**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) – 802.15.4ab | |
| Title | Narrow Band Mirroring channels | |
| Date Submitted | 13 July 2022 | |
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| Re: | Developing technical content for NB Mirroring in NB assisted UWB | |
| Abstract | This document provides details of MAC features for NB assisted UWB – NB mirroring channels feature | |
| Purpose | Support development of technical content for the draft | |
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# MAC functional description

## Channel access

### 6.2.xx Narrow Band Mirroring Channels

Support of narrow band (NB) mirroring channels for a controller of enhanced ranging capable device (ERDEV) is mandatory. Mirroring channel uses a narrow band radio which tightly coupled with the UWB channel. The purpose of mirroring channel is mirroring the usage of UWB channel to help scheduling and avoid collision among UWB transmissions. A controller with NB-UWB shall transmit an advertisement packet in every active ranging block in one of the NB mirroring channels corresponding to the UWB channel in which it is operating. The advertisement packet is used for notifying UWB channel occupation status to other devices co-existing in the vicinity. The advertisement packet in NB mirroring channel may include the information about UWB transmission like start time of ranging round, length of ranging block, number of ranging rounds, and index of active ranging round. An example ranging time structure for NB mirroring channel is shown in Figure 6-XX. If an controller with NB-UWB want to make a new ranging area network (RAN), the first a controller shall scan the set of NB mirroring channels for the corresponding UWB channel before transmission to find an idle slot during at least one cycle (i.e., Ranging Block with length *L*). If advertisement packets are detected, then the controller shall start its reservation delay timer (RDT) to start transmission in idle slots in one of the NB mirroring channels corresponding for reserving the time slot in corresponding UWB channel based on the information in advertisement packets to avoid collision among the existing RANs. RDT is used to avoid collision between controllers which newly start their RANs. If advertisement packets are not detected during at least one cycle, the controller sends the advertisement packets immediately to start its RAN.



**Figure 6‑xx A example ranging time structure for NB mirroring channel**

If controllers reserve the same time slot, then the collision occur between advertisement packets transmission in NB mirroring channel 0 or default NB mirroring channel. A collision avoidance scheme is proposed to overcome the issue of collision during reservation. Figure 6-xx+1 shows the example operation of collision avoidance during reservation in NB mirroring channels. A controller with NB-UWB shall start RDT before reserving a transmission and wait for it to be expired. RDT starts at the beginning of the reservation window with a maximum value of difference between reservation window size and time duration of advertisement packet. In addition, a duration of RDT shall be the multiple of ranging slot. This ensures the advertisement is transmitted completely within the reservation window that the controller wishes to reserve. At any point during running of RDT, if channel is detected as busy, a reservation shall be aborted in this cycle and attempted in a newly chosen slot in next cycle. Post reservation, the controller with NB-UWB shall send the advertisement at beginning of reservation window in one of the mirroring channels.



**Figure 6‑xx+1 Example operation of collision avoidance during reservation in NB mirroring channels**

# MAC frame formats

7.4 IEs

7.4.4 Nested IE

7.4.4.1 Format of Nested IE

7.4.4.1.XX NB-UWB mirroring IE

TBD