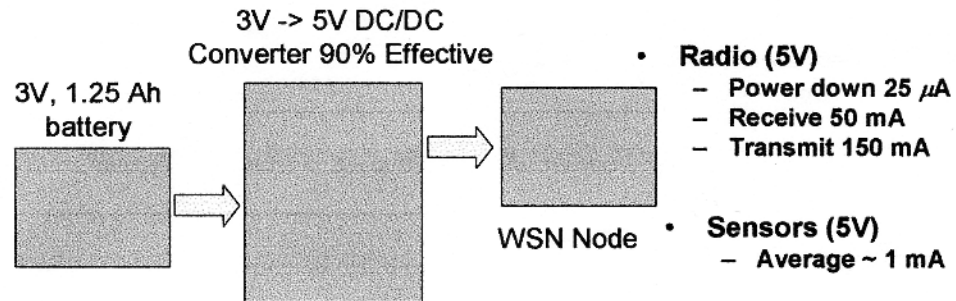


Energy Budget



WSN node is programmed to turn on radio every 5 seconds, listen on the network for 0.5 seconds, and then power down the radio.

It is estimated that it will be required to make a 10-second transmission once every 5 minutes.

Estimate how long the node can operate. Assume that 70% of the battery capacity is available.

Solution

$$\text{Ave. receiver current} = I_R = \frac{0.5}{5} \times 50 \text{ mA} = 5 \text{ mA}$$

$$\text{Ave. transmit current} = I_T = \frac{10}{5 \times 60} \times 150 \text{ mA} = 5 \text{ mA}$$

$$\begin{aligned} \text{Ave current for node} = I_N &= I_R + I_T + I_S \\ &= 5 + 5 + 1 \text{ mA} \\ &= 11 \text{ mA} \end{aligned}$$

$$\text{Power out of DC/DC} = 5 \times 11 = 55 \text{ mW}$$

$$\text{Power into DC/DC} = 55 / 0.9 = 61 \text{ mW}$$

$$\text{@ 3V this is } 61 / 3 = 20.33 \text{ mA}$$

of hours battery can supply this

$$\text{is } \frac{0.7 \times 1.25}{0.0233} = 37.6 \text{ hours} \rightarrow$$