IEEE P802.11  
Wireless LANs

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| LB257 Resolution for CID 2178 | | | | |
| Date: November 11, 2021 | | | | |
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Abstract

This submission proposes resolution for CID 2178 received from LB257: P802.11bc D2.0 Working Group Recirculation Ballot.

Note: The changes shown are based on 802.11bc draft 2.0.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revise some figure numbers.
* Rev 2: Add descriptions into Clause 11.55. Delete the content related to ANQP Request/Response element.
* Rev 3: Further revisions are made to the text based on the TGbc telco.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page(C)** | **Line(C)** | **Comment** | **Proposed Change** | **Resolution** |
| 2178 | Lei Huang | 9.4 | 24 | 60 | 11bc provides Enhanced Broadcast Request/Response ANQP-element and EBCS Content Request/Response frame for fast acquisition of EBCS service. However, if the EBCS data are authenticated by the PKFA or HCFA algorithm, the EBCS non-AP STA still cannot authenticate the EBCS data before receiving the EBCS Info frame. | Add authentication algorithm related information to the Enhanced Broadcast Request/Response ANQP-element and EBCS Content Request/Response frame. | **Revised.**  Agree with the commenter to add authentication algorithm related information to the EBCS Content Request/Response frame.  TGbc editor to make the changes shown in 11-21/1787r3. |

**Discussion:**

1. Add authentication algorithm related information (i.e., Authentication Info subfield) to the EBCS Content Request/Response frame can be an optional feature for 802.11bc. Only when an EBCS non-AP STA requests the authentication algorithm related information of an EBCS traffic stream, the Authentication Info subfield exists in the EBCS Content Response frame.
2. The overhead of Authentication Info:

When the PKFA is used, the format of Authentication Info subfield is shown as below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Content Authentication Algorithm | Content Information Control | Title Length | Title | Next TX Schedule (optional) | Allowable Time Difference (optional) | Service URL Length  (optional) | Service URL  (optional) | Certificate  Length | Certificate |

Octets: 1 1 1 variable 0 or 2 0 or 2 0 or 1 variable 0 or 2 variable

**Authentication Info subfield format (for PKFA)**

The additional overhead is less than 10 bytes + Length[Title] + Length[Service URL] + Length[Certificate].

**Discussion with Hitoshi:** Since the Certificate field exists in both EBCS UL frame and the first fragment of EBCS Info frame, the Certificate field can be also included in the EBCS Content Response frame.

When the HCFA is used, the format of Authentication Info subfield is shown as below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Content Authentication Algorithm | Content Information Control | Title Length | Title | Next TX Schedule (optional) | Allowable Time Difference (optional) |

Octets: 1 1 1 variable 0 or 2 0 or 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| HCFA Base Key (optional) | Previous Period HCFA Base Key 0 Sequence (optional) | Previous Period HCFA Base Key 0 (optional) | Previous Period HCFA Base Key 1 Sequence (optional) | Previous Period HCFA Base Key 1 (optional) | HCFA Key  Change Interval (optional) |

Octets: 0 or 32 0 or 1 0 or 32 0 or 1 0 or 32 0 or 1

|  |  |  |  |
| --- | --- | --- | --- |
| Number Of Instant Authenticators (optional) | Instant Authenticator List  (optional) | Service URL Length  (optional) | Service URL  (optional) |

Octets: 0 or 1 *n* x 33 0 or 1 variable

**Authentication Info subfield format (for HCFA)**

The additional overhead is less than 108 bytes + *n*\*33+Length[Title] + Length[Service URL].

**Conclusion:** It is possible to add the proposed Authentication Info subfield into EBCS Content Response frame. There is one possible use case that needs lower latency (< 20ms), Use Case 6: VR eSports Video Distribution. Suppose that when we are switching between different VR sport channels, the EBCS Info frame transmits every 1 second. This latency will be a problem for VR video use case. However, if we add the authentication information to the EBCS Content Request frame, the delay of switching between different VR sport channels will be greatly reduced. Although the usage scenario of this function is limited, but it is possible to be an optional function for 802.11bc.

*Editor: Please modify the Figure 9-144d as follows and insert the following content:*

**9.4.1 Fields that are not elements**

**9.4.1.68 EBCS Request field**

The EBCS Request field is included in an EBCS Content Request frame used by an EBCS non-AP STA to request one or more EBCS traffic streams from its associated AP. The format of the EBCS Request field is shown in Figure 9-144b (EBCS Request field format).

EBCS Request Information List

Octets: variable

**Figure 9-144b—EBCS Request field format**

The EBCS Request Information List field contains one or more EBCS Request Info subfields.

The format of the EBCS Request Info subfield is shown in Figure 9-144c (EBCS Request Info subfield format).

|  |  |  |  |
| --- | --- | --- | --- |
| EBCS  Request Info Control | Content ID | Broadcaster MAC Address | Requested Time To Termination |

Octets: 1 1 0 or 6 0 or 3

**Figure 9-144c—EBCS Request Info subfield format**

The format of the EBCS Request Info Control subfield is shown in Figure 9-144d (EBCS Request Info Control subfield).

B0 B1 B2 B3 B7

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Requested Time To  Termination Present | Broadcaster MAC Address Present | (#2178) Request Authentication Info | Reserved |
| Bits: | 1 | 1 | 1 | 5 |

**Figure 9-144d—EBCS Request Info Control subfield**

A value of 1 in the Requested Time To Termination Present subfield indicates that a Requested Time To Termination subfield is present in the same EBCS Request Info subfield. A value of 0 in the Requested Time To Termination Present subfield indicates that a Requested Time To Termination subfield is not present in the same EBCS Request Info subfield.

A value of 1 in the Broadcaster MAC Address Present subfield indicates that a Broadcaster MAC Address subfield is present in the same EBCS Request Info subfield. A value of 0 in the Broadcaster MAC Address Present subfield indicates that a Broadcaster MAC Address subfield is not present in the same EBCS Request Info subfield.

(#2178) A value of 1 in the Request Authentication Info subfield indicates that STA requests the authentication information of the EBCS traffic streams identified by the Content ID included in the EBCS Request Info subfield. A value of 0 in the Request Authentication Info subfield indicates that there is no request for the authentication information of the EBCS traffic streams identified by the Content ID included in the EBCS Request Info subfield.

*Editor: Please modify Figure 9-144f and Figure 9-144g as follows and insert the following content:*

**9.4.1.69 EBCS Response field**

The EBCS Response field is included in an EBCS Content Response frame used by an EBCS AP to respond to a request for one or more EBCS traffic streams from an associated STA. The format of the EBCS Response field is shown in Figure 9-144e (EBCS Response field format).

EBCS Response Information List

Octets: Variable

**Figure 9-144e—EBCS Response field format**

The EBCS Response Information List field contains one or more EBCS Response Info subfields. The format of the EBCS Response Info subfield is shown in Figure 9-144f (EBCS Response Info subfield format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| EBCS  Response Info Control | Content ID | EBCS  Request Failure Code | Time To Termination | EBCS SP  Duration | EBCS SP  Interval | (#2178) Authentication Info |

Octets: 1 1 0 or 1 0 or 3 0 or 2 0 or 2 variable

**Figure 9-144f—EBCS Response Info subfield format**

The format of the EBCS Response Info Control subfield is shown in Figure 9-144g (EBCS Response Info Control subfield).

B0 B1 B2 B3 B4 B5 B7

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | EBCS Request Status | Time to Termination Present | EBCS SP Duration Present | EBCS SP Interval Present | (#2178) Authentication Info Present | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 3 |

**Figure 9-144g—EBCS Response Info Control subfield**

A value of 0 in the EBCS Request Status subfield indicates that the request for the EBCS traffic stream identified by the Content ID subfield included in the same EBCS Response Info subfield is successful and an EBCS Request Failure Code subfield is not included in the same EBCS Response Info subfield. A value of 1 in the EBCS Request Status subfield indicates that the request for the EBCS traffic stream identified by the Content ID subfield included in the same EBCS Response Info subfield is refused and an EBCS Request Failure Code subfield is included in the same EBCS Response Info subfield.

A value 1 in the Time To Termination Present subfield indicates that a Time To Termination subfield is included in the same EBCS Response Info subfield. A value 0 indicates that the same EBCS Response Info subfield does not contain a Time To Termination subfield.

A value 1 in the EBCS SP Duration Present subfield indicates that an EBCS SP Duration subfield is included in the same EBCS Response Info subfield. A value 0 indicates that the same EBCS Response Info subfield does not contain an EBCS SP Duration subfield.

A value 1 in the EBCS SP Interval Present subfield indicates that an EBCS SP Interval subfield is included in the same EBCS Response Info subfield. A value 0 indicates that the same EBCS Response Info subfield does not contain an EBCS SP Interval subfield.

(#2178) A value of 1 in the Authentication Info Present subfield indicates that an Authentication Info subfield is included in the EBCS Response Info subfield. A value of 0 indicates that the EBCS Response Info subfield does not contain an Authentication Info subfield.

The Content ID subfield indicates the ID of the EBCS content stream.

If the request for the EBCS traffic stream identified by the Content ID subfield in the same EBCS Response Info subfield is refused, the value of the EBCS Request Status Code subfield indicates one of the failure codes defined in Table 9-91i (EBCS Request Failure Code).

**Table 9-91i—EBCS Request Failure Code**

|  |  |  |
| --- | --- | --- |
| **Failure Code** | **Name** | **Meaning** |
| 0 | REFUSED\_REASON\_UN- SPECIFIED | Unspecified failure |
| 1 | REFUSED\_ASSOCIA- TION\_REQUIRED | Request for the EBCS traffic stream is refused since the traffic stream requires the requesting STA to be associated. |
| 2-255 |  | Reserved |

The Time To Termination subfield indicates the requested period in number of TBTTs after which the EBCS traffic stream identified by the Content ID subfield included in the same EBCS Response Info subfield is terminated. The value 0 is reserved. An EBCS traffic stream identified by the Content ID subfield contained in an EBCS Response Info subfield has no specific termination time if the EBCS Response Info subfield contains no Time To Termination subfield.

The EBCS SP Duration subfield indicates the nominal duration of each EBCS service period in TUs.

The EBCS SP Interval subfield indicates the target interval between consecutive EBCS service periods for the EBCS traffic stream identified by the Content ID subfield in the same EBCS Response Info subfield in TUs.

*Editor: Please insert the following* *paragraphs after P27L11:*

(#2178) The Authentication Info subfield is used to authenticate an EBCS traffic stream and shown in Figure 9-xx (Authentication Info subfield format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Content Authentication Algorithm | Content Information Control | Title Length | Title | Next TX Schedule (optional) | Allowable Time Difference (optional) | Certificate  Length  (optional) | Certificate  (optional) |

Octets: 1 1 1 variable 0 or 2 0 or 2 0 or 2 variable

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| HCFA Base Key (optional) | Previous Period HCFA Base Key 0 Sequence (optional) | Previous Period HCFA Base Key 0 (optional) | Previous Period HCFA Base Key 1 Sequence (optional) | Previous Period HCFA Base Key 1 (optional) | HCFA Key  Change Interval (optional) |

Octets: 0 or 32 0 or 1 0 or 32 0 or 1 0 or 32 0 or 1

|  |  |  |  |
| --- | --- | --- | --- |
| Number Of Instant Authenticators (optional) | Instant Authenticator List  (optional) | Service URL Length  (optional) | Service URL  (optional) |

Octets: 0 or 1 *n* x 33 0 or 1 variable

**(#2178) Figure 9-xx Authentication Info subfield format**

Each of the subfields, and the allowed combinations of subfields, are defined in 9.6.7.54 (EBCS Info frame format).

*Editor: Please insert the following content to subclause 11.55.2.3:*

**11.55 Enhanced Broadcast Services procedures**

**11.55.2 EBCS DL procedures**

**11.55.2.3 EBCS DL operation at an EBCS receiver**

An EBCS receiver finds an EBCS capable AP by receiving Beacon frames, Probe Response frames, EBCS Info frames or by receiving an Enhanced Broadcast Services ANQP-element. To validate the source of an EBCS traffic stream, an EBCS receiver shall use the content of received EBCS Info frames or EBCS Content Response frames. An EBCS receiver is able to know when the next EBCS Info frame is transmitted by inspecting the EBCS Parameters element in Beacon frames and Probe Response frames. An EBCS receiver may select the EBCS traffic streams to receive and consume. Details of the usage of the EBCS Info frame is described in 11.55.2.4 (EBCS Info frame generation and usage).

*Editor: Please insert the following content to subclause 11.55.4:*

**11.55.4 EBCS negotiation procedure for associated STAs**

To request one or more EBCS traffic streams provided by an EBCS AP, with which an EBCS non-AP STA is associated, the STA shall transmit an EBCS Content Request frame to the EBCS AP. To request one or more EBCS traffic streams that an EBCS AP has indicated require association, an unassociated EBCS non-AP STA shall associate with the EBCS AP and subsequently transmit an EBCS Content Request frame. A request for one or more EBCS traffic streams that does not require association may also be included in the same EBCS Content Request frame. When requesting an EBCS traffic stream using an EBCS Content Request frame, an EBCS non-AP STA may request an EBCS traffic stream with a certain time to termination as indicated in the Requested Time To Termination field included in the EBCS Content Request frame. This element optionally allows the non-AP STA to provide the MAC address of the AP currently serving the EBCS traffic stream, which might not be the same as the one receiving the request. An EBCS non-AP STA may authenticate an EBCS traffic stream by requesting the authentication information using the Request Authentication Info subfield.

After receiving an EBCS Content Request frame from an associated EBCS non-AP STA, an EBCS AP shall respond with an EBCS Content Response frame. If the EBCS AP indicates in the EBCS Content Response frame that the request for an EBCS traffic stream is successful, it may include a Time To Termination field to indicate the time to termination for the EBCS traffic stream. It may also include EBCS SP duration, the EBCS SP interval and authentication information for the EBCS traffic stream in the EBCS Content Response frame. The Authentication Info subfield of the EBCS Content Response frame can be used by an associated EBCS non-AP STA to authenticate an EBCS traffic stream before receiving the EBCS Info frame, thus reducing the EBCS DL latency.

An EBCS non-AP STA that receives an EBCS Content Response frame may negotiate for the extension of an EBCS traffic stream if the EBCS traffic stream indicated in one of the EBCS Response Info subfields terminates earlier than desired. The EBCS STA may negotiate the extension of the EBCS traffic stream by transmitting another EBCS Content Request frame to its associated AP by including a desired value in the Requested Time To Termination subfield in the EBCS Request Info subfield whose Content ID subfield corresponds to the EBCS traffic stream.

NOTE 1—Which values of a received Time To Termination subfield are considered desirable is determined by the receiving EBCS non-AP STA and is beyond the scope of this standard.

NOTE 2—The EBCS transmitter of an EBCS traffic stream has the authority to determine the time to termination of the EBCS traffic stream.