IEEE P802.11  
Wireless LANs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Comments related to FILS IP address assignment | | | | | |
| Date: 2013-11-11 | | | | | |
| Author(s): | | | | | |
| Name | Affiliation | Address | Phone | | email |
| Abhishek Patil  George Cherian | Qualcomm | 5775 Morehouse Dr, San Diego, CA, USA | | +1 858 651 6645 | gcherian@qti.qualcomm.com |

Abstract

Comments related to FILS IP address assignment

Addresses following CIDs

CID2868, CID2169, CID2170, CID2171, CID3068, CID3177, CID3176, CID3033

* Reassociation Response frame format

|  |  |  |
| --- | --- | --- |
| * Reassociation Response frame body | | |
| Order | Information | Notes |
| 6 | FILS Session | present whenif dot11FILSActivated is true. |
| 7 | FILS Public Key | optionally present whenif dot11FILSActivated is true. |
| 8 | FILS Key Confirmation | present whenif dot11FILSActivated is true. |
| 9 | FILS KDE Container | A field that contains the KDE information. |
| 10 | [No CID, Editorial error]FILS Secure Container | optionally present if dot11FILSActivated is true. |

* FILS Secure Container element [CID #1086]

FILS Secure Container element includes one or more FILS Secure Container TLV(s). FILS Secure Container TLVs are shown in Table  8-183ai (FILS Secure Container TLV).

|  |  |  |  |
| --- | --- | --- | --- |
| * FILS Secure Container TLV [CID #1086] | | | |
| Type | Type ID | Length (octets) | Extensible |
| FILS HLP Wrapped data | 1 | variable but limited by MPDU [CID #1297] | No |
| FILS IP Address Request | 2 | 4 to 255 | No |
| FILS IP Address Assignment | 3 | 4 to 255 | No |
| FILS DNS Information | 4 | 4 to 255 | No |
| KEY RSC | 5 | 19 | No |
| GTK Transfer | 6 | 4 to 255 | No |

The format of the FILS Secure Container element is shown in Figure 8-401dg (FILS Secure Container element format). [CID1433]

|  |  |  |  |
| --- | --- | --- | --- |
|  | Element ID | Length | FILS Secure Container TLV(s) |
| Octets: | 1 | 1 | variable |
| * FILS Secure Container element format [CID #1433] | | | |

**[CID #1108]**FILS Secure Container TLVs are used to carry out various purpose such as IP address assignment and GTK transfer.[CID1086]

* FILS HLP wrapped data TLV [CID #1108, 1188]

The FILS HLP wrapped data element contains higher layer packets transported during association. One or more FILS HLP wrapped data TLVs may be included in an Association Request, a Reassociation Request an Association Response, or a Reassociation Response frames if dot11FILSActivated is true.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | TLV ID | Length | | Destination MAC Address | | |
| Octets: | 1 | 2 | | 6 | | |
|  |  |  |  |  |  |  |
|  | Source MAC Address | | | | LLC/SNAP | HLP |
| Octets: | 6 | | | | variable | variable |
| * FILS HLP Wrapped Data TLV format [CID #1435] | | | | | | |

[CID #1318]

The Element ID field is equal to the FILS HLP Wrapped data value in Table  8-183ai (FILS Secure Container TLV). [CID #1015, 1191, 1319]

The value of the Length field is 12 plus the length of data after Source MAC Address including LLC/SNAP and HLP

The value of Destination MAC Address field is the destination MAC address of the HLP.

The value of Source MAC Address field is the source MAC address of the HLP.

The value of LLC/SNAP field is the LLC header and SNAP header (if applicable) of the HLP. If the LLC field is equal to 0xaa 0xaa, a 5-octet SNAP header is added, see 4.2.5. [CID #1434]

The HLP field contains the HLP.

* FILS IP address request TLV [13/0596r1]

FILS IP address request TLV is used by STA to request IP address using FILS IP Address assignment method. FILS IP address request TLV may be sent in an Association Request, a Reassociation Request or a FILS Secure Container Action frame if dot11FILSActivated is true.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | TLV ID | Length | IP Address Request Control | Requested IPv4 address (optional) | Requested IPv6 address (optional) |
| Octets: | 1 | 1 | 1 | 4 | 16 |
| * FILS IP address request TLV [13/0596r1] | | | | | |

The TLV ID field is set to the FILS IP Address Assignment value.

The value of IP Address Request Control is as follows

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 | B5 B7 |
|  | IPv4 request | IPv4 request type | IPv6 request | IPv6 request) type | DNS server address request | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 3 |
| * IP address request control | | | | | | |

**[13/0596r1]**A STA sets IPv4 request subfield to 1 if STA is requesting an IPv4 address and sets it to 0 otherwise.

A STA sets IPv4 request type subfield to 1 if STA requests a new IPv4 address and sets it to 0 if STA requests the IPv4 address that is present in the TLV.

A STA sets IPv6 request subfield to 1 if STA is requesting an IPv6 address and sets it to 0 otherwise.

A STA sets IPv6 request type subfield to 1 if STA requests a new IPv6 address and sets it to 0 if STA requests the IPv6 address that is present in the TLV.

A STA sets DNS server address request subfield to 1 if STA is requesting DNS server(s) address(es). **[13/0596r1]**

The value of Requested IPv4 address is the IPv4 address requested by the STA if IPv4 Request type bit of IP Address Request control field is '0'

The value of Requested IPv6 address is the IPv6 address requested by the STA if IPv6 Request type bit of IP Address Request control field is '0'

* FILS IP Address Assignment TLV

FILS IP Address Assignment TLV is used by AP to include IP address using FILS IP Address assignment method. FILS IP Address Assignment TLV may be sent in an Association Response, a Reassociation Response, or a FILS Secure Container Action frame if dot11FILSActivated is true.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | TLV ID | Length | IP Address Response Control | | Assigned IPv4 address (optional) | Gateway IPv4 address (optional) |
| Octets | 1 | 2 | 1 | | 4 | 4 |
|  | IPv4 Gateway MAC address (optional) | | | Subnet mask (optional) | Assigned IPv6 address (optional) | |
| Octets | 6 | | | 4 | 16 | |
|  | IPv6 Gateway address (optional) | | | IPv6 Gateway MAC address (optional) | | IPv6 prefix length (optional) |
| Octets | 16 | | | 6 | | 1 |
|  |  |  | | TTL IPv4 (optional) | TTL IPv6 (optional) | [CID2868, CID2170]IP address request timeout (optional) |
|  |  | Octets | | 2 | 2 | 1 |
| * IP Address Assignment TLV [CID #1354 | | | | | | |

The TLV ID field is set to the FILS IP Address Assignment value.



[CID2868, CID2170]

[CID2868, CID2170]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|  | IP[CID #1289address assignment pending | | IPv4 assigned  (optional) | Subnet mask included  (optional) | IPv6 assigned  (optional) | Prefix length included  (optional) | TTL-IPv4 included  (optional) | TTL-IPv6 included  (optional) | Reserved |
| Bits: | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|  | | * IP Address Response Control | | | | | | | | |

[CID2868, CID2170]it

An AP sets IPv4 Assigned subfield to 1 if Assigned IPv4 address, Gateway IPv4 address and IPv4 Gateway MAC Address are included in the TLV and sets it to 0 otherwise. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

An AP sets Subnet mask included subfield to 1 if IPv4 Assigned subfield is set to 1 and if the subnet mask is included in the TLV for the Assigned IPv4 address and sets it to 0 otherwise. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

An AP sets IPv6 Assigned subfield to 1 if Assigned IPv6 address, Gateway IPv6 address and IPv6 Gateway MAC Address are included in the TLV and sets it to 0 otherwise. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

An AP sets Prefix Length included subfield to 1 if IPv6 Assigned subfield is set to 1 and if the prefix length is included in the TLV for the Assigned IPv6 address and sets it to 0 otherwise. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

An AP sets TTL IPv4 included subfield to 1 if IPv4 Assigned subfield is set to 1 and the Time to Live for IPv4 is included in the TLV. If this field is set to '0', and if IPv4 Assigned is set to '1', then the IPv4 is assumed to be valid during the entire time of Association with the AP. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

An AP sets TTL IPv6 included subfield to 1 if IPv6 Assigned subfield is set to 1 and the Time to Live for IPv6 is included in the TLV. If this field is set to '0', and if IPv6 Assigned is set to '1', then the IPv6 is assumed to be valid during the entire time of Association with the AP. This field is set to 0 if IP address assignment pending subfield is set to ‘1’.

[CID #1437, 13/0596r1]

[Editorial]If the value of IPv4 Assigned bit in the IP Address Response Control field is '1', then Assigned IPv4 address field is included and its value is set to the assigned IPv4 address.

[Editorial]If the value of IPv4 Assigned bit in the IP Address Response Control field is '1', then Gateway IPv4 address field is included and its value is set to the IP address of the IPv4 Gateway.

[Editorial]If the value of IPv4 Assigned bit in the IP Address Response Control field is '1', then Gateway MAC Address field is included and its value is set to the MAC address of the IPv4 Gateway.

[Editorial]If the Subnet mask included bit in the IP Address Response Control field is '1', then Subnet Mask field is included and its value is set to the subnet mask of the IPv4 subnet.

[Editorial]If the value of IPv6 Assigned bit in the IP Address Response Control field is '1', then Assigned IPv6 address field is included and its value is set to the assigned IPv6 address.

[Editorial]If the value of IPv6 Assigned bit in the IP Address Response Control field is '1', then Gateway IPv6 address field is included and its value is set to the IP address of the IPv6 Gateway.

[Editorial]If the value of IPv6 Assigned bit in the IP Address Response Control field is '1', then IPv6 Gateway MAC Address field is included and its value is set to the MAC address of the IPv6 Gateway.

[Editorial]If the value of Prefix Length bit in IP Address Response Control field is '1', then IPv6 Prefix Length field is included and its value is set to the prefix length of the IPv6 network.

[Editorial]If the value of TTL-IPv4 bit in IP Address Response Control field is '1', then TTL IPv4 field is included and its value is set to the IPv4 Time to Live in the unit of seconds.

[Editorial]If the value of TTL-IPv6 bit in IP Address Response Control field is '1', then TTL IPv6 field is included and its value is set to the IPv6 Time to Live in the unit of seconds.

[CID2868, CID2170]If the value of IP [CID #1289address assignment pending bit in the IP Address Response Control field is '1', then IP address request timeout is included and its value is set to the maximum estimated time in the unit of seconds within which the AP may assign an IP address to the requesting STA.

* FILS DNS Information TLV

FILS DNS Information TLV is used by AP to send DNS information in the FILS IP Address assignment method. FILS DNS Information TLV may be sent in an Association Response, a Reassociation Response [Editorial]or a FILS Secure Container Action frame if dot11FILSActivated set to true. FILS DNS Information TLV carries IP address and MAC address information of the DNS Server to which the DNS queries may be sent

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | TLV ID | Length | DNS Info Control | DNS server IPv4 address (optional) | DNS server IPv6 address (optional) | IPv4 DNS server MAC address (optional) | IPv6 DNS server MAC address (optional) |
| Octets: | 1 | 1 | 1 | 4 | 16 | 6 | 6 |
| * DNS server information TLV | | | | | | | |

The TLV ID field is the FILS DNS Information value.

The value of DNS Info Control is as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [Editorial] | B0 | B1 | B2 | B3 | B4 B7 |
|  | DNS server IPv4 address present | DNS server IPv6 address present | IPv4 DNS server MAC address present | IPv6 DNS server MAC address present | reserved |
| Bits: | 1 | 1 | 1 | 1 | 4 |
| * DNS Info control field | | | | | |

An AP sets DNS Server IPv4 address Present subfield to 1 if IPv4 DNS server IPv4 address is present in the TLV and sets it to 0 otherwise.

An AP sets DNS Server IPv6 address Present subfield to 1 if IPv6 DNS server IPv6 address is present in the TLV and sets it to 0 otherwise.

An AP sets IPv4 DNS Server MAC Address Present subfield to 1 if MAC address to which IPv4 based DNS queries may be sent is present and sets it to 0 otherwise.

An AP sets IPv6 DNS Server MAC Address Present subfield to 1 if MAC address to which IPv6 based DNS queries may be sent is present and sets it to 0 otherwise. [CID1438, 13/0596r1]

[CID1438, 13/0596r1]The value of DNS Server IPv4Address is the IPv4 address of the DNS server if DNS Server IPv4address Present bit of DNS Info Control is '1'

The value of DNS Server IPv6Address is the IPv6 address of the DNS server if DNS Server IPv6 address Present bit of DNS Info Control is '1'

The value of IPv4 DNS Server MAC Address is the MAC address of theIPv4 DNS server if IPv4 DNS Server MAC Address Present bit of DNS Info Control is '1'

The value of IPv6 DNS Server MAC Address is the MAC address of theIPv6 DNS server if IPv6 DNS Server MAC Address Present bit of DNS Info Control is '1'

* FILS Action Frames

The FILS Action Frame is used for FILS operation after the non-AP STA has associated with the AP. A FILS Action field, in the octet immediately after the Category field, differentiates the FILS Action frame formats. The defined FILS Action frames are listed in Table  8-281al (FILS Action frame fields).

|  |  |
| --- | --- |
| * FILS Action frame fields | |
| Action field value | Description |
| 0 | FILS [CID2171]Secure Container Action frame |
| 1-255 | Reserved |

* FILS [CID2171, CID3177, CID3176, CID3033]Secure Container Action frame [CID 1227 from 13/0607r2, 13/0596r1]

FILS Secure Container Action frame is used to exchange TLVs in the FILS Secure Container as defined in Table 8-183ai except for FILS HLP Wrapped data. [CID3068, CID3176]

|  |  |  |  |
| --- | --- | --- | --- |
|  | Category | FILS Action | FILSSecure Container elements (defined in  8.4.2.186 (FILS Secure Container element)) |
| Octets: | 1 | 1 | Variable |
| * FILS Secure Container Action frame format | | | |

The Category field is set to the value for public action defined in Table  8-38 (Category values).

The FILS Action field is set to the value given in Table  8-281al (FILS Action frame fields) for FILS Secure Container Action frame

[CID2171]The FILS Secure Container element carries the FILS parameters for IP address assignment and DNS server information.

* address setup during association/reassociation procedure [CID #1321, 1322, 1323, 13/0596r1]

IP address setup may be performed during association/reassociation procedure. Two mechanisms are defined for IP address setup: (a) encapsulation of a higher layer protocol, such as DHCP, (b) FILS IP address configuration. The choice is determined by the STA based on what IP Address assignment methods are supported by the AP.

IP address setup procedure may be[CID #1367) protected by securing FILS Secure Container element. [CID #1086, 13/0596r1]

* IP address assignment using higher layer packet encapsulation, 1322, 1323)

“FILS HLP Wrapped data” field of MLME-ASSOCIATE.request or MLME-REASSOCIATE.request is used to request an IP address using an encapsulation a higher layer protocol (such as DHCP). STA sends “FILS HLP Wrapped data TLV” in the FILS Secure Container element of the Association/Reassociation Request frame. [CID #1086, 13/0596r1]

When the AP receives Association/Reassociation Request frame including FILS Secure Container element with FILS HLP Wrapped data TLV, the AP forwards the HLP(s) to the DS. [CID #1086, 13/0596r1]

If the AP receives HLP(s) from DS targeted to the STA before AP transmits Association Response frame, then the AP may include the HLP(s) as FILS HLP Wrapped data TLV of FILS Secure Container element. If the AP receives HLP(s) from DS targeted to the STA after AP transmits Association Response frame, the AP sends it to the STA as a normal data frame. [CID #1086, 13/0596r1]

When the non-AP STA receives Association Response with HLP Wrapped data TLV, the non-AP STA decapsulates the HLP(s) and generates MA-UNITDATA.indication primitive for each HLP.

* IP address assignment using FILS IP Address Configuration [CID #1321, 1322, 1323)

“FILS IP Address Request data” field of MLME-ASSOCIATE.request or MLME-REASSOCIATE.request is used to request an IP address using FILS IP address method. STA sends “FILS IP Address Request TLV” in the FILS Secure Container element of the Association/Reassociation Request frame or FILS Secure Container Action frame[CID3177]. [CID #1086, 13/0596r1]

When the AP receives an Association Request including FILS Secure Container element or a [CID3177] FILS Secure Container Action Frame with FILS IP Address Request TLV, the AP initiates a procedure to assign an IP address for the STA using a mechanism that not specified in this standard. [CID #1247 and 13/0607r2) [CID #1086, 13/0596r1]

The AP may send Association Response with FILS Secure Container element or [CID3177] FILS Secure Container Action Frame including the assigned IP address in a FILS IP Address Assignment TLV. In addition the AP may also send one or more DNS Information TLVs to provide address information of one or more DNS Servers. [CID #1086, 13/0596r1]

[CID2868, CID2169, CID2170]If the STA has included IP Address Request TLV in the Association Request frame, and if the AP is able to assign IP address in the Association Response frame, then the AP sets the IP address assignment pending flag in the IP Address Response Control field of the FILS IP Address Assignment TLV to '0' and includes the IP address (along with other IP address fields as defined in 8.4.2.186.3) in its Association Response frame send to the requesting STA.

If the STA has included IP Address Request TLV in the Association Request frame, and if the AP is unable to assign IP address in the Association Response frame, then the AP sets the IP address assignment pending flag in the IP Address Response Control field of the FILS IP Address Assignment TLV to '1' and sets the IP address request timeout to the maximum estimated time in the unit of seconds within which it (AP) will try to assign an IP address to the requesting STA.

If a STA receives an Association Response from an AP with the IP address assignment pending flag in the IP Address Response Control field of the FILS IP Address Assignment TLV set to '1' and the STA does not receive the FILS Secure Container Action Frame containing IP assignment within a duration mentioned in the Association Response frame, then the STA may initiate IP address assignment procedure using FILS Secure Container Action frame or mechanisms that are out of scope of this specification.

[CID2171]STA may use FILS Secure Container Action frame to re-request its IP address to extend the TTL.