**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Proposal of NB PHY assisted CCA for UWB medium access** |
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| Re: | Contribution to IEEE 802.15.4ab |
| Abstract |  |
| Purpose | This submission proposes text to for the IEEE Std 802.15.4ab specification framework document. |
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*Purpose of the document*

*… …*

*In the following, the proposed add-on texts are highlighted in blue while black is the original text of IEEE 802.15.4-2020.*

**10. General PHY requirements**

**10.2 General radio specifications**

**10.2.8 Clear channel assessment (CCA)**

**… …**

An HRP UWB PHY shall implement one CCA Mode 1 through CCA Mode 4 or one of the following methods:

* *CCA Mode 5: HRP UWB preamble sense based on the SHR of a frame.* CCA shall report a busy medium upon detection of a preamble symbol as specified in 15.2.6. An idle channel shall be reported if no preamble symbol is detected up to a period not shorter than the maximum packet duration plus the maximum period for acknowledgment.
* *CCA Mode 6: HRP UWB preamble sense based on the packet with the multiplexed preamble as specified in 15.6.* CCA shall report a busy medium upon detection of a preamble symbol as specified in 15.2.6.
* *CCA Mode 7: UWB medium access coupled with CCA of narrow-band assisted PHY (NBA-PHY) as specified in 15.x.* Transmission or CCA conducted by the coupled NBA-PHY act as indications of the UWB-PHY medium access status. CCA shall report an idle or a busy UWB medium based on the NBA-PHY CCA results.

**15. HRP UWB PHY**

**… …**

**15.x Narrow-band assisted CCA**

A compliant device shall contain a UWB PHY and a coupled narrow-band assisted PHY (NBA-PHY). The UWB PHY that uses CCA mode 7 as defined in 10.2.8 shall be operated with the NBA-PHY in tightly coupled manner, at least, with synchronized clock or same MAC timer.

On one hand, a compliant device shall perform CCA using the NBA-PHY against narrow-band medium whenever it intends to access a UWB medium. On another hand, a compliant device that intends to execute a UWB task after receiving an idle medium report shall firstly transmit an NBA packet and then execute the UWB task. Transmission of NBA packet and execution of UWB task are time deterministic. In other words, by receiving the NBA packet, the time parameters of UWB task execution are self-transparent. Here, UWB task refers to a procedure performed by UWB such as ranging, communication, or sensing.

When accessing medium, the NBA-PHY of a compliant device shall conduct CCA for a time duration as specified in [subclause for NB MAC]. Once the NBA-PHY senses a busy medium, both UWB PHY and NBA-PHY of the compliant device shall keep corresponding medium clear for a period of a UWB task duration. If the NBA-PHY senses an idle medium, the NBA-PHY can contend medium to obtain medium access right. When medium access right is contended, the NBA-PHY executes packet transmission to indicate medium occupancy and then the UWB-PHY executes UWB task. It is worth to mention that NBA-PHY can perform CCA using one of *CCA Mode 1* through *CCA Mode 3* of 10.2.8.

Figure x-1 shows conceptual illustration of medium access among three compliant devices D1, D2, and D3. Detailed description is given in [subclause for NB MAC].



Figure x1 Conceptual illustration of narrow-band assisted CCA for UWB medium access