IEEE P802.11  
Wireless LANs

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| ED CCA for Clauses 16, 17 | | | | |
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Abstract

This document contains proposed changes to satisfy CIDs 3116, 3121, 3124

**CID 166**

Background

There have been several CIDs on the subject of making support of Clause 16 and 17 by clause 19 devices, optional. This proposal does not affect the status quo.

However, a point to note is that if an 11g network overlapped a mix 11b/g, then the co-existence should be carried out by ED-CCA. The standard allows an 11b STA to just use one of three CCA schemes one of which is ED-CCA (the others are CS and CS with ED threshold).

It is not clear how many 11b devices actually implement ED-CCA or solely use 11b preamble detect. However, because many (if not all) 11b devices use just CS, 11g OFDM transmissions must use protection mechanism that is usually a RST/CTS or CTS-to-self. Mandating energy detect CCA for 11b devices would mean that the protection for 11g/11b devices is then mutual. This proposal could not affect present 11b devices but would affect new 11b implementations.

Any new 11b device, built to 802.11-2015 could instantly improve the situation for interoperability by implementing ED-CCA as per the standard.

**This proposal mandates CCA Mode 1 (Energy Detect) for Clause 16 and 17 devices**. (Clauses 16.4.6.5 and 17.4.8.5)

**DISCUSSION:**

Here is a summary of the present CCA specifications.

**Summary of existing CCA specs:**

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| --- | --- | --- | --- | --- |
| **Clause** | **Description** | **Min RX** | **CCA -CS** | **CCA-ED** |
| 16 | DSSS  1, 2Mbps  16.4.6.3 | -80dBm  @ 2Mbps) | One of following:  (1 – above ED)  2 – any DSSS  3 – DSSS above ED | -80dBm >100mW  -76dBm >50<100mW  -73dm <50mW |
| 17 | CCK  5.5, 11Mbps  17.3.8.2 | -76dBm  @ 11Mbps | One of following:  (1 – above ED)  4 – any HR (with timer)  5 – HR above ED | -76dBm >100mW  -73dBm >50<100mW  -70dm <50mW |
| 18 | 11a OFDM  18.3.10.6 | -82dBm 20MHz  -85dBm 10MHz  -88dBm 5MHz | -82dBm 20MHz  -85dBm 10MHz  -88dBm 5MHz | Mandatory  -62dBm 20MHz  -65dBm 10MHz  -68dBm 5MHz |
| 19 | 11g ERP  19.4.6 | -82dBm 20MHz  -85dBm 10MHz  -88dBm 5MHz | Valid signal  -76dBm | No Spec |
| 20 | 11n  20.3.20.5.2 | -82dBm 20MHz  -79dBm 40MHz | HT signal  -82dBm 20MHz  -79dBm 40MHz | -62dBm 20MHz  -59dBm 40MHz  If not support HT-GF  -72dBm for HT-GF (20MHz)  -69dBm for HT-GF (40MHz) |
| 22 | 11ac  22.3.18.5 |  | Primary Channel  -82dBm 20MHz  -79dBm 40MHz  -76dBm 80MHz  -73dBm 160MHz | Secondary channel  Any signal -62dBm 20MHz  -59dBm 40MHz  -72dBm in any 20MHz of 40MHz |

One observation is that Clause 19 (11g) seems out of sync. It is proposed to use this opportunity to bring this into line with Clauses 18, 20 and 22.

**Present text**

**16.4.6.5 CCA**

The DSSS PHY shall provide the capability to perform CCA according to at least one of the following three methods:

— *CCA Mode 1:* Energy above threshold. CCA shall report a busy medium upon detection of any

energy above the ED threshold.

— *CCA Mode 2:* CS only. CCA shall report a busy medium only upon detection of a DSSS signal. This signal may be above or below the ED threshold.

— *CCA Mode 3:* CS with energy above threshold. CCA shall report a busy medium upon detection of a DSSS signal with energy above the ED threshold.

**Proposed Changes**

***Make changes as indicated below:***

**16.4.6.5 CCA**

Page 2174 Line 63

Delete

“The DSSS PHY shall provide the capability to perform CCA according to at least one of the following three methods:”

Insert

*{Note to 802.11REVmc reader, to be removed before publication. The following change has no force until REVmc is ratified (for anticipated ratification date, see* [*http://www.ieee802.org/11/Reports/802.11\_Timelines.htm*](http://www.ieee802.org/11/Reports/802.11_Timelines.htm)*). Pre-existing DSSS STAs compliant to 802.11-2012 remain compliant to 802.11-2012.}*

“The DSSS PHY shall perform CCA according to CCA Mode 1 and may also provide the capability to perform CCA according to CCA Mode 2 or CCA mode 3: “

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**Present Text**

**17.3.8.5 CCA**

The high rate PHY shall provide the capability to perform CCA according to at least one of the following three methods:

— CCA Mode 1: Energy above threshold. CCA shall report a busy medium upon detecting any energy above the ED threshold.

— CCA Mode 4: CS with timer. CCA shall start a timer whose duration is 3.65 ms and report a busy medium only upon the detection of a high rate PHY signal. CCA shall report an IDLE medium after the timer expires and no high rate PHY signal is detected. The 3.65 ms timeout is the duration of the

longest possible 5.5 Mb/s PSDU.

— CCA Mode 5: A combination of CS and energy above threshold. CCA shall report busy at least

while a high rate PPDU with energy above the ED threshold is being received at the antenna

**Proposed Changes**

***Make changes as indicated below:***

**17.3.8.5 CCA**

Page 2206 Line 4

Delete

“The high rate PHY shall provide the capability to perform CCA according to at least one of the following three methods:”

Insert

*{Note to 802.11REVmc reader, to be removed before publication. The following change has no force until REVmc is ratified (for anticipated ratification date, see* [*http://www.ieee802.org/11/Reports/802.11\_Timelines.htm*](http://www.ieee802.org/11/Reports/802.11_Timelines.htm)*). Pre-existing HR/DSSS STAs compliant to 802.11-2012 remain compliant to 802.11-2012.}*

“The high rate PHY shall perform CCA according to CCA Mode 1 and also may provide the capability to perform CCA according to CCA Mode 4 or CCA mode 5:”

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**Proposed changes to Clause 19.4.6**

Discussion: Clause 19 does not specify any CCA energy detect level. In addition it specifies a level of -76dBm whereas one might expect a value of -82dBm so as to be consistent with 11a, 11n, and 11ac. It is proposed to bring this clause into line with the others.

***Make changes as indicated below:***

**19.4.6 CCA performance**

The CCA shall indicate true if there is no CCA “medium busy” indication. The CCA parameters are subject to the following criteria:

1. When a valid signal at a receive level greater than or equal to the minimum modulation and coding rate sensitivity (–82 dBm for 20 MHz channel spacing, –85 dBm for 10 MHz channel spacing, and –88 dBm for 5 MHz channel spacing) at the receiver antenna connector is present at the start of the PHY slot, the receiver’s CCA indicator shall report the channel busy with probability CCA\_Detect\_Probabilty within a aCCATime.(M8) CCA\_Detect\_Probabilty is the probability that the CCA does respond correctly to a valid signal and shall be at least 99% for the long slot time and at least 90% for the short slot time.(M8) The values for the other(M8) parameters are found in Table 19-6 (ERP characteristics). Note that the CCA Detect Probability and the power level are performance requirements.
2. In the event that a correct PHY(#61) header is received, the ERP shall hold the CCA signal inactive (channel busy) for the full duration, as indicated by the PHY(#61) LENGTH field. Should a loss of CS occur in the middle of reception, the CCA shall indicate a busy medium for the intended duration of the transmitted PPDU.
3. The CCA mechanism shall detect a medium busy condition within 4 us of any signal with a received energy that is 20 dB above the minimum modulation and coding rate sensitivity (minimum modulation and coding rate sensitivity + 20 dB resulting in –62 dBm for 20 MHz channel spacing, –65 dBm for 10 MHz channel spacing, and –68 dBm for 5 MHz channel spacing.