Power Profile

Power consumption for a node

Global Constants

Power required to turn on mcu,sensor and radio
$(P_{off \to on})_{mcu}$, $(P_{off \to on})_{sensor}$, $(P_{off \to on})_{radio}$

Power in idle state for mcu,sensors and the idle and receive state for radio
$(P_{idle})_{mcu}$, $(P_{idle})_{sensor}$, $(P_{idle})_{radio}$, $(P_{rx})_{radio}$

Power for different modes and switching between them
$(P_{on \to sleep})_{mcu}$, $(P_{sleep})_{mcu}$, $(P_{sleep \to on})_{mcu}$, $(P_{on \to sleep})_{radio}$, $(P_{sleep})_{radio}$, $(P_{sleep \to on})_{radio}$

Power for procssing packet, sending packet and reading sensor
P_{procss_packet}, P_{send_packet}, P_{read_sensor}

Functions/Equations

Turn On Node $(P_{on})_{node} = (P_{off \to on})_{mcu} + (P_{off \to on})_{sensor} + (P_{off \to on})_{radio}$

Idle State $P_{idle\_state} = P_{mcu\_state} + P_{radio\_state} + P_{sensor\_state}$

- **MCU** $P_{mcu\_state} = (P_{idle})_{mcu}$
- **Radio** P_{radio_state} = RX * $(P_{rx})_{radio}$ + (1 -RX) * $(P_{idle})_{radio}$
- **Sensor** $P_{sensor\_state} = (P_{idle})_{sensor}$

Sleep Node $P_{sleep} = P_{mcu\_state} + P_{radio\_state} + P_{sensor\_state}$

- **MCU** $P_{mcu\_state} = (P_{on \to sleep})_{mcu} + (P_{sleep})_{mcu}$
- **Radio** $P_{radio\_state} = (P_{on \to sleep})_{radio} + (P_{sleep})_{radio}$
- **Sensor** $P_{sensor\_state} = 0$

Wakeup Node $P_{wakeup} = P_{mcu\_state} + P_{radio\_state} + P_{sensor\_state}$

- **MCU** $P_{mcu\_state} = (P_{sleep \to on})_{mcu}$
- **Radio** $P_{radio\_state} = (P_{sleep \to on})_{radio}$
- **Sensor** $P_{sensor\_state} = (P_{off \to on})_{sensor}$

Sense Send Message $P_{message} = P_{mcu\_state} + P_{radio\_state} + P_{sensor\_state}$

- **MCU** $P_{mcu\_state} = P_{procss\_packet}$
- **Radio** $P_{radio\_state} = P_{send\_packet}$
- **Sensor** $P_{sensor\_state} = P_{read\_sensor}$

RX = Whether Radio in Recieve state or idle state