IEEE 802.15.4 ED measurement example

```
#define ED_RSSISCALE 4 // From electrical specifications
uint8_t sample_ed(void)
{
    int val;
    NRF_RADIO->TASKS_EDSTART = 1; // Start
    while (NRF_RADIO->EVENTS_EDEND != 1) {
        // CPU can sleep here or do something else
        // Use of interrupts are encouraged
        }
    val = NRF_RADIO->EDSAMPLE * ED_RSSISCALE; // Read level
    return (uint8_t)(val>255 ? 255 : val);    // Convert to IEEE 802.15.4 scale
}
```

For scaling between hardware value and dBm, see Clear channel assessment (CCA) on page 479.

The `mlme-scan.req`primitive of the MAC layer uses the ED measurement to detect channels where there might be wireless activity. To assist this primitive, a tailored mode of operation is available where the ED measurement runs for a defined number of iterations keeping track of the maximum ED level. This is engaged by writing the EDCNT field of the EDCTRL register to a value different from `0`, where it will run the specified number of iterations and report the maximum energy measurement in the EDSAMPLE register. The scan is started with the EDSTART task and the end indicated with the EDEND event. This significantly reduces the interrupt frequency and therefore power consumption. The following figure shows how the ED measurement will operate depending on the EDCNT and EDPERIOD fields of the EDCTRL register.

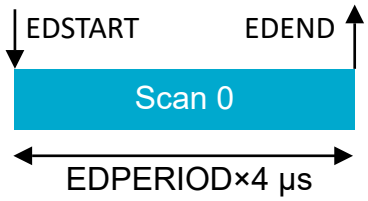

Figure 125: Energy detection measurement for a single iteration (EDCNT = 0)

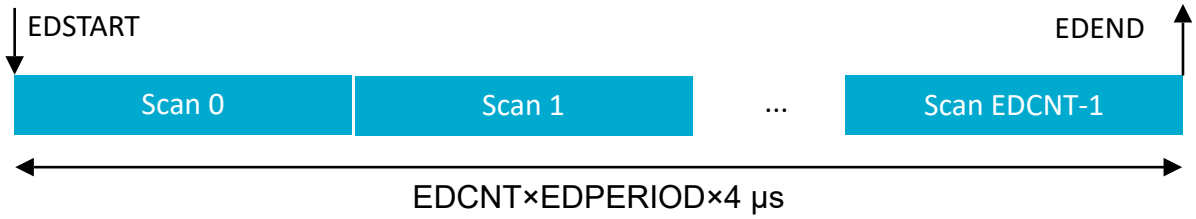

Figure 126: Energy detection measurement example with multiple iterations

The scan is stopped by writing the EDSTOP task. It is followed by the EDSTOPPED event when the module has terminated.

8.17.12.4 Clear channel assessment (CCA)

IEEE 802.15.4 implements a listen-before-talk channel access method to avoid collisions when transmitting. This is known as carrier sense multiple access with collision avoidance (CSMA-CA). The key part of this method is measuring if the wireless medium is busy or not.

The following clear channel assessment modes are supported:

- CCA Mode 1 (energy above threshold) – The medium is reported busy upon detecting any energy above the ED threshold.