IEEE P802.11  
Wireless LANs

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CC35 PHY CIDs 4662 | | | | | | Date: 2021-11--5 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Brian Hart | Cisco Systems |  |  | [brianh@cisco.com](mailto:brianh@cisco.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from comment collection on P802.11-REVbeD1.2:

4662

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

# CID 4662



**Discussion**

See 21/1757

**Proposed Resolutions: CID 4662**

**Revised**.

**Note to Commenter:**

See 21/1791R<motionedRevision> which provides significant enhamcements to RTWT (And introduces Triggered Access) and substatnailly implements the features requested by the commenter

**Instruction to Editor:**

Implement the proposed text updates listed under CID 4662 in 21/1791R<motionedRevision>

**Proposed Text Updates: CID 4662**

***Editor, modify as shown via Word track changes using D1.2 as the baseline***

9.3.3.2 Beacon frame format

Table 9-32—Beacon frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| <Last assigned + 4> | Channel Usage element | The Channel Usage element is optionally present if dot11EHTSafehavenOptionImplemented is true |
| <Last assigned + 5> | Safehaven Channel element | The Safehaven Channel element is optionally present if dot11EHTSafehavenOptionImplemented is true |

9.3.3.10 Probe Response frame format

Table 9-32— Probe Response body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| 37 | Channel Usage element | The Channel Usage element is present either a) if the Channel Usage element is present in the Probe Request frame and dot11ChannelUsageActivated is true, or b) optionally if dot11EHTSafehavenOptionImplemented is true. |
| <Last assigned + 4> | Safehaven Channel element | The Safehaven Channel element is optionally present if dot11EHTSafehavenOptionImplemented is true |

9.3.3.6 Association Response frame format

Table 9-32— Association Response frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| <Last assigned + 5> | Channel Usage element | The Channel Usage element is optionally present if dot11EHTSafehavenOptionImplemented is true |
| <Last assigned + 6> | Safehaven Channel element | The Safehaven Channel element is optionally present if dot11EHTSafehavenOptionImplemented is true |

9.3.3.8 Reassociation Response frame format

Table 9-32— Reassociation Response frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| <Last assigned + 5> | Channel Usage element | The Channel Usage element is optionally present if dot11EHTSafehavenOptionImplemented is true |
| <Last assigned + 6> | Safehaven Channel element | The Safehaven Channel element is optionally present if dot11EHTSafehavenOptionImplemented is true |

9.4.2.1 General

Table 9-92—Element IDs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible | Fragmentable |
| Safehaven Channel element | 255 | <ANA> | No | No |

9.4.1.22 Operating Class and Channel field

The Operating Class and Channel field is used in the Location Indication Channels subelement of the Location Parameters element, in the Channel Usage element, and in the Safehaven Channel element. The Operating Class and Channel field indicates an operating class and channel. The format of the field is defined in Figure 9-106 (Operating Class and Channel field format)

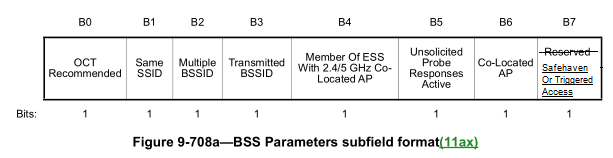
9.4.2.3 Supported Rates and BSS Membership Selectors element

Change Table 9-93 (BSS membership selector value encoding) as follows

Table 9-93—BSS membership selector value encoding

|  |  |  |
| --- | --- | --- |
| Value | Feature | Interpretation |
| <ANA> | EHT PHY | Support for the mandatory features of Clause 36 (Extremely High Throughput  (EHT) PHY specification) is required in order to join the BSS that was the source of the Supported Rates and BSS Membership Selectors element or Extended Supported Rates and BSS Membership  Selectors element containing this value. |

9.4.2.170.2 Neighbor AP Information field



Safehaven, RTWT, Or Triggered Access

(11ax)The Co-Located AP subfield is set to 1 if every AP in this Neighbor AP Information field is in the

same co-located AP set as the transmitting AP. It is set to 0 otherwise.

The Safehaven, RTWT, Or Triggered Access subfield is set to 1 to indicate that the reported AP transmits a Triggered Access Required field that is set 1 or a Safehaven Channels element that encompasses the channel of the AP’s BSS (see 35.14a TSN QoS Procedures), or the AP has established one or more restricted TWT agreements. The Safehaven, RTWT, Or Triggered Access subfield is set to 0 otherwise.

9.4.2.295aEHT Operation element

9.4.2.295c.2 EHT MAC Capabilities Information field

Table 9-322al—EHT Operation Information subfields(#1086)(#1667)(#2148)(#2147)

|  |  |  |
| --- | --- | --- |
| Subfield | Definition | Encoding |
| Triggered Access Required | This subfield whether the AP requires associated non-AP STAs to support Triggered Access operation for channel access. | Set to 1 if Triggered Access is required (see 35.14a.2 (Triggered Access operation)); set to 0 otherwise. |

***TGbe editor: convert the next available bit from the Reserved field to a 1 bit “Triggered Access Support” field.***

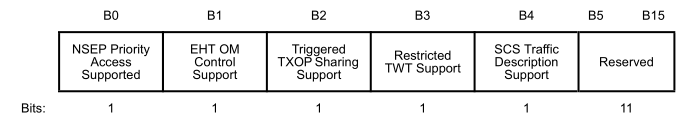


Figure 9-788ew—EHT MAC Capabilities Information field format

Table 9-322at—Subfields of the EHT MAC Capabilities Information field

|  |  |  |
| --- | --- | --- |
| Subfield | Definition | Encoding |
| Triggered Access Support | Indicates support for Triggered Access operation | Set to 1 if the STA supports Triggered Access operation (see 35.14a.2 (Triggered Access operation)).  Set to 0 otherwise. |

9.4.2.295f Safehaven Channel element

The Safehaven Channel element defines the set of channels for which Safehaven Channel access is requested. The format of the Safehaven Channel element is shown in Figure 9-788fff (Safehaven Channel element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | Zero or more entries |
|  | Element ID | Length | Element ID Extension | Channel Entry |
| Octets | 1 | 1 | 1 | 2*n* |

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

The Channel Entry field is defined in 9.4.1.22

The Channel Entry field includes zero or more Operating Class and Channel fields. The format of the Operating Class and Channel field is defined in 9.4.1.22 (Operating Class and Channel field). A listed Operating Class and Channel also indicates all narrower channels falling within the listed Operating Class and Channel.

The Safehaven Channel element can be included in Beacon frames, as described in 9.3.3.2 (Beacon frame format), Probe Response frames, as described in 9.3.3.10 (Probe Response frame format), Association Response frames, as described in 9.3.3.6 (Association Response frame format) and Reassociation Response frames, as described in 9.3.3.8 (Reassociation Response frame format).

The use of the Safehaven Channel element is described in 35.14a.1 (Safehaven Channel access).

35.14a TSN QoS Procedures

35.14a.1 Safehaven Channel access

Define a multi-ESS-band as a collection of co-hosted or multiple BSSID APs advertising one or more SSIDs on channels of a band, with sufficient AP density that the APs of the multi-ESS-band are capable of simultaneously operating BSSs that encompass every channel defined for the band in the regulatory domain within the convex hull of APs. Safehaven Channel access is defined as:

* EHT APs in the multi-ESS-band opting to not operate BSSs on certain channels (known as Unmanaged Channels) and
* simultaneously soliciting that EHT APs that are not part of the multi-ESS-band do not operate on certain other channels (known as Safehaven Channels).

NOTE 1 – The multi-ESS-band might use the Safehaven Channels for flows with critically low latency and jitter requirements. The multi-ESS-band might use Safehaven Channels with a variety of other mitigations to provide greater scheduling assurance, including one or more of: physical controls, Triggered Access operation (see 35.14a.2 (Triggered Access operation)) and Restricted TWTs (see 35.7 (Restricted TWT)).

NOTE 2 – A channel might be neither a Safehaven Channel nor an Unmanaged Channel.

An EHT AP in the multi-ESS-band advertises a list of Safehaven Channels by including a Safehaven Channel element in its Beacon, Probe Response and (Re)Association Response frames. An EHT STA may also determine that a BSS may be operating on a Safehaven Channel within a multi-ESS-band when the STA receives a Safehaven, RTWT, Or Triggered Access field in the BSS Parameters subfield in the Neighbor AP Information field for the AP in a Reduced Neighbor Report frame equal to 1. An EHT AP in the multi-ESS-band advertises a list of Unmanaged Channels by including an Unmanaged element in its Beacon, Probe Response and (Re)Association Response frames.

Before an EHT AP first includes an Operating Class and Channel field in a transmitted Safehaven Channel element, the AP should first verify that there is not an already an AP that a) is not part of the multi-ESS-band, b) is received above the minimum required receiver sensitivity, and c) occupies a channel within the channel or channels described by the Operating Class and Channel field.

The EHT APs of the multi-ESS-band should signal, in the Channel Usage element, as much bandwidth for the Unmanaged Channels as the APs signal, in the Safehaven element, for the Safehaven Channels whenever the channel busy duty cycle on the Unmanaged Channels exceeds the higher of

* the channel busy duty cycle on the Safehaven Channels minus the channel busy duty cycle due to non- multi-ESS-band transmissions on the Safehaven Channels, and
* the channel busy duty cycle on channels that are neither signaled as Safehaven Channels nor Unmanaged Channels in the band.

If at least one STA of a co-hosted device, containing one or more EHT STAs, is associated to an AP that transmits a Safehaven Channel element, then each STA of the co-hosted device shall meet the requirements of 35.14a.2 (Triggered Access operation) before transmitting on any of the Safehaven Channels. If no STA of a co-hosted device, containing one or more EHT STA, is associated to any AP that transmits a Safehaven Channel element yet receives Safehaven Channel elements then, after excluding APs whose claim to being part of a multi-ESS-band are determined to be inauthentic, each STA of the device should meet the requirements of 35.14a.2 (Triggered Access operation) before transmitting on the Safehaven Channels indicated by the non-excluded AP received with strongest RSSI. If no STA of a co-hosted device is associated to any AP that transmits a Safehaven Channel element yet a STA of the co-hosted device receives a Safehaven, RTWT, Or Triggered Access field in the BSS Parameters subfield in the Neighbor AP Information field in Reduced Neighbor Report frames set to 1 from nearby APs then, after excluding APs whose claim to being part of a multi-ESS-band are determined to be inauthentic, then each STA of the device should meet the requirements of 35.14a.2 (Triggered Access operation) before transmitting on a Safehaven Channel advertised by any non-excluded AP.

An AP that is not part of a multi-ESS-band and that receives a Safehaven Channel element from another AP whose claim to being part of a multi-ESS-band is not determined to be inauthentic should channel switch its BSS to a non-Safehaven Channel (see 11.8 (DFS procedures)) if the current BSS channel of the AP is within the list of Safehaven Channels listed in the Safehaven Channel.

35.14a.2 Triggered Access operation

In a BSS requiring Triggered Access, almost all uplink transmissions are triggered by the EHT AP.

A STA that is capable of Triggered Access sets the Triggered Access Support field in the EHT MAC Capabilities Information field in the EHT Capabilities element to true.

The AP of a BSS requiring Triggered Access for the BSS sets the Triggered Access Required field in the EHT MAC Capabilities Information field in the EHT Operation element to 1. An EHT STA may also determine that a BSS may be operating with Triggered Access when the STA receives a Safehaven, RTWT, Or Triggered Access field in the BSS Parameters subfield in the Neighbor AP Information field for the AP in a Reduced Neighbor Report frame equal to 1.

An EHT AP may include an EHT PHY BSS membership selector in the Supported Rates and BSS Membership Selectors element in order to prevent the assocaiton of non-EHT STAs. An EHT STA that is incapable of Triggered Access shall not attempt to associate to a BSS requiring Triggered Access.

While an EHT STA is associating to a BSS and the STA has received a Safehaven, RTWT, Or Triggered Access field equal to 1 for the AP of the BSS but has not received a Beacon or Probe Response frame from the AP, then the STA shall not transmit on the BSS channel. While an EHT STA is associating to a BSS and has received a Beacon or Probe Response frame from the AP of the BSS, then the STA shall not transmit on the BSS channel during the start time of a Restricted TWT Service Period defined by the BSS.

From when an EHT STA has associated to a BSS and the STA has received a Triggered Access Required field set to 1 from the AP of the BSS until no longer continuing to receive Beacon frames from the AP, the STA shall not transmit on the BSS channel except when triggered by the AP.

If an EHT STA of a co-hosted device is associated to an AP that transmits a Triggered Access Required field set to 1, then all STAs of the co-hosted device shall follow the Triggered TXOP sharing procedure (see 35.2.1.3 (Triggered TXOP sharing procedure)) for all transmissions on the BSS channel.

Annex C

Dot11StationConfigEntry ::= SEQUENCE

{

dot11StationID MacAddress,

…

dot11BSSMaxIdlePeriodIndicationByNonAPSTA, TruthValue,

(#1004)(#2246)dot11EHTOptionImplemented, TruthValue,

(#3173)dot11EHTBaseLineFeaturesImplementedOnly, TruthValue,

dot11EHTNSEPPriorityAccessActivated, TruthValue,

(#4183)dot11EHTTXOPSharingTFOptionImplemented TruthValue,

dot11EHTSafehavenOptionImplemented TruthValue}

(#4183)dot11EHTTXOPSharingTFOptionImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates the ability of the EHT STA to support

the triggered TXOP sharing procedure. If the attribute is false, the sta-

tion does not support the triggered TXOP sharing procedure."

::= { dot11StationConfigEntry <Last assigned+1>}

dot11EHTSafehavenOptionImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates the ability of the EHT STA to support the Safehaven Channel procedures. If the attribute is false, the station does not support the Safehaven Channel procedures."

::= { dot11StationConfigEntry <Last assigned+1>}