Application Note

Best Practices for Maximizing Battery Life with SignalFire Telemetry Equipment

Primary and Solar Rechargeable Systems

OVERVIEW

In many remote monitoring applications, power is not available at the measurement location. In these scenarios, the wireless sensor control system must provide power – not only for itself – but also for the attached sensor. Power usage must be carefully optimized to extend the life of the battery power source over many years. This paper will detail how to maximize your battery life using SignalFire primary lithium or rechargeable solar power.

NODE SETUP

SignalFire's wireless nodes are configured by the user. Attention should be paid to these settings to ensure long battery life. These items are relevant to both internal lithium (non-rechargeable) batteries as well as SignalFire's C1D1 solar module.

- **Sensor ON Time** – Set this to the minimum amount of time necessary to allow for a stable sensor reading. Most often, the sensor is the highest user of power so minimizing this is important.
- **Check-In Period** – Consider how often you really need to have your data pushed to the Gateway and set this parameter to as long a period as possible.
    - Many nodes have settable "cry out" thresholds you can enable which may allow you to set a longer check-in period. For example, with the Pressure Scout, if you are worried about a critical pressure and would need to know within 15 seconds if this pressure is exceeded, you could have a standard check-in time of 5 minutes but set a threshold where the sensor reading is checked every 5 or 15 seconds. If that threshold is violated, the unit will check-in immediately. This is a large power saver as you assume that the unit is not in the alarmed state most of the time.
- **Radio Mode** – When given the choice, always select "Sleeping". This will depower the radio between check-in periods. The only caveat to this is when you have solar power (see below)

SENSOR SELECTION

Many of SignalFire's nodes do not have a supplied sensor. One of the benefits of our product line is we allow the user to choose the best sensor for each application measurement.

When choosing a sensor, consider the battery ramifications of your selection. Choose a sensor that has the following characteristics:

- **Low Power Draw** – 1-5V analog interface is often much lower power than 4-20mA. HART is low power as well (4mA). Many sensors have a HART as well as Modbus versions. Often the HART is much lower current draw as the Modbus version adds a converter adding to the power draw.
- **Short Warm Up Time** – Choose a sensor with as short a warm-up time as possible. This specification is, often, not published but it is available from the manufacturer or call SignalFire for help.

SOLAR SOLUTIONS

SignalFire has a Class 1 Division 1 rated solar power solution for situations when internal lithium (non-rechargeable) battery power is not optimal. Some reasons for this are:

- **Long sensor warm-up time.** This is a common issue with guided wave radars where the warm-up time can be on the order of 45 seconds. Any check-in time faster than about 15 minutes will result in short internal battery life and solar power is a good option.
- **You want the sensor always on.**
- **You want the radio always on** (but not both radio and sensor at the same time!) Having the radio always on will allow the node to participate in the mesh network and allow other nodes to route (or hop) through it.

BATTERY LIFE ESTIMATES

To help users determine battery life in different remote monitoring applications, SignalFire offers ToolKit Configuration Software with a calculator that estimates battery life based on sensor type, sensor warm- up time, and reporting interval. This tool helps the installer quickly evaluate how configuration changes may impact the system battery life.

To read about how SignalFire Remote Sensing Systems are used in different applications, visit our website.

Below is a table showing how battery life is affected by Sensor-ON time and Check-In interval for a typical HART node where the current is set at 4mA. Any figures in the red or yellow categories are candidates for solar power.

Sentinel-HART High sensor power (18.5V)

Sensor On Time (sec)	Check-in Interval								
	5 sec	15 sec	1 min	2 min	4.5 min	10 min	15 min	30 min	60 min
2	0.3	0.7	2.4	4.6	9.7	10+	10+	10+	10+
5	0.2	0.4	1.4	2.6	5.6	10+	10+	10+	10+
30	0.2	0.2	0.4	0.7	1.3	2.8	4.0	7.6	10+
45	0.2	0.2	0.3	0.5	1.0	1.9	2.8	5.3	10+
60	0.2	0.2	0.3	0.4	0.8	1.5	2.2	4.1	10+