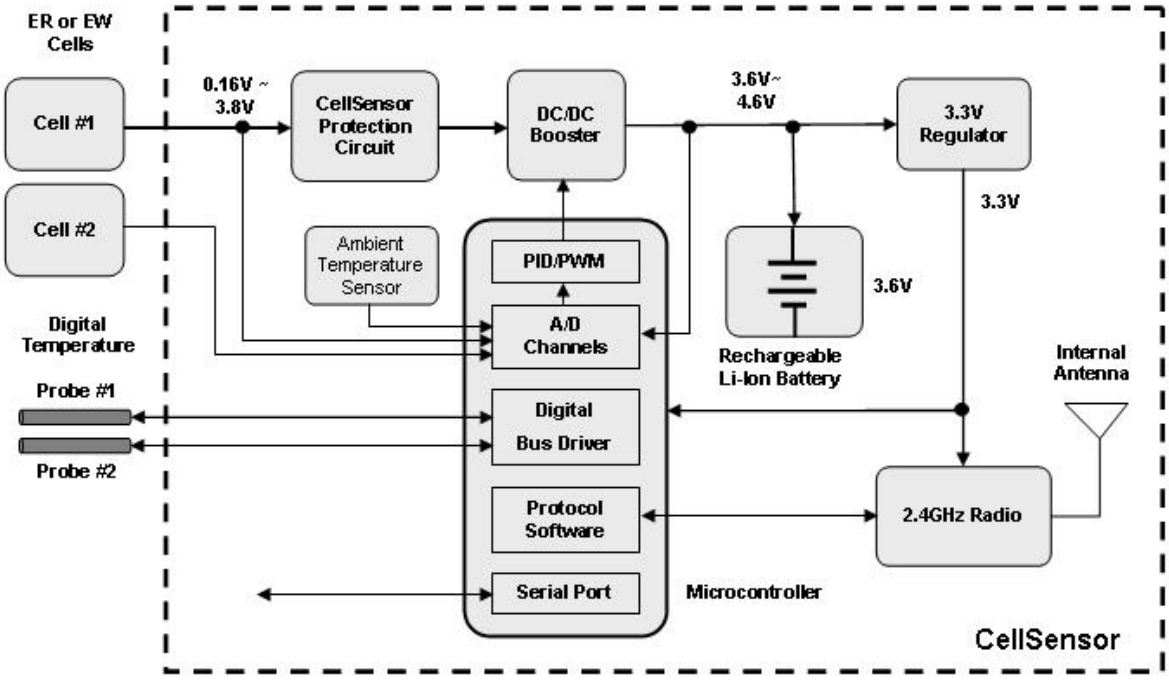
BLOCK DIAGRAM OF CELLSENSOR DEVICE



Radio Frequency Range:	2.405 – 2.480 GHz
Crystal (16.000 MHz) in 2.4 GHz Radio Block	

Operating Principle

A CellSensor PCB is mainly comprised of 2.4 GHz radio, microprocessor and a voltage booster as shown in Figure 4.

2.4 GHz Radio

The 2.4 GHz Radio using Direct Sequence Spread Spectrum (DSSS) technology is compliant with IEEE 802.15.4 standard. An integrated PCB antenna is used so no parts are exposed outside of the sealed box. It has a 250 kbps data rate and 0 dBm maximum output power. One CellSensor can communicate with a Coordinator up to 50-200 meters away in open space.

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Cell Voltage Booster

The voltage booster in CellSensor makes the it power self-sufficient and a true wireless device. The booster normally powers the CellSensor directly. A rechargeable Li-Ion battery is equipped as a backup power supply in case the external power source is unavailable. The battery will be charged by the booster and kept full whenever the cell voltage is available, and it will be switched in if the cells are powered down during cathode harvest, maintenance and cut-in/cut-off of the sections during operation. CellSensor enters power-saving mode automatically if no external power is available and the battery can last from 4 months to a year depending on the scan rate and data transmission intervals specified. The output voltage of the booster is controlled and regulated by the on-board microprocessor with high speed digital PID controller. The advanced battery charging scheme is implemented due to very accurate and microprocessor-adjustable output voltage of the booster.

The booster of the CellSensor is able to boost the input voltage from as low as 0.16 to above 4.0 V. In case the cell voltage is very low that the booster is unable to provide sufficient power to the system, the backup battery will be switched in as described above.

Data Acquisition and Filtering

The CellSensor samples cell voltage and temperature with the scan rates that can be defined by user. A temperature sensor is installed on the circuit board to measure the ambient temperature in the sealed box and the data is used for automatic temperature compensation of the data acquisition system and for diagnostic purposes.

CellSensor has a 10-bit A/D converter. An oversampling technique which produces a single sample by averaging 1024 consecutive 10-bit samples in a data block is used.

A calibration free and high precision digital temperature sensor is used for the electrolyte temperature measurement. The sampled cell voltage signal is digitally filtered using the on-board microprocessor and results in very high quality data. Normal scan rate is typically 15 seconds