



APPLICATION SPOTLIGHT

Wireless Telemetry System Streamlines Water Distribution System of Open Pit Mining Operation



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A2 Long Range Node



Gateway Stick



Solar Powered Repeater Node

APPLICATION:

A mining company experienced problems when manually monitoring water flowing through a pipeline system that supported its open pit mining operations. Workers would travel along the waterline that enveloped mountains at a range of up to 11,000 feet to read ultrasonic flow meters that measured the mass flow rate of water several times a day. As the manual process was only as accurate as the last reading, a waterline break between operator visits resulted in undetected water running down a mountain and nearly flooding a nearby control building.

To quickly identify any future waterline breaks while adhering to strict environmental regulations on mining activities, the mining company wanted to streamline water flow monitoring by adding capabilities for remote data collection as well as alarm notifications to maintain more timely status of the water distribution system.

PRODUCT SUPPLIED:

- **Gateway Stick:** integrates a 500 mW high-gain antenna and gateway electronics to manage outbound communications.
- **A2 Long Range Nodes:** integrates with ultrasonic flow meters within a range of up to 3 miles line of sight.

- **C1D1 Solar Power System:** consists of a solar panel, watertight battery and high-efficiency solar charger that provide power to the nodes.
- **Solar-Powered Repeater Node:** extends the power of the SignalFire wireless mesh network in locations where power is unavailable.

CHALLENGE:

The mining company needed a remote water flow monitoring system that could:

- Operate wirelessly as wires represent an installation problem in the mountain terrain, especially as land is reclaimed, replanted and repurposed after mining completion.
- Perform reliably in snow and cold temperatures present in high mountain elevations.
- Maintain its own long-term energy source as power is unavailable or unreliable throughout the maintain range.
- Configure and maintain a strong communications network without obstruction by the mountain range.
- Alarm and stop water flow in the occurrence of a waterline rupture.



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SOLUTION:

SignalFire offered a wireless telemetry solution for transmitting data from the existing ultrasonic flow meters to a control building for remote water flow monitoring. The wireless sensor control system features A2 Long Range Nodes that interface with 24V ultrasonic flow meters installed along the waterline. The Nodes transmit sensor data to a Gateway Stick located at a remote control building beyond the mountain range. The Long Range Nodes are capable of maintaining a communication range of three miles within a line of sight of the ultrasonic flow meters. The SignalFire mesh network provides reliable communications from the Nodes to the Gateway in the elevated and uneven mountain terrains.

To conserve power, many of the A2 Long Range Nodes operate in sleep position to lengthen their battery life. Based on programmed variables, these Nodes “wake up” at specific intervals (every 15 sec, every minute, etc.) to take readings and send a signal to the Gateway. Some Long-Range Nodes are solar-powered to remain in the “on” position to serve as repeaters so that Nodes in sleep mode can immediately communicate with them when awakened to join the network. Working in a mesh network, the A2 Long Range Nodes utilize neighboring radio

Nodes to “hop” messages to the Gateway. Each Node determines the best path to the Gateway based on information derived from nearby Nodes.

A Solar-Powered Repeater Node located at the peak of the 11,000-foot mountain ensures signals reach the Gateway from adjoining Nodes situated on the terrain below. The Gateway Stick serves as the central communication point, storing the most recent readings of all Nodes in Modbus format.

Operators can download data from the Gateway from a two-wire serial port. An Ethernet PC interface also supports a remote network configuration using a SignalFire Toolkit (a PC application for configuring all settings in the nodes and Gateway).

Since installation, the SignalFire wireless telemetry system provides the mining company with remote feedback on the flow status of the entire water distribution systems. Operators know when ultrasonic flow meters are not performing to make immediate repairs and ensure a reliable water management system.