

Doing more with SCADA

Wireless Ethernet boosts efficiency at growing Vancouver Island municipality

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Located between Victoria and Nanaimo, nestled in the heart of the Cowichan Valley, the Municipality of North Cowichan offers a serene, easy-going lifestyle amidst magnificent forests, mountains, lakes, rivers and ocean inlets. Laced with history and culture, North Cowichan also boasts an enticing variety of recreational adventures. The District of North Cowichan currently runs a telemetry system in 41 remote water, sanitary and drainage facilities, including pumping stations and sanitary lift stations. Its jurisdiction covers seven separate utilities from Chemainus and Crofton to the boundaries of the City of Duncan.

Fast-growing municipalities like North Cowichan face challenges not only to replace retired technologies,

but to implement appropriate security measures with those technologies. Monitoring facilities through supervisory control and data acquisition (SCADA) and adding remote video surveillance and data logging for security at remote sites are at the forefront of such challenges.

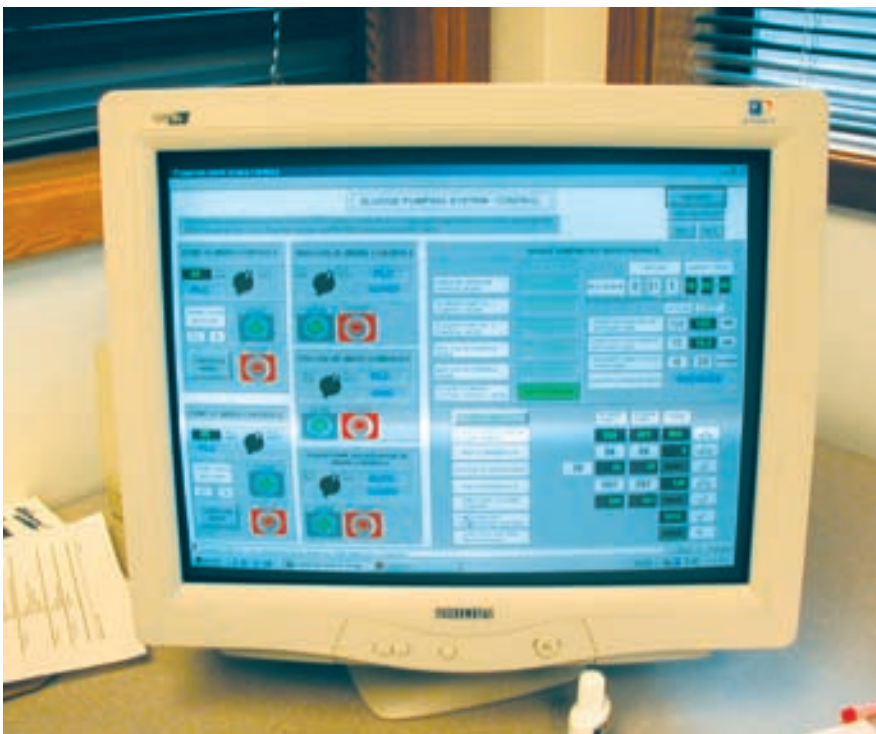
With any municipal or industrial growth comes a need to move data from remote locations to a central monitoring facility. That is where Ethernet network environments come in. They use radio instead of cable to provide network connectivity for field radio telemetry unit (RTU) locations. Communications vendors now demonstrate Ethernet networks from 115 Kbps up to 1 MBp, using spread spectrum radios using 900, 2400 and 5800 MHz radio bands. As a result, industry can cost-effectively

manage remote systems with enhanced bandwidth.

New wireless Ethernet network systems are scalable and flexible to ensure organizational network growth, which could work well for a growing city. The solutions also provide easy-to-deploy and easy-to-manage networks that allow remote management and control of network devices to reduce overall management and servicing costs. For SCADA systems, radio products for the 900 MHz band and data rates from 115 to 512 KBps are the most cost-effective.

SCADA on the move

Most municipalities today already have SCADA systems in place, but those using radio communications as the primary backbone face limits through



A typical graphical display SCADA screen view



A typical radio communications tower



PLC controller at typical SCADA facility used for local control and communications



A typical radio repeater facility used for high speed wireless communications

small bandwidths, with only minimal bandwidth available for retrieving logged data for analysis and applying remote surveillance. With the growing popularity of SCADA systems in larger municipalities for monitoring remote water and sewer facilities, even small towns now use basic remote

telemetry devices to monitor alarms and provide call-out to operation personnel.

North American governments and municipalities operating distribution systems use telemetry systems for fresh water, waste water and storm water. Managed traffic-light control,

security, irrigation, lane control and vehicle location systems use a combination of computer monitoring at central facilities and remote field devices, including RTU and programmable logic controller (PLC) products.

The District of North Cowichan had operated its water and sewer distribution systems using PLCs (programmable logic controls) and telephone alarm dialers to provide basic control and alarm monitoring. The central monitoring facility was running a DOS-based alarm software package, but it was not enough. The telemetry system did not provide adequate distribution monitoring and remote control required for more efficient and effective operations.

After years of growing and investing in short-term fixes to optimize the telemetry system, the District decided to upgrade to a fully-integrated SCADA system using existing PLCs to provide local control and communications through Ethernet radios and a Microsoft Windows-based HMI software package. The PLCs could now move data to a central monitoring facility as well as execute commands to start and stop pumps and valves based on remote operations. As the District recognized the need to utilize the SCADA system as a management system, the requirement for more data from its distribution networks and water and sanitary treatment facilities became part of the design criteria.

The District retained Dayton & Knight Ltd. Consulting Engineers for the design and implementation of its SCADA system and matching today's SCADA technologies with the District's requirements. A recommendation was made to use Ethernet-capable radio systems for communications, while using existing PLCs for local logic controls.

With Ethernet, the District could supply high-bandwidth data transmission using addressable packets of information to route data between locations which connect via network cable. Thirty years earlier, this technology did not easily support long-distance cable runs needed for field RTU or PLC use. Fiber-optic cables can move data over longer distances, but the costs

are still too high for the amount of data a SCADA system would typically transmit.

Minimizing security issues

Because all wireless data networks offer the opportunity for data interception and insertion, it is impossible to guarantee absolute security in a wireless or even a wired network. But, you can minimize those risks by providing layers of security to the wireless Ethernet network. Today's terrorism concerns have led manufacturers to enhance security for door-and-hatch entry alarming by adding video surveillance to better respond to potential threats to reservoirs and pumping stations. Field personnel need to use more and faster information carrying notebook computers and handheld devices. We cannot address these challenges without more bandwidth in SCADA system communications design.

Using wireless Ethernet in municipal applications, such as those at the District of North Cowichan, could open up new possibilities to integrate data, voice and video into one single network. Applications might include a combination of traditional SCADA and telemetry services, remote video and surveillance monitoring and emergency voice services, while leveraging existing infrastructures. These applications are possible because of the larger bandwidths a wireless Ethernet system could provide over conventional radio systems.

Some municipal agencies have even reassessed their security readiness and are now installing new or upgraded security and surveillance systems, including wireless video, to help enhance the security system. This is a first step in reducing damage to a water supply system. Ethernet systems could also piggyback voice data over the radio network using voice-over-Internet protocol. This provides a cost-effective alternative to a traditional telephone network in municipal systems where traditional services are not available or where you might need a temporary voice connection, such as at water reservoirs or watersheds.

Investment pays off

The District of North Cowichan was not going to be left behind. Before getting proposals for the new wireless Ethernet data network, the District was already on the wireless bandwagon, having some of its key facilities monitored with lower bandwidth spread spectrum radios.

Already, the District is enjoying improved data response time for alarms and analog information. In fact, the District realized the possibility of using video data on this network within the bandwidth limits and is in the process of integrating irrigation controls sharing the same communications infrastructure. Operations personnel could also remotely access the SCADA system and, consequently, provide a more efficient and effective service to the municipality.

As the District becomes more comfortable in working with the SCADA system, we will see more initiatives from its operators and managers to leverage its existing SCADA system to optimize the District's operations, planning and engineering in the future. The Municipality of North Cowichan is an example of an 'Innovation Success Story' and they have shown great leadership for its community and set the benchmark for other communities to follow. They are truly 'doing more with SCADA.' 💧

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