Smart Diagnostic Wireless Description

Smart Diagnostic (SD) is an intelligent wireless network solution that will send sensor data over the 2.4GHz ISM band to a receiver which then transports the data serially to a PC, laptop, collection server, cloud, etc. for evaluation. This wireless board can be attached to many different types of both analog and digital sensors. These nodes can operate from a single CR123A 3.0V or 3.6V battery and the receiver operates from power off of a USB connection. The current network topology supported is a star.

The microprocessor can be configured to capture a certain amount of data (depending on the sensor attached) on the node, at which time it wakes up the radio and begins sending data serially to it for transmission. The microprocessor and the radio communicate via a SPI bus.

A given network operates on a distinct frequency with the 2.4GHz ISM band. The network does NOT use frequency hopping spread spectrum. It can however use a form of agility in a multi-receiver environment when poor radio quality on a given frequency has been determined. The radio uses GFSK modulation with a fixed over the air rate. The radio inherently has the ability to turn itself around as a receiver, in what is known as Enhanced ShockBurst, for a short duration after transmission to automatically listen for acknowledgements and or commands.

Topside software (GUI) controls the data acquisition rate and the periodicity with which this is done, depending on the sensor attached. This in turn controls the amount of over the air RF activity. Sensor data from the node is sent over the air in blocks of at most 329 bits (hardware overhead, software overhead and payload). Each block can be retransmitted if necessary in the event of a poor radio frequency link. These blocks are packaged together to form packets.