###  **IEEE P802.11Wireless LANs**

|  |
| --- |
| Channel Usage |
| Date: 2023-09-27 |
| Author(s): |
| Name | Affiliation | Address | Phone | Email |
| Brian Hart | Cisco Systems |  |  | brianh@cisco.com |
| Binita Gupta | Cisco Systems |  |  |  |
| Srini Kandala | Samsung |  |  |  |
|  |  |  |  |  |

**Abstract**

CID 19478

**Revisions:**

* Rev 1: Initial version of the document.
* Rev 2: Corrected doc#, streamlined text after offline feedback, clarified the limitations of the unsolicited approach, added a fix to call out the probe req/resp mechanism.
* Rev 3: Relaxed the normative text at the end due to offline feedback.
* Rev 4: a) removed the unsolicited probe response mechanism, b) removed any consideration of channel usage in an AP’s beacon if the client is not associated to the AP, d) added more discussion (due to offline feedback)
* Rev 5: Stronger separation between untrusted and trusted mechanisms + Country for (Re)Assoc as requested at the F2F and offline discussion.
* Rev 6: Changes on TWT agreement since probe req/resp cannot establish P2P TWT agreements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 19478 | 9.4.2.84 | 1122.30 | Evolving use cases suggest upgrades to Channel Usage feature are preferred. | Commenter will bring a proposal. | Revised. Incorporate changes under CID 19478 in 23/1478<motioned Revision> which substantially address the commenter’s concern.  |

**Discussion**

P2P sharing can be addressed via two complementary techniques: orthogonality via time (Triggered TXOP Sharing (TTS)) and/or orthogonality via frequency (11v Channel Usage (CU)). 11v Channel Usage enables an associated STA that also has or intends to participate in a P2P BSS to solicit a list of channels for better P2P BSS coexistence from its associated AP. Recommended TX power and EDCA parameters may also be conveyed to the STA. TTS, although higher complexity, is fine-grained and the STA’s resources can be reused on the same channel. CU is lower complexity, albeit coarse-grained and typically involves off-channel operation.

During the 11v timeframe there was no Beacon frame protection so Channel Usage was not added to the Beacon since it could be trivially spoofed. Now we have routine Beacon frame protection, Channel Usage can be safely added to the usual mgmt. frames (Beacons, (Re)Assoc Resp frames) (already present in Probe Resp).

Note: the AP can cancel individualized channel usage information by sending fresh individualized channel usage information that equals the broadcast channel usage information according to the final “While” sentence in the proposed text.

**Change text for CID 19478**

***TGbe editor: Add the following row to each of tables Table 9-63 (Association Response frame body) and Table 9-65 (Reassociation Response frame body):***

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| <Last assigned + <11beEditorToAssign>> | Country | The Country element is present if the Channel Usage element is present. |

***TGbe editor: Add the following row to each of tables 9-60 (Beacon frame body), Table 9-63 (Association Response frame body) and Table 9-65 (Reassociation Response frame body):***

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| <Last assigned + <11beEditorToAssign>> | Channel Usage | Zero or more Channel Usage elements are present if dot11ChannelUsageActivated is true. |

11.21.15 Channel usage procedures

The channel usage procedures may be used to assist the STA that operates a noninfrastructure BSS(#3349) or an off-channel TDLS direct link to better coexist with the infrastructure network by

* exchanging Channel Usage Request and Channel Usage Response frames with an associated AP(#3311)(#4009), or
* receiving a Beacon or (Re)Association Response frame containing unsolicited Channel Usage element(s) from an associated AP, or
* exchanging Probe Request and Probe Response frames containing Channel Usage element(s), or
* receiving a Beacon frame containing unsolicited Channel Usage element(s) from an unassociated AP.

The first two mechanisms provide trusted channel usage; the final two mechanisms provide untrusted channel usage. The term channel usage signifies one or both of trusted and untrusted channel usage.

Implementation of (#3311)channel usage is optional for a WNM STA. A STA that implements (#3311) channel usage has dot11ChannelUsageImplemented equal to true. When dot11ChannelUsageImplemented is true, dot11WirelessManagementImplemented shall be true, or the STA shall support(#546) acting as an S-AP within a CCSS. A STA with dot11ChannelUsageActivated equal to true shall support channel usage and shall set to 1 the Channel Usage field of the Extended Capabilities elements that it transmits.

…

An AP may also include one or more unsolicited Channel Usage elements in Beacon frames and (Re)Association Response frames. Unlike a Channel Usage Request/Response exchange, such unsolicited elements do not establish a peer-to-peer TWT agreement. Unlike Probe Request/Response and Channel Usage Request/Response exchanges, such unsolicited elements may provide partial channel usage information and/or may not be individualized for the recipient’s traffic.

The AP may send an unsolicited group addressed or individually addressed Channel Usage Response frame to the STAs that have requested (#3311)channel usage information or have received channel usage information in a (Re)Association Response frame if the corresponding (#3311)channel usage information needs to be updated. The Country element shall be included in the unsolicited and/or group addressed Channel Usage Response or (Re)Association Response frame. The AP may include the Power Constraint information and EDCA Parameter in the Channel Usage Response frame. The values of the fields in the Power Constraint and EDCA Parameter Set elements included in the Channel Usage Response frame shall be the same values of the fields in the Power Constraint and EDCA Parameter Set elements that are transmitted by the AP.

In trusted channel usage, upon receipt of a Channel Usage element in a Beacon frame from the associated AP, a (Re)Association Response frame or a Channel Usage Response frame, the receiving STA may use the following:

* The channel usage information as part of channel selection processing to start a (#3349)noninfrastructure BSS or an off-channel TDLS direct link
* The Power Constraint element, if present, as part of determining its maximum transmit power for transmissions for the (#3349)noninfrastructure BSS or an off-channel TDLS direct link
* The EDCA Parameter Set element, if present, as part of determining its EDCA parameters for transmissions for the noninfrastructure BSS(#3349) or an off-channel TDLS direct link
* The QMF Policy element, if present and dot11QMFActivated is true, as part of determining its classification of Management frames for transmissions for the noninfrastructure BSS(#3349) or an off-channel TDLS direct link

In untrusted channel usage, upon receipt of a Channel Usage element in a Beacon frame from an unassociated AP or a Probe Response frame, the receiving STA may use the following:

* The channel usage information as part of channel selection processing to start a noninfrastructure BSS or an off-channel TDLS direct link
* The Power Constraint element, if present, as part of determining its maximum transmit power for transmissions for the noninfrastructure BSS or an off-channel TDLS direct link
* The EDCA Parameter Set element, if present, as part of determining its EDCA parameters for transmissions for the noninfrastructure BSS or an off-channel TDLS direct link
* The QMF Policy element, if present and dot11QMFActivated is true, as part of determining its classification of Management frames for transmissions for the noninfrastructure BSS(#3349) or an off-channel TDLS direct link

If either a recommended operating class, or a recommended channel, or both are not supported or understood

by the recipient, or if the operating country of the sender is unknown, the recipient shall discard the

corresponding channel usage recommendation. A STA that has not requested (#3311)channel usage

information and has not received channel usage information in a (Re)Association Response frame shall discard an unsolicited group addressed Channel Usage Response frame. While a STA’s most recently received individually addressed and broadcast channel usage recommendations from the STA’s associated AP differ, the STA should give higher priority to the individually addressed channel usage recommendation. A STA that performs both trusted and untrusted channel usage should give higher priority to the trusted channel usage information.