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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel Usage Resolutions | | | | |
| Date: 2024-01-15 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Brian Hart | Cisco Systems |  |  | brianh@cisco.com |
|  |  |  |  |  |
|  |  |  |  |  |

**Abstract**

CIDs resolved 6070, 6071, 6072, 6073, 6074, 6075

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Revised definition of non-infra BSS
* Rev 2: Fixed during REVme call
* Rev 3: Refined non-infrastructure BSS for Channel Usage definition

***TGme editor: Please note Baseline is 11me D4.0. Edits are expressed via Word track changes:***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6070 | 3.1 | 189 | 28 | No definition for "infrastructure BSS" (yet "noninfrastructure BSS" is defined in terms of "infrastructure BSS") | Add a definition for infrastructure BSS - e.g. a BSS with an AP. | Revised; in general agreement with commenter; see changes under 6070 in doc 23/1924<motionedRevision>. |

***Discussion***

|  |
| --- |
| 3.1 Definitions  **infrastructure**: An infrastructure comprises a distribution system (DS), one or more access points (APs), zero or one portals, and zero or more mesh gates. It is also the logical location of distribution and integration service functions of an extended service set (ESS).(#238)  4.3.5 Distribution system (DS) concepts  4.3.5.1 Overview  Instead of existing independently, an infrastructure BSS **might** also form a component of an extended form of network that is built with multiple BSSs.  An access point (AP) is any entity that has STA functionality and a distribution system access function (DSAF), which enables access to the DS, via the WM for associated STAs. |

Since an AP has access to the DS, therefore the existence of an AP requires the presence of a DS. Therefore, if a BSS has an AP, then infrastructure is present (i.e., a distribution system (DS), one or more access points (APs), zero or one portals, and zero or more mesh gates). Use this direction to define an infrastructure BSS.

***Changes for CID 6070***

3.1 Definitions

infrastructure basic service set (BSS): [infrastructure BSS] A BSS that includes an access point (AP), which enables access to a distribution system (DS).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6071 | 9.4.2.84 | 1125 | 43 | Especially for Channel Usage, what is really meant by "noninfrastructure BSS" since Wi-Fi Direct group, Wi-Fi tethering are both in this P2P bucket but both are BSSes with an AP (or similar) | Try "A BSS whose AP has connectivity to a DS and thence a portal BSS and where the AP of the BSS either is a non-mobile AP or is a mobile AP in the ongoing absence of non-mobile APs." | Revised; in general agreement with commenter; see changes under 6071 in doc 23/1924<motionedRevision>. |

***Discussion***

|  |
| --- |
| noninfrastructure basic service set (BSS): [noninfrastructure BSS](M118) A BSS that is not an infrastructure BSS.(#3349) |

Given the preceding definition of an infrastructure BSS, this definition doesn’t really work for the Channel Usage feature.

Since the channel assignment portion of radio resource management is a slow process (to minimize disruption to clients), the Channel Usage feature was designed to be consumed by the classes of devices that are marked as AP in “noninfrastructure BSS” (below) and not by the other classes of devices. Certain cells are highlighted, to denote that they make it more difficult to establish a general rule.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Example device | Preferred outcome | Has connectivity to a portal | Mobile | Mobile with respect to a mobile platform that is not within the BSA of non-mobile APs | C, Power from external device required during operation |
| Smartphone tethering | AP in “noninfrastructure BSS” | Y | Y | Y | N |
| Windows/Linux/macOS laptop operating as a Wi-Fi Direct Group Owner or similar | AP in “noninfrastructure BSS” | Only when bridging from 802.11 to another LAN technology (e.g., 802.3) | Y | Y | N |
| AP in a car | AP in “noninfrastructure BSS” | Y (quite likely) | Y | Y | Y |
| Printer / projector with P2P connectivity | AP in “noninfrastructure BSS” | N | N | N | Y |
| IBSS | STA in an independent BSS | N | Y and N | Y and N | Y and N |
| Enterprise AP on a bus/train | Could go either way but lean to AP in “noninfrastructure BSS” just because AP in infrastructure BSS creates bigger problems | Y | Y | Y | Y |
| Enterprise AP on an isolated cruise ship out at sea | AP in an infrastructure BSS | Y | Y | N | Y |
| Wired home AP | AP in an infrastructure BSS | Y | N | N | Y |
| Wired mesh enterprise AP | AP in an infrastructure BSS | Y | N | N | Y |
| Wired classic enterprise AP | AP in an infrastructure BSS | Y | N | N | Y |
| Proposal | AP in “noninfrastructure BSS” = | (NOT this) |  | OR (this) |  |

A potentially workable definition for all these cases is:

noninfrastructure BSS: “A BSS a) whose DS is not connected to a Portal or b) whose AP is both mobile with respect to the nearest planet and is not fixed to a mobile platform where the mobile platform is not within the BSA of non-mobile APs.”

However, the “noninfrastructure BSS” term is no longer correct term since is not a simple negation of an infrastructure BSS. We need a replacement term here.

At the same time, the existing term noninfrastructure BSS is used (and should continue to be used) in the following:

|  |
| --- |
| peer-to-peer (PTP) link: [PTP link] (M118)(#1752)A station-to-station (STA-to-STA) link between tunneled direct link(#2154) setup (TDLS) peer STAs in an infrastructure basic service set (BSS) or between STAs in a noninfrastructure BSS.(#3349)  service set identifier: [SSID] A string used to identify the infrastructure basic service sets (BSSs) that comprise an extended service set (ESS), or to identify a noninfrastructure BSS(#3349). |

Therefore introduce a new term and use it.

Further ARC discussion raised concerns with immobility.

***Changes for CID 6071***

3.2 Definitions specific to IEEE Std 802.11

channel-usage-aiding basic service set (BSS): [channel-usage-aiding BSS] An infrastructure BSS whose AP performs channel coordination with at least one other non-co-hosted AP that has an overlapping BSA.

channel-usage-aidable basic service set (BSS): [channel-usage-aidable BSS] A BSS that is not a channel-usage-aiding BSS.

9.4.2.84 Channel Usage element

The Channel Usage element defines the channel usage information for channel-usage-aidable BSSs or an off channel TDLS direct link. The format of the Channel Usage element is shown in Figure 9-530 (Channel Usage element format).

Table 9-266—Usage Mode definitions

|  |  |
| --- | --- |
| Value | Usage Mode |
| 0 | Channel-usage-aidable BSS(#3349) |
| 1 | Off-channel TDLS direct link |
| (#1024)2 | Channel-usage-aidable BSS(#3349) in which none of the APs in the channel-usage-aiding BSSes and belonging to the same ESS operate on the channels identified by the Channel Entry field |
| 3(#3145) | Peer-to-peer link indication |
| 4(#4028) | Channel-usage-aidable BSS channel switch request |
| 5–254 | Reserved |
| 255(#4006) | Unknown request |

11.21.15 Channel usage procedures

The channel usage procedures may be used to assist the STA that operates a channel-usage-aidableBSS(#3349), or an off-channel TDLS direct link to better coexist with a network of channel-usage-aidable BSSs by exchanging Channel Usage Request and Response frames with an AP of a channel-usage-aidable BSS.(#3311)(#4009) 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.

(#1024)(#3145)A TWT agreement that is established between a STA and its associated AP, by exchanging Channel Usage Request and Response frames, is referred to as (#3150)a peer-to-peer TWT agreement and the corresponding TWT schedules are referred to as (#3150) peer-to-peer TWT schedules. (#3145)In this case, the Channel Usage element carried in the Channel Usage Request and Response frames may:

* include a single Channel Entry field with Operating Class and Channel field(s) that are different from the associated AP's BSS channel, or
* include a single Channel Entry field with Operating Class and Channel field(s) that are the same as the associated AP's BSS channel, or
* include no Channel Entry field.

(#3148)Unless explicitly indicated in this subclause, the rules defined in 10.46 (Target wake time (TWT)) and in 26.8 (TWT operation) shall be ignored when establishing and operating with a peer-to-peer TWT agreement.

NOTE 1—The TWT element is used for a peer-to-peer TWT agreement only to determine the timing parameters of the peer-to-peer TWT schedule.

(#3150)An HE AP that has dot11ChannelUsageActivated equal to true and supports negotiating a peer-to-peer TWT schedule that is requested by a non-AP STA to establish a channel-usage-aidable BSS(#3349) or an off- channel TDLS direct link shall set to 1 the (#3022)Peer-to-peer TWT Support field of the Extended Capabilities elements that it transmits.

(#1024)NOTE 2—An HE AP has dot11TWTOptionImplemented equal to true and has the TWT Responder Support subfield set to 1 in the Extended Capabilities element and the HE Capabilities element.

A non-AP STA that supports (#3311)channel usage and is not associated to an AP prior to using a channel-usage-aidableBSS(#3349) 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 (#3311)channel usage may send a Channel Usage Request frame at any time after association to the AP that supports the use of (#3311)channel usage to request the (#3311)channel usage information for supported operating classes. (#1024)A non-AP STA that transmits a Channel Usage Request frame shall set the Usage Mode field of the Channel Usage element to 2 if it requests assistance to setup a channel-usage-aidable BSS(#3349) on an off-channel that does not have any infrastructure BSSs operated by any AP that belongs to the ESS of its associated AP. Otherwise, the non-AP STA shall set the Usage Mode field of the Channel Usage element to (#4337)0, 1 or 3.(#3145)

(#1024)A non-AP STA that supports channel usage and has the TWT Requester Support subfield set to 1 (#3391)in the HE Capabilities element that it transmits, may negotiate (#3150)a peer-to-peer TWT schedule with its associated AP, (#3155)to indicate up the service period, and optionally the channel operation, of a channel-usage-aidable BSS(#3349) or an off-channel TDLS direct link, by transmitting a Channel Usage Request frame that includes TWT Elements and Timeout Interval Element fields, if the AP has the (#3022)(#3150)Peer-to-peer TWT Support field set to 1 in the Extended Capabilities element. Each TWT element carried in the TWT Elements field includes a single Individual TWT Parameter Set field whose subfields shall be set as described in 26.8.2 (Individual TWT agreements) (#3155)and 9.4.2.198 (TWT element) except that the TWT Group Assignment subfield shall be set to zero and the Responder PM Mode subfield, the Trigger subfield, the Flow Type subfield, and the TWT Channel subfield shall be reserved. Each TWT element in the TWT Elements field applies to all the Channel Entry subfields of the Channel Usage Elements field. The non-AP STA may indicate the lifetime of the requested peer-to-peer TWT agreement in the Timeout Interval Value field of the TIE that it includes in the Channel Usage Request frame and shall set the Timeout Interval Type field to 5. (#3155)

(#3148)A non-AP STA may send a Channel Usage Request frame to its associated AP with a TWT element configured as a TWT request. In this case, if the non-AP STA receives a Channel Usage Response frame from the AP that includes a TWT element configured as a TWT response with the TWT Setup Command field indicating Accept TWT, then the non-AP STA has successfully completed the peer-to-peer TWT agreement with the AP for the TWT flow identifier indicated in the TWT element that is carried in the Channel Usage Response frame. Otherwise, that peer-to-peer TWT agreement has not been established. The TWT flow identifier, together with the MAC addresses of the requesting STA and the responding AP, identifies the peer- to-peer TWT agreement.

(#3145)A non-AP STA that has already selected a Channel for peer-to-peer communication may transmit a Channel Usage Request frame with the Usage Mode field of the Channel Usage element set to 3 and without a Channel Entry field to inform the AP about its unavailability during the peer-to-peer TWT agreement.

Otherwise, the non-AP STA (#4337)shall set the Usage Mode field to 0, 1 or 2.

(#1024)A non-AP STA that has successfully set up (#3150)a peer-to-peer TWT schedule with its associated AP should use the negotiated (#3150)peer-to-peer TWT SPs for (#3349)(#4311)communication not via the AP.(#3052)

(#3157)A non-AP STA may teardown a peer-to-peer TWT agreement by sending a TWT Teardown frame with the Negotiation Type subfield set to 0 and the TWT Flow Identifier field set to the value of the corresponding TWT flow identifier.

NOTE 3—The total number of peer-to-peer TWT agreements and of individual TWT agreements between a non-AP STA and its AP can be up to 8, since the TWT Flow Identifier field of the TWT element comprises 3 bits.(#4010)

(#3157)A non-AP STA may suspend a peer-to-peer TWT agreement by sending a TWT Information frame with the TWT Flow Identifier field set to the value of the TWT Flow Identifier field of the TWT element in the Channel Usage Response frame that concluded the setup of the corresponding peer-to-peer TWT agreement if the AP has set the TWT Information Frame Disabled field to 0 in the TWT element sent during the TWT setup; otherwise, the non-AP STA shall not transmit a TWT Information frame to the AP. If the Next TWT subfield is present in the TWT Information frame, the value of the Next TWT subfield shall be selected from existing TWT values for the peer-to-peer TWT agreement.

NOTE 4—If the Next TWT subfield is present in the TWT Information frame, the peer-to-peer TWT agreement will resume at the time indicated in the Next TWT subfield.(#3157)

Upon receipt of a Channel Usage element in the Probe Request frame, the AP supporting (#3311)channel usage shall send a Probe Response frame including one or more Channel Usage elements. Upon receiving a Channel Usage Request frame (#1024)with the Usage Mode field set to 0 or 1, 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 the Usage Mode field set to 2 in a Channel Usage element, an AP that supports channel usage shall send a Channel Usage Response frame with the Usage Mode field in the Channel Usage element set to 2 if the AP can determine that none of the APs belonging to the same ESS operate BSSs on the channels indicated by the Channel Entry field in the Channel Usage element of the response. Otherwise, the AP shall set the Usage Mode field of the Channel Usage element to (#4337)0, 1 or 3. (#3145)

NOTE 5—The determination of which APs belonging to the same ESS operate BSSs on a particular channel is implementation dependent and beyond the scope of this standard.(#1024)

(#1024)Upon receiving a Channel Usage Request frame with a TWT element, an AP that supports (#3150)peer-to-peer TWT scheduling shall send a Channel Usage Response frame including (#3145)zero or one Channel Usage element that includes a Channel Entry field with only one Operating Class and Channel field, a TWT Elements field and may include a Timeout Interval Element field. Each TWT element carried in the TWT Elements field includes a single Individual TWT Parameter Set field whose subfields shall be set as described in 26.8.2 (Individual TWT agreements) except that the TWT Group Assignment subfield shall be set to zero and the Responder PM Mode subfield, the Trigger subfield, the Flow Type subfield, and the TWT Channel subfield shall be reserved. (#3155)The TWT element(s) in the TWT Elements field apply to the Channel Entry subfield of the Channel Usage Elements field, if present. When the lifetime of the peer-to-peer TWT agreement expires, the AP shall send a TWT Teardown frame to terminate that peer-to-peer TWT agreement.

NOTE 6—If the Usage Mode field set to 3, it is possible that the Channel Usage Request frame does not include a Channel Entry field. In such case, the TWT element indicates the unavailability of the requesting non-AP STA for communication with the AP during the peer-to-peer TWT schedule.(#3145)

(#3148)The outcome of the TWT setup when negotiating a peer-to-peer TWT agreement initiated by the exchange of Channel Usage Request and Channel Usage Response frames that carry a TWT element as described in this clause is the same as that defined in Table 10-40 (TWT setup exchange command interpretation(11ax)).

(#3152)The AP shall not send an unsolicited Channel Usage Response frame with a TWT element to a non-AP STA.

(#1024)An AP that successfully sets up (#3150)a peer-to-peer TWT agreement (#3146)after receiving a Channel Usage Request frame with a TWT Elements field from a non-AP STA may indicate the lifetime of the (#3150)peer-to-peer TWT agreement for the corresponding TWT element(s) in the Timeout Interval Value field of the (#3146)TIE that it includes in the Channel Usage Response frame and shall set the corresponding Timeout Interval Type field to 5. An AP that successfully sets up (#3150)a peer-to-peer TWT agreement (#3156)shall consider the non-AP STA to be in power save mode and doze state at the start of the peer-to-peer TWT SP and back to its original power management mode at the end of the peer-to-peer TWT SP unless the AP receives a frame addressed to it from the non-AP STA within the time that overlaps with the peer-to-peer TWT SP.

(#3145)Upon receiving a Channel Usage Request frame with a TWT element configured as a TWT request and a Channel Usage element with the Usage Mode field set to 3 (Peer-to-peer link) that does not carry a Channel Entry field, an AP that supports peer-to-peer TWT scheduling shall transmit a Channel Usage Response frame that includes a Channel Usage element without a Channel Entry field and a TWT element configured as a TWT response (i.e., TWT Request field set to 0) with a TWT Setup Command field indicating Accept TWT and all other fields of that TWT element set to the same value as the fields of the TWT element carried in the Channel Usage Request frame. In this case, the Timeout Interval Value field of the TIE, if any, in the Channel Usage Response frame includes the same value as that of the Channel Usage Request fraidable.

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. (#4006)If the Usage Mode field in the Channel Usage element carries a value that is unknown to the AP, the AP should send in the Probe Response or Channel Usage Response frame a Channel Usage element without a Channel Entry field and with a Usage Mode field value indicating Unknown request, to inform the client that the AP does not support the usage mode indicated in the request. Usage mode Unknown request shall not be used in a Probe Request frame, in a Channel Usage Request frame, or in a Channel Usage Response frame that is sent in response to a Channel Usage Request frame that includes a Channel Usage element with usage modes 0 to 3.

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 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 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 (#3349)channel-usage-aidable 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)channel-usage-aidable 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 channel-usage-aidable 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 channel-usage-aidable BSS(#3349) or an off-channel TDLS direct link

(#4028)A non-AP STA that is operating in a channel-usage-aidable BSS may send a Channel Usage Request frame with a Channel Usage element that carries a Usage Mode field with a value equal to 4 to a peer STA to indicate that it prefers to switch the operating channel of the channel-usage-aidable BSS to another channel. A non-AP STA may indicate the preferred operating channels by including one or more Operating class and Channel fields in the Channel Entry field of the Channel Usage element carried in the corresponding Channel Usage Request frame.

(#4028)Upon receiving a Channel Usage Request frame with a Channel Usage element that carries a Usage Mode field with a value equal to 4, a STA that supports channel-usage-aidable BSS channel switch requests and is operating in a channel-usage-aidable BSS should consider switching the operating channel of the channel-usage-aidable BSS to a new channel that is one of the preferred channels indicated in the received Channel Entry field of the Channel Usage element, if present. The STA shall transmit a Channel Usage Response frame in response to the reception of a Channel Usage Request frame with the Usage Mode field equal to 4 that includes a Channel Usage element with the Usage Mode field set to 4. If the channel switch request is accepted, the STA shall include the target operating class and channel in the Channel Entry field of the Channel Usage element in the Channel Usage Response frame. Otherwise, no Channel Entry field shall be included. (#4028)When the Channel Usage element is carried in a Probe Request or Probe Response frame, the Usage Mode field shall not be set to 4.

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 shall discard an unsolicited group addressed Channel Usage Response frame.

***REVme editor: in sections 9.4.2.84 (Channel Usage element) and 11.21.15 (Channel usage procedures), please change all instances of “noninfrastructure BSS” to “channel-usage-aidable BSS” and all instances of “Noninfrastructure BSS” to “channel-usage-aidable BSS”.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6072 | 9.3.3.9 | 729 | 36 | A single Channel Usage element ("The Channel Usage element ...") is listed but text at P2613L23 refers to "Channel Usage elements" | Try "One or more Channel Usage elements ..." | Revised; in general agreement with commenter; see changes under 6072 in doc 23/1924<motionedRevision>. |

***Discussion***

|  |
| --- |
| 11.21.15 Channel usage procedures  A non-AP STA that supports (#3311)channel usage and is not associated to an AP prior to using a noninfrastructure BSS(#3349) or an off channel TDLS direct link may transmit a Probe Request frame including both Supported Operating Classes and Channel Usage elements.  Upon receipt of a Channel Usage element in the Probe Request frame, the AP supporting (#3311)channel usage shall send a Probe Response frame including one or more Channel Usage elements. |

Sending multiple Channel Usage elements in parallel makes sense since there are different flavors of them, identified by Usage Mode.

|  |
| --- |
| 9.4.2.84 Channel Usage element |

***Changes for CID 6072***

3.2 Definitions specific to IEEE Std 802.11

Table 9-66—Probe Request frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| 11 | Channel Usage | One or more Channel Usage elements are optionally present if dot11ChannelUsageActivated is true. |

Table 9-67—Probe Response frame body

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| 37 | Channel Usage | One or more Channel Usage elements are present if at least one Channel Usage element is present in the Probe Request frame and dot11ChannelUsageActivated is true. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6073 | 11.21.15 | 2614 | 21 | Peer-to-peer TWT scheduling is complicated for the AP and in general APs are unlikely to be able to support an infinite number of Peer-to-peer TWT schedules. However, current language seems to force the AP to accept a Peer-to-peer TWT scheduling request without any consideration of AP overload etc. | Make this protocol more realistic: AP can accept / deny. A TWT Setup Command of Reject TWT (and arguably Alternate) is unavoidable so explicitly allow that. |  |

***Discussion (open, but one way forward is proposed below)***

|  |
| --- |
| 11.21.15 Channel usage procedures  (#3145)Upon receiving a Channel Usage Request frame with a TWT element configured as a TWT request and a Channel Usage element with the Usage Mode field set to 3 (Peer-to-peer link) that does not carry a Channel Entry field, **an AP that supports peer-to-peer TWT scheduling shall transmit a Channel Usage Response frame that includes** a Channel Usage element without a Channel Entry field and **a TWT element configured as a TWT response (i.e., TWT Request field set to 0) with a TWT Setup Command field indicating Accept TWT** and all other fields of that TWT element set to the same value as the fields of the TWT element carried in the Channel Usage Request frame. In this case, the Timeout Interval Value field of the TIE, if any, in the Channel Usage Response frame includes the same value as that of the Channel Usage Request frame. |

For all circumstances when this feature is disabled, clients can assert and de-assert the PM field at any time yet these transitions are intrinsically rate-limited – it is one parameter change per client and this parameter change happens at a maximum rate of say dozens of clients (OFDMA) every “300us” at most. With P2P TWT schedules, intermittently the AP would have to allow for all schedules lining up such that then the AP would need to do 8\*300 parameter changes in “1usec”. This is 24000x more processing than previously defined. As an example, each P2P flow could be synchronized to a codec that uses a client’s undisciplined oscillator for a timing reference, so the AP has to allow for a panoply of P2P TWT schedules at say 55.9998/59.9999/60.0000/60.0001/etc Hz. Such schedules need a lot of maintenance and can pile up on each other periodically.

Then, with this force-accept language, if an AP were to become overloaded, it has no choice but to completely disable its support for peer-to-peer TWT scheduling. This doesn’t affect just the new client requests, but also *all previously accepted requests*. It makes it less likely that the AP would even enable support for peer-to-peer TWT scheduling. It enables a new DoS attack, whereby the attacker creates multiple virtual clients each seeking multiple P2P TWT agreements.

Elsewhere we always allow an AP to reject a request when it runs out of resources, and that is the better template here. This behavior is already the default behavior for P2P TWT agreements, so we no longer need special-case language.

|  |
| --- |
| (#3148)The outcome of the TWT setup when negotiating a peer-to-peer TWT agreement initiated by the exchange of Channel Usage Request and Channel Usage Response frames that carry a TWT element as described in this clause is the same as that defined in Table 10-40 (TWT setup exchange command interpretation(11ax)). |

Also, the AP might attempt to prioritize accepting requests based on the channel selected for P2P operations, so allow the client to report its P2P channel even if already selected.

***Proposed resolution for CID 6073***

Rejected due to lack of consensus.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6074 | 11.21.15 | 2611 | 33 | There are concerns that the Channel Usage procedures mix trusted and untrusted info | Clearly delineate trusted and untrusted information |  |

***Proposed resolution***

Rejected. This work is already underway in 802.11be and can continue there.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6075 | 11.21.15 | 2614 | 52 | The channel usage recommendation only applies at the time the STA “starts” a non-infra BSS / TDLS but if it’s already started and then the AP sends a recommendation later, there is no normative text (not even a “may”, although it’s clearly not forbidden in practice) for the STA to change the channel of the non-infra BSS / TDLS if it is able. This is overly limiting. | For when and if (and maybe never) if the non-infraBSS/off-ch TDLS chooses to switch channel, allow this ch usage info as a consideration. Try "- The channel usage information as part of channel selection processing to start a noninfrastructure BSS or an off-channel TDLS direct link, \*or when switching the channel of a pre-existing noninfrastructure BSS or off-channel TDLS direct link\*" | Revised; in general agreement with commenter; see changes under 6075 in doc 23/1924<motionedRevision>. |

***Discussion***

Makes sense.

***Changes for CID 6075***

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
  + when starting a (#3349)noninfrastructure BSS or an off-channel TDLS direct link, or
  + when switching the channel of an existing noninfrastructure BSS or 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