IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TGah D1.0 LB200 Comment Resolutions on Section 24.3.18.5 CCA Sensitivity | | | | |
| Date: 2014-01-20 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Eugene Baik | Qualcomm Technologies, Inc. | 5775 Morehouse Dr. San Diego, CA 92122 | 858-658-2568 | eugeneb@qti.qualcomm.com |

Abstract: This document contains proposed resolutions for the following CIDs from LB200 of TGah D1.0:

***Clause 24.3.18.5.\*:***

* 1569
* 1570
* 1571
* 1583
* 1623
* 1775
* 1776
* 1777
* 1792
* 1793
* 1794
* 2172
* 2460
* 2461
* 2692
* 2693
* 2817

##### CIDs for Clause 24.3.18.5.\*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page.  Line | Comment | Proposed Change | Resolution |
| 1569 | Bo Sun | 24.3.18.5.2 | 340.22 | Type 2 channel CCA levels (i.e. thresholds) are never set to be equal to Type 1channel CCA levels | remove "equal to or" | Accepted  See reproduced text below for change. |
| 1570 | Bo Sun | 24.3.18.5.2 | 342.20 | there is no 9.19.2.8a | change 9.19.2.8a into 9.20.2.9 | Accepted  See reproduced text below for change. |
| 1571 | Bo Sun | 24.3.18.5.2 | 341.50 | what is the conditions for CCA BUSY on the Primary 1 MHz? | Clarify the primitive used for 1MHz channel conditions | Accepted.  Please see the rewrite of Section 24.3.18.5.4 for the conditions in which Primary 1MHz channel is busy (i.e. PHY-CCA.indication(BUSY, {primary1}) |
| 1583 | Bo Sun | 24.3.18.5.5 | 343.07 | Table 7-5 has defined primary, secondary, secondary1, secondary40/80. There's no definition for secondary2, secondary4 and secondary8. | Unify the terms to keep spec consistance. | Accepted.  Table 7-5 has been re-written (separate CID resolution document, 13/1522r0 by Yongho Seok) to use terminology consistent with 24.3.18.5 |
| 1623 | Brian Hart | 24.3.18.5 | 339.54 | I don't see a mandatory energy detection CCA for the primary channels. I only see a mandatory energy detection CCA for the secondary channels. (24.3.18.5.3 is for specific (theoretical) bands only) | Add a mandatory energy detection CCA for the primary channels, as expected by the NOTE at P340L52. | Accepted.  Although Section 24.3.18.5.3 mentions ED requirements for Primary 1, Primary 2MHz channels, they are now explicitly stated again in 24.3.18.5.4.\* |
| 1775 | Eugene Baik | 24.3.18.5 | 339.54 | Primary channel CCA in 11ah should include a Midpacket detection requirement (within PIFS duration) to protect against collisions in cases where the preamble is missed or not detected. This includes cases where devices are waking up out of sleep mode, and cases where transmission failure and retry lead to the preamble detection not triggering the CCA indication. Additionally, transmissions in secondary 1MHz are given implicit protection from a 2MHz Midpacket detection requirement | Add Midpacket detection criteria to Primary channel CCA. Add Midpacket detection levels for Type 1, Type 2 channels. | Accepted.  Please see the rewrite of Section 24.3.18.5.4 for the conditions in which Primary 1MHz channel is busy (i.e. PHY-CCA.indication(BUSY, {primary1}) and PHY-CCA.indication(BUSY, {primary2})) |
| 1776 | Eugene Baik | 24.3.18.5 | 339.54 | Terminology for "primary2, secondary2, secondary4, secondary8, etc" do not match up with the current channel-list parameter definitions in 7.3.5.11 | Fix definitions in section 7.3.5.11 and coordinate CCA section text to align and be consistent | Revised.  Table 7-5 in Section 7.3.5.11 has been re-written (separate CID resolution document 13/1522r0 by Yongho Seok) to use terminology consistent with 24.3.18.5 |
| 1777 | Eugene Baik | 24.3.18.5 | 339.54 | CCA for the Primary 1MHz channel needs to be clarified from the current definition and criteria, which ostensibly describes that for the Primary 2MHz channel. This is needed because EDCA for 1MHz and >=2MHz PPDUs are performed with separate processes. For transmission of 1MHz PPDUs, backoff is performed on the Primary 1MHz channel, while for transmission of >=2MHz PPDUs backoff is performed on the Primary 2MHz channel | Add definitions and criteria for Primary 1MHz channel criteria to work alongside current Primary 2MHz definitions in text. | Accepted  Please see the rewrite of Section 24.3.18.5.4 |
| 1792 | G Rajendra Kumar | 24.3.18.5.5 | 343.00 | "secondary2" is used instead of "secondary" as per Table 7-5 | Change "secondary2" to "secondary" in subclause 24.3.18.5.5 to maintain consistency | Revised.  Agree in principle. Instead, Table 7-5 in Section 7.3.5.11 has been re-written (separate CID resolution document 13/1522r0 by Yongho Seok) to use terminology consistent with 24.3.18.5 |
| 1793 | G Rajendra Kumar | 24.3.18.5.5 | 343.00 | "secondary4" is used instead of "secondary40" as per Table 7-5 | Change "secondary4" to "secondary40" in subclause 24.3.18.5.5 to maintain consistency | Revised.  Agree in principle. Instead, Table 7-5 in Section 7.3.5.11 has been re-written (separate CID resolution document 13/1522r0 by Yongho Seok) to use terminology consistent with 24.3.18.5 |
| 1794 | G Rajendra Kumar | 24.3.18.5.5 | 343.00 | "secondary8" is used instead of "secondary80" as per Table 7-5 | Change "secondary8" to "secondary80" in subclause 24.3.18.5.5 to maintain consistency | Revised.  Agree in principle. Instead, Table 7-5 in Section 7.3.5.11 has been re-written (separate CID resolution document 13/1522r0 by Yongho Seok) to use terminology consistent with 24.3.18.5 |
| 2172 | Kenichi Mori | 24.3.18.5.3 | 340.56 | The line 56 says details of CCA-ED threshold is explained in D.2.5 but there is no section such that. Add D.2.5 in Annex D. | Add D.2.5 that explains CCA-ED threshold in detail in Annex D based on the discussion result on CCA-ED. | Revised.  Reference to Annex D2.5 not needed, as current Section 24.3.18.5.3 contains all thresholds relevant for Energy Detection. Removed referencing text. |
| 2460 | Mark RISON | 24.3.18.5.5 | 343.00 | secondary2 only appears in this subclause (thrice) | Was plain secondary intended? | Revised.  Agree that there was inconsistency with Table 7-5 in Section 7.3.5.11. That text has been modified to make terminology consistent (see separate CID resolution doc 13/1522r0 by Yongho Seok) |
| 2461 | Mark RISON | 24.3.18.5 | 340.00 | What is primary2 (7 times)? | Was plain primary intended? | Revised.  Agree that there was inconsistency with Table 7-5 in Section 7.3.5.11. That text has been modified to make terminology consistent (see separate CID resolution doc 13/1522r0 by Yongho Seok) |
| 2692 | ron porat | 24.3.18.5.4.1 | 342.54 | there are many CCA levels (three), complicating implementation. Propose to harmonize some of the levels | propose to change the levels of 8/16MHz in this section to the same levels as for type 2 because this section should not allow even higher levels for 8/16MHz but rather only to the lower BW | Rejected.  Different sets of CCA levels do not necessarily complicate implementation, since PHY can load in different sets of CCA levels depending on scenario. Separate set of CCA levels for 8/16MHz BW are strictly optional for devices that choose to implement that special EDCA procedure. |
| 2693 | ron porat | 24.3.18.5.5 | 343.41 | not clear why secondary levels do not scale with BW |  | Rejected.  Spacing between bandwidths (for either Type 1 or Type 2) are the same as spacing in 11ac. |
| 2817 | Vinko Erceg | 24.3.18.5 | 339.00 | There are too many CCA levels including different types of channelization for the CCA levels. | Deterrnine only 1 CCA level without different channelization types. No simulations were presented that show benefits of the current CCA spec. | Rejected.  Need for Type 1 and Type 2 levels in US/China agreed upon within TGah, based on the different needs of expected sensor and extended range WiFi use cases. Tradeoff of Tx Protection/Range for sensor devices vs. Ease of Medium acces for wider BW devices. |
|  |  |  |  |  |  |  |

*TGah Editor: Please make the following changes to the Section 24.3.15.2 text, changes below highlighted in yellow. Also please pay attention to ~~old text striked out in red~~, and also red text as special notes to editor:*

* CCA sensitivity
* General

The thresholds in this subclause are compared with the signal level at each receiving antenna.

* Type 1 and Type 2 channelization for CCA levels

In S1G operation, the CCA sensitivity levels are defined such that they are dependent and specific to country channelization and channel location within the frequency band. For S1G channelizations in all regions of the world, there are to be two available classifications for channels and CCA levels, defined as Type 1 and Type 2.

For BSSs set up on channels classified as using Type 1, the AP and non-AP STA devices are required to use what are referred to in this section as Type 1 CCA levels when performing their CCA procedures. Likewise, if the BSS is set up on channels classified as Type 2, the AP and non-AP STA devices are required to use Type 2 specific CCA levels ~~specific to Type 2 channels~~. The Type 1 and Type 2 channel classification for different operating classes in different regions of the world are denoted by "CCA Level Classification" in Table E-1 through Table E-4 in Annex E.

In general ~~Generally speaking~~, Type 1 channels have CCA levels set to favor protection of ongoing transmissions and range of devices, relative to Type 2 channels. Type 2 channels have CCA levels set to favor higher bandwidth and data rate transmissions, and to allow for higher reuse within the total network across different BSSs (relative to Type 1 channels). To achieve this, Type 2 channel CCA levels (i.e. thresholds) are defined to be ~~set to be equal to or~~ higher than Type 1channel CCA levels.

~~Because of differences in CCA levels and its system implications,~~ CCA levels will impact system behavior and performance increasingly with loading, therefore it is generally advantageous for BSSs ~~intending to service~~ primarily serving devices requiring ~~higher levels of~~ more channel and transmission protection to set up on Type 1 channels, and for BSSs ~~expected to service~~ primarily serving devices with higher bandwidth and data rate transmissions to set up on Type 2 channels if the region/country has both Type 1 and Type 2 channels available.

* CCA sensitivity for operating classes requiring CCA-ED

For the operating classes requiring CCA-Energy Detect (CCA-ED), CCA shall also detect a medium busy condition when CCA-ED detects a channel busy condition.

For improved spectrum sharing, CCA-ED is required in some bands. The behavior class indicating CCA-ED is given in Table E-1 through Table E-4 (Behavior limit sets). The operating classes requiring the corresponding CCA-ED behavior class are given in Annex E. A STA that is operating within an operating class that requires CCA-ED shall operate with CCA-ED. ~~The CCA-ED is not required for license-exempt operation in any band.~~

There is no distinction between Type 1 and Type 2 channel CCA levels for CCA-Energy Detect threshold levels, and all channels will use the same set of values: CCA-ED shall indicate a channel busy condition when the received signal strength exceeds the CCA-ED threshold of -75 dBm for the primary 1MHz, -72dBm for the primary 2 MHz channel and the secondary 2 MHz channels, -69 dBm for the secondary 4 MHz channel, and -66 dBm for the secondary 8 MHz channel. ~~The CCA-ED thresholds for the operating classes requiring CCA-ED are subject to the criteria in D.2.5 (CCA-ED threshold).~~

~~NOTE-The requirement to issue a CCA signal busy as stated in 24.3.19.5.4 (CCA sensitivity for signals occupying the primary 2 MHz and/or Primary 1MHz channel) and 24.3.19.5.5 (CCA sensitivity for signals not occupying the primary 2 MHz channel) is a mandatory energy detect requirement on all Clause 24 receivers. Support for CCA-ED is an additional requirement that relates specifically to the sensitivities described in D.2.5 (CCA-ED threshold).~~

*TGah Editor: Please replace the entire Section 24.3.18.5.4.\* text with the text highlighted in yellow below*

* CCA sensitivity for signals occupying the Primary 2MHz and/or Primary 1MHz channel

In S1G operation, the CCA sensitivity levels a device must obey when detecting the start of S1G PPDUs are based on whether the occupied Primary channel in question is classified as Type 1 or Type 2.

For devices operating in Type 1 channels, the PHY shall issue a PHY-CCA.indication(BUSY, {primary1}) if one of the following conditions is present in an otherwise idle Primary 1MHz channel:

* The start of a 1 MHz S1G PPDU detected in the Primary 1 MHz channel at or above - 98 dBm with >90% probability within a period aCCATime (see 24.4.4 (PHY characteristics)).
* A 1MHz S1G PPDU detected in the Primary 1 MHz channel at or above -89dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A >= 2MHz S1G PPDU overlapping the Primary 2MHz channel (in which the Primary 1MHz is contained) detected at or above -89dBm/2MHz (in regions where such PPDUs are permitted) with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).

For devices operating in Type 2 channels, the PHY shall issue a PHY-CCA.indication(BUSY, {primary1}) if one of the following conditions is present in an otherwise idle Primary 1MHz channel:

* The start of a 1 MHz S1G PPDU detected in the Primary 1 MHz channel at or above - 89 dBm with >90% probability within a period aCCATime (see 24.4.4 (PHY characteristics)).
* A 1MHz S1G PPDU detected in the Primary 1 MHz channel at or above -86dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A >= 2MHz S1G PPDU overlapping the Primary 2MHz channel (in which the Primary 1MHz is contained) detected at or above -86dBm/2MHz (in regions where such PPDUs are permitted) with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).

The PHY shall hold the CCA indication as BUSY for the duration of the PPDU or until the all conditions above are no longer satisfied. Additionally, for both Type 1 and Type 2 channels, the CCA indication will be BUSY if any received signal in the Primary 1MHz channel exceeds the CCA-ED threshold of -75dBm within a period aCCATime.

For devices operating in Type 1 channels, the PHY shall issue a PHY-CCA.indication(BUSY, {primary2}) if the conditions for issuing PHY-CCA.indication(BUSY, {primary1}) are not present and one of the following conditions is met in an otherwise idle 2 MHz, 4 MHz, 8 MHz, or 16 MHz operating channel width:

* A 1MHz S1G PPDU detected in the non-Primary 1 MHz portion of the Primary 2MHz channel at or above -89dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* Any of the applicable conditions listed in Table 24-33 (Additional Conditions for CCA BUSY on the Primary 2 MHz in Type 1 Channelization). An applicable condition shall be met (i.e. triggered) if the PHY detects the start of the described PPDU(s) in Table 24-33 or Table 24-34 with >90% probability within a period of aCCATime (see 24.4.4 (PHY characteristics)).

For devices operating in Type 2 channels, the PHY shall issue a PHY-CCA.indication(BUSY, {primary2}) if the conditions for issuing PHY-CCA.indication(BUSY, {primary1}) are not present and one of the following conditions is met in an otherwise idle 2 MHz, 4 MHz, 8 MHz, or 16 MHz operating channel width:

* A 1MHz S1G PPDU is detected in the non-Primary 1 MHz portion of the Primary 2MHz channel at or above -86dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* Any of the applicable conditions listed in Table 24-34 (Additional Conditions for CCA BUSY on the Primary 2 MHz in Type 2 Channelization). An applicable condition shall be met (i.e. triggered) if the PHY detects the start of the described PPDU(s) in Table 24-33 or Table 24-34 with >90% probability within a period of aCCATime (see 24.4.4 (PHY characteristics)).

The PHY shall hold the CCA indication as BUSY for the duration of the PPDU or until the all triggering conditions are no longer satisfied. Additionally, for both Type 1 and Type 2 channels, the CCA indication will be BUSY if any received signal in the Primary 2MHz channel exceeds the CCA-ED threshold of -72dBm within a period aCCATime.

Additionally, when a STA detects a PPDU with its PAID or BSSID of its own, the PHY shall issue a PHY-CCA.indication(BUSY, {primary2}) for the protected duration of the PPDU.

|  |  |
| --- | --- |
| * Additional Conditions for CCA BUSY on the Primary 2 MHz in Type 1 Channelization | |
| Operating Channel Width | Conditions |
| 2 MHz, 4 MHz, 8 MHz,  16 MHz | The start of a 2 MHz S1G PPDU in the primary 2 MHz channel at or above –92 dBm. |
| 4 MHz, 8 MHz, 16 MHz | The start of a 4 MHz S1G PPDU in the primary 4 MHz channel at or above –89 dBm. |
| 8 MHz, 16 MHz | The start of an 8 MHz S1G PPDU in the primary 8 MHz channel at or above –86 dBm. |
| 16 MHz | The start of a 16 MHz S1G PPDU at or above –83 dBm. |

|  |  |
| --- | --- |
| * Conditions for CCA BUSY on the Primary 2 MHz in Type 2 Channelization | |
| Operating Channel Width | Conditions |
| 2 MHz, 4 MHz, 8 MHz,  16 MHz | The start of a 2 MHz S1G PPDU in the primary 2 MHz channel at or above –89 dBm. |
| 4 MHz, 8 MHz, 16 MHz | The start of a 4 MHz S1G PPDU in the primary 4 MHz channel at or above –86 dBm. |
| 8 MHz, 16 MHz | The start of an 8 MHz S1G PPDU in the primary 8 MHz channel at or above –83 dBm. |
| 16 MHz | The start of a 16 MHz S1G PPDU at or above –80 dBm. |

* CCA sensitivity for devices in Type 2 channels implementing intended 8 or 16 MHz transmit channel width channel access procedure

For devices operating in Type 2 channels, if the device intends to transmit an 8 or 16 MHz channel width PPDU and the device implements the procedure and rules for high intended BW transmission channel access described in 9.19.2.9 EDCA channel access in an S1G BSS, the PHY shall issue a PHY-CCA.indication(BUSY, {primary1}) if one of the following conditions is present in an otherwise idle Primary 1MHz channel:

* The start of a 1 MHz S1G PPDU detected in the Primary 1 MHz channel at or above - 86 dBm with >90% probability within a period aCCATime (see 24.4.4 (PHY characteristics)).
* A 1MHz S1G PPDU detected in the Primary 1 MHz channel at or above -86dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A >= 2MHz S1G PPDU overlapping the Primary 2MHz channel (in which the Primary 1MHz is contained) detected at or above -86dBm/2MHz with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).

The PHY shall hold the CCA indication as BUSY for the duration of the PPDU or until the all conditions above are no longer satisfied. Additionally, the CCA indication will be BUSY if any received signal in the Primary 1MHz channel exceeds the CCA-ED threshold of -75dBm within a period aCCATime.

The PHY shall issue a PHY-CCA.indication(BUSY, {primary2}) if the conditions for issuing PHY-CCA.indication(BUSY, {primary1}) are not present and one of the following conditions is met in an otherwise idle 8 MHz or 16 MHz operating channel width:

* A 1MHz S1G PPDU is detected in the non-Primary 1 MHz portion of the Primary 2MHz channel at or above -86dBm with >90% probability within a period of aCCAMidTime (see 24.4.4 (PHY characteristics)).
* Any of the applicable conditions listed in Table 24-35 (Additional Conditions for CCA BUSY on the Primary 2 MHz in Type 2 Channelization for 8/16MHz intended channel width). An applicable condition shall be met (i.e. triggered) if the PHY detects the start of the described PPDU(s) in Table 24-35 with >90% probability within a period of aCCATime (see 24.4.4 (PHY characteristics)).

The PHY shall hold the CCA indication as BUSY for the duration of the PPDU or until the all triggering conditions are no longer satisfied. Additionally, for both Type 1 and Type 2 channels, the CCA indication will be BUSY if any received signal in the Primary 2MHz channel exceeds the CCA-ED threshold of -72dBm within a period aCCATime.

Additionally, when a STA detects a PPDU with its PAID or BSSID of its own, the PHY shall issue a PHY-CCA.indication(BUSY, {primary2}) for the protected duration of the PPDU.

|  |  |
| --- | --- |
| * Additional Conditions for CCA BUSY on the Primary 2 MHz in Type 2 Channelization for 8/16MHz intended channel width | |
| Operating Channel Width | Conditions |
| 8 MHz,  16 MHz | The start of a 2 MHz S1G PPDU in the primary 2 MHz channel at or above –86 dBm. |
| 8 MHz, 16 MHz | The start of a 4 MHz S1G PPDU in the primary 4 MHz channel at or above –83 dBm. |
| 8 MHz, 16 MHz | The start of an 8 MHz S1G PPDU in the primary 8 MHz channel at or above –80 dBm. |
| 16 MHz | The start of a 16 MHz S1G PPDU at or above –77 dBm. |

* CCA sensitivity for signals not occupying the primary 2MHz channel

In S1G operation, the CCA sensitivity levels for detecting signals in the Secondary channels may be classified separately for Type 1 or Type 2 channels.

The PHY shall issue a PHY-CCA.indication(BUSY, {secondary2}) if the conditions for issuing PHY-CCA.indication(BUSY, {primary2}) are not present and one of the following conditions are present in an otherwise idle 4 MHz, 8 MHz, 16 MHz operating channel width:

* For both Type 1 and Type 2 channels, any signal within the secondary 2 MHz channel at or above a threshold of -72dBm within a period of aCCATime after the signal arrives at the receiver's antenna(s); then the PHY shall not issue a PHY-CCA.indication(BUSY,{secondary4}), PHY-CCA.indication(BUSY,{secondary8}) or PHY-CCA.indication(IDLE) while the threshold continues to be exceeded.
* For Type 1 channels, a 2 MHz S1G PPDU detected in the secondary 2 MHz channel at or above - 86 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).
* For Type 2 channels, a 2 MHz S1G PPDU detected in the secondary 2 MHz channel at or above - 82 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).

The PHY shall issue a PHY-CCA.indication(BUSY, {secondary4}) if the conditions for issuing PHY-CCA.indication(BUSY, {primary2}) and PHY-CCA.indication(BUSY, {secondary2}) are not present and one of the following conditions are present in an otherwise idle 8 MHz, 16 MHz operating channel width:

* For both Type 1 and Type 2 channels, any signal within the secondary 4 MHz channel at or above a threshold of - 69 dBm within a period of aCCATime after the signal arrives at the receiver's antenna(s); then the PHY shall not issue a PHY-CCA.indication(BUSY, {secondary8}) or PHY-CCA.indication(IDLE) while the threshold continues to be exceeded.
* For Type 1 channels:
* A 4 MHz S1G PPDU detected in the secondary 4 MHz channel at or above - 86 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A 2 MHz S1G PPDU detected in any 2 MHz sub-channel of the secondary 4 MHz channel at or above - 86 dBm with >90% probability within a period aCCAMidTime.
* For Type 2 channels:
* A 4 MHz S1G PPDU detected in the secondary 4 MHz channel at or above - 82 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A 2 MHz S1G PPDU detected in any 2 MHz sub-channel of the secondary 4 MHz channel at or above - 82 dBm with >90% probability within a period aCCAMidTime.

The PHY shall issue a PHY-CCA.indication(BUSY, {secondary8}) if the conditions for PHY-CCA.indication(BUSY, {primary2}), PHY-CCA.indication(BUSY, {secondary2}) and PHY-CCA.indication(BUSY,{secondary4}) are not present and one of the following conditions are present in an otherwise idle 16 MHz operating channel width:

* For both Type 1 and Type 2 channels, any signal within the secondary 8 MHz channel at or above -66 dBm.
* For Type 1 channels:
* An 8 MHz S1G PPDU detected in the secondary 8 MHz channel at or above - 83 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A 4 MHz S1G PPDU detected in any 4 MHz sub-channel of the secondary 8 MHz channel at or above - 86 dBm with >90% probability within a period aCCAMidTime.
* A 2 MHz S1G PPDU detected in any 2 MHz sub-channel of the secondary 8 MHz channel at or above - 86 dBm with >90% probability within a period aCCAMidTime.
* For Type 2 channels:
* An 8 MHz S1G PPDU detected in the secondary 8 MHz channel at or above - 79 dBm with >90% probability within a period aCCAMidTime (see 24.4.4 (PHY characteristics)).
* A 4 MHz S1G PPDU detected in any 4 MHz sub-channel of the secondary 8 MHz channel at or above - 82 dBm with >90% probability within a period aCCAMidTime.
* A 2 MHz S1G PPDU detected in any 2 MHz sub-channel of the secondary 8 MHz channel at or above - 82 dBm with >90% probability within a period aCCAMidTime.