IEEE P802.11
Wireless LANs

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| Proposed Text Changes for OBSS\_PD-based SR parameters |
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Abstract

This document provides proposals for spec changes for OBSS\_PD-based SR mode to address CID 8111.

1. **Revision notes**

**R6**: slight modifications to the optionally present fields of the SRP element, i.e. rewording for readability without technical change

 Change “ESS” to “ESS ” in a few places (i.e. just a spacing issue) (later changed all ESS to SRG)

 Expanded the description of how to determine if a PPDU is inter-ESS – i.e. used language that discusses the use of the bitmap, as opposed to just saying “use the bitmap”

 Changed OBSSPD to OBSS\_PD everywhere, since that seems to be the term that has more momentum in the TGax community

**R7**: update the “not received at all” language to reflect updated language fom 11-16-1223r6

 Removed default value statements for TXPwr\_ref and OBSS\_PD MIN and OBSS\_PD MAX because these are duplicates of changes that appear already in 11-16-1223r6 which should precede the changes in this document

**R8**: add a note to the editing instructions to point out that subclause 25.9.3 becomes 25.9.2.1 after the application of changes found in 11-16-1223r6

**R9**:

In 25.9.2:

Merged condition for ESS OBSS PD use of ESS Info present = 1 and PPDU is an intra-ESS PPDU

Merged condition for ESS OBSS PD use of ESS Info present = 1 and PPDU is an inter-ESS PPDU

(Note that the R10 revision changes ESS to SRG)

**R10**:

Because the AP might be selective about which colors to include, the set of colors and/or partial BSSID values might not be the same as the ESS which the STA belongs to – so ESS is replacaed with SRG = Spatial Reuse Group

Added a definition of the term SRG

Changed ESS to SRG

**R11**:

Changed occurrences of addSRG to address

**R12**:

Changed occurrences of wirelSRG to wireless

In 25.9.2 changed the first paragraph, which used to be the only paragraph in the draft descsribing how to discard an OBSS PPDU, and was using only inter-BSS identification – in earlier revisions, this paragraph included a new condition such that the OBSS PPDU discard could only be performed if no SRG parameters were received – that condition has now been removed, effectively making the use of the SRG list optional by a receiver – i.e. if a non-AP STA receives an SR P IE with SRG present, then it may decide to continue to only apply an inter-BSS test based on the associated BSS color

Added NDPA to 25.11a list of PPDUs that have SRP disallowed set in the HE PHY SRP field

25.9.2 – added NDPA to the list of non-HT PPDUs to which SR cannot be applied

**R13**:

25.9.3 SRG OBSS PD MIN offset and SRG OBSS PD MAX offset values transmitted by the AP in SR info elements language updated to fix errors, i.e. offset vs absolute value

Fixed a couple more places where SRG should be “ess”, e.g. within the title page in the word “wireless” and within the R10 revision notes, where a couple of instances of SRG should remain as ESS, and within R6 and R9 revision notes, which reference an earlier version of the document that did not yet contain the term SRG

**R14**:

Global:

Changed name of OBSS\_PD parameter to NON SRG OBSS PD

3.2 definitions:

Added OBSS PD SR PPDU – as the PPDU that is transmitted by an SR transmitter

9.4.2.x Spatial reuse parameter set element

Removed NON SRG OBSS PD MIN OFFSET

25.2.1

Added a description of an SRG.

Modified wording so that if SRG information is present, a STA identifies intr-SRG PPDUs instead of identifying inter-SRG PPDUs.

25.9.2

Added a restriction against SRP use when the STA receives an SR Set element from its AP with SRP Disallowed = 1.

Removed the third case, since it is redundant to the first case, provided that the SRG PD is always >= NON SRG PD, which is an enforced condition under the rules of setting the SRG offset values that are added.

25.9.3

Added more conditions to be met for setting the thresholds, common sense values.

Added two tables to show how to determine MIN and MAX values for NON SRG and SRG OBSS PD thresholds.

Fixed default language – instead of “Default OBSS\_PD” and SRG OBSS\_PD, the equivalent terms are NON SRG OBSS\_PD and SRG OBSS\_PD

Added at the very end, text to allow CTS2SELF to be transmitted in order to allow a transmitter of a PPDU to prevent a third party recipient from invoking OBSS\_PD on the PPDU that follows the CTS2SELF:

Provided that other conditions are fulfilled to allow the transmission of an OBSS PD SR PPDU, a STA may transmit the PPDU only if one of the following conditions is met:

1. the medium was idle for PIFS preceding the received OBSS PPDU
2. a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received OBSS PPDU and the transition corresponded to the end of a PPDU that did not contain a CTS
3. a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received OBSS PPDU and the transition corresponded to the end of a PPDU that contained a CTS and a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received CTS and that transition corresponded to the end of a PPDU that contained an RTS
4. An existing SRP transmit power restriction is not exceeded

Adjusted behavioural language to account for the new bits, in particular, noting the default values to be used for various bit combinations

25.11a

Corrected field names

**R15**:

Removed extra copy of R14 revision notes

9.4.2.x Spatial Reuse Parameter Set element

Removed NON SRG OFFSET MAX and its present bit in the SR control field

25.9.3

Removed NON SRG OBSS PD MAX OFFSET references and associated language

At the very end, fixed the conditions for transmission to separate the last one from the others to make it an or of the first three and an and of the fourth condition

Added SRP transmit power to the set of conditions

**R16:**

Removed SRP PPDU definition – the term is not used in this document

25.9.2

Added definition of SRO\_PPDU as a PPDU discarded based on OBSS\_PD

25.9.2.2

Added allowance for TX power to revert to full power at end of last SRO\_PPDU

**R17:**

9.4.2.x

Reinserted NON SRG OBSS PD MAX OFFSET into the element along with field description and presence bit

25.9.2.2

Added definition of SR Opportunity

25.9.3

Reinserted NON SRG OBSS PD MAX OFFSET and its use in generating the NON SRG OBSS PD parameter value

At the very end, made the tx power restriction language more accurate

**R18**:

3.2 definitions:

Added OBSS PD SR PPDU – as the PPDU that is transmitted by an SR transmitter

9.4.2.x element definition

Added/modified three bits in the SR Control field

Added SRG and NON SRG Offsets present bits to allow NON SRG Max value to be adjusted below the default value without having to include 16 octets of bitmaps

Added NON SRG OBSS PD MAX offset – again, to minimize element length for case of NON SRG mode only

Separate NON SRG OFFSET fields created and associated present bit

25.9.2

Remove the third case, since it is redundant to the first case, provided that the SRG PD is always >= NON SRG PD, which is an enforced condition if both offsets are present.

25.9.3 – added at the very end, text to allow CTS2SELF to be transmitted in order to allow a transmitter of a PPDU to prevent a third party recipient from invoking OBSS\_PD on the PPDU that follows the CTS2SELF:

Provided that other conditions are fulfilled to allow the transmission of an OBSS PD SR PPDU, a STA may transmit an OBSS PD SR PPDU only if the received OBSS PPDU is not immediately preceded by a CTS that is not part of an RTS-CTS exchange.

Fixed default language – instead of “Default OBSS\_PD” and SRG OBSS\_PD, the equivalent terms are NON SRG OBSS\_PD and SRG OBSS\_PD

Adjusted behavioural language to account for the new bits, in particular, noting the default values to be used for various bit combinations

**R19**:

Updated to D1.0 numbering and language

9.4.2.x element definition (and elsewhere as applicable):

Deleted NON SRG OBSS PD MIN OFFSET – reverts to immutable -82

Various language cleanup

**R20**:

27.9.2.2 – make the parameters apply to the AP that transmitted them in addition to the associated STAs

1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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.***

1. **Explanation of the proposed changes**
	1. **OBSS\_PD-based SR parameters**

The spec defines a spatial reuse mode that we call OBSS\_PD-based SR, and which is defined in 25.9.2 and 25.9.3.

In the SFD, we agreed that the TxPower and OBSS\_PD can be adjusted based on a proportional rule.

An 11ax STA regards a valid OBSS PPDU as not having been received at all (e.g., should not update its NAV), except that the medium condition shall indicate BUSY during the period of time that is taken by the receiving STA to validate that the PPDU is from an Inter-BSS, but not longer than the time indicated as the length of the PPDU payload if the RXPWR of the received PPDU is below the OBSS\_PD threshold and TBD conditions are met, noting that the OBSS\_PD threshold is accompanied by a TXPWR value following adjustment rules:



[SR Motion 4, September 17, 2015, see [137], modified with SR Motion 7, March 2016, see 16/414r0]

This document proposes to fill TBDs in the spec:

* Default parameters for this proportional rule
* how to set/adjust the different values in this proportional rule.

**Default parameters:**

This document proposes default parameters that are conservative:

* + OBSS\_PD MIN\_default = -82dBm for 20MHz
	+ OBSS\_PD MAX\_default = -62dBm for 20MHz
	+ PWRref = 21dBm for non-AP STAs or AP STAs with 1 and 2 SSs, 25dBm for AP STAs of 3 SSs or more

**how to set/adjust the different values in this proportional rule.**

An SRG may provide SRG OBSS PD MIN and OBSS\_PD MAX values that apply to SRG PPDUs

* OBSS\_PD MIN\_default <= OBSS\_PD MIN <= ED threshold
* OBSS\_PD MIN <= OBSS\_PD MAX

NON SRG OBSS\_PD MIN and NON SRG OBSS\_PD MAX values apply to inter-BSS PPDUs that are not SRG PPDUs

* 1. **Allowing/disallowing SR modes:**

In the specification framework 11-15-0132-17-00ax, we have the following sentence:

Include the “SR\_allowed” signaling in HE-SIGA to indicate whether SR operation is allowed or not.

* use a value of Spatial Reuse field to indicate SR is disallowed
* The conditions to disallow SR are TBD

[SR Motion 6, March 2016, see 16/382r0]

We have 2 spatial reuse modes currently defined in the SFD:

* OBSS\_PD-based SR: which uses OBSS\_PD levels as defined in 25.9.2 and 25.9.3, and which don’t use information in SIG-A.
* SRP-based SR: defined in the SFD and which uses information in SIG-A SR field.

We propose:

* that the “SR disallowed” entry set in SR field in HE-SIGA only disallows SRP-based SR

We propose also that:

– non-AP STAs set “SR disallowed” entry in Spatial Reuse field when AP requests.

– non-AP STAs set “SR disallowed” entry in Spatial Reuse field in frame with NDP or FTM.

1. **Proposed changes**

3. Definitions, acronyms, and abbreviations

**3.2 Definitions specific to IEEE 802.11**

**TGax Editor: *Add the following definitions in the appropriate location within subclause 3.2 Definitions specific to IEEE 802.11:***

**SRP PPDU:** a PPDU that does not contain a Trigger and is received with an RXVECTOR parameter Spatial Reuse value other than SR\_DELAY, SR\_DISALLOW, SR\_RESTRICTED, or reserved, or a PPDU that does contain a Trigger and is received with an RXVECTOR parameter Spatial Reuse value other than SR\_DELAY, SR\_DISALLOW or SR\_RESTRICTED

**SR PPDU:** a PPDU that is transmitted during a spatial reuse opportunity

**OBSS PD SR PPDU:** a PPDU that is transmitted during a spatial reuse opportunity that was determined using the OBSS\_PD threshold

3.4 Abbreviations and acronyms

**TGax Editor: *Add the following in the appropriate location within subclause 3.4 Abbreviations and acronyms:***

SR Spatial Reuse

SRG Spatial Reuse Group

***TGax editor: Add the following row to the frame format descriptions for the following frames, Beacon, Probe Response, (Re)Association Response (header row shown for reference only):***

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <ANA> | Spatial Reuse Parameter Set | The Spatial Reuse Parameter Set element is optionally present if dot11HighEfficiencyOptionImplemented is true |

**9.4.2 Elements**

**9.4.2.1 General**

***TGax editor: Add a new row for the spatial reuse parameter set element in Table 9-77—Element IDs as shown, noting that the header row below is shown only for reference and is not part of the proposed change:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Element** | **Element ID**  | **Element ID Extension** | **Extensible** |
| Spatial Reuse Parameter Set element (see 9.4.2.x Spatial reuse parameter set element) | 255 | <ANA> | Yes |

***TGax editor: Insert the following new subclause at the end of 9.4.2:***

**9.4.2.x Spatial reuse parameter set element**

The Spatial Reuse Parameter Set element provides information needed by STAs when performing OBSS\_PD-based spatial reuse as defined in 27.9.2 (OBSS\_PD-based spatial reuse). The format of the Spatial Reuse Parameter Set element is defined in Figure 9-ax6b (Spatial Reuse Parameter Set element).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension  | SR Control | NON SRG OBSS PD MAX OFFSET | SRG OBSS PD MIN OFFSET | SRG OBSS PD MAX OFFSET | SRG BSS Color Bitmap | SRG Partial BSSID Bitmap |
| Octets: | 1 | 1 | 1 | 1 | 0 or 1 | 0 or 1 | 0 or 1 | 0 or 8 | 0 or 8 |

 **Figure 9-ax6b- Spatial Reuse Parameter Set element**

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

The SR Control field is defined in Figure 9-ax6c (SR Control field format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | SRP Disallowed | OBSS\_PD SR Disallowed | NON SRG Offset Present | SRG Information Present | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 4 |

**Figure 9-ax6c SR Control field format**

The SRP Disallowed subfield in the SR Control field indicates whether SRP-based SR transmissions are allowed or not at non-AP STAs that are associated with the AP that transmitted this element. SRP-based SR transmissions are disallowed when the SRP Disallowed subfield has the value 1. SRP-based SR transmissions are allowed when the SRP Disallowed subfield has the value 0.

The OBSS\_PD SR Disallowed subfield in the SR Control field indicates whether OBSS\_PD SR transmissions are allowed or not at non-AP STAs that are associated with the AP that transmitted this element. OBSS\_PD SR transmissions are disallowed when the OBSS\_PD SR Disallowed subfield has the value 1. OBSS\_PD SR transmissions are allowed when the OBSS\_PD SR Disallowed subfield has the value 0.

The NON SRG Offset Present subfield indicates whether the NON SRG OBSS PD MAX Offset subfield is present in the element. When this bit is set to 1, the NON SRG OBSS PD MAX Offset subfield is present. When this bit is set to 0, the NON SRG OBSS PD MAX Offset subfield is not present.

The SRG Information Present subfield indicates whether the SRG OBSS PD MIN Offset, SRG OBSS PD MAX Offset, SRG BSS Color Bitmap and SRG Partial BSSID Bitmap subfields are present in the element. When this bit is set to 1, the SRG OBSS PD MIN Offset, SRG OBSS PD MAX Offset, SRG BSS Color Bitmap and SRG Partial BSSID Bitmap subfields are present. When this bit is set to 0, the SRG OBSS PD MIN Offset, SRG OBSS PD MAX Offset, SRG BSS Color Bitmap and SRG Partial BSSID Bitmap subfields are not present.

The NON SRG OBSS PD MAX Offset subfield is present when the value of the NON SRG Offset Present subfield is equal to 1; Otherwise the NON SRG OBSS PD MAX Offset subfield is not present. The NON SRG OBSS PD MAX Offset field contains an unsigned integer which is added to the value -82 dBm to generate the value of the NON SRG OBSS PD MAX parameter.

The SRG OBSS PD MIN Offset subfield is present when the value of the SRG Information Present subfield is equal to 1; Otherwise the SRG OBSS PD MIN Offset subfield is not present. The SRG OBSS PD MIN Offset field contains an unsigned integer which is added to the value -82 dBm to generate the value of the SRG OBSS PD MIN parameter.

The SRG OBSS PD MAX Offset subfield is present when the value of the SRG Information Present subfield is equal to 1; Otherwise the SRG OBSS PD MAX Offset subfield is not present. The SRG OBSS PD MAX Offset field contains an unsigned integer which is added to the value -82 dBm to generate the value of the SRG OBSS PD MAX parameter.

The SRG BSS Color Bitmap subfield is present when the value of the SRG Information Present subfield is equal to 1; Otherwise the SRG BSS Color Bitmap subfield is not present. The SRG BSS Color Bitmap subfield is a bitmap that indicates which BSS Color values are used by members of the SRG of which the transmitting STA is a member. Each bit of the bitmap corresponds to one of the 63 available BSS Colors, where the lowest numbered bit corresponds to BSS Color value 0 and the highest numbered bit corresponds to BSS Color value 63. A BSS Color value is used by at least one BSS that is a member of the same SRG of the transmitting STA if the corresponding bit of the bitmap is set to 1. If a bit in the bitmap is set to 0, then no BSS in the same SRG of the transmitting STA uses the corresponding BSS Color value.

The SRG Partial BSSID Bitmap subfield is present when the value of the SRG Information Present subfield is equal to 1; Otherwise the SRG Partial BSSID Bitmap subfield is not present. The SRG Partial BSSID Bitmap subfield is a bitmap that indicates which Partial BSSID values are used by members of the SRG of which the transmitting STA is a member. Each bit of the bitmap corresponds to one of the 2^6 possible values of BSSID[39:44], where the lowest numbered bit corresponds to Partial BSSID value 0 and the highest numbered bit corresponds to Partial BSSID value 63. A Partial BSSID value is used by at least one BSS that is a member of the same SRG of the transmitting STA if the corresponding bit of the bitmap is set to 1. If a bit in the bitmap is set to 0, then no BSS in the same SRG of the transmitting STA uses the corresponding Partial BSSID value.

***TGax editor: Change the name of subclause 27.2.1 Intra-BSS and inter-BSS frame detection and all references to the subclause, as shown***

**27.2.1a Intra-BSS and inter-BSS frame determination**

***TGax editor: Insert the following text as a new subclause to immediately follow subclause 27.2.1 Intra-BSS and inter-BSS frame detection:***

**27.2.1a SRG and non-SRG frame determination**

An HE 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 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. If BSS Color information is present in a PPDU, the PPDU is determined to be an SRG PPDU if the bit corresponding to the BSS Color of the PPDU in the SRG BSS Color Bitmap is 1. If Partial BSSID information is present in a PPDU, the PPDU is determined to be an SRG PPDU if the bit corresponding to the SRG Partial BSSID Bitmap is 1. Otherwise, the PPDU is not determined to be an SRG PPDU. An HE 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.

**27.9.2 OBSS\_PD-based spatial reuse operation**

**27.9.2.1 General**

***TGax editor: Change the text of subclause 27.9.2.1 “General” as shown:***

If the PHY of a STA issues a PHY-CCA.indication with a value equal to BUSY followed by an RXSTART.indication due to a PPDU reception then the STA’s MAC sublayer may a) issue a PHYCCARESET. request primitive and b) not update its NAV timers based on frames carried in the PPDU if all the following conditions are met:

 — The received PPDU is an Inter-BSS PPDU (see 27.2.1 (Intra-BSS and inter-BSS frame detection))

— The RXVECTOR parameter RSSI\_LEGACY in the PHY-RXSTART.indication primitive, which defines the received power level measured from the legacy portion of the PPDU is below the NON SRG OBSS\_PD level defined in 27.9.2.2 (Adjustment of OBSS\_PD and transmit power)

— The PPDU is not one of the following:

• A non-HT PPDU that carries an individually addressed Public Action frame where the RA field is equal to the STA MAC address

• A non-HT PPDU that carries a group addressed Public Action frame

A non-HT PPDU that carries an NDPA

If the PHY of a STA issues a PHY-CCA.indication with a value equal to BUSY followed by an RXSTART.indication due to a PPDU reception then the STA’s MAC sublayer may a) issue a PHYCCARESET. request primitive and b) not update its NAV timers based on frames carried in the PPDU if all the following conditions are met:

 — The received PPDU is an Inter-BSS PPDU (see 27.2.1 (Intra-BSS and inter-BSS frame detection))

* The received PPDU is an SRG PPDU (see 27.2.1a SRG and non-SRG frame determination)

— The most recently received Spatial Reuse Parameter Set element from the AP associated with the STA had the SRG Information Present subfield equal to 1 or the STA is an AP and its most recently transmitted Spatial Reuse Parameter Set element had the SRG Information Present subfield equal to 1

— The RXVECTOR parameter RSSI\_LEGACY in the PHY-RXSTART.indication primitive, which defines the received power level measured from the legacy portion of the PPDU is below the SRG OBSS\_PD level defined in 27.9.2.2 (Adjustment of OBSS\_PD and transmit power)

— The PPDU is not one of the following:

• A non-HT PPDU that carries an individually addressed Public Action frame where the RA field is equal to the STA MAC address

• A non-HT PPDU that carries a group addressed Public Action frame

A non-HT PPDU that carries an NDPA

If the inter-BSS frame is carried in an HE extended range SU PPDU (where power of the L-STF/L-LTF symbols is boosted 3 dB), the received power measured based on the legacy preamble and captured in the RXVECTOR parameter RSSI\_LEGACY in the PHY-RXSTART.indication primitive shall be decreased by 3 dB to compensate for the power boost factor when compared to the OBSS PD level.

**27.9.2.2 Adjustment of OBSS\_PD and transmit power**

***TGax editor: Add the following text to the end of subclause 27.9.2.2 Adjustment of OBSS\_PD and transmit power:***

An AP may define SRG OBSS PD MIN Offset and SRG OBSS PD MAX Offset values that are used by its associated STAs and by the AP to derive an SRG OBSS\_PD level for determining reception behaviour for inter-BSS PPDUs that are determined to be SRG PPDUs. An AP may define a NON SRG OBSS PD MAX Offset value that is used by its associated STAs and by the AP to derive a NON SRG OBSS\_PD level for determining reception behaviour for inter-BSS PPDUs that are not determined to be SRG PPDUs. The values of SRG OBSS PD MIN Offset, SRG OBSS PD MAX Offset and NON SRG OBSS PD MAX Offset are transmitted to associated STAs within the Spatial Reuse Parameter Set element.

An AP transmitting a Spatial Reuse Parameter Set element shall respect the following constraints:

* OBSS\_PDmin\_default <= -82 + SRG OBSS PD MIN Offset dBm <= -62dBm
* SRG OBSS PD MIN Offset <= SRG OBSS PD MAX Offset
* SRG OBSS PD MAX Offset + -82 dBm <= -62 dBm
* NON SRG OBSS PD MAX Offset <= SRG OBSS PD MAX Offset
* NON SRG OBSS PD MAX Offset + -82 dBm <= -62 dBm

HE STAs shall maintain a NON SRG OBSS\_PD level, with its value calculated according to the Allowable OBSS\_PD level equation above but with NON SRG OBSS PD MIN and NON SRG OBSS PD MAX in place of OBSS\_PDmin and OBSS\_PDmax, respectively, where NON SRG OBSS PD MIN and NON SRG OBSS PD MAX are determined according to Table 25-xyz

**Table 25-xyz 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 | OBSS PD MIN\_default | OBSS PD MAX\_default |
| 0 | 0 | OBSS PD MIN\_default | OBSS PD MAX\_default |
| 0 | 1 | OBSS PD MIN\_default | -82 + NON SRG OBSS PD MAX Offset |
| 1 | Don’t care | -82 | -82 |

HE STAs shall maintain a SRG OBSS\_PD level, with its value calculated according to the Allowable OBSS\_PD level equation above but with SRG OBSS PD MIN and SRG OBSS PD MAX in place of OBSS\_PDmin and OBSS\_PDmax, respectively, where SRG OBSS PD MIN and SRG OBSS PD MAX are determined according to Table 25-yyz

**Table 25-yyz Determining SRG OBSS\_PD\_MIN and SRG OBSS\_PD\_MAX values**

|  |  |  |  |
| --- | --- | --- | --- |
| **OBSS\_PD SR Disallowed** | **SRG Information Present** | **Value of SRG OBSS\_PD\_MIN** | **Value of SRG OBSS\_PD\_MAX** |
| Spatial Reuse Parameter Set element not received | Spatial Reuse Parameter Set element not received | N/A\* | N/A\* |
| 0 | 0 | N/A\* | N/A\* |
| 0 | 1 | -82 + SRG OBSS PD MIN Offset | -82 + SRG OBSS PD MAX Offset |
| 1 | Don’t care | -82 | -82 |
| \*Note: When SRG Information is not present, a STA cannot determine a PPDU to be SRG and so will not use SRG OBSS\_PD\_MIN or SRG OBSS\_PD\_MAX values. |

STAs which receive a Spatial Reuse Parameter Set information element from their associated AP that has a value of 1 in the SRP Disallowed subfield shall not perform SRP-based SR transmissions.

The Spatial Reuse Parameter Set element is optionally present in Beacons, Probe Responses and (Re)Association responses.

***TGax editor: Add the following text as a new subclause to appear immediately after subclause 27.9.2.2 Adjustment of OBSS\_PD and transmit power:***

**27.9.2.2a Transmission of an OBSS\_PD-based SR PPDU**

Provided that other conditions are fulfilled to allow the transmission of an OBSS\_PD-based SR PPDU, a STA may transmit the PPDU only if one of the following conditions is met:

1. the medium was idle for PIFS preceding the received OBSS PPDU that was discarded based on OBSS\_PDlevel
2. a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received OBSS PPDU and the transition corresponded to the end of a PPDU that did not contain a CTS
3. a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received OBSS PPDU and the transition corresponded to the end of a PPDU that contained a CTS and a PHY-CCA.indication transition from BUSY to IDLE occurred within the PIFS time immediately preceding the received CTS and that transition corresponded to the end of a PPDU that contained an RTS

***TGax Editor: Add the following text to the end of subclause, 27.11.6 SPATIAL\_REUSE as shown:***

**27.11.6 SPATIAL\_REUSE**

A STA shall set the TXVECTOR parameter SPATIAL\_REUSE of an HE PPDU to SR\_DISALLOW if the STA is an HE non-AP STA and the SR Disallowed subfield of the SR Control field of the most recently received Spatial Reuse Parameter Set element from its associated AP is equal to 1