IEEE P802.11  
Wireless LANs

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| REVme self-protected action frame comment resolution | | | | |
| Date: 2021-10-19 | | | | |
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Abstract

This submission contains comments on REVmd initial SA ballot, relating to Self-protected action frames and suggested resolution to the following comments:

R0 – initial version. CID 125, 126, 127, 128, and 129.

R1 – Added NOTE2 to the end of table 9-71, as suggested by Jouni in a REVme conference call.

R2 – Changed cross reference in NOTE2 to 14.5.3, based on offline discussion among, Mark. R, Jouni, and Dan. There are some more things to be clarified, but they will be handled by other comments.

**Comment:**

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| **CID** | **PP.LL** | **Comment** | **Proposed Change** |
| 125 | 1609.46  (subclause 9.6.15.2.2) | Subclause 9.6.15.2.2 explains Mesh Peering Open frame format. However, many of the information elements contained in the frame are not explained as done in other subclauses. Also, Table 9-436 does not show MIC element, OCI element, and Authenticated Mesh Peering Exchange element, where as there are some mentioning on these elements in the subclause. It is very confusing how the Mesh Peering Open frame shall be formatted. | In subclause 9.6.15.2.2 (Mesh Peering Open frame details), add paragraphs explaining what the elements in table 9-436 are. Clarify how the MIC element and OCI element present in the frame. Add pointer to subclause 9.3.3.13 (Action frame format) to clarify the use of Authenticatd Mesh Peering Exchange element. |
| 126 | 1611.22  (subclause 9.6.15.3.2) | Subclause 9.6.15.3.2 explains Mesh Peering Confirm frame format. However, many of the information elements contained in the frame are not explained as done in other subclauses. Also, Table 9-437 does not show MIC element, OCI element, and Authenticated Mesh Peering Exchange element, where as there are some mentioning on these elements in the subclause. It is very confusing how the Mesh Peering Confirm frame shall be formatted. | In subclause 9.6.15.3.2 (Mesh Peering Confirm frame details), add paragraphs explaining what the elements in table 9-437 are. Clarify how the MIC element and OCI element present in the frame. Add pointer to subclause 9.3.3.13 (Action frame format) to clarify the use of Authenticatd Mesh Peering Exchange element. |
| 127 | 1612.49  (subclause 9.6.15.4.2) | Subclause 9.6.15.4.2 explains Mesh Peering Close frame format. However, many of the information elements contained in the frame are not explained as done in other subclauses. Also, Table 9-438 does not show MIC element, OCI element, and Authenticated Mesh Peering Exchange element, where as there are some mentioning on these elements in the subclause. It is very confusing how the Mesh Peering Confirm frame shall be formatted. | In subclause 9.6.15.4.2 (Mesh Peering Close frame details), complete paragrphs explaining what the elements in table 9-438 are, i.e. what are the Mesh ID and the Mesh Peering Management. Clarify how the MIC element present in the frame. Add pointer to subclause 9.3.3.13 (Action frame format) to clarify the use of Authenticatd Mesh Peering Exchange element. |
| 128 | 1613.52  (subclause 9.6.15.5.2) | Subclause 9.6.15.5.2 explains Mesh Group Key Inform frame format. Table 9-439 contains the Authenticated Mesh Peering Exchange element. This element looks to be duplicated with the same element contained in the table 9-43 in 9.3.3.13 (Action frame format). | Remove duplication and clarify how to format the frame. |
| 129 | 1614.40  (subclause 9.6.15.6.2) | Subclause 9.6.15.6.2 explains Mesh Group Key Acknowledge frame format. Table 9-440 contains the Authenticated Mesh Peering Exchange element. This element looks to be duplicated with the same element contained in the table 9-43 in 9.3.3.13 (Action frame format). | Remove duplication and clarify how to format the frame. |

**Discussion:**

Subclauses 9.6.15.2, 9.6.15.3, 9.6.15.4, 9.6.15.5, and 9.6.15.6 explain self-protected action frame details, which is used for secure mesh MBSS and secure AP-AP communication. Descriptions in these subclauses are partially incomplete and confusing. It is suggested to clean up the description in these subclauses.

Particularly, this document intends to solve the following issues:

* Mesh Peering Open frame, Mesh Peering Confirm frame, and Mesh Peering Close frame may contain OCI element and MIC element depending on the MIB setting. However, OCI element and MIC element are not included in the table specifying Action field format.
* Mesh Group Key Inform frame and Mesh Group Key Acknowledgement frame are supposed to contain one AMPE element. However, the AMPE element is defined both in table 9-43 and table 9-440, which results in duplicated inclusion of the same element in an action frame.
* Mesh Peering Open frame, Mesh Peering Confirm frame, and Mesh Peering Close frame may be used for CCA TXOP negotiation between APs. However, this is not well articulated in clause 9.
* STAs should be allowed to include Vendor Specific element in Self-protected action frames.
* There are rooms for editorial improvement.

**Proposed resolution: REVISED**

***Apply the following changes to 9.3.3.13 (Action frame format), 9.6.15.2.2 (Mesh Peering Open frame details), 9.6.15.3.2 (Mesh Peering Confirm frame details), 9.6.15.4.2 (Mesh Peering Close frame details), 9.6.15.5.2 (Mesh Group Key Inform frame details), and 9.6.15.6.2 (Mesh Group Key Acknowledge frame details):***

* Action frame format

The frame body of an Action frame contains the information shown in Table 9-71 (Action frame body and Action No Ack frame body).

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| --- | --- |
| * Table 9-71 Action frame body and Action No Ack frame body | |
| Order | Information |
| 1 | Action |
| Last – 3 | One or more Vendor Specific elements are optionally present.  These elements are absent when the Category subfield of the Action field is Vendor-Specific, Vendor-Specific Protected, or when the Category subfield of the Action field is VHT and the VHT Action subfield of the Action field is VHT Compressed Beamforming or when the Category subfield of the Action field is HE and the HE Action subfield of the Action field is HE Compressed Beamforming/CQI.(11ax) |
| Last – 2 | The MME is present when management frame protection is enabled at the AP, the frame is a group addressed robust Action frame, and the category of the Action frame does not support group addressed privacy as indicated by Table 9-79 (Category values); otherwise not present. |
| Last – 1 | The MIC element is present in a Self-protected Action frame if a PMK exists between the sender and recipient of this frame; otherwise not present. |
| Last | The Authenticated Mesh Peering Exchange element is present in a Self-protected Action frame if a PMK exists between the sender and recipient of this frame; otherwise not present. |
| NOTE—The MME appears after any fields that it protects in a group addressed frame. Therefore, it appears last in the frame body to protect the frames as specified in 12.5.4 (Broadcast/multicast integrity protocol (BIP)).  NOTE 2— The MIC element and the Authenticated Mesh Peering Exchange element appears after any fields that they protect in an individually addressed frame. Therefore, they appear last in in the frame body. The Authenticated Mesh Peering Exchange element is encrypted and authenticated as specified in 14.5.3 (Construction and processing AES-SIV-protected mesh peering Management frames). | |

* Self-protected Action frame details
* General

The Self-protected Action frame is defined to allow robust STA-STA communications of the Action frames that are not robust (see 9.4.1.11 (Action field)). The protocols that use these Action frames are responsible for deciding whether to protect these frames and supporting protection mechanisms for these frames as needed.

Self-protected Action frames have a different nature than Public Action frames and robust Action frames. Robust Action frames assume the existence of a completely established security association. Self-protected Action frames typically exist to manage the creation and deletion of security associations, regardless of whether they are completely established.

Public Action frames are defined as public for all STAs, including those that are not in the BSS and MBSS. Self-protected Action frames, however, are used for relationship creation and maintenance between two specific STAs. Their public nature is incidental.

The Mesh Peering Open frame, the Mesh Peering Confirm frame, and the Mesh Peering Close frame are referred to as *mesh peering Management frames*.

A Self-protected Action field, in the field immediately after the Category field, differentiates the formats. The defined Self-protected Action frames are listed in Table 9-509 (Self-protected Action field values).

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| --- | --- |
| * Self-protected Action field values | |
| Self-protected Action field value | Description |
|  | Reserved |
|  | Mesh Peering Open |
|  | Mesh Peering Confirm |
|  | Mesh Peering Close |
|  | Mesh Group Key Inform |
|  | Mesh Group Key Acknowledge |
| 6–255 | Reserved |

NOTE—In Self-protected Action frames, the MIC element and the Authenticated Mesh Peering Exchange element are present after the Action field when the frame is protected (see 9.3.3.13 (Action frame format)).

* Mesh Peering Open frame format
* Mesh Peering Open frame self protection

Protection of this frame is provided when authenticated mesh peering exchange (AMPE) is enabled. AMPE provides integrity protection of Mesh Peering Open frames.

When the Mesh Peering Open frame is used by the mesh peering management (MPM) protocol, integrity protection on the frame is not enabled.

* Mesh Peering Open frame details

The Mesh Peering Open frame is used to open a mesh peering using the procedures defined in 14.3.6 (Mesh peering open) and in 14.5.5 (Mesh peering Management frames for AMPE). It is also used for HCCA TXOP negotiation between APs (see 11.26.3 (HCCA TXOP negotiation)). The format of the Mesh Peering Open frame Action field is shown in Table 9-510 (Mesh Peering Open frame Action field format).

|  |  |  |
| --- | --- | --- |
| * Mesh Peering Open frame Action field format | | |
| Order | Information | Notes |
|  | Category | The Category field is defined in 9.4.1.11 (Action field). |
|  | Self-protected Action | The Self-protected Action field is defined in 9.6.15.1 (Self-protected Action fields). |
|  | Capability | The Capability field is defined in 9.4.1.4 (Capability Information field). |
|  | Supported Rates and BSS Membership Selectors | The Supported Rates and BSS Membership Selectors element is defined in 9.4.2.3 (Supported Rates and BSS Membership Selectors element). |
|  | Extended Supported Rates and BSS Membership Selectors | The Extended Supported Rates and BSS Membership Selectors element is present if there are more than eight supported rates and is optionally present otherwise. |
|  | Power Capability | The Power Capability element is present if dot11SpectrumManagementRequired is true. |
|  | Supported Channels | The Supported Channels element is present if dot11SpectrumManagementRequired is true and dot11ExtendedChannelSwitchActivated is false. |
|  | RSN | The RSNE is present if dot11MeshSecurityActivated, dot11ProtectedQLoadReportActivated, or dot11ProtectedTXOPNegotiationActivated is true; otherwise not present. |
|  | Mesh ID | The Mesh ID element is defined in 9.4.2.98 (Mesh ID element) and is present when dot11MeshActivated is true; otherwise it is not present.. |
|  | Mesh Configuration | The Mesh Configuration element is defined in 9.4.2.97 (Mesh  Configuration element) and is present when dot11MeshActivated is true; otherwise it is not present. |
|  | Mesh Peering Management | The Mesh Peering Management element is defined in 9.4.2.97 (Mesh Configuration element). |
|  | ERP Information | The ERP element is present if ERP mesh STA detects non-ERP STAs in its vicinity and is optionally present otherwise. |
|  | Supported Operating Classes | The Supported Operating Classes element is present if dot11ExtendedChannelSwitchActivated is true, or for a mesh STA if dot11OperatingClassesImplemented is true and the STA is capable of operation in more than one operating class. |
|  | HT Capabilities | The HT Capabilities element is present when dot11HighThroughputOptionImplemented is true. |
|  | HT Operation | The HT Operation element is included when dot11HighThroughputOptionImplemented is true. |
|  | 20/40 BSS Coexistence element | The 20/40 BSS Coexistence element is optionally present when dot112040BSSCoexistenceManagementSupport is true. |
|  | Extended Capabilities  element | The Extended Capabilities element is present if any of the fields in this element are nonzero. |
|  | Interworking | The Interworking element is present if dot11InterworkingServiceActivated is true. |
| 19 | VHT Capabilities | The VHT Capabilities element is present when dot11VHTOptionImplemented is true. |
| 20 | VHT Operation | The VHT Operation element is present when dot11VHTOptionImplemented is true. |
| 21 | Operating Mode Notification | The Operating Mode Notification element is optionally present if dot11OperatingModeNotificationImplemented is true. |
| 22(11ax) | HE Capabilities | The HE Capabilities element is present when dot11HEOptionImplemented is true; otherwise, it is not present. |
| 23(11ax) | HE Operation | The HE Operation element is present when dot11HEOptionImplemented is true; otherwise, it is not present. |
| 24 | OCI | The OCI element is present when dot11RSNAOperatingChannelValidationActivated is true; otherwise, it is not present. |

* Mesh Peering Confirm frame format
* Mesh Peering Confirm frame self protection

Protection of this frame is provided when authenticated mesh peering exchange (AMPE) is enabled. AMPE provides integrity protection of Mesh Peering Confirm frames.

When the Mesh Peering Confirm frame is used by the mesh peering management (MPM) protocol, integrity protection on the frame is not enabled.

* Mesh Peering Confirm frame details

The Mesh Peering Confirm frame is used to confirm a mesh peering using the procedures defined in 14.3.7 (Mesh peering confirm) and 14.5.5 (Mesh peering Management frames for AMPE). It is also used for HCCA TXOP negotiation between APs (see 11.26.3 (HCCA TXOP negotiation)). The format of the Mesh Peering Confirm frame Action field is shown in Table 9-511 (Mesh Peering Confirm frame Action field format).

|  |  |  |
| --- | --- | --- |
| * Mesh Peering Confirm frame Action field format | | |
| Order | Information | Notes |
|  | Category | The Category field is defined in 9.4.1.11 (Action field). |
|  | Self-protected Action | The Self-protected Action field is defined in 9.6.15.1 (Self-protected Action fields). |
|  | Capability | The Capability field is defined in 9.4.1.4 (Capability Information field). |
|  | AID | The AID field is defined in 9.4.1.8 (AID field). |
|  | Supported Rates and BSS Membership Selectors | The Supported Rates and BSS Membership Selectors element is defined in 9.4.2.3 (Supported Rates and BSS Membership Selectors element). |
|  | Extended Supported Rates and BSS Membership Selectors | The Extended Supported Rates and BSS Membership Selectors element is present if there are more than eight supported rates and is optionally present otherwise. |
|  | RSN | The RSNE is present only when dot11MeshSecurityActivated, dot11ProtectedQLoadReportActivated, or dot11ProtectedTXOPNegotiationActivated is true. |
|  | Mesh ID | The Mesh ID element is defined in 9.4.2.98 (Mesh ID element) and is present when dot11MeshActivated is true; otherwise it is not present. |
|  | Mesh Configuration | The Mesh Configuration element is defined in 9.4.2.97 (Mesh Configuration element) and is present when dot11MeshActivated is true; otherwise it is not present. |
|  | Mesh Peering Management | The Mesh Peering Management element is defined in 9.4.2.101 (Mesh Peering Management element). |
|  | HT Capabilities | The HT Capabilities element is present when dot11HighThroughputOptionImplemented is true. |
|  | HT Operation | The HT Operation element is included when dot11HighThroughputOptionImplemented is true. |
|  | 20/40 BSS Coexistence element | The 20/40 BSS Coexistence element is optionally present when dot112040BSSCoexistenceManagementSupport is true. |
|  | Extended Capabilities  element | The Extended Capabilities element is present if any of the fields in this element are nonzero. |
| 15 | VHT Capabilities | The VHT Capabilities element is present when dot11VHTOptionImplemented is true. |
| 16 | VHT Operation | The VHT Operation element is present when dot11VHTOptionImplemented is true. |
| 17 | Operating Mode Notification | The Operating Mode Notification element is optionally present if dot11OperatingModeNotificationImplemented is true. |
| 18(11ax) | HE Capabilities | The HE Capabilities element is present when dot11HEOptionImplemented is true; otherwise, it is not present. |
| 19(11ax) | HE Operation | The HE Operation element is present when dot11HEOptionImplemented is true; otherwise, it is not present. |
| 20 | OCI | The OCI element is present when dot11RSNAOperatingChannelValidationActivated is true; otherwise, it is not present. |

* Mesh Peering Close frame format
* Mesh Peering Close frame self protection

Protection of this frame is provided when authenticated mesh peering exchange (AMPE) is enabled. AMPE provides integrity protection of Mesh Peering Close frames.

When the Mesh Peering Close frame is used by the mesh peering management (MPM) protocol, integrity protection on the frame is not enabled.

* Mesh Peering Close frame details

The Mesh Peering Close frame is used to close a mesh peering using the procedures defined in 14.3.8 (Mesh peering close) and in 14.5.5 (Mesh peering Management frames for AMPE). It is also used for HCCA TXOP negotiation between APs (see 11.26.3 (HCCA TXOP negotiation)). The format of the Mesh Peering Close frame Action field is shown in Table 9-512 (Mesh Peering Close frame Action field format).

|  |  |  |
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| * Mesh Peering Close frame Action field format | | |
| Order | Information | Notes |
|  | Category | The Category field is defined in 9.4.1.11 (Action field). |
|  | Self-protected Action | The Self-protected Action field is defined in 9.6.15.1 (Self-protected Action fields). |
|  | Mesh ID | The Mesh ID element is defined in 9.4.2.98 (Mesh ID element) and is present when dot11MeshActivated is true; otherwise it is not present. |
|  | Mesh Peering Management | The Mesh Peering Management element is defined in 9.4.2.101 (Mesh Peering Management element). |

* Mesh Group Key Inform frame format
* Mesh Group Key Inform frame self protection

The protection of the frames is provided by the mesh group key handshake protocol (see 14.6 (Mesh group key handshake)) that uses Mesh Group Key Inform frames.

* Mesh Group Key Inform frame details

The Mesh Group Key Inform frame is used to update a mesh GTK (MGTK) with a peer (see 14.6.2 (Protection on mesh group key handshake frames)). The format of the Mesh Group Key Inform frame Action field is shown in Table 9-513 (Mesh Group Key Inform frame Action field format).

|  |  |  |
| --- | --- | --- |
| * Mesh Group Key Inform frame Action field format | | |
| Order | Information | Notes |
|  | Category | The Category field is defined in 9.4.1.11 (Action field). |
|  | Self-protected Action | The Self-protected Action field is defined in 9.6.15.1 (Self-protected Action fields). |
|  |  |  |
|  |  |  |

* Mesh Group Key Acknowledge frame format
* Mesh Group Key Acknowledge frame self protection

The protection of the frames is provided by the mesh group key handshake protocol (see 14.6 (Mesh group key handshake)) that uses Mesh Group Key Acknowledge frames.

* Mesh Group Key Acknowledge frame details

The Mesh Group Key Acknowledge frame is used to acknowledge receipt and processing of a Mesh Group Key Inform frame (see 14.6.2 (Protection on mesh group key handshake frames)). The format of the Mesh Group Key Acknowledge frame Action field is shown in Table 9-514 (Mesh Group Key Acknowledge frame Action field format).

|  |  |  |
| --- | --- | --- |
| * Mesh Group Key Acknowledge frame Action field format | | |
| Order | Information | Notes |
|  | Category | The Category field is defined in 9.4.1.11 (Action field). |
|  | Self-protected Action | The Self-protected Action field is defined in 9.6.15.1 (Self-protected Action fields). |
|  |  |  |
|  |  |  |

**Reference:**

[1] Draft P802.11REVme\_D0.0

[2] 11-21/0793r5 “REVmd Working Group Comments for MAC ad-hoc”