SIGNALFIRE
WIRELESS TELEMETRY

APPLICATION SPOTLIGHT

Wireless Monitoring of Farm Silo Levels and Temperatures

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APPLICATION:

Farming requires managing a multitude of assets and operations. Staying connected to what is happening with the field environment, equipment utilization, supply levels and crop growth is an essential – and challenging – task to remain productive. For example, farmers must constantly monitor the levels of farm silos to know the available inventory of feed and seed essential for farming operations. Tracking silo temperatures also guards against high moisture content that can stimulate the growth of mold and, consequently, result in loss of inventory.

Rather than rely on manual data collection methodologies that can take time and lead to ineffective data management and reporting, farms need a remote sensor control system that can automatically collect data on silo operating parameters for on-demand access by farm workers and/or download into analytics software for better asset management.

PRODUCT SUPPLIED:

- SignalFire Remote Sensing System including a SignalFire node configured with a solar power system and a SignalFire Gateway Stick
- Level and temperature sensors
- Mesh network
- Ethernet module interface

CHALLENGE:

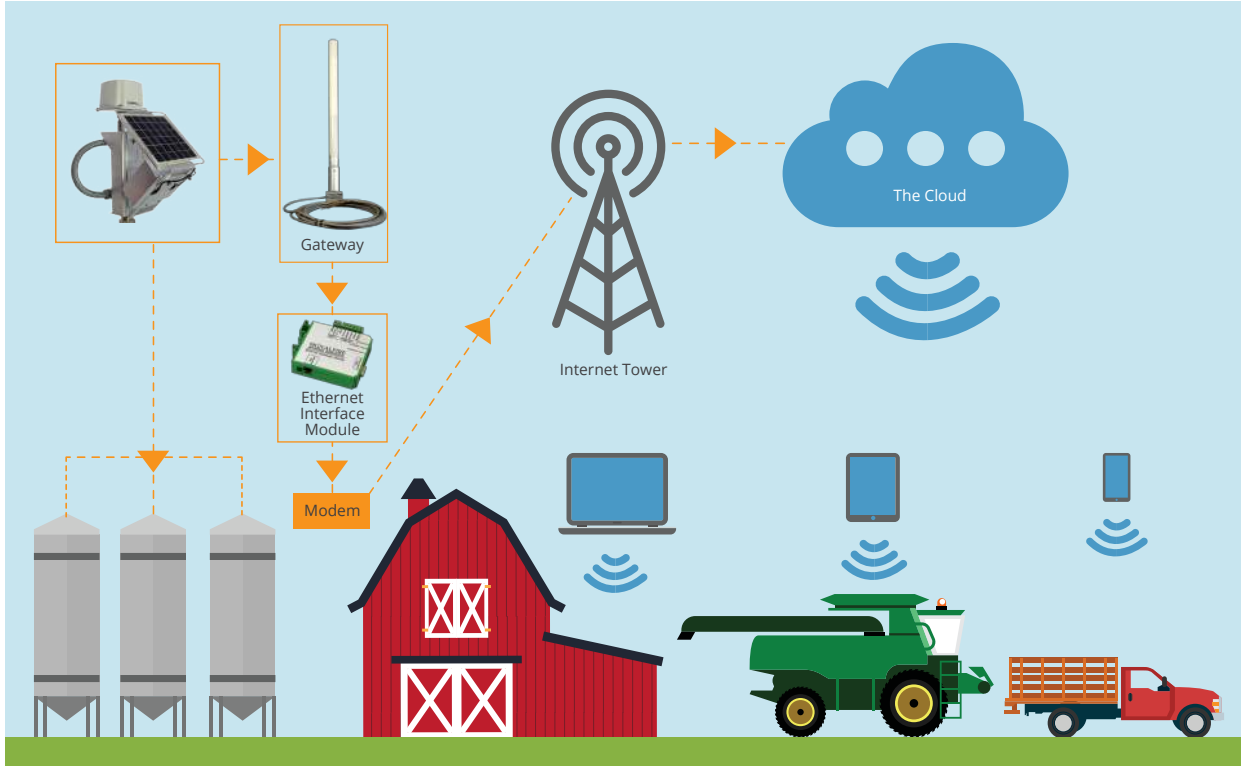
Data capture on many farms is still very labor intensive, with farmhands regularly traveling to silos located in different areas of the farm to manually gauge instrumentation. To maintain silo status, workers need to collect data from silos several times a day. For a small farm, that can mean monitoring assets over 300-500 acres, 1,500-2,500 acres for a medium to a large farm and 5,000-10,000 acres for a mega farm. And as workers operate in isolation from one another, data is not quickly shared throughout the farm operation.

Looking for an automated solution, some farms utilize wired instrumentation systems to monitor silo levels and humidity. While supporting remote data management, wired control systems require cabling each sensor to the PLC. If monitoring multiple parameters with different sensors, a wired system requires a large interface panel with many different interfaces.

Sensors installed on top of silos are prone to lightning strikes that will propagate along wires, often destroying equipment attached to the system. And when removing sensors for periodic maintenance, wires integrating to units also can be damaged.

SOLUTION:

The SignalFire Remote Sensing System (SFRSS) offers a wireless asset monitoring and control system in monitoring solid levels and temperatures in silos. Level and temperatures sensors installed within silos are connected to Sentinel nodes (radios) that power and extract data from the sensors via radio transmission to a gateway that serves as the central processing hub. The nodes power the sensors, making for a truly wireless system.



The Connected Farm
Access Information regarding your operations from Anywhere!

The gateway formats then delivers data to a PLC in a control center.

In some configurations, an Ethernet interface module connects to the Gateway to tie information into either a local Wifi network for local access or a modem that connects the Internet and a cloud service provider so that data is accessible across a co-op or is shared with a supplier or a customer. Farm operators can access data on temperature and grain usage through the convenience of their laptops and even smartphones using their cloud service. Easy-to-read templates provide a graphic view, illustrating which silos are low on feed, making it easier for operators to get a good overview of the silos throughout the entire farm.

While many wireless networking systems restrict sensor selection to one or two types, the SFRSS allows users to specify many sensor types to monitor assets. With the ability to pick and choose sensors, farms can choose their preferred level and temperature sensors to monitor silage storage and humidity and bring all the data together to a single point with a single data interface without cabling requirements or the need for multiple interfaces.

Unaffected by ground faults associated with cabling, the SFRSS is less susceptible to damage from lightning strikes as only the hit sensor might be damaged and not the entire network. The wireless remote sensing system also allows for the installation of the level and humidity sensors at any height and location on the silo. Operating on a mesh network, the sensor control system can be deployed over large areas regardless of hills, buildings and other structures that may obstruct the radio transmissions of other networks. Robust gateways can accommodate hundreds of transceiver inputs from the field sensor, enabling the network to cover a geographic range of a mega farm of 10,000 acres that roughly equals 15 square miles.

By automating silo monitoring activities, farmhands will know when they need to switch to another silo or refill the measured silo. As a result, the farmer increases production efficiency as well as gain true transparency over operations by receiving a constant status on silos.