applications have stimulated interest in developing very high-speed wireless networks for short range communication, for example, the planned IEEE 802.11ac, and the planned IEEE 802.11ad WLAN specifications that are to provide a very high throughput in various frequency bands. Applications of these IEEE 802.11 standards include products such as consumer electronics, telephones, personal computers, and access points for both for home and office.

[0096] 1. IEEE 802.11 MAC Frames and Information Elements

[0097] There are three major types of medium access control (MAC) frames in the IEEE 802.11 protocol: the management frame, the control frame, and the data frame. Management frames provide management services. Data frames carry payload data. Control frames assist in the delivery of data frames. Each of these types of MAC frame consists of a MAC header, a frame body, and a frame check sequence (FCS). The header contains control information used for defining the type of 802.11 MAC frame and providing information necessary to process the MAC frame. The frame body contains the data or information included in either management type or data type frames. The frame check sequence is a value representing a cyclic redundancy check (CRC) over all the fields of the MAC header and the frame body field.

[0098] Management frames are used to provide management services that may be specified by variable-length fields called information elements included in the MAC frame body. An information element includes three fields: its function is identified by an element ID field, its size is provided by a length field, and the information to deliver to the recipient is provided in a variable-length information field.

[0099] 2. IEEE 802.11 Beacon, Probe Request and Response

[0100] a. Beacon

[0101] The beacon frame is a management frame that is transmitted periodically to allow wireless devices to locate and identify a network. The beacon frame includes the fields: timestamp, beacon interval, and capability information. The timestamp contains the value of the device's synchronization timer at the time that the frame was trans-