**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **Resolution to CIDs 1, 2, 3, 8, 11, 13, 236, 237, 250, 251, 271, 292, 308, 309, 313 for 15.4ab Draft 2.0** | |
| Date Submitted | July 2025 | |
| Sources | Pooria Pakrooh, Bin Tian (Qualcomm) |  |
| Abstract | Resolution to comments: **1, 2, 8, 11, 13, 236, 237, 250, 251, 271, 292, 309, 313** | |
| Purpose | To propose comments resolution for “P802.15.4ab™/D (pre-ballot) C Draft Standard for Low-Rate Wireless Networks” | |
| Notice | This document does not represent the agreed views of the IEEE 802.15 Working Group or IEEE 802.15.4ab Task Group. It represents only the views of the participants listed in the “Sources” field above.It is offered as a basis for discussion and is not binding on the contributing individuals. The material in this document is subject to change in form and content after further study. The contributors reserve the right to add, amend or withdraw material contained herein. | |

***Comment Indices 1, 2, 8, 11, 13, 236, 237, 250, 251, 271, 292, 309, 313 in 15-24-0174-30-04ab-consolidated-comments\_draft\_1.0***

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| **CID** | **Name** | **Sub-Clause** | **Page** | **Line** | **Comment** | **Proposed Change** |
| 236 | PAKROOH, POORIA | 10.39.8.3 | 83 | 13 | NB coexistence with other technologies in UNII-3 and UNII-5 bands needs to be addressed by defining a mandatory channel access mechanism for NB operation in UNII-3/5, with clear guidance for the implementers. A good option is the LBT mechanism proposed and evaluated in DCN 15-24-212/r5. | 1. Adopt a mandatory coexistence mechanism for NB operation in UNII-3 and UNII-5 bands.   2. Define specific parameters for NB (such as LBT with ED threshold value, CCA duration, etc.) such that they are clear to the implementers.  A good proposal is presented and evaluated in DCN 15-24-212/r5.   Add the following text from DCN 15-24-212/r5 following: "A NB capable device operating in UNII-3 or UNII-5 band shall measure its NB transmission duty cycle. For a NB capable device, if its NB transmission duty cycle is more than 2.5%, it shall perform listen-before-talk (LBT) before any NB transmission. Otherwise, LBT is optional." |
| 271 | QIAN, BIN | 10.39.8.3 | 83 | 13 | Since WiFi is disallowed to operate in 6GHz band in China, 5GHz UNII 3 band becomes very important for Wi-Fi in China. Therefore, it is better to mandate a coexistence mechanism between NB and Wi-Fi devices in 5GHz UNII 3 band even if this mandatory requirement is not specified in the regulations. | Change the sentence to "If LBT is required before a transmission, either for regulatory reasons or as a coexistence mechanism, then the device shall perform CCA before each O-QPSK PHY transmission." |
| 292 | Shellhammer, Steve | 10.39.8.3 | 83 | 13 | NB coexistence with other technologies in UNII-3 and UNII-5 bands needs to be addressed by defining a mandatory channel access mechanism for NB operation in UNII-3/5, with clear guidance for the implementers. A good option is the LBT mechanism proposed and evaluated in DCN 15-24-212/r5. | Adopt a mandatory coexistence mechanism for NB operation in UNII-3 and UNII-5 bands. A good proposal is presented and evaluated in DCN 15-24-212/r5.   Add the following text from DCN 15-24-212/r5: "A NB capable device operating in UNII-3 or UNII-5 band shall measure its NB transmission duty cycle. For a NB capable device, if its NB transmission duty cycle is more than 2.5%, it shall perform listen-before-talk (LBT) before any NB transmission. Otherwise, LBT is optional." |
| 313 | TIAN, BIN | 10.39.8.3 | 83 | 16 | Details of LBT scheme need to be defined such like the energy detection threahold, | as in the comment |
| 11 | Aldana, Carlos | 10.39.8.3 | 83 | 20 | What should the EDT be? Please specify | For channels 50 to 249, I recommend to use the latest compromise in 6 GHz which is max( –85 dBm, min( –65 dBm/MHz, –72 dBm/MHz – Ptx ) ), where Ptx is the transmit power in dBm. For channels 0 to 49, the phyCcaEdThreshold is set to -67 dBm/MHz - Ptx. |
| 13 | Aldana, Carlos | 10.39.8.3 | 83 | 22 | Change the "may" to a "shall" to enable a baseline NB coex mechanism | Change the "may" to a "shall" to be consistent with ETSI 303687 and adopt changes described in document 15-407-07 |
| 237 | PAKROOH, POORIA | 10.39.8.3 | 83 | 22 | Sentence is unclear. What does "according to regulatory constraints" mean? | Change to :"LBT shall be applied to channel numbers 0 to 249." |
| 309 | TIAN, BIN | 10.39.4.2 | 80 | 9 | Mutliple channel access in different NB channels within the same slot can be allowed to increase the chance of transmission | as in the comment |
| 1 | Wentink, Menzo | 10.39.8.3 | - | - | CCA with energy detect is currently optional for NB transmissions. This implies that there is no assurance that NB transmissions will defer for ongoing Wi-Fi transmissions. | Make CCA based on energy detect mandatory for NB transmissions in channels 0-249, so that the spectrum can be shared with other technologies. Changes can be made per 15-25-0099-01-04ab-multiple-cca-for-nb or one of its revisions, which also proposes to reduce the impact of CCA busy events. |
| 2 | Wentink, Menzo | 10.39.8.3 | - | - | The absence of retries in the protocol design makes that any NB packet loss or CCA busy before an NB transmission causes a high penalty, because the entire exchange may be lost. | To increase the resilience of the protocol against interference or CCA busies without building retries into the protocol, a possible consideration might be to allow for more than one CCA before an NB transmission or transmission sequence. A work in progress on this topic is 15-25-0099-01-04ab-multiple-cca-for-nb or one of its revisions. Adopt this document or one of its revisions in 802.15.4ab. |
| 250 | PAKROOH, POORIA | 10.44 | 194 | 13 | Not clear why this NB data transmission protocol is needed, given the significantly lower data rate relative to UWB, and also higher fading. If many users start to use this protocol, the congestion can be problematic. This can cause interference to unnecessarily longer range. There is no duty cycle limit specified for this feature and the benefits are not clear.  Remove this functionality, or add a proper mandatory channel access mechanism. | Remove NB data offload by deleting subclause 10.44. Another alternative is to add a proper channel access mechanism for this feature for high duty cycle usage. |
| 251 | PAKROOH, POORIA | 10.44.1 | 194 | 19 | Benefits of NB usage for ranging has been justified. What is the benefit of using two links with significantly different link budget? what is the application? The data communication associated with this application are for close range cases, which does not need NB. | Remove NB data offload by deleting subclause 10.44. |
| 8 | Aldana, Carlos | 10.44.2 | 194 |  | There is no description on how NB channel access is done. | adopt changes described in document 15-407-07 |

**Discussion:** The comments above all raise similar concerns on the coexistence issue for NB OQPSK in UNII-3/5 bands, with other wireless technologies. There are several presentations in 802.15 and 802.11 providing simulations and measurements related to detrimental impact of NB-OQPSK operating without a well-defined channel access, both for 802.15.4ab devices, and coex of 802.15.4ab and 802.11 devices, see for example 15-24-212/r5, 11-24-360/r3, 11-23/1279/r0.

The proposed resolution here provides a detailed description of how the channel access needs to be conducted for NB protocol. Note that the proposed resolution:

1. Does not mandate CCA for typical ranging applications where the duty cycle is smaller than the specified threshold (<2.5% duty cycle).
2. Enables option to do multiple retries for CCAs in multiple NB channels, thus, improving the chances of finding an available channel for NB OPQSK. This increases the resilience of the NB protocol. (CIDs 1 and 309)

**Resolution: Revised**

**Notes to Editor:**

1. **Change page 83, subclause 10.39.8.3 as follows:**

An NB device in section 10.39 (NBA UWB MMS) and 10.44 (UWB data offload to NB) operating in channels 0-249 in 5800 MHz and 6200 MHz bands, shall measure its NB transmission duty cycle, which is defined as the maximum ratio of the total NB transmission duration divided by any 100 ms observation window. Above 2.5% duty cycle an NB capable device shall perform CCA mode 1 before each O-QPSK PHY transmission. The ED threshold shall be set to the value required by local regulations; otherwise, it shall be set to 75 dBm/MHz. After completing the CCA, if the CCA is idle , the device shall start transmission no later than 16 μs after completing the CCA. If the CCA is busy and the number of consecutive CCAs is not equal to *macMmsNbMaxConsecutiveCCAs*, the device shall go the next channel (which might be the same channel) and perform a new CCA after at least 50 μs when on another channel or after at least 100 μs when on the same channel. Otherwise, the device shall skip transmission for the current ranging round.

A receiving device shall check for the presence of an expected O-QPSK PHY transmission. If the expected transmission is not present and the number of consecutive absences is not equal to *macMmsNbMaxConsecutive-CCAs*, the device shall go to the next channel (which might be the same channel) and check for the presence of the expected transmission there. Otherwise, the device shall skip the expected reception.

Figure 45 illustrates the use of CCA for the two-sided packet exchange across two consecutive slots between the initiator and responder, as needed during the MMS UWB control phase..

A diagram of a diagram

AI-generated content may be incorrect.

1. In table 31, add the following attribute:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute | Type | Range | Description | Default |
| macMmsNbMaxConsecutiveCCAs | Integer | 0-255 | Number of channels to perform additional consecutive CCA, as defined in subclause | 6 |

***Comment Indices 3, 308 in 15-24-0174-30-04ab-consolidated-comments\_draft\_2.0***

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| **CID** | **Commenter** | **Sub-Clause** | **Page** | **Line** | **Comment** | **Proposed Change** |
| 3 | Aldana, Carlos | 10.39.4.2 | 80 | 6 | There is no baseline coex mechanism for NB channel access using O-QPSK | Change the "may" to a "shall" to be consistent with ETSI 303687 and adopt changes described in document 15-407-07 |
| 308 | TIAN, BIN | 10.39.4.2 | 80 | 6 | channel access shall use contention based protocol for better coexistence. Certain exemption condition may be considered for low duty cycle operation | as in the comment |

**Discussion:** The comments raise similar concerns as in the first group of comments in this document. Please check the discussion in previous resolution for more details.

**Notes to Editor:**

**Change page 80, line 6 as follows**

For the NBA, channel access shall use the listen-before-talk (LBT) functionality defined in 10.39.8.3