

Radio Telemetry and Newer Technologies

A Blend for Expanded Data Performance

Applications Paper



OVERVIEW

For more than 25 years UHF and VHF licensed radio technology has been the main stay in automation data acquisition and equipment control for remote areas with little to no infrastructure. Now this traditional form of telemetry can be shared with newer technologies; spread spectrum frequencies, cellular service, and satellite connectivity to allow for alternate forms of SCADA communication. This paper will discuss three user sites that have combined licensed radio and public-domain technologies successfully.

LICENSED RADIO COMMUNICATION EXTENDED WITH SPREAD SPECTRUM

Located in the North Platte Valley in southeastern Wyoming, the town of Saratoga communicates to its well field 5 miles out of town using a combination of licensed UHF and spread spectrum radios. By utilizing spread spectrum non-licensed frequency radios for the short distances at the well field and the licensed UHF system for the robust data link back to town, the total up-front cost of the project was held to a minimum.

In this system, the UHF telemetry manages the complex commands such as analog speed control of the well VFDs and the chlorine gas injection system. The UHF telemetry transmits motor control commands to the well sites single remote terminal unit (RTU) and transmits back individual well performance data to the SCADA computer in town. Flow rates and pressure values are monitored through the combination of 900 MHz spread spectrum radios and the UHF licensed radio. The spread spectrum radios are used for transmitting the flow and pressure rates from each of the producing wells, located within a 580 ft. radius to the well field pump control house. The pump house has a gateway that receives the values and hands off the data to the UHF telemetry system for transmission back to the SCADA computer in town.

If UHF technology were solely used on this project the Saratoga well field costs would have more than tripled as each well would have required its own RTU for only a few analog and discrete input/output signals.

This blend of spread spectrum local communications and long distance licensed telemetry can also be used to monitor dam structures, industrial safety, or intrusion detection.





ADDING CELLULAR

The small town of Minturn Colorado has a water plant that is outside the range of available land-line DSL or phone service, and the terrain in Minturn is typical Rocky-Mountain-roughness...a real challenge to all wireless communications. The operators needed to remotely monitor and control the water plant and two tank sites while staying within very tight budget. After a path study, Timber Line deployed three VHF licensed-frequency Motorola telemetry units: One at each tank and one at the water plant. Information on the water plant process as well as the two tank levels is collect-

ed, logged and displayed on a Red Lion operator interface panel (OIP) which comes equipped with a web-host feature. The addition of a broadband cellular modem allows the OIP to be connected to the web. Although the cellular signal strength is only "one bar", the data does manage to flow in both directions. The contract operators enjoy the web-connected functionality because they can receive alarms and check on Minturn's system even when they are working at another location. The use of the cellular technology helped to save the town money by eliminating the need for a 4th telemetry site in town to receive the water system information. However, the Town does pay a monthly fee for the cellular connection and a small yearly fee for a third-party email server that relays the alarm text messages.

Cellular communications for radio telemetry are now also a cost effective option for urban locations where there is fierce competition between cellular carriers. Typically, the cost of a broadband cellular modem is about the same as a UHF radio, but the antenna structure for cellular is less expensive. If a site is temporary, or expected to be in use for less than 5 years, it may be worth comparing the total life-span cost of cellular and licensed-frequency communications. If the site is expected to serve for more than 5 years, the licensed-frequency option will probably be more cost effective.

COMBINING WITH SATELLITE

Very remote sites benefit from VHF and Satellite communications

Wyoming Water Development Commission (WWDC) owns and operates a very remote dam that is located in south-central Wyoming. For a much as 8 months of the year, the only access to the dam is by snowmobile or snowcat. WWDC is required to monitor the stream flows into the reservoir as well as control the water being released downstream of the dam. In an effort to increase the level of information and control at the dam site that is almost 100 mile away, Timber Line helped WWDC to implement a satellite connection to the dam. This connection does carry a monthly cost, but the cost is minimal when compared to the expense (and safety concerns) of a snow cat trip in the middle of winter. The satellite connection allows for speedy two way monitoring and control, AND it is connected to three other VHF telemetry units that collect information from the streams that flow into the reservoir. This blend of VHF and satellite technology brings an extremely remote system right to WWDC's desktop computers in Cheyenne with the click of a mouse.



Timber Line has also used satellite technology to allow customers to upload information from high altitude stream gauging stations, from remote National Park water systems, and to span a 40 mile distance between two very remote flow control sites.