

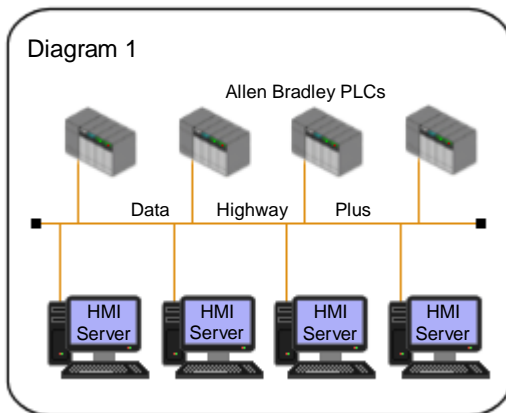


Bringing it all Together

Centralized Backup & Configuration for Remote Plant HMIs

By Christopher Little, Trihedral Engineering Ltd.

As Wastewater Manager for four sewage treatment plants spread across Colchester County, Nova Scotia, Nicole MacDonald faced the daunting task of ensuring all systems continued to function seamlessly on a 24/7 basis. Each plant had its own separate monitoring and control system that allowed it to function autonomously. What MacDonald really wanted was to be able to monitor all four plants and make configuration changes from her office. After reviewing her existing infrastructure, she saw the potential to transform these four systems into one unified solution that would also address long standing issues such as remote data backup and automatic system failover. Engineers from Trihedral Engineering Limited worked closely with MacDonald to bring her idea into reality.

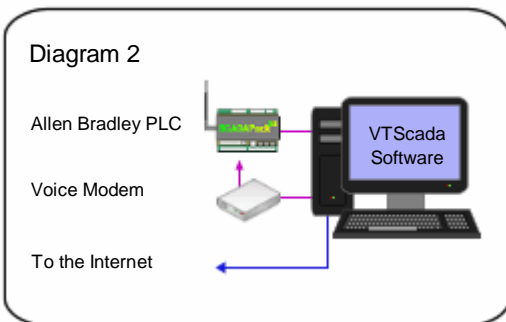


History

Colchester County's four treatment plants serviced approximately 45,000 residents. The Colchester plant (the largest in Atlantic Canada) was also home to Nicole MacDonald's office and was the only plant with full time staff.

Monitoring at the Colchester plant was handled by RS View HMI software running on four PCs connected to four Allen Bradley PLCs via a Data Highway Plus (DH+) network (Diagram 1). An alarm dialer notified staff in the event of increased or decreased flow, gas or fire.

The Tatamagouche, Great Village, and Brookfield plants all used identical systems consisting of a SCADAPack PLC from Control Microsystems and a VTS Alarm Dialer connected to a PC running VTScada HMI software from Trihedral Engineering. (Diagram 2)



Despite the sophistication of these systems, several issues remained.

1. Two different kinds of HMI software meant more training and a steeper learning curve for new employees
2. Plants could not be monitored from one central location
3. Configuration changes had to be done on-site at each plant
4. There was no remote backup of each plant's historical data
5. All of the servers at the Colchester plant communicated with their local PLCs simultaneously, resulting in unnecessary network traffic

Design

To address the first issue, it was decided that all four plants would use the same HMI software. Since VTScada was already being used in three of the plants, the Colchester plant would be switched over to use VTScada as well. During initial discussions with Trihedral, MacDonald proposed that they use the opportunity to go even further. She wanted to create a single unified system that addressed all her long-standing concerns about historical data backup and automatic system failover.

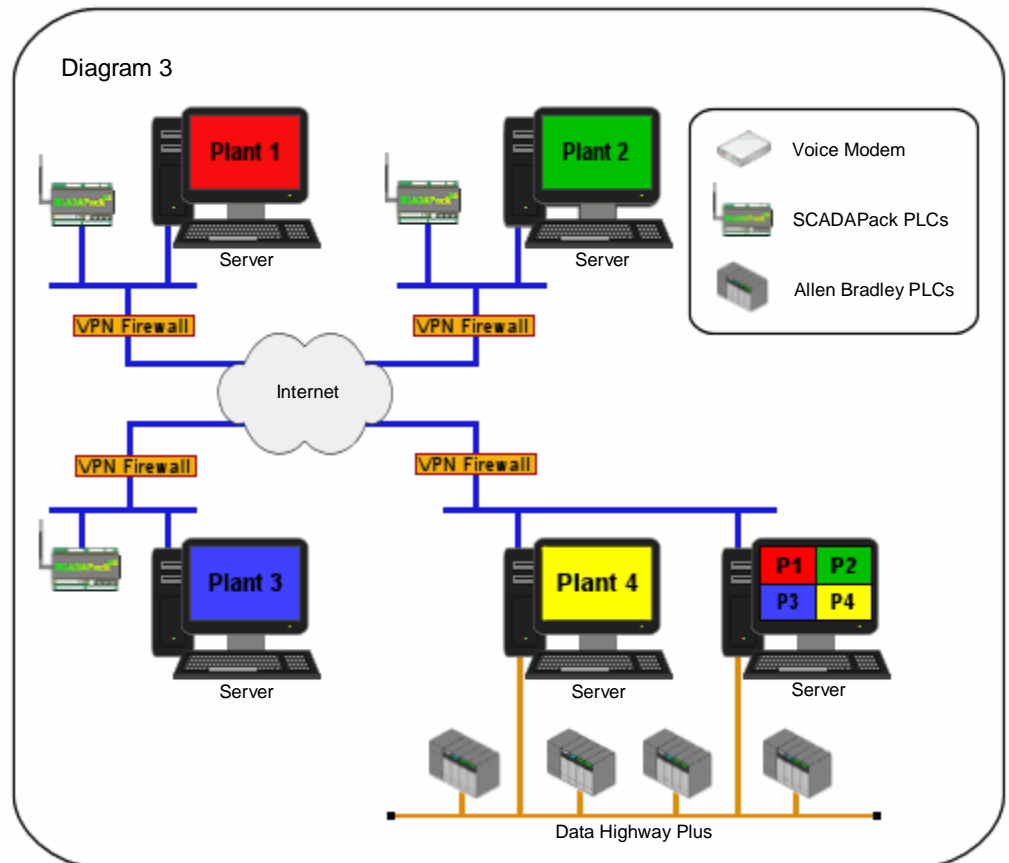
Trihedral developer Doug Spurrell worked closely with MacDonald to create an elegant design that made the best use of the infrastructure they already had. "Since so much of what we were doing was about remote monitoring and control, it was also very important to us to increase the security for the whole system," said Spurrell. "The people at Trihedral were great to work with," remembered MacDonald. "I always knew I could reach them if I needed to speak with them."

A Unified Design

Each of the four plants now runs a primary HMI server which communicates with local I/O via its own Local Area Network (LAN) and maintains a database of local historical data. (Diagram 3)

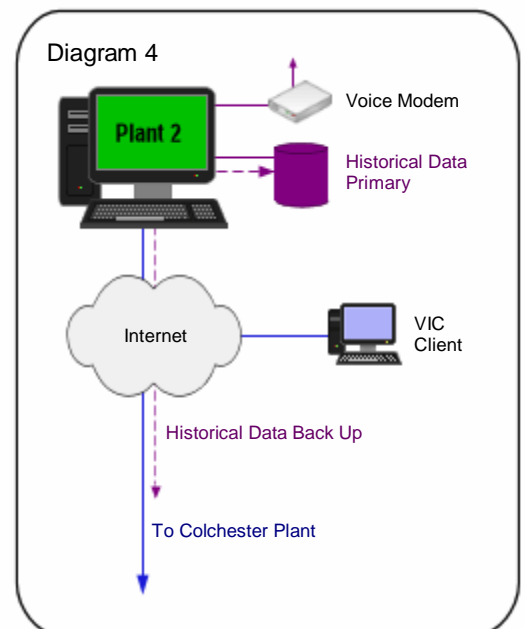
Additionally, each plant's HMI can be viewed remotely via Internet client and has a VTS Alarm Dialer that communicates alarm information to operations personnel.

Moreover, alarms for all of the plants can be viewed and acknowledged from a single computer in the Colchester office.



Benefits

1. **Centralized monitoring & control:** To meet MacDonald's central computer requirements, a workstation, located in the Colchester plant, is connected to each of the other three plants via high speed Internet.
2. **Security:** Each of these connections is secured using an inexpensive VPN firewall device.
3. **Remote configuration:** Over these remote connections MacDonald can simultaneously monitor and make remote, online configuration changes without leaving her office or restarting the on-site primary servers. "The old system was just something visual that I could only look at." says MacDonald, "Now if there are conditions that make it dangerous or impossible to reach the plants, we can make configuration changes from almost anywhere."
4. **Remote back up:** All four historical databases are replicated on the central workstation in Colchester, providing convenient, offsite database backups. (Diagram 4)
5. **Remote failover:** By connecting the PLCs at each plant to their own Local Area Networks, MacDonald's workstation can now take over all server functionality, including I/O communications, for any or all of the plants in the event their (on-site) primary servers fail.
6. **Reduced learning Curve:** Adopting a single, unified SCADA software methodology was not the only way that MacDonald and Spurrell were able to simplify things for Colchester personnel. Spurrell recalls, "I started with the HMI application that they had been using at Colchester and I made sure that the screens for the VTScada application had the same look and feel. At the same time Spurrell improved workflow by drastically reducing the number of screens and grouping together related data. "This system is a lot easier to use." says MacDonald.



7. **Overlapping trend data:** The integrated VTS Historical Data Viewer allows users to discover patterns and problems in their process. For example, if a pump stops because of a power blip it can result in mysterious readings across the system. By overlaying pump rates over a flow curve in the VTS Historical Data Viewer, users can trace anomalous readings back to their original source. In this case, the stopped pump. “Then, once I’ve found the problem, I can write a note on the trend itself for future reference.” says MacDonald.
8. **Integrated Logbook:** Previously, Colchester staff hand wrote comments like these into log books. VTS improves on this process by providing an electronic operator’s notes display. User notes are automatically time-stamped and labeled with the operator’s name. Once created, notes cannot be edited and the entire log is saved to an encrypted file that is unreadable outside VTS. MacDonald much prefers this electronic approach, “It gives me something neater to work with so I’m not trying to read people’s writing. That saves a lot of time.”
9. **More historical data:** The new system is able to handle much more data. “Before we could only record twenty-four hours worth of trend information. Now we can go back several years.”

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The Future

“There is some I/O for pumps and things that we haven’t chosen to monitor in the past that we want to incorporate in the current system.” says MacDonald. Since the Colchester plant has its own Full Development License, she can make many of these changes herself without having to go to the remote plants.

The municipality is currently building a new treatment plant and MacDonald is very clear about what SCADA software they are going to use. “We definitely want VTScada running in all of our plants.”

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