IEEE P802.11
Wireless LANs

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| --- |
| Resolutions for Clause 11.100.2 |
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|  |  |  |  |  |

Abstract

This document describes the resolutions for clause 11.100.2 on LB252.

**The baseline is D1.03.**

**Gray backgrounded text indicates architecture related texts.**

# Suggested resolution

***TGbc editor: please add the following definitions:***

3.2 Definitions specific to IEEE 802.11

**enhanced broadcast services (EBCS) Data frame:** a Data frame used to carry an EBCS traffic stream. [1149, 1415]

***TGbc editor: please add the following subclauses at the end of clause 5.1.5:***

5.1.5 MAC data service architecture

5.1.5.2 Non-GLK non-AP role

The MAC data plane architecture of a non-GLK non-AP STA is completed by replacing the role-specific behavior block with that shown in Figure 5-3 (Role-specific behavior block for a non-GLK non-AP STA).

The function of this block in a non-AP STA is to perform destination address filtering as described in 10.2.8

(MAC data service).

NOTE—In implementations, the DA address filtering function may be done “lower in the stack.” It is shown in the rolespecific behavior block location for simplicity, and any implementation choice needs to provide equivalent behavior.

NOTE—When a non-GLK non-AP STA is not associated with an AP, EBCS traffic get through IEEE 802.1X port.

5.1.5.3 Non-GLK AP role

In a non-GLK AP, the MAC data plane architecture includes distribution system access in its role-specific behavior block, as shown in Figure 5-4 (Role-specific behavior block for a non-GLK AP). This block provides access to the DS for associated non-AP STAs as described in 4.5.2.1 (Distribution).

NOTE—This behavior block indicates that there is no access through the controlled port to or from the local upperlayers (the LLC sublayer) at an AP. Any such access is logically achieved in the architecture via transition of the DS and Portal to an integrated LAN. In actual implementations, this is likely to be optimized, and Data frames appear to be delivered directly to one or more local LLC sublayer entities on the same physical device as the AP. Such optimization is effectively distributing the functions of the DS and Portal, and it is the responsibility of the implementation to ensure the logical behavior of these entities is maintained.

NOTE---The EBCS traffic might originate from another STA in the ESS, or from a device outside the ESS, through a portal.

5.1.5.11 EBCS non-GLK AP role [1409]

In an EBCS non-GLK AP, the MAC data plane architecture includes distribution system access in its role-specific behavior block, as shown in Figure 5-9 (Role-specific behavior block for an EBCS non-GLK AP). This block provides access to the DS for associated non-AP STAs as described in 4.5.2.1 (Distribution). The EBCS filter identifies EBCS Data frames according to the dot11EBCSContentList. The EBCS filter forwards EBCS MSDUs for which the EBCS content ID in the EBCS content ID Parameter in the MA-UNITDATA.request primitive is not null, and non-EBCS MSDUs to the IEEE 802.1X Controlled Port as described in 5.1.5.3 (Non-GLK AP role).

NOTE---The EBCS traffic might originate from another STA in the ESS, or from a device outside the ESS, through a portal.



Figure 5-9 Role-specific behavior block for an EBCS non-GLK AP

5.2.3 MA-UNITDATA.request [1409]

5.2.3.2 Semantics of the service primitive

***TGbc editor: please modify the parameter of MA-UNITDATA.request as follows:***

The parameters of the primitive are as follows:

MA-UNITDATA.request(

 source address,

 destination address,

 routing information,

 data,

 priority,

 drop eligible,

 service class,

 station vector,

 MSDU format,

 EBCS content ID

 )

***TGbc editor: please insert the following paragraph at the end of clause 5.2.3.2:***

The EBCS content ID parameter specifies the EBCS content ID. If the MSDU is not EBCS traffic, the EBCS content ID parameter is null.

5.2.4 MA-UNITDATA.indication

5.2.4.2 Semantics of the service primitive

***TGbc editor: please modify the parameter of MA-UNITDATA.indication as follows:***

The parameters of the primitive are as follows:

MA-UNITDATA.indication(

 source address,

 destination address,

 routing information,

 data,

 priority,

 drop eligible,

 service class,

 station vector,

 MSDU format,

 EBCS content ID

 )

***TGbc editor: please insert the following paragraph at the end of clause 5.2.3.2:***

The EBCS content ID parameter specifies the EBCS content ID. If the MSDU is not EBCS traffic, the EBCS content ID parameter is null.

9.2.4 Frame fields

9.2.4.1 Frame Control field

9.2.4.1.3 Type and Subtype subfields

***TGbc editor: pleaseadd the following line to Table 9-1:***

Table 9-1--- Valid type and subtype combinations [1409, 1415]

|  |  |  |  |
| --- | --- | --- | --- |
| Type valueB3 B2 | Typedescription | Subtype valueB7 B6 B5 B4 | Subtype description |
| 10 | Data | [ANA] | EBCS Data |

9.3.3 Management frames

9.3.3.2 Beacon frame format [1005]

***TGbc editor: please insert the following line before “Vendor Specific” in Table 9-32 and align Order:***

**Table 9-32---Beacon frame body**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| [ANA] | EBCS TIM | The EBCS TIM is present if the length of dot11EBCSContentList is larger than 0. |

9.4.2 Elements

9.4.2.1 General [1005]

***TGbc editor: please insert the following line in Table 9-92 and align Element ID Extension:***

**Table 9-92---Element IDs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| … | … | … | … | … |
| EBCS TIM (see 9.4.2.x (EBCS TIM element)) | 255 | [ANA] | Yes | No |
| Reserved | 255 | ([ANA]+1)-255 |  |  |

***TGbc editor: please insert the following subclause at the end of clause 9.4.2:***

9.4.2.x EBCS TIM element [1005]

The EBCS TIM element is used to signal the availability of EBCS traffic stream frames. The format of this element is shown in Figure 9-xx (EBCS TIM element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EBCS DTIM Count | EBCS DTIM Period | Content ID Bitmap Control | Content ID Bitmap |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 | 0-32 |

**Figure 9-xx---EBCS TIM element format**

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1 (General).

The format of the Content ID Bitmap Control field is shown in Figure 9-yy (Bitmap Control field format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B3 | B4 | B7 |
|  | Bitmap Mode | Bitmap Offset | Reserved |
| Bits: | 1 | 3 | 4 |

**Figure 9-yy---Content ID Bitmap Control field format**

The EBCS traffic indication virtual bitmap, maintained by the AP or the mesh STA that generates an EBCS TIM, consists of 256 bits, and it is organized into 8 octets such that bit number $N (0\leq N \leq 255)$ in the bitmap corresponds to bit number $(N mod 8)$ in octet number $\left⌊N/8\right⌋$ where the low order bit of each octet is bit number 0, and the high order bit is bit number 7. A bit value 1 means the corresponding EBCS traffic stream is buffered at the AP.

The EBCS DTIM Count field indicates how many Beacon frames (including the current frame) appear before the next EBCS DTIM. An EBCS DTIM count of 0 indicates that the current EBCS TIM is an EBCS DTIM.

The EBCS DTIM Period field indicates the number of beacon intervals or short beacon intervals between successive EBCS DTIMs. If all EBCS TIMs are EBCS DTIMs, the EBCS DTIM Period field has the value 1. The EBCS DTIM Period value 0 is reserved. The EBCS DTIM Period field is set to dot11EBCSDTIMPeriod.

If the Bitmap Mode subfield value is 0, the Bitmap Offset subfield is set to 0 and the Content ID Bitmap field contains the Content ID (see 11.100.2.x (Content stream configuration)) of the EBCS traffic stream that is buffered at the AP in each octet.

If the Bitmap Mode subfield value is 1, the Bitmap Offset subfield is set to the starting octet number of the Content ID Bitmap field. If a bit is not included in the Content ID Bitmap field, the corresponding EBCS traffic stream is not buffered at the AP.

If no EBCS traffic stream are buffered at the AP, the Bitmap Mode field is set to 1 and the length of the Content ID Bitmap field is 0.

When dot11MultiBSSIDImplemented is true and the Nontransmitted BSSID provides EBCS DL, this element is included in the Nontransmitted BSSID Profile subelement.

9.4.5 Access network query protocol (ANQP) elements

9.4.5.30 Enhanced Broadcast Services ANQP-element

***TGbc editor: please modify the Figure 9-839b as follows:***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Control | Content ID | Negotiation Method | ~~Next Tx Schedule (Optional)~~ | ~~Time To Termination (Optional)~~ |
| Octets: | 1 | 1 | 1 | ~~0 or 8~~ | ~~0 or 2~~ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Content Authentication Algorithm | Content Address Type ~~(Optional)~~ | Content Address ~~(Optional)~~ | Title Length ~~(Optional)~~ | Title ~~(Optional)~~ | PHY Type | TX Rate |
| Octets: | 1 | ~~0 or~~ 1 | variable | ~~0 or~~ 1 | variable | 1 | variable |

|  |  |  |
| --- | --- | --- |
|  | Next Tx Schedule (Optional) | Time To Termination (Optional) |
| Octets: | 0 or 8 | 0 or 2 |

**Figure 9-839b---Enhanced Broadcast Service Tuple field format**

***TGbc editor: please modify the Figure 9-839c as follows:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B1 | B2 | ~~B3~~ | ~~B4~~ | B~~5~~3 | B~~6~~4 | B7 |
|  | Next Tx Schedule Present | Time To Termination Present | ~~Content Address Present~~ | ~~Title Present~~ | Association Required | Reserved |
| Bits: | 1 | 1 | ~~1~~ | ~~1~~ | 1 | ~~2~~4 |

**Figure 9-839c---Control field format**

***TGbc editor: please remove the following paragraphs at P32L7-12:***

~~The Content Address Present subfield is set to 1 by a STA to indicate that the Enhanced Broadcast Services Tuple field contains Content Address Type and Content Address fields. This subfield is set to 0 to indicate that there are no Content Address Type and Content Address fields.~~

~~The Title Present subfield is set to 1 by a STA to indicate that the Enhanced Broadcast Services Tuple field contains a Title Length field and a Title field. This subfield is set to 0 to indicate that there are no Title Length and Title fields.~~

***TGbc editor: please insert the following paragraphs after P34L28:***

The PHY Type subfield indicates the PHY type of the EBCS Data frames of the content stream. The PHY type is encoded as shown in Table 9-340d (PHY Type subfield).

**Table 9-840d---PHY Type subfield**

|  |  |
| --- | --- |
| **Value** | **PHY Type** |
| 0 | DSSS / HR/DSSS / OFDM / ERP |
| 1 | HT |
| 2 | DMG |
| 3 | VHT |
| 4 | TVHT |
| 5 | S1G |
| 6 | CDMG |
| 7 | CMMG |
| 8 | HE |
| 9 | EDMG |
| 10-255 | Reserved |

The TX Rate subfield indicates the transmission rate of the EBCS Data frames of the content stream.

The format of the TX Rate subfield for DSSS, HR/DSSS, OFDM or ERP is shown in Figure 9-839d (DSSS / HR/DSSS / OFDM / ERP TX Rate subfield format).

|  |  |
| --- | --- |
|  | Data Rate |
| Octets: | 1 |

**Figure 9-839d---** **DSSS / HR/DSSS / OFDM / ERP TX Rate subfield format**

The Data Rate subfield indicates the transmission rate multiplied by 2 in unit of Mbps.

The format of the TX Rate subfield for HT is shown in Figure 9-839e (HT TX Rate subfield format).

|  |  |  |
| --- | --- | --- |
|  | HT MCS | Flags |
| Octets: | 1 | 1 |

**Figure 9-839e---** **HT TX Rate subfield format**

The MCS subfield indicates the HT MCS Index.

The format of the Flags subfield is shown in Figure 9-839f (Flags subfield format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B7 |
|  | 40MHz | Short GI | Reserved |
| Octets: | 1 | 1 | 6 |

**Figure 9-839f---** **Flags subfield format**

The 40MHz subfield is set to 1 when the channel bandwidth is 40MHz. Otherwise, the subfield is set to 0.

The Short GI subfield is set to 1 when short GI is used. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for DMG is shown in Figure 9-839g (HT TX Rate subfield format).

|  |  |
| --- | --- |
|  | DMG MCS |
| Octets: | 1 |

**Figure 9-839g---** **DMG TX Rate subfield format**

The format of the DMG MCS subfield is shown in Figure 9-839h (DMG MCS subfield format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B5 | B6 | B7 |
|  | MCS Index | PSK Applied | Reserved |
| Octets: | 6 | 1 | 1 |

**Figure 9-839h---** **DMG** **MCS subfield format**

The MCS Index subfield indicates the DMG MCS index. The DMG MCS index 9.1, 12.1, 12.2, 12.3, 12.4, 12.5 and 12.6 are mapped to 32, 33, 34, 35, 36, 37 and 38 respectively.

The PSK Applied subfield is set to 1 when π/2-8-PSK is applied. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for VHT is shown in Figure 9-839i (VHT TX Rate subfield format).

|  |  |
| --- | --- |
|  | VHT MCS |
| Octets: | 2 |

**Figure 9-839i---** **VHT TX Rate subfield format**

The format of the VHT MCS subfield is shown in Figure 9-839j (VHT MCS subfield format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B3 | B4 | B6 | B7 | B9 | B10 | B11 | B12 | B15 |
|  | MCS Index | Channel Bandwidth | Nss | STBC | Short GI | Reserved |
| Octets: | 4 | 3 | 3 | 1 | 1 | 4 |

**Figure 9-839j--- VHT MCS subfield format**

The MCS Index subfield indicates the VHT MCS index.

The Channel Bandwidth subfield value is encoded as shown in Table 9-840e (Channel Bandwidth subfield).

**Table 9-840e---Channel Bandwidth subfield**

|  |  |
| --- | --- |
| **Value** | **Channel Bandwidth** |
| 0 | 20MHz |
| 1 | 40MHz |
| 2 | 80MHz |
| 3 | 160MHz |
| 4 | 80+80MHz |
| 5-7 | Reserved |

The Nss subfield value indicates the *NSS*-1.

The STBC subfield is set to 1 when the STBC is used. Otherwise, the subfield is set to 0.

The Short GI subfield is set to 1 when short GI is used. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for TVHT is shown in Figure 9-839k (TVHT TX Rate subfield format).

|  |  |
| --- | --- |
|  | TVHT MCS |
| Octets: | 2 |

**Figure 9-839k---** **TVHT TX Rate subfield format**

The format of the TVHT MCS subfield is shown in Figure 9-839l (TVHT MCS subfield format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B3 | B4 | B6 | B7 | B8 | B9 | B10 | B11 | B15 |
|  | MCS Index | Mode | Nss | STBC | Short GI | Reserved |
| Octets: | 4 | 3 | 2 | 1 | 1 | 5 |

**Figure 9-839l---** **TVHT MCS subfield format**

The MCS Index subfield indicates the TVHT MCS index.

The Mode subfield value is encoded as shown in Table 9-840f (Mode subfield).

**Table 9-840f---Mode subfield**

|  |  |
| --- | --- |
| **Value** | **Mode** |
| 0 | TVHT\_MODE\_1 |
| 1 | TVHT\_MODE\_2C |
| 2 | TVHT\_MODE\_2N |
| 3 | TVHT\_MODE\_4C |
| 4 | TVHT\_MODE\_4N |
| 5-7 | Reserved |

The Nss subfield value indicates the *NSS*-1.

The STBC subfield is set to 1 when the STBC is enabled. Otherwise, the subfield is set to 0.

The Short GI subfield is set to 1 when short GI is used. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for S1G is shown in Figure 9-839m (S1G TX Rate subfield format).

|  |  |
| --- | --- |
|  | S1G MCS |
| Octets: | 2 |

**Figure 9-839m---** **S1G TX Rate subfield format**

The format of the S1G MCS subfield is shown in Figure 9-839n (S1G MCS subfield format).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B3 | B4 | B6 | B7 | B8 | B9 | B10 | B11 | B15 |
|  | MCS Index | Channel Bandwidth | Nss | STBC | Short GI | Reserved |
| Octets: | 4 | 3 | 2 | 1 | 1 | 5 |

**Figure 9-839n---** **S1G MCS subfield format**

The MCS Index subfield indicates the S1G MCS index.

The Channel Bandwidth subfield value is encoded as shown in Table 9-840g (Channel Bandwidth subfield).

**Table 9-840g---Channel Bandwidth subfield**

|  |  |
| --- | --- |
| **Value** | **Channel Bandwidth** |
| 0 | 1MHz |
| 1 | 2MHz |
| 2 | 4MHz |
| 3 | 8MHz |
| 4 | 16MHz |
| 5-7 | Reserved |

The Nss subfield value indicates the *NSS*-1.

The STBC subfield is set to 1 when the STBC is enabled. Otherwise, the subfield is set to 0.

The Short GI subfield is set to 1 when short GI is used. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for CDMG is shown in Figure 9-839o (CDMG TX Rate subfield format).

|  |  |
| --- | --- |
|  | CDMG MCS |
| Octets: | 1 |

**Figure 9-839o---** **CDMG TX Rate subfield format**

The CDMG MCS subfield indicates the CDMG MCS index.

The format of the TX Rate subfield for CMMG is shown in Figure 9-839p (CMMG TX Rate subfield format).

|  |  |
| --- | --- |
|  | CMMG MCS |
| Octets: | 1 |

**Figure 9-839p---** **CMMG TX Rate subfield format**

The format of the CMMG MCS subfield is shown in Figure 9-839q (CMMG MCS subfield format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B4 | B5 | B6 | B7 |
|  | MCS Index | 1080MHz | STBC | Reserved |
| Octets: | 5 | 1 | 1 | 1 |

**Figure 9-839q---** **CMMG MCS subfield format**

The MCS Index subfield indicates the CMMG MCS index.

The 1080MHz subfield is set to 1 when the channel bandwidth is 1080MHz. Otherwise, the subfield is set to 0.

The STBC subfield is set to 1 when the STBC is enabled. Otherwise, the subfield is set to 0.

The format of the TX Rate subfield for HE is shown in Figure 9-839r (HE TX Rate subfield format).

|  |  |
| --- | --- |
|  | HE MCS |
| Octets: | 2 |

**Figure 9-839r---** **HE TX Rate subfield format**

The format of the HE MCS subfield is shown in Figure 9-839s (HE MCS subfield format).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B3 | B4 | B6 | B7 | B9 | B10 | B11 | B12 | B13 | B15 |
|  | MCS Index | Channel Bandwidth | Nss | STBC | GI | Reserved |
| Octets: | 4 | 3 | 3 | 1 | 2 | 3 |

**Figure 9-839s---** **HE MCS subfield format**

The MCS Index subfield indicates the HE MCS index.

The Channel Bandwidth subfield value is encoded as shown in Table 9-840e (Channel Bandwidth subfield).

The Nss subfield value indicates the *NSS*-1.

The STBC subfield is set to 1 when the STBC is used. Otherwise, the subfield is set to 0.

The GI subfield value is encoded as shown in Table 9-840h (GI subfield).

**Table 9-840h---GI subfield**

|  |  |
| --- | --- |
| **Value** | **Guard Interval** |
| 0 | 0.8μs |
| 1 | 1.6μs |
| 2 | 3.2μs |
| 3 | Reserved |

The format of the TX Rate subfield for EDMG is shown in Figure 9-839t (EDMG TX Rate subfield format).

|  |  |  |
| --- | --- | --- |
|  | EDMG MCS | Channel Configuration |
| Octets: | 2 | 1 |

**Figure 9-839t---** **EDMG TX Rate subfield format**

The format of the EDMG MCS subfield is shown in Figure 9-839u (EDMG MCS subfield format).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B4 | B5 | B7 | B8 | B9 | B10 | B11 | B12 | B13 | B14 | B15 |
|  | MCS Index | Nss | Modulation | DCM BPSK | Phase Hopping | Open Loop PC | GI | Reserved |
| Octets: | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 2 |

**Figure 9-839u---** **EDMG MCS subfield format**

The MCS Index subfield indicates the EDMG MCS index.

The Nss subfield value indicates the *NSS*-1.

The Modulation subfield is set to 1 when EDMG OFDM mode is used. Otherwise, the subfield is set to 0.

The DCM BPSK subfield is set to 1 when DCM π/2-BPSK is applied. Otherwise, the subfield is set to 0.

The Phase Hopping subfield is set to 1 when phase hopping modulation is applied. Otherwise, the subfield is set to 0.

The Open Loop PC subfield is set to 1 when open loop precoding is applied. Otherwise, the subfield is set to 0.

The GI subfield value is encoded as shown in Table 9-840i (GI subfield).

**Table 9-840i---GI subfield**

|  |  |
| --- | --- |
| **Value** | **Guard Interval** |
| 0 | Short GI |
| 1 | Normal GI |
| 2 | Long GI |
| 3 | Reserved |

The Channel Configuration subfield indicates the channel configuration number.

***TGbc editor: please move the description about the TimeTo Termination subfield and the Next Tx Schedule subfield at P32L24-P33L5 to the end of this subclause (after the TX Rate subfield).***

***TGbc editor: please insert the following paragraph at the end of clause 10.2.7:***

10.2.7 MAC data service [1409]

In an AP, if the EBCS content ID parameter of the MA-UNITDATA.request primitive is not null, the MSDU shall be encoded according to the EBCS content ID as described in 11.55.2.2 (EBCS DL operation at an EBCS AP).

***TGbc editor: please modify the following clause:***

10.6.5.3 Rate selection for EBCS frames [1409]

The transmission rate for EBCS Info frames~~,~~ and EBCS UL frames~~, and EBCS Data frames~~ is determined from dot11EBCSInfoTxRate ~~and dot11EBCSDataTxRate respectively~~, if FMS or GCR is not used~~,~~. The transmission rate for EBCS Data frames is determined from dot11EBCSContentList, if neither FMS nor GCR is used. ~~o~~Otherwise follow clause 10.6.5.4 (Rate selection for other group addressed Data and Management frames) and 10.6.5.6 (Rate selection for Data frames sent within an FMS stream).

***TGbc editor: please change clause 11.3.3 as follows:***

11.3.3 Frame filtering based on STA state

The frame classes are defined as follows:

1. Class 1 frames

3) Data frames

 i) Data frames between IBSS STAs

 ii) Data frames within PBSS

 iii) EBCS Data frames [1409, 1415]

***TGbc editor: please change clause 11.55.2 as follows:***

11.55.2 EBCS DL procedures

11.55.2.1 General

~~The EBCS DL uses three types of frame authentication mechanisms as follows:~~

~~• PKFA (12.13.2 Public Key Frame Authentication)~~

~~• HCFA (12.13.3 Hash Chain Frame Authentication)~~

~~• HLSA (12.13.4 No frame authentication with mandatory higher layer source authentication)~~

~~EBCS DL uses both EBCS Info frames and EBCS Data frames.~~

~~In addition to these frames, Management frames are optionally used.~~

~~The frame sequence for a non-AP STA without association is shown in Figure 11-61f (EBCS DL frame sequence for a non-AP STA without association). The frame sequence for a non-AP STA with association is shown in Figure 11-61g (EBCS DL frame sequence for a non-AP STA with association).~~

The EBCS DL allows an EBCS AP to distribute multicast contents to both associated and unassociated EBCS receivers with data origin authenticity. [1001 1413 1530 1629 1578 1618]

~~11.55.2.2 EBCS DL capability indications~~ [1001 1413 1530 1629 1578 1618]

~~The EBCS AP shall include the EBCS Capability element (9.4.2.300 EBCS Parameters element) in Beacon and Probe Response frames. The EBCS Capability element indicates the next EBCS Info transmission time in units of Beacon Interval. The EBCS Info frame is transmitted immediately after the indicated beacon.~~

**~~11.55.2.3 Content stream configuration~~ [1004]**

~~The EBCS traffic streams are specified in dot11EBCSContentList. The content ID shall be unique within the BSS and shall not be changed in the lifetime of the content stream.~~

11.55.2.2 EBCS DL operation at an EBCS AP [1001 1413 1530 1629 1578 1618]

The EBCS traffic streams to be transmitted are specified in dot11EBCSContentList. The content ID shall be assigned to be able to identify the content by the AP certificate and the content ID. [1004]

An EBCS AP shall advertise the capabilities of the EBCS in the EBCS Support field in the Extended Capabilities element in Beacon frames and Probe Response frames. An EBCS AP that is enabled EBCS DL shall transmit EBCS Info frames periodically in the interval that is specified by the dot11EBCSInfoInterval, at the transmission rate that is specified by the dot11EBCSInfoTxRate. An EBCS AP shall advertise the next EBCS Info frame transmission timing in the EBCS Info Frame TX Countdown field in the EBCS Parameters element (9.6.2.296 EBCS Parameters element) and shall not signal the EBCS Info frame in the TIM element in Beacon frames and Probe Response frames. [1030] The EBCS Info frame shall be transmitted immediately after the indicated Beacon frame. Details of the EBCS Info frame generation is described in 11.100.2.x (EBCS Info frame generation and usage). [1005]

An EBCS filter affiliated with the AP (see Figure 5-9 (Role-specific behavior block for an EBCS non-GLK AP)) shall compare the HLP addressed of each packet and the Content Address of the dot11EBCSContentList. If the packet matches one of the dot11EBCSContentList, the EBCS filter generates MA-UNITDATA.request with the EBCS content ID parameter set to the Content ID of the matched dot11EBCSContentList. Otherwise, the packet shall follow non-EBCS AP rules with the EBCS conctent ID parameter set to null. [1409]

In the MAC, the packet forwarded by the EBCS filter shall bypass IEEE 802.1X filtering as shown in Figure 5-9 (Role-specific behavior block for an EBCS non-GLK AP) and use of the following three frame authentication mechanisms. [1409]

~~The EBCS DL uses three types of frame authentication mechanism as follows:~~ [1409]

* PKFA (12.13.2 Public Key Frame Authentication)
* HCFA (12.13.3 Hash Chain Frame Authentication)
* HLSA (12.13.4 No frame authentication with mandatory higher layer source authentication)

~~EBCS DL uses both EBCS Info frames and EBCS Data frames.~~

~~In addition to these frames, Management frames are optionally used.~~

~~The frame sequence for a non-AP STA without association is shown in Figure 11-bc1 (EBCS DL frame sequence for a non-AP STA without association). The frame sequence for a non-AP STA with association is shown in Figure 11-bc2 (EBCS DL frame sequence for a non-AP STA with association).~~[1287 1128 1579 1619 1286 1150 1580 1289 1288]

The EBCS traffic streams are carried by EBCS Data frames. The Type and Subtype subfield in the Frame Control field of the EBCS Data frames shall be set to EBCS Data. [1409]

*(Is addressing description required?*

*The RA (Dst MAC address) is set by the content server and the AP uses it. It is general behavior of the AP.*

*The TA and BSSID assignements follow 9.3.3.1 in the baseline.*

*The addressing in MBSS follows Table 9-47 in the baseline.)* [1416, 1005]

The EBCS AP generates PHY-TXSTART.request with the transmission rate information that is specified by the dot11EBCSContentList for each EBCS Data frames according to the EBCS content ID. [1409]

The EBCS Data frames may be signaled in the EBCS TIM element (see 9.4.2.x (EBCS TIM element)) instead of the TIM element in Beacon frames. [1005]

The frame sequence of the EBCS DL is shown in Figure 11-bc1 (EBCS DL frame sequence).[1287 1128 1579 1619 1286 1150 1580 1289 1288]



***(TGbc Editor: please replace Figure 11-bc1 as shown above.)*** [1287 1128 1579 1619 1286 1150 1580 1289 1288]

Figure 11-bc1 EBCS DL frame sequence ~~for a non-AP STA without association~~ [1287 1128 1579 1619 1286 1150 1580 1289 1288]

***(TGbc editor: please remove Figure 11-bc2)*** [1287 1128 1579 1619 1286 1150 1580 1289 1288]

~~Figure 11-bc2 EBCS DL frame sequence for a non-AP STA with association~~ [1287 1128 1579 1619 1286 1150 1580 1289 1288]

11.55.2.3 EBCS DL operation at an EBCS receiver [1001 1413 1530 1629 1578 1618]

An EBCS receiver finds an EBCS capable AP by receiving Beacon, Probe Response or EBCS Info frame. An EBCS receiver shall wait for receiving the EBCS Info frame to receive EBCS traffic streams. An EBCS receiver is able to know when the next EBCS Info frame is transmitted by 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).

The SME of an EBCS receiver gets EBCS content list from the EBCS Info frame. The SME selects one or more EBCS contents to receive and set dot11GroupAddressesTable. If the content destination address is IPv4 address or IPv6 address, the DA is assumed to be mapped according to IETF RFC 1112 and IETF RFC 2464 respectivery. [1409]

An EBCS receiver shall authenticate all EBCS Info frames and EBCS Data frames by the authentication mechanism specified in the EBCS Info Authentication Algorithm subfield in the EBCS Info Control field for the EBCS Info frame and the Content Authenticatino Algorithm subfield in the Content Information field for the EBCS Data frames, in the EBCS Info frame. Details of the frame authentication is described in 12.13 (Frame authentication for EBCS).

If the frame authentication succeeds, the EBCS traffic stream shall be forwarded to the higher layer via unrestricted IEEE 802.1X control port that does not filter any EBCS Data frames. The EBCS receiver may filter EBCS Data frame by its Content ID. [1409]

If an EBCS receiver receives an EBCS traffic stream that is transmitted from multiple APs with the same AP certificate and the same content ID, the EBCS may forward the EBCS traffic stream received from multiple APs to the higher layer. [1004]

NOTE – The higher layer protocol of the EBCS traffic stream shall provide duplicate detection.

11.55.2.~~4~~ EBCS Info frame generation and usage

The EBCS Info frame is transmitted periodically every dot11EBCSInfoInterval beacon periods. ~~(~~[w/o CID] For the APs in a multiple BSSID set, only the AP corresponding to the EBCS DL enabled BSSID may transmit an EBCS Info frame; other APs corresponding to EBCS DL disabled BSSIDs shall not transmit an EBCS Info frame. The RA of the EBCS Info frame shall be the broadcast address. [1416]

The EBCS Info [w/o CID] Sequence Number subfield is initialized to a random number at the time of starting an EBCS and incremented by 1 for every new EBCS Info frame transmission. If the EBCS Info [w/o CID] Sequence Number overflows, it is set to 0.

If all content uses HLSA, the authentication algorithm of the EBCS Info frame may be none, otherwise the EBCS Info frame shall use RSASSA-PSS, ECDSA or Ed25519.

On reception of an EBCS Info frame, an EBCS ~~non-AP STA~~ reciever [1000] shall check the integrity of the EBCS Info frame as described in 12.100 (Frame authentication for EBCS) if the Certificate of the AP is included in the EBCS Info frame.

If the integrity of the EBCS Info frame is verified, the EBCS ~~non-AP STA~~ reciever [1000] processes each Content Information according to the Authentication Algorithm.

* Common in all authentication algorithms,
	+ The ~~non-AP STA~~ EBCS reciever [1000] shall cache the title, the negotiation method, the higher layer destination address, the time to termination and the next schedule.
	+ The ~~non-AP STA~~ EBCS reciever [1000] shall notify the cached information to the SME through the SME-MLME SAP as described in 6.3.200 (EBCS procedures).
* In case of PKFA,
	+ If data is present in the Content Information field, the ~~non-AP STA~~ EBCS reciever [1000] shall forward the MSDU in the data to a higher layer and shall cache the certificate in the EBCS Info frame to authenticate PFKA MSDUs.
* In case of HCFA,
	+ The HCFA base key in the Content Information field shall be cached.
	+ If instant authenticators are present in the content information, the instant authenticators shall be cached.
	+ If HCFA base keys from a previous period are present in the Content Informatio Information field, the non-AP STA shall authenticate the EBCS data frames of the previous HCFA period.

11.55.2.5 EBCS Info frame fragmentation

An EBCS Info frame may be fragmented into multiple MPDUs. The length of each fragment shall be an even number of octets, except for the last fragment, which may have an odd length. The length of a fragment shall not be larger than dot11FragmentationThreshold.

The fragmentation procedure is following.

1. Construct an EBCS Info frame which is not yet fragmented and determine the length of fragments.
2. When the EBCS Info frame is fragmented to ~~N~~*n* [w/o CID] MPDUs, the Number of Fragments subfield in the EBCS Info Control field is set to ~~N~~*n*-1 [w/o CID]
3. Insert a space for ~~N~~*n*-1 [w/o CID] Fragment Hash Values fields to the EBCS Info frame.
4. Divide the EBCS Info frame after the Fragment Hash Values field into fragments. The Fragment Hash Values field, the Certificate field [w/o CID] and the Signature field [w/o CID] shall be contained in the first fragment.
5. The Fragment Index subfield in the EBCS Info Control field is set to 0 (the first) to ~~N~~*n*-1 [w/o CID] (the last) respectively.
6. Calculate the hash value of each fragment except the first one and put into the Fragment Hash Values field.
7. Calculate and fill the signature of the first fragment.
8. Transmit the fragments consecutively in order of the Fragment Index. Data frames for EBCS shall not be transmitted before all of the fragments are transmitted.

The EBCS Info frame fragmentation is shown in Figure 11-bc3 (EBCS Info frame fragmentation).

Figure 11-bc3 EBCS Info frame fragmentation

11.55.2.6 EBCS Info frame defragmentation

When an EBCS ~~non-AP STA~~ reciever [1000] receives an EBCS Info frame with the Number Of Fragments subfield in the EBCS Info Control field not equal to 0 and the Fragment Index subfield equal to 0, the EBCS ~~non-AP STA~~ reciever [1000] shall verify the signature. If the verification succeeds, the EBCS ~~non-AP STA~~ reciever [1000] shall cache the EBCS Info frame Sequence Number, Timestamp, EBCS Info Control and Fragment Hash Values field values.

When the EBCS ~~non-AP STA~~ reciever [1000] receives the subsequent fragments of the EBCS Info frame, the EBCS non-AP STA shall check the integrity of the fragments by the following procedure.

1. Verify that the EBCS Info frame Sequence Number field, Timestamp field and Number Of Fragments subfield in the EBCS Info Control field in the received fragment are equal to those (sub)fields in the first fragment. If the values are different, the received fragment shall be discarded.
2. Calculate the hash value of the received fragment and compare it with the corresponding hash value in the Fragment Hash Values field in the first fragment. If the hash values are different, the received fragment shall be discarded.
3. Cache the content information of the received fragment.

After all fragments are received, the EBCS ~~non-AP STA~~ reciever [1000] concatenates the fragments and processes the EBCS Info frame as described in 11.100.2.3 (EBCS Info frame generation and usage).

C.3 MIB Detail

***TGbc editor: please delete dot11EBCSDataTxRate (P73L16, P75L11-37 and P76L56).*** [1409]

***TGbc editor: please insert dot11EBCSDTIMPeriod as follows:*** [1005]

***At P73L16:***

 dot11EBCSDTIMPeriod Unsigned32,

***At P75L11:***

dot11EBCSDTIMPeriod OBJECT-TYPE

SYNTAX Unsigned32 (1..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by an external management entity.

Changes take effect for the next MLME-START.request primitive.

This attribute specifies the number of beacon intervals that elapsebetween transmission of Beacon frames containing a EBCS TIM element whose DTIM Count field is 0. This value is transmitted in the DTIM Period field of Beacon frames."

::= { dot11StationConfigEntry <ANA> }

***At P76L56:***

 dot11EBCSDTIMPeriod,