IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CR Spatial Reuse Group Management CID 12044 12304 | | | | | | Date: 2018-03-02 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Matthew Fischer | Broadcom |  |  | [Matthew.fischer@broadcom.com](mailto:Matthew.fischer@broadcom.com) | | Thomas Derham | Broadcom |  |  | [thomas.derham@broadcom.com](mailto:thomas.derham@broadcom.com) | | Laurent Cariou | Intel |  |  | [laurent.cariou@intel.com](mailto:laurent.cariou@intel.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

Comment resolution with proposed changes to TGax D2.2 for CIDs relating to Spatial Reuse Group.

The CID list is:

12044, 12304

The proposed changes on this document are based on TGax Draft 2.0.

**REVISION NOTES:**

**R0**:

Initial

**R1**:

27.9.2.5 – added the adjective “receiving” to clarify which AP is being refered to – the receiving AP is the one that receives an authorize message and can use the authorize message to set a color bit only when the receiving AP is named either through an included BSSID value or by being a member of an indicated SSID value or network ID value

Updated doc references

**R2**:

Removed SRG Network ID. Authorization is granted based on matching BSSID or SSID only

Clarified language to make clear that the scheme does not allow one AP to send an Authorization element which could cause other APs to add arbitrary OBSS (other than the BSS of the sending AP) to their SRGs

Added Max/Min thresholds, and AP vs AP+STAs flag, associated with an authorization.

**END OF REVISION NOTES**

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 TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

**CIDs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 12044 | Jarkko Kneckt | 156.56 | 9.4.2.243 | The SRG OBSS PD Min Offset can allow associated STAs to transmit with full transmission power even when they detect WLAN signal from an SRG BSS at -62 dBm energy. The spatial reuse is targetted to organise higher transmission density by lowering the transmission power when the sensitivity requirement is relaxed. An ill behaving AP can get benefit by misconfiguring SRG OBSS PD MIN value. In this case the non-AP STAs may transmit with full transmission power during the transmissions of the SRG OBSSs. The 802.11 should ensure fairness between STAs and not allow such behaviour. In worst case, this operation may be used against the WLAN, for instance  It may be difficult to explain to the FCC and other regulators why WLAN allows such interfering transmissions and why it cannot control WLAN BSSs and STAs. Lack of control may prevent WLAN use in new spectrum and cause changes in the current regulation. | Please delete all instances of the SRG OBSS PD Min Offset and its use in the spec. Please allow only to control the OBSS PD MaxOffset[CL1] . | Revise – Tgax editor to make changes found in 11-18-0225r2 |
| 12304 | Laurent Cariou | 27.9.2 | 290.25 | OBSS\_PD based spatial reuse operation is defining specific rules and equations when applied to an SRG (SR group). In some managed environments, the definition and settlement of SRG can be done in a proprietary way within an ESS. In less managed environments, such SRG formation would require a specific protocol and specific frame exchanges. The spec should define such protocol to extend the usability of the SRG OBSS\_PD SR mode | Define the protocol and frame exchanges needed to establish an SRG among neighboring APs. | Revise – Tgax editor to make changes found in 11-18-0225r2 |

**Discussion:**

The Spatial Reuse Group (SRG) concept applies to OBSS\_PD Spatial Reuse. An AP can determine an SRG that applies to its own transmissions, and SRGs that apply to transmissions by associated STAs in its BSS.

In 11ax D2.2, an AP can indicate SRG parameters in the Spatial Reuse Parameter Set element to its associated STAs, and those associated STAs use the indicated SRG PD\_Min, SRG PD\_Max, SRG BSS Color Bitmap and SRG Partial BSSID Bitmap. The bitmaps indicate the group of OBSSs that constitute the SRG for the recipient associated STA. The associated STAs use the indicated SRG PD\_Min/Max values when conditions are met for OBSS\_PD Spatial Reuse on reception of a PPDU that matches an indicated BSS Color or Partial BSSID in the bitmaps.

SRG is expected to be used primarily in planned networks – that is, where the deployer either knows (e.g. for professionally-installed APs in stadiums or enterprises), or can reasonably estimate (e.g. based on residential address for self-installed APs) the physical locations of all the APs that are operating BSS within a given SRG. Knowledge of the AP location and configurability of operating parameters enables the deployer to determine SRG PD\_Max and PD\_Min values that optimize aggregate capacity within the network. For example, in deployments where the APs are densely deployed and the SINR distribution of links to associated STAs is high, substantial gains in aggregate capacity may be achieved by each AP in the network determining its same-network co-channel neighbors to be in its SRG, and increasing SRG PD\_Min and/or PD\_Max to values higher than the non-SRG values. These gains occur because the resulting increase of transmit opportunities more than outweighs the impact of SINR compression due to increased mutual interference in a high SINR operating regime. (See 11-15/1039r0.)

The use of SRG means that interference caused to other OBSS that are not part of the (SRG enabled) network is not increased, hence enabling these capacity gains to be achieved without causing coexistence issues or unfairness with respect to other independent network deployments - unlike existing proprietary solutions to this use case which may desense reception of signals from all other BSS, irrespective of their source.

One commenter notes in CID 12044 that, because the mechanism by which an SRG is determined is not currently defined, an “ill-behaving AP” could set its SRG bitmaps to include BSS that the deployer is not managing and is therefore not in a position to determine the interference impact of a higher SRG PD\_Max. It is noted that this comment applies both to transmissions by the associated STAs (which receive the SRG bitmaps from their AP) and the AP’s own transmissions, and that the current text does not clearly define how an SRG is to be determined for the AP’s own transmissions.

Another commenter in CID 12304 notes that a mechanism by which the AP of one BSS could authorize the AP of another BSS to add the first BSS to its SRG(s) without centralized management could be beneficial; this may be the case for example in lightly-managed residential networks, where the APs in each of multiple neighboring residences may be provided by the same operator (e.g. fixed-line service provider) with lightweight remote management, but for scalability reasons may not be under full joint control, and may be operating independent data networks (e.g. home network of each residence).

The proposed solution to address all of the above comments is as follows:

* Define messaging and rules by which an AP is allowed to add BSS Colors and Partial BSSIDs to an SRG that it defines
  + The authors of this document gave some consideration to simply defining rules on the AP’s SME, however these would have involved concepts (e.g. “APs in a managed network”) which are out-of-scope of 802.11, and may not be sufficiently well defined to ensure correct implementation. Therefore, the proposed approach is based on explicit 802.11 messaging between APs, whereby the AP of an OBSS authorizes a second AP to add the BSS Color and Partial BSSID of the OBSS to the SRG(s) determined by the second AP. In the absence of (or revokation of) such authorization, or when certain other conditions are met, the rules prevent an AP from adding the corresponding BSS Color or Partial BSSID to its SRG(s)
  + The authorization includes limits on the max/min offsets that are allowed to be used with SRGs that include the corresponding BSS, therefore allowing an AP to say “I authorize you to add me to the SRG(s) you define, but only if you use max/min offsets up to a certain level”
  + The authorization includes a flag that indicates if it applies only to the SRG determined for an AP’s own transmissions, or if it also applies to SRGs determined by the AP for use by associated STAs. This allows an AP, if it wishes, to limit authorization to neighbor AP transmissions, which are likely to be in fixed locations and hence the potential reuse/interference impact may be more accurately assessed.
  + The proposed solution targets scalable SRG authorization in large managed networks, and can also be used for opportunitic SRG authorization between unmanaged or lightly-managed APs.
  + An SRG Authorization element is defined which can be sent (unsolicitied) broadcast in Beacon and Probe Response frames, or unicast in a Public Action frame
  + An SRG Authorization element can carry a “Revoked” status code in order to revoke a previous authorization
  + An SRG Authorization element specifies a list of the APs (OBSS) that are being authorized. It is noted that, particularly in managed networks, it is convenient for a single SRG Authorization element to authorize multiple APs (OBSS) operated by a physical managed network, which may or may not all be in the same ESS. On the other hand, in some cases such as opportunistic authorization, it might be more typical for an AP to authorize a single neighboring AP (OBSS). Therefore, the SRG Authorization element contains one or more subelements, each of which defines one of two possible identifiers as follows:
    - BSSID (authorizing a single neighboring BSS)
    - SSID (authorizing all BSS in a specified ESS)
  + Note: While the SRG authorization message is sent between APs in unauthenticated frames (Beacon, Probe Response or Public Action), and therefore it is theoretically possible than an attacker could send spoofed SRG Authorization elements, the risk and consequences of such attack are low and if an AP discovers that it has been added to an SRG, it can revoke the membership. If the attacker persists, then this amounts to an unauthorized addition and effectively, a form of denial of service.
* Define a mechanism by which an AP, which may be considering to send an SRG Authorization element, can make that determination based on knowledge of the APs it would be authorizing
  + The decision by an AP to authorize an OBSS will typically be made based on knowledge of the interference impact on itself such authorization might cause. As mentioned earlier, in some cases this knowledge will be known a-priori, e.g. due to RF planning, while in other cases it may not. In any case, it is useful that an AP can identify the APs that it would be authorizing, e.g. to confirm interference assumptions based on Beacon RSSI measurements.
  + With respect to the two possible identifiers of an SRG authorization defined above:
    - BSSID – already indicated in Beacon and Probe Response frames
    - SSID – already indicated in Beacon and Probe Response frames (hidden SSIDs may not be indicated in Beacon frames, but are indicated in responses to directed probe requests)
* Add text to specify rules for determining SRG vs non-SRG PPDU for both APs and non-AP STAs.
* Add an HE protected action frame which carries the Spatial Reuse Parameter Set element, so that APs can update associated STAs with new Spatial Reuse parameter information (including updated SRGs) post-association, e.g. if an OBSS AP grants or revokes SRG authorization

Two possible use cases are described as follows:

1. A stadium deploys a large number of RF-planned APs, all operating in the same ESS. All APs are configured (by their WLAN Controller) to advertise SRG Authorization element in Beacon and Probe Response frames, indicating the SSID. Therefore, each AP authorizes all other APs in the ESS to add its BSS to their SRGs
2. A fixed-line operator provides its customers with 802.11 home gateways and remotely manages them. In general, the home gateways operate both a home network SSID (different for each customer) and a “homespot” SSID (common across all participating customers). The APs are not professionally installed however, on average, the BSS have characteristic RF parameters due to wall attenuation between residences, location of associated STAs, etc. The operator configures the APs on each home gateway to discover their neighbors and evaluate the Beacon RSSI and other parameters pertaining to those neighbors, and decide whether or not to send an SRG Authorization element in order to allow (some of) those neighbors to add the AP to the SRG they define. The SRG Authorization element contains the BSSID(s) of the neighboring APs that the AP decides to authorize.

**Proposed Changes to Draft Text of TGax D2.2:**

**CID 12044, 12304**

***TGax editor: modify TGax D2.2 subclause 9.3.3 as follows:***

* Management frames
* Beacon frame format

Insert the following new rows into Table 9-27 (Beacon frame body):

|  |  |  |
| --- | --- | --- |
| * Beacon frame body | | |
| **Order** | **Information** | **Notes** |
| 83 | SRGAuthorization | The SRG Authorization element is optionally present |

* Probe Response frame format

Insert the following new rows into Table 9-34 (Probe Response frame body):

|  |  |  |
| --- | --- | --- |
| * Probe Response frame body | | |
| **Order** | **Information** | **Notes** |
| 100 | SRGAuthorization | The SRG Authorization element is optionally present |

***TGax editor: modify TGax D2.2 subclause 9.4.2 as follows:***

Insert the following new rows into Table 9-77 (Element IDs):

|  |  |  |  |
| --- | --- | --- | --- |
| SRG Authorization(#5163) | 255 | <ANA> | Yes |

***Add the following section:***

* + - 1. SRG Authorization element(#5163)

The format of the SRG Authorization element is shown in Figure 9-XXX (SRG Authorization element format).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | |  | |  | |  | |  |  |
|  | Element ID | Length | | Element ID Extension | | SRG Authorization Control | | SRG OBSS Min Offset Limit | | SRG OBSS Max Offset Limit | Authorized List |
| Octets: | 1 | 1 | | 1 | | 1 | | 1 | | 1 | Variable |
| Figure 9-XXX - SRG Authorization element format | | |  | |  | |  | |

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

The SRG Authorization Control field is defined in Figure 9-yXX (SRG Authorization Control field format)

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 | B2 B7 |
|  | Status Code | AP Only Authorization | Reserved |
| Bits: | 1 | 1 | 6 |

**Figure 9-yXX SRG Authorization Control field format**

The Status Code field is set to 1 to indicate that the AP(s) of the BSS(s) indicated in the Authorized List field are authorized to add the BSS of the AP transmitting the element to their SRG(s). The Status Code field is set to 0 to indicate that any previous authorization of the AP(s) indicated in the Authorized List field is revoked, and the indicated BSS(s) are not authorized to add the BSS of the AP transmitting the element to any SRG that they define.

The AP Only Authorization field is set to 1 to indicate that the authorization applies only to definition of an SRG for the recipient AP’s own transmissions, and not to the definition of SRGs for associated STAs in the AP’s BSS. The AP Only Authorized field if set to 0 to indicate the authorization applies both to definition of an SRG for the recipient AP’s own transmissions and to the definition of SRGs used for OBSS\_PD Spatial Reuse operation by associated STAs in the AP’s BSS. The AP Only Authorized field is ignored if the Status Code field is set to 0.

The SRG OBSS Min Offset Limit field is set to the maximum limit of the SRG OBSS Min Offset that is authorized to be used for an SRG that includes the BSS Color or Partial BSSID of the AP transmitting the element.

The SRG OBSS Max Offset Limit field is set to the maximum limit of the SRG OBSS Max Offset that is authorized to be used for an SRG that includes the BSS Color or Partial BSSID of the AP transmitting the element.

The Authorized List field contains one or more subelements, per the Table 9-zXX.

**Table 9-zXX SRG Authorized List subelements**

|  |  |
| --- | --- |
| Authorized List subelement | Subelement ID |
| SRG BSSID | 0 |
| SRG SSID | 1 |
| Reserved | 2-255 |

The SRG BSSID subelement indicates the BSSID of a BSS that is being authorized. The format of the SRG BSSID subelement is shown in Figure 9-yyx (SRG BSSID Subelement format).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Subelement ID | Length | BSSID |
| Octets: | 1 | 1 | 6 |

**Figure 9-yyX SRG BSSID Subelement format**

The SRG SSID subelement indicates the SSID of an ESS that is being authorized. The SSID field contains a valid SSID with non-zero length. All APs operating a BSS in the specified ESS are being authorized. The format of the SRG SSID subelement is shown in Figure 9-yy7 (SRG SSID Subelement format).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Subelement ID | Length | SSID |
| Octets: | 1 | 1 | 1-32 |

**Figure 9-yy7 SRG SSID Subelement format**



The use of the SRG Authorization element is described in 27.9.2.3 (General Operation with SRG OBSS\_PD level).

***TGax editor: modify TGax D2.2 subclause 9.6.8 as follows:***

* Public Action details

***Add the following section:***

* + - 1. SRG Authorization frame

An SRG Authorization frame is sent to authorize the indicated APs to add the transmitting AP’s BSS to the SRGs they determine. The format is shown in Table 9-235XX SRG Authorization frame format.

|  |  |  |
| --- | --- | --- |
| * SRG Authorization frame format | | |
| Order | Information | Notes |
| 1 | Category |  |
| 2 | Public Action |  |
| 3 | Dialog Token |  |
| 4 | SRG Authorization element |  |
| 5 | HE Operation | The HE Operation element is present when dot11HEOptionImplemented  is true; otherwise it is not present. |

***TGax editor: modify TGax D2.2 subclause 9.6.29 as follows:***

* Protected HE Action frame details(#4911)

***Modify the following section:***

* Protected HE Action field

A Protected HE Action field, in the octet immediately after the Category field, differentiates the Protected HE Action frame formats. The Protected HE Action field values associated with each frame format within the HE category are defined in Table 9-421z (HE Action field values).

|  |  |
| --- | --- |
| * Protected HE Action field values | |
| Value | Meaning |
| 0 | HE BSS Color Change Announcement |
| 1 | HE Spatial Reuse Parameter Set |
| 2-255 | Reserved |

***Add the following section:***

* + - 1. HE Spatial Reuse Parameter Set frame format

The HE Spatial Reuse Parameter Set frame is an Action or Action No ACK frame of category Protected HE. The Action field of an HE Spatial Reuse Parameter Set frame contains the information shown in Table XXX.

|  |  |
| --- | --- |
| Table XXX: HE Spatial Reuse Parameter Set frame Action field format | |
| Order | Information |
| 1 | Category |
| 2 | Protected HE Action(#4911) |
| 3 | Spatial Reuse Parameter Set element (see 9.4.2.243 (Spatial Reuse Parameter Set element))(#4911) |

The Category field is defined in Table 9-47 (Category values).

The Protected HE Action field is defined in Table 9-421z (Protected HE Action field values).(#4911)

The Spatial Reuse Parameter Set element as defined in 9.4.2.243 (Spatial Reuse Parameter Set element) is always present in the frame.

No Vendor-Specific elements are present in the(#5350) HE Spatial Reuse Parameter Set frame.

***TGax editor: modify TGax D2.2 subclause 27.9.2.3 as follows:***

27.9.2.3 General Operation with SRG OBSS\_PD level

***Add the following new text at the end of Section 27.9.2.3 General Operation with SRG OBSS\_PD level:***

An HE AP may define a Spatial Reuse Group (SRG) that applies to OBSS\_PD Spatial Reuse operation by an associated STA in the AP’s BSS, in accordance with clause 27.2.3, and indicate that SRG to the associated STA using the Spatial Reuse Parameter Set element by setting the SRG Information Present field to 1 and including the SRG OBSS PD Min Offset, SRG OBSS Max Offset, SRG BSS Color Bitmap, SRG Partial BSSID Bitmap fields.

An HE AP may define an SRG for its own transmissions, without transmitting information to indicate the composition of that SRG, where the corresponding SRG OBSS PD Min/Max offsets are equal to dot11SRGAPOBSSPDMinOffset and dot11SRGAPOBSSPDMaxOffset, respectively.

An HE AP that defines an SRG may include a BSS Color or Partial BSSID in that SRG if and only if all the following criteria are true, otherwise it shall not include the BSS Color or Partial BSSID in the SRG:

* The most recent SRG Authorization element received by the AP meets all of the following criteria:
  + The element is contained in a frame that contains an HE Operation element that matches the BSS Color (for including the BSS Color) or is contained in an MPDU with TA that matches the Partial BSSID (for including the Partial BSSID)
  + The Authorized List field matches the BSSID or SSID of the receiving AP
  + The Status Code field is equal to 1
  + If the SRG being defined applies to OBSS\_PD Spatial Reuse operation by an associated STA in the AP’s BSS (as opposed to applying to the AP’s own transmissions):
    - the AP Only Authorization field is equal to 0
    - the SRG OBSS Min Offset value associated with the SRG, as indicated to the associated STA in the Spatial Reuse Parameter Set element, is less than or equal to the value of the SRG OBSS Min Offset Limit field
    - the SRG OBSS Max Offset value associated with the SRG, as indicated to the associated STA in the Spatial Reuse Parameter Set element, is less than or equal to the value of the SRG OBSS Max Offset Limit field
  + If the SRG being defined applies to the AP’s own transmissions:
    - dot11SRGAPOBSSPDMinOffset is less than or equal to the value of the SRG OBSS Min Offset Limit field
    - dot11SRGAPOBSSPDMaxOffset is less than or equal to the value of the SRG OBSS Max Offset Limit field
* The AP has not detected a BSS Color clash (for including the BSS Color) or Partial BSSID clash (for including the Partial BSSID) for the BSS corresponding to this BSS Color or Partial BSSID within the previous 10 seconds.
  + A BSS Color clash is detected if an MPDU is received where all the following conditions apply:
    - The MPDU contains an HE Operation element that matches the BSS Color, or is contained in an HE PPDU that matches the BSS Color
    - Address 3 (BSSID) of the MPDU does not match the TA of a previously received SRG Authorization element that was the basis for setting the BSS Color bit to 1
  + a Partial BSSID clash is detected if an MPDU is received where all the following conditions apply:
    - Address 3 (BSSID) of the MPDU matches the Partial BSSID
    - Address 3 (BSSID) of the MDPU does not match the TA of a previously received SRG Authorization element that was the basis for setting the Partial BSSID bit to 1

If an HE AP defines an SRG for its own transmissions or the transmissions of its associated STAs, the AP shall subsequently monitor the above criteria corresponding to the BSS Colors and Partial BSSIDs in the SRG. If the criteria for including a BSS Color or Partial BSSID in a defined SRG are no longer met, the AP shall update the SRG by removing the BSS Color or Partial BSSID and, if the defined SRG is for transmissions of an associated STA, shall transmit a Spatial Reuse Parameter Set element to the corresponding STA containing the updated SRG information.

An AP may indicate SRG authorization by transmitting an SRG Authorization element in an SRG Authorization frame or in Beacon and Probe Response frames.

SRG Authorization elements are received directly (from one AP to another) or, if transmitted in Beacon and Probe Response frames. via associated STAs that support the Beacon request capability (as indicated by the Beacon Passive Measurement Capability Enabled bit or the Beacon Active Measurement Capability Enabled bit being set in the RM Enabled Capabilities element in the (Re)Association frame).

Note: While the OBSS\_PD Spatial Reuse transmission is defined only for HE STAs, any AP (regardless of HE capability) may transmit an SRG Authorization element in order to authorize receiving HE APs to include the AP’s BSS in their SRGs.

***TGax editor: modify TGax D2.2 subclause 27.2.3 as follows:***

* SRG (#8111)PPDU determination

*Modify the following paragraph:*

An HE non-AP STA that has received a Spatial Reuse Parameter Set element from its associated AP with a value of 1 in the SRG Information Present subfield shall use information provided in the most recently received Spatial Reuse Parameter Set element to identify BSSs that are members of the STA's SRG to determine whether or not a received inter-BSS PPDU is an SRG PPDU.

*Modify the following paragraph:*

Otherwise, the PPDU is not determined to be an SRG PPDU. An HE non-AP STA that has not received a Spatial Reuse Parameter Set element from its associated AP with a value of 1 in the SRG Information Present subfield shall not classify any received PPDUs as an SRG PPDU.

*Add the following paragraph at the end of this section:*

An HE AP that has determined an SRG for its own transmissions per the rules in Clause 11.48 shall use that SRG to determine whether or not a received inter-BSS PPDU is an SRG PPDU.

A received HE PPDU that is an inter-BSS PPDU is an SRG PPDU if the numerical value of the BSS\_COLOR parameter of the RXVECTOR is equal to a BSS Color in the SRG. A received VHT PPDU that is an inter-BSS PPDU is an SRG PPDU if the GROUP\_ID parameter of the RXVECTOR has a value of 0 and the numerical value of PARTIAL\_AID[0:5] of the RXVECTOR is equal to a Partial BSSID in the SRG.

A received PPDU that is an inter-BSS PPDU is an SRG PPDU if BSSID information from an MPDU of the PPDU is correctly received and the numerical value of BSSID[39:44] is equal to a Partial BSSID in the SRG.(#8111)

Otherwise, the PPDU is not determined to be an SRG PPDU. An HE AP that has not determined an SRG for its own transmissions shall not classify any received PPDUs as an SRG PPDU.

27.9.2.4 Adjustment of OBSS\_PD and transmit power

***TGax editor: Modify the following tables:***

|  |  |  |  |
| --- | --- | --- | --- |
| * Determining Non-SRG OBSS PD Min and Non-SRG OBSS PD Max values | | | |
| OBSS\_PD SR Disallowed | Non-SRG Offset Present | Value of Non-SRG OBSS PD Min | Value of Non-SRG OBSS PD Max |
| Spatial Reuse Parameter Set element not received | Spatial Reuse Parameter Set element not received | 82 | Non-AP STA: 62  AP: 82 + dot11NonSRGAPOBSSPDMaxOffset |
| 0 | 0 | 82 | 62 |
| 0 | 1 | 82 | 82 + Non-SRG OBSS PD Max Offset |
| 1 | Don’t care | 82 | -82 |

|  |  |  |
| --- | --- | --- |
| * Determining SRG OBSS PD Min and SRG OBSS PD Max values | | |
| SRG Information Present | Value of SRG OBSS PD Min | Value of SRG OBSS PD Max |
| Spatial Reuse Parameter Set element not received | Non-AP STA: N/A  see NOTE  AP: 82 + dot11SRGAPOBSSPDMinOffset | Non-AP STA: N/A  see NOTE  AP: 82 + dot11SRGAPOBSSPDMaxOffset |
| 0 | N/A  see NOTE | N/A  see NOTE |
| 1 | 82 + SRG OBSS PD Min Offset | 82 + SRG OBSS PD Max Offset |
| NOTE—When SRG Information is not present, a non-AP STA cannot determine a PPDU to be SRG and so will not use SRG OBSS PD Min or SRG OBSS PD Max values. | | |

**C.3 MIB Detail**

***TGax editor: Add the following to Dot11HEStationConfigEntry:***

dot11NonSRGAPOBSSPDMaxOffset Unsigned32,

dot11SRGAPOBSSPDMinOffset Unsigned32,

dot11SRGAPOBSSPDMaxOffset Unsigned32

***TGax editor: Add the following:***

dot11NonSRGAPOBSSPDMaxOffset

OBJECT-TYPE SYNTAX Unsigned32 (0..1023)

UNITS "dB"

MAX-ACCESS read-write

STATUS current

DESCRIPTION "This is a control variable. It is written by an external management entity. Changes take effect as soon as practical in the implementation. This attribute indicates the PD\_Max Offset to be used by the AP for non-SRG OBSS\_PD operation."

DEFVAL { 0 } ::= { dot11HEStationConfigEntry TBD}

dot11SRGAPOBSSPDMaxOffset

OBJECT-TYPE SYNTAX Unsigned32 (0..1023)

UNITS "dB"

MAX-ACCESS read-write

STATUS current

DESCRIPTION "This is a control variable. It is written by an external management entity. Changes take effect as soon as practical in the implementation. This attribute indicates the PD\_Max Offset to be used by the AP for SRG OBSS\_PD operation."

DEFVAL { 0 } ::= { dot11HEStationConfigEntry TBD}

dot11SRGAPOBSSPDMinOffset

OBJECT-TYPE SYNTAX Unsigned32 (0..1023)

UNITS "dB"

MAX-ACCESS read-write

STATUS current

DESCRIPTION "This is a control variable. It is written by an external management entity. Changes take effect as soon as practical in the implementation. This attribute indicates the PD\_Min Offset to be used by the AP for SRG OBSS\_PD operation."

DEFVAL { 0 } ::= { dot11HEStationConfigEntry TBD}