IEEE P802.11
Wireless LANs

|  |
| --- |
| Resolution for CIDs 1024 and 1113 |
| Date: 2022-04-27 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Abdel Karim Ajami | Qualcomm Inc |  |  | aajami@qti.qualcomm.com |
| Abhishek Patil |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes resolution for CIDs 1024 and 1113 received in LB258 (REVme D1.0).

***TGm editor: The baseline for this document is REVme D1.2.***

**Revisions:**

* Rev 0: Initial version of the document.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGm Draft. This introduction is not part of the adopted material.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Page** | **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 1024 | Abhishek Patil | 9.6.7.36 | 1906 | 18 | Many upcoming device-to-device applications require lower latency and higher throughput. Add a signaling from the AP to assist more scalable direct link operation that can coexist with infra mode operation. | The commenter will provide a contribution | **Revised**Agree with the comment. Defined a new value for the Channel Usage Mode field that is carried in the Channel Usage element to signal dedicated peer-to-peer off-channel. In addition, extended the Channel Usage Request and Response frame to enhance the scalability of peer-to-peer operation on the off-channel.**TGm editor, please implement changes as shown in 528r0 tagged as 1024** |
| 1113 | George Cherian | 9.6.7.36 | 1906 | 34 | To cater to many emerging use cases involving device-to-device applications, 802.11 should provide better support and co-ex scheme for direct link applications (coex with infra). Add a signaling (e.g. beacon) from an AP recommending a channel for device-to-device (direct link) operations | The commenter will provide a contribution | **Revised**Agree with the comment. Same resolution as CID 1024.**TGm editor, please implement changes as shown in 528r0 tagged as 1024** |

Discussion:

Anticipate wide adoption of peer-to-peer (P2P) devices with increasing QoS requirements in Enterprise & Residential environments. The AP operating channel is not scalable with infrastructure and P2P transmissions; hence scalability is a key issue to address. In addition, the AP has a better view of network resources and can help to orthogonalize the P2P transmissions on the off-channel

The goal is to enable the coexistence of large number of P2P devices with each other and with the infrastructure where the AP recommends service periods on a set of off-channels (AP does not operate on) to orthogonalize P2P transmissions. AP recommends one or more (channel, service period) tuples. AP will rely on existing signaling by extending the Channel Usage Request/Response frame

The existing Channel Usage Request/Response frame was designed to provide the necessary signaling to enable the AP to advise the non-AP STA on how to coexist with the infrastructure network. We are extending the existing functionality to aid the P2P operation on the off-channel

**9.4.2.85 Channel Usage element**

***TGm editor: Please update Table 9-265 in this subclause as shown below:***

Table 9-265—Usage Mode definitions [1024]

|  |  |
| --- | --- |
| **Value** | **Usage Mode** |
| 0 | Noninfrastructure IEEE 802.11 network |
| 1 | Off-channel TDLS direct link |
| 2 | Noninfrastructure IEEE 802.11 network in which none of the APs belonging to the same ESS operate infrastructure BSSs on the channels indicated by the Channel Entry field |
| 3-255 | Reserved |

**9.6.13.24 Channel Usage Request frame format**

***TGm editor: Please update the following paragraph and Figure 9-1174 in this subclause as shown below:***

The Channel Usage Request frame is sent by a non-AP STA to the AP to request the specified Channel

Usage information. The format of the Channel Usage Request frame Action field is defined in Figure 9-1174 (Channel Usage Request frame Action field format)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Category | WNMAction | Dialog Token | Channel Usage Elements | Supported Operating Classes Element | TWT RequestList (optional) |
| **Octets:** | 1 | 1 | 1 | variable  | variable | variable |

Figure 9-1174 — Channel Usage Request frame Action field format[1024]

***TGm editor: Please add the following paragraphs and figure in this subclause as shown below after the paragraph starting “The Supported Operating Classes…”:***

[1024]The format of the TWT Request List field is shown in Figure 9-1174a

|  |  |  |
| --- | --- | --- |
|  | Count | TWT Elements |
| **Octets:** | 1 | variable |

Figure 9-1174a — TWT Request List field format

The Count subfield is an unsigned integer that indicates the number of TWT elements included in the TWT Elements field. The value 0 is reserved.

The TWT Elements subfield includes one or more TWT elements with each TWT element having one individual TWT parameter set. The TWT element is described in 9.4.2.199 (TWT element). The Trigger and the Flow Type subfields of the TWT element are reserved when the TWT element is carried in the TWT Request List field.

**9.6.13.25 Channel Usage Response frame format**

***TGm editor: Please update the following paragraph and Figure 9-1175aa in this subclause as shown below:***

The Channel Usage Response frame is sent by an AP in response to a Channel Usage Request frame, or autonomously. The format of the Channel Usage Response frame Action field is shown in Figure 9-1175 (Channel Usage Response frame Action field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Category | WNMAction | Channel Usage Elements | Country String | Power Constraint Element (optional) | EDCA Parameter Set Element (optional) |
| **Octets:** | 1 | 1 | variable  | 3 | 0 or 3 | variable |
|  |  |  |  |  |  |
|  | Transmit Power Envelope Element (optional) | TWT Response List(optional) |
| **Octets:** | variable | variable |  |  |  |

Figure 9-1175—Channel Usage Response frame Action field format [1024]

***TGm editor: Please add the following paragraphs and figure in this subclause as shown below after the paragraph starting “The Transmit Power Envelope element …”:***

[1024] The format of the TWT Response List field is shown in Figure 9-1175a

|  |  |  |  |
| --- | --- | --- | --- |
|  | TWT Persistence | Count | TWT Elements |
| **Octets:** | 2 | 1 | variable |

Figure 9-1175a — TWT Response List field format

The TWT Persistence subfield indicates the number of TBTTs during which the off-channel TWT SP(s) corresponding to the TWT Element(s) in the Channel Usage Response frame are valid. The number of beacon intervals during which the off-channel TWT SPs are present is equal to the value in the TWT Persistence field plus 1.

The Count subfield is an unsigned integer that indicates the number of TWT elements included in the TWT Elements field. The value 0 is reserved.

The TWT Elements subfield includes one or more TWT elements with each TWT element having one individual TWT parameter set. The TWT element is described in 9.4.2.199 (TWT element). The Trigger and the Flow Type subfields of the TWT element are reserved when the TWT element is carried in the TWT Response List field.

**11.21.15 Channel usage procedures**

***TGm editor: Please update this subclause as shown below:***

Channel Usage information is a set of channels provided by an AP to non-AP STAs for operation of a noninfrastructure network or an off-channel TDLS direct link. The Channel Usage information provided by the AP to the non-AP STA is to advise the STA on how to coexist with the infrastructure network.

Implementation of Channel Usage is optional for a WNM STA. A STA that implements 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.

A non-AP STA that supports Channel Usage and is not associated to an AP prior to using a Noninfrastructure network or an off channel TDLS direct link may transmit a Probe Request frame including both Supported Operating Classes and Channel Usage elements. A non-AP STA supporting Channel Usage may send a Channel Usage Request frame at any time after association to the AP that supports the use of Channel Usage to request the Channel Usage information for supported operating classes. [1024] An associated non-AP HE STA that supports Channel Usage and have the TWT Requester Support subfield set to 1 in the HE Capabilities element may request a TWT schedule on the off-channel by including in the Channel Usage Request frame a TWT Request List field. The TWT Request List field includes one or more TWT elements with each TWT element having one individual TWT parameter set as described in 26.8.2 (Individual TWT agreements). Each TWT element in the TWT Request List field applies to all the Channel Entry subfields of the Channel Usage Elements field.

Upon receipt of a Channel Usage element in the Probe Request frame, the AP supporting Channel Usage shall send a Probe Response frame including one or more Channel Usage elements. Upon receiving a Channel Usage Request frame, the AP supporting Channel Usage shall send a Channel Usage Response frame including one or more Channel Usage elements. Channel Usage elements shall include channels that are valid for the regulatory domain in which the AP transmitting the element is operating and consistent with the Country element in the Beacon or Probe Response frame; the Channel Usage elements shall not include any other channels. [1024] Upon receiving a Channel Usage Request frame with a TWT element, an HE AP that supports Channel Usage and has the TWT Responder Support subfield set to 1 in the HE Capabilities element shall send a Channel Usage Response frame including a TWT Response List field. The TWT Response List field includes one or more TWT elements with each TWT element having one individual TWT parameter set as described in 26.8.2 (Individual TWT agreements). Each TWT element in the TWT Response List field applies to all the Channel Entry subfields of the Channel Usage Elements field. When the Channel Usage element in a received Probe Request or Channel Usage Request frame includes one or more Operating Class/Channel Pair fields, the Operating Class/Channel Pair field(s) indicate(s) the requested non-AP STA operating class/channels for the usage mode indicated in the frame.

The AP may send an unsolicited group addressed or individually addressed Channel Usage Response frame to the STAs that have requested Channel Usage information if the corresponding Channel Usage information needs to be updated. The Country element shall be included in the unsolicited and/or group addressed Channel Usage 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.

Upon receipt of a Channel Usage element in the Probe Response or Channel Usage Response frame, the

receiving STA may use the following:

* The channel usage information as part of channel selection processing to start a Noninfrastructure network 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 network 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 network 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 network or an off-channel TDLS direct link
* [1024] The individual TWT parameter set in the TWT element(s) included in the TWT Response List field as part of channel selection processing to start a noninfrastructure network on the off-channel 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 Channel Usage information shall discard an unsolicited group addressed Channel Usage Response frame.