A Deep Look: The Trio Q

We're pleased to announce the release of the Schneider Electric Q series of Ethernet-capable, licensed, narrow-band data radios. This product has been available on the international market and is going to begin shipping in the US in the next 6-8 weeks. The Q series radio is a native Ethernet product which can be enabled as an IP traffic router. Each radio then becomes a gateway to the Wide Area Network (WAN), and individual routing rules can be configured to route the Ethernet traffic. IP router mode offers a reduction in TCP connection setup latency, as ARP requests from external Ethernet equipment don't get sent over air. While the IP router is more efficient and offers lower latency TCP connections, it does require detailed IP planning and IT engineering principles in its application, making the configuration effort higher than regular Bridge Mode. An alternative to IP router mode, Bridge Mode provides a quick and effective way to configure Ethernet operation over the radio network. In Bridge Mode, the radio behaves like a transparent Layer 2 Ethernet bridge, treating local LAN ports and the wireless ports as different sources/destinations, and learns where traffic is flowing to provide a degree of dynamic network optimization.

The Trio Q makes the most of the narrow band channel by changing data transmission rate dynamically, based on the quality of the radio channel. Each radio in the system can then utilize the highest possible data rate, eliminating the need to configure an entire system to run at the slowest speed of one remote radio's signal strength. With the Q, data speed is also dyn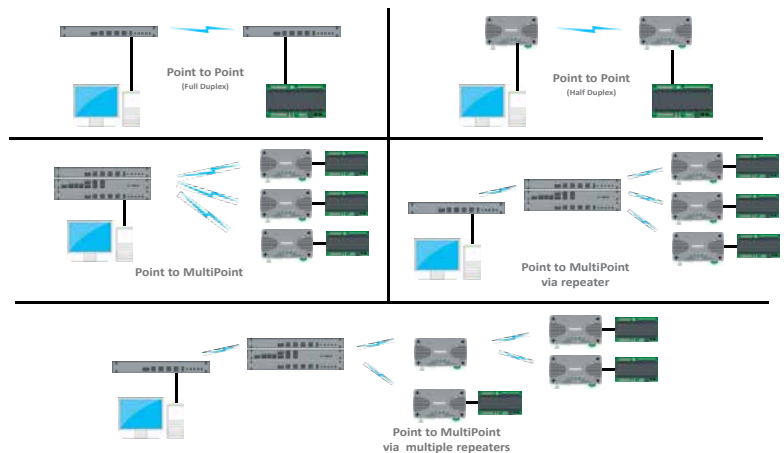amically variable for each remote radio to match the quality of the channel. As the radio channel changes over time, the radio monitors the changes and automatically alters the data transmission speed to ensure the fastest possible data speed.

ChannelShare+ Collision Avoidance is an advanced dynamic channel access/contention control process permitting multiple user applications, including remote diagnostics, to use the same radio channel. Building on the original ChannelShare, ChannelShare+ adds multiple control protocols with dynamic switching as channel loading changes. The process makes it possible to implement polling and unsolicited reporting, as well as transparent diagnostics with Trap (alarm) reporting, using one radio channel, while minimizing data collisions and loss of data.

Automatic Retries (ARQ) is an automatic dynamic error detection and correction method which prevents a connected RTU or PLC from detecting lost data packets. Some transmission methods, Ethernet in particular, are susceptible to significant slow-downs when packet loss is detected (Ethernet drivers assume channel congestion), and occasional lost packets are expected in long range licensed data radio systems. ARQ detects the lost packet, retries and corrects the transfer, and ensures that the connect RTU/PLC equipment only detects a slight delay/latency to the message while the correction occurs.

Q-series radios include a web and telnet server which can be accessed locally or remotely. Each radio is shipped with a default IP address which allows access to the configuration servers. The Q-series can operate in HTTP/HTTPS, Telnet/SSH, or Serial Console, enabling or disabling them for configuration and diagnostics access. Each method is password-protected, and HTTPS & SSH require security certificates. The Q radio can generate self-signed certificates or be loaded with externally generated certificates.

With the Trio Q there are no inherent limits to the number of remote data radios that can communicate with a single master radio, or to the number of master/repeater radios in one system. System capacity is determined by the characteristics and volume of user data being transported, as well as the efficiency with which the data is communicated. Using the accelerated Ethernet transport data compression and the ChannelShare+ process results in optimum system capacity and a highly efficient utilization of the limited available frequency spectrum.

Trio Q radio diagnostics are integrated into ClearSCADA 2014, with a built-in available template allowing the radio to be treated as another SCADA parameter along with alarms and notifications. Remote diagnostics are also available via SNMP, including Traps and Informs, allowing the radio to be integrated into any standard SNMP management tool. The required .MIB files can be downloaded from the product's internal web page. Network management can be transparently achieved, with local and remote configuration accessible through a web browser interface. Configuration and diagnostics are also available via a Telnet interface. Firmware upgrades can be achieved both locally and remotely (over the radio channel). The remote firmware upgrade uses rate limited broadcasting (simultaneously to all radios) to retrieve firmware patches, rather than the full firmware image, to minimize impact on the channel's user data capacity.

For full lists of features, capability descriptions, and spec sheets, contact your local Sage Designs representative!

Q Range : Versatile & Flexible

Point to Point (Full Duplex)

Point to Point (Half Duplex)

Point to MultiPoint

Point to MultiPoint via repeater

Point to MultiPoint via multiple repeaters

Schneider Electric

Inside this issue:

- Free SCADA Seminars
- HMI vs. SCADA Master
- Training Classes
- Spotlight: Palmdale
- Q&A: Cybersecurity

SCADA Master Station vs. HMI

The terms SCADA Master Station Software (SCADA Software) and Human Machine Interface (HMI) are often used interchangeably in theory, but in practice SCADA and HMI software are very different animals.

HMI products are designed to work in LAN systems to provide operators with a "window into the process", a graphical interface that provides process information and allows control of the process through that interface. SCADA Software has several things in common with an HMI as both display information about the process through graphics or tables. Recently the emphasis on graphics has been losing favor in modern HMI design. Current design principals now downplay the need for elaborate process graphics and animations as distractions that fail to inform the operator. As Hollifiend, et al point out in "The Process Pictorial – An Overused, Low-Performance Paradigm", a sub-section of The High Performance HMI Handbook, high-end graphics are fast falling from favor. The idea that you have a need for a 3-D graphic to illustrate a lift station is no longer in vogue.

The design of modern SCADA Master Station software, on the other hand, is optimized for use on a geographically diverse system with all of the communications challenges that come with such an installation. Additionally, SCADA Software, by definition, includes a Historian and an Alarm and Event Journal to meet the demands of Data Acquisition. In an HMI, these are often add-on packages or options.

A complete SCADA Software package will have native communications capabilities lacking in most HMIs. The SCADA software package includes more than a list of DLL drivers, it includes a diverse range of communications capabilities: fail-over backup channels, communications diagnostics, and robust polling management algorithms for large systems. These extra capabilities make the management of communications much simpler. Varying polling rates, taking remotes off poll, and adding new stations are much easier through SCADA Software than by re-programming a Master RTU. Additionally, a proper SCADA protocol supports Event-driven Exception reporting in which the remotes assemble a message on important data and send it unsolicited to the SCADA Master Station. Fortunately, an open protocol exists called DNP (Distributed Network Protocol) which meets this need.

RTUs that offer DNP3 log data locally, then download time-stamped historical data to the server, on a polled or exception basis automatically back-filling the database and trend charts at the master station. The robust rules regarding buffering of data, confirmation of packed delivery and data quality information are critical to assurance that all data is accurate and no historical information is lost. This "No Lost Data" mindset provides Operations with critical data for compliance and management of their systems, whether for Water, Waste Water, Power or Oil & Gas systems .

Let's take a look at some of the more advanced communications features in the Struxureware ClearSCADA SCADA software from Schneider Electric. When configuring a communications channel there is, as you might expect, a component for defining a protocol and communications method (Ethernet, Serial or Dial-up), and an object that relates to each RTU or PLC (outstation) in the system. There is a third piece of the setup, referred to as a Set, which can be configured to switch between two channels of any type should one fail. This allows you to easily select your high-speed Ethernet radio system as the primary and automatically switch over to your old serial radio or dial-up system as a backup. You can also define dual networks for your Outstations as ClearSCADA can easily deal with dual NICs .

Built in to ClearSCADA is a communications monitoring system that will log all DNP or Modbus communications packets, whether they be Ethernet or serial, to allow advanced diagnostics of protocol problems within your system. There's even a built-in Protocol analyzer for both Modbus and DNP3 protocols that translates the packets into easy to read files to help with the troubleshooting process.

ClearSCADA also deals well with large SCADA systems and can manage polling without the need to write any scripts or code to keep communications sorted out. Switched Channel Sets, a flexible set of settings for retries, and channel timing allow for the configuration of a reliable communications system.

Since true SCADA systems often rely on a Master Station to do their polling rather than a master PLC or RTU, strong support for redundancy is called for. With Check-box redundancy configuration offering triple redundancy and Performance servers, ClearSCADA can reliably manage a large system's communications directly.

Network diagnostics, such as an SNMP driver and the ability to monitor the condition of other ClearSCADA servers' CPUs, also enhance the operator's ability to monitor not only the remotes, but the network as well.

Communications are often the most difficult part of a SCADA system and using a SCADA Master Station package goes a long way towards making this part of the project manageable. Take a close look at ClearSCADA when choosing a Master Station for your next SCADA project.

Free SCADAWise Seminar:
'Advances in SCADA Technology'

November 18, 2014
8AM – Noon
Southern California - Invensys Complex
26561 Rancho Parkway South
Lake Forest, CA 92630

November 20, 2014
8AM – Noon
Northern California – Marriot Residence Inn
1000 Airway Blvd.
Livermore, CA 94551

7:30 – 8:15	**Continental Breakfast & Sage Designs Welcome**
8:15 - 8:45	**Schneider Electric TRSS Industry Introduction** Greg Ochs, Schneider Electric TRSS Regional Manager, will discuss the breadth of the Schneider Electric Telemetry and Remote SCADA Systems offering and sketch a roadmap regarding ClearSCADA, SCADAPack, Trio Radios and Accutech Wireless Instrumentation.
8:45 – 9:45	**SCADAPack 535 Controller** Grant Van Hemert, Schneider Electric SCADAPack Product Manager for North America, will introduce the SCADAPack 535 Controller and some of the features of this new SCADAPack flagship product. Grant will discuss the advanced communications and programming features, as well as which programming environments the 535 will support.
9:45 – 10:00	**Break**
10:00 – 11:00	**Trio 'Q' Data Radios** Join Jordan Heldrich, Schneider Electric Offer Marketing Telemetry Solutions, for an inside look at the most unique features of the Q series, and how users will be able to greatly increase the number of remote sites per system and the amount of data transported over the network. Jordan will go over the improved bandwidth, speed, and efficiency through automatic retries (ARQ), enhanced collision avoidance, and dynamic speed selection of the Q series.
11:00 – 12:00	**What's New in ClearSCADA 2014** Tony Sannella, Sage Designs Inc. Northern California Sales, will demonstrate some of the new features that ClearSCADA 2014 brings to the SCADA Master Station software platform and discuss the differences between this product and traditional HMI.

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Pre-registration Required

To Register: **Return this form via fax to 888-329-7243 or via e-mail to info@sagedesignsinc.com to reserve your seat.** A confirmation will be emailed to you.
This form is available as a pdf on the Events Page of our website: http://www.sagedesignsinc.com/events. Please note that although attendance is free, space is limited.

☐ **Register me for the free seminar in Lake Forest on Tuesday, November 18, 2014**
☐ **Register me for the free seminar in Livermore on Thursday, November 20, 2014**

Name (*please print*):	Title:
Company:	Phone:
Address:	Fax:
	Email:
City/State/Zip:	Notes/Diet Restrictions:

* * * Registration Deadline: November 5, 2014 * * *
There is no charge for this event, but we would appreciate notification if you must cancel your reservation.

SCADAWise™ Training Classes

ClearSCADA   SCADAPack

ClearSCADA Level 1 Training Course

October 6-9, 2014 — Indio, CA
October 27-30, 2014 — Mill Valley, CA
February 23-26, 2015 — Mill Valley, CA

Day 1 (8AM– 4PM)   Installing ClearSCADA, Introduction to ClearSCADA, Components, Using ViewX, Using WebX, ClearSCADA Help

Day 2 (8AM - 4PM)   Configuring using ViewX, Database Organization, Basic Telemetry Configuration, Creating Mimics, Creating Trends

Day 3 (8AM - 4PM)   Configuring using ViewX, Templates & Instances, Logic Languages, Security, Communications Diagnostics

Day 4 (8AM - 4PM)   Reports, System Configuration, System Architecture, Questions

Cost: ClearSCADA Training Course $2,200   (2014 rates)

Sage Designs' ClearSCADA Level 1 Course has been certified by (a) the California Department of Public Health as courses qualifying for contact hour credit for Water Operator Certification for Drinking Water Treatment or Distribution in the State of California and (b) the State of Nevada Department of Environmental Protection, Bureau of Drinking Water for contact hours towards the Nevada Drinking Water Operator Certification Program.

(28 Contact Hours)

ClearSCADA Level 2 Training Course

November 4-6, 2014 — Alpharetta, GA
January 2015 — Mill Valley, CA (TBA)

Day 1 (8AM– 4PM)   Installation, Understanding the Architecture of ClearSCADA, Application Design Considerations, Server Automation Interface, ClearSCADA Logic Engine, Using ODBC and SQL with ClearSCADA

Day 2 (8AM - 4PM)   Advanced Mimic Design and Techniques, Data Grids and Data Tables.

Day 3 (8AM - 1PM)   Accessing Historical Data, Ad Hoc trends, Archiving

Prerequisite: ClearSCADA Level 1 Training Course

Cost: ClearSCADA Level 2 Training Course $1,650 (2014 rates)

Instructor: Schneider Electric | Telemetry & Remote SCADA Systems factory trainer.

Telepace Studio Training Course

September 23-25, 2014 — Mill Valley, CA
February 10-12, 2015 — Mill Valley, CA

Day 1 (8AM - 4PM)   SCADAPack controller operation, Series 5000 I/O, Telepace Studio introduction

Day 2 (8AM - 4PM)   Telepace Studio advanced programming techniques and advanced functions

Day 3 (8AM - 2PM)   Controller communications, Modbus Master/Slave protocol, Diagnostics, Modems

Cost: SCADAPack Telepace Studio Course $1,650*   (2014 rates)

* You must have a licensed copy of Telepace Studio installed on your computer for this course. If you do not have a licensed copy, you may purchase one with the class at a special course price. Course price for Telepace Studio: $510 + applicable CA sales taxes

Sage Designs' Telepace Studio Course has been certified by (a) the California Department of Public Health as courses qualifying for contact hour credit for Water Operator Certification for Drinking Water Treatment or Distribution in the State of California and (b) the State of Nevada Department of Environmental Protection, Bureau of Drinking Water for contact hours towards the Nevada Drinking Water Operator Certification Program.

(20 Contact Hours)

Instructors: ClearSCADA Level 1 & Telepace classes will be taught by Tony Sannellla, Sage Designs, a Factory-Certified Instructor. SCADA Level 2 classes will be taught by a SEUSA training instructor. The ClearSCADA Le vel 2Test drives will be conducted by Sage Designs or a factory representative.

Location: See individual course registration form. Those requiring overnight accommodations should call the hotel directly for reservations.

What should I bring? Laptop computer with minimum requirements as shown on the specific course registration forms, plus necessary permissions to install software on your computer.

*You must have a licensed copy of Telepace Studio to take the Telepace course. We offer a course price for a license or you may purchase through your local Schneider Electric TRSS representative.

What is provided? Course manual, daily continental breakfast, lunch & beverages.

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Call 1-888-ASK-SAGE
email: info@scadawise.com

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SCADA & Security Products

Download the Registration form at: http://www.SCADAWise.com

* * * Registration Deadline: 4 weeks before 1st day of course * * *
All registrations are subject to cancellation fees. A confirmation notice will be sent to all registrants on or before the deadline date.

Customer Spotlight: Out with the Old

Palmdale Water District (PWD), approximately sixty miles northwest of downtown Los Angeles, consists of 22 active wells, 15 tank sites, 8 hydropneumatic tanks, 2 surface water sources, and one 35 MGD water treatment plant. Palmdale's combined capacity of 80 million gallons of water serves 130,000 connections across three other water districts in limited capacity, which is increased during emergencies.

In years past, Palmdale Water District (PWD) has used many SCADAPack Micro 16 PLC's programmed with TelePACE Ladder Logic. In 2009, we looked at our SCADA system and decided to upgrade it with contemporary technology and improve overall system efficiencies. While there were no issues with the products, or their age, the controllers were becoming mature and did not have Ethernet Protocol. Our intent was to bring the Water Distribution SCADA System up to date and improve our communication back to the HMI.

The first obstacle we encountered was the limitation of available I/O on our existing telemetry system, so our journey started with the PLC's. We upgraded all of our PLC panels to SCADAPack 32 or SCADAPack 32Ps with enough Digital and Analog I/O cards to handle the data required for our expanding water system. We added more Power CT and PT instrumentation to our well pumps and booster pump controls to give the District pump efficiency data. We added additional emergency power generation and programing for energy efficiency schemes for TOU-SOP-I, and Auto DR operations. New control panel back pans were built in-house to drawings generated by our operations staff. All the SCADA Packs were replaced and reprogrammed over time, as our busy schedule permitted.

During this SCADA hardware upgrade our need to upgrade the HMI Servers and Software became a priority. Since we were programing and servicing the software in-house, we wanted SCADA Master Station management software with tight integration to the new SCADAPack. Sage recommended Schneider Electric ClearSCADA management software designed to operate SCADAPacks. Before transiting to ClearSCADA our Sage rep arranged for us to visit other Water Districts already using ClearSCADA and to talk with the users there. When we saw what ClearSCADA can do, we were impressed with the functionality and ease of use. Once we decided to use ClearSCADA and SCADAPack, we sent several of our operators for training with Sage Designs, both in ClearSCADA and TelePACE Studio, where they learned the essentials.

The need to address our operating system coincided with the time that our annual support came due on our old system. Our programmers had been having trouble with customer support on our old system, which paired with a very high cost of annual support, and the need to run two separate systems for production and distribution, to make the transition to ClearSCADA extremely cost-effective. Using ClearSCADA we are able to have one SCADA software covering both areas, and the price to permanently convert our entire system was only five percent higher than the annual support cost on our old software. We were also thrilled with the incredibly reasonable annual support cost on a ClearSCADA OS system. During the development of our ClearSCADA system we were able to run both OS systems together, with the ClearSCADA "ghost" running parallel to the existing HMI. We had a streamlined switchover to the new system, because it was already running!

Next we addressed our communications system. We had been running 900MHz Intellinet radios and, yes, this was an issue. The Sage Designs team came through again when they recommended 4.9 GHz Firetide 7020 series radios, again setting up some site visits with other districts already using them. We were again impressed with how functional and easy to use they are. Our new Firetide 7020 radios ar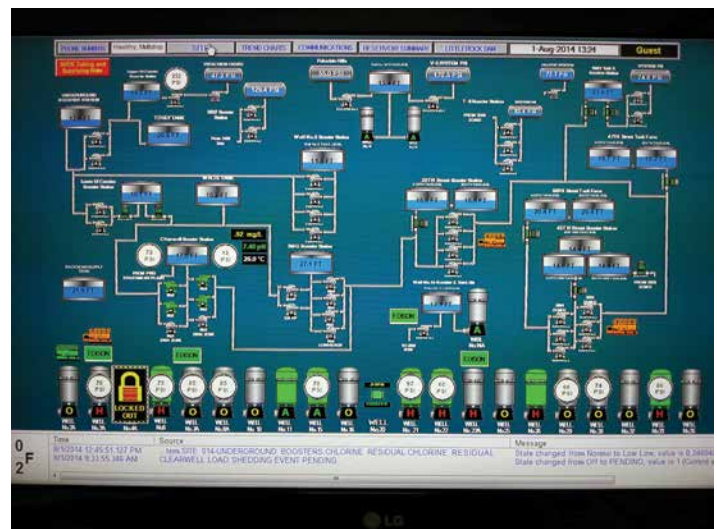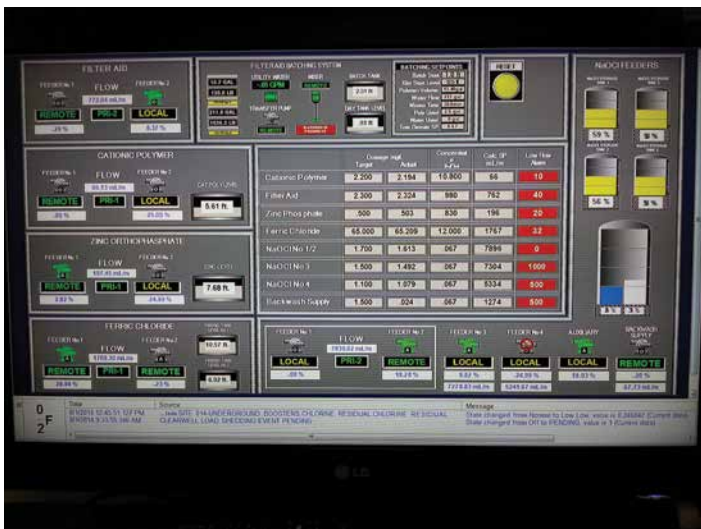e licensed, allowing them to communicate on the U.S. Public Safety band used by police, fire departments, and hospitals, which is recommended for water district use by the Homeland Security Agency. We're currently completing our installation of this system, comprising four radio networks over 40+ sites and transmitting ove a wireless mesh network. Receiving real-time data has never been this good!

The Palmdale Water District staff deserve special recognition for this upgrade. All of the above-mentioned work was done by them in-house and during the year, while they also kept up with regular system and plant maintenance, as well as unexpected emergencies that occurred. I'm grateful to be working with Erik Bouthillier, Sal Zuniga, Dan McKensey, and Dennis Trujillo.

I'm also grateful for the support of the Sage Designs team that helped us through this process: Ken VandeVeer, Dena Cornett, and Tony Sannella. This upgrade wouldn't have happened without them.

— Kelley P Jeters,
Systems Supervisor,
Palmdale Water District

Q&A: Cybersecurity

With continually increasing population density, lower resource investment, and the added burden of budgetary shortfalls, ensuring the security of existing critical infrastructure has taken on greater importance at the same time that resources to implement it are becoming harder to find. Realizing this, new Critical Infrastructure Protection Legislation is changing the landscape in Water & Wastewater. We asked several of our clients, known for their responsibility and work quality, to answer a question:

"What are you doing to make sure your customers' SCADA systems meet the requirements of the Critical Infrastructure Protection Act? Do you think they are prepared?"

Sierra Controls:

We provide several layers of protection in our design methodology of SCADA Systems. This requires the joint efforts of our clients and our staff to make correct project specific decisions. The solutions are just as customized as the threats.

We recommend isolating the SCADA Network to aid in Perimeter Control. Each component including the right firewall and PLC is carefully chosen to aid in the overall security of the system. We also follow secure remote access standards to help prevent unauthorized user access. Protection is only as strong as its weakest link.

— Danny Hunsaker, P.E., *General Manager*

SIERRA CONTROLS, LLC
WATER MEASUREMENT AND CONTROL SYSTEMS

Tesco Controls:

Tesco believes that the majority of our customers know of the new Cyber Security legislation, however, few are fully prepared to address the requirements once the bill is signed into law. Tesco's present approach to Cyber Security involves intrusion detection systems partnered with intrusion prevention devices. While some of our clients insist on completely isolated control systems, we believe that remote access can be safely configured with the proper combination of technologies and vigilance. We follow the security practices promoted by AWWA and Homeland Security and abide by the guidelines identified in ISA-62443. Tesco promotes regular updates to security appliances and procedures. Tesco is closely following the Critical Infrastructure Protection Legislation and has always been fully committed to deploying control systems that are both flexible and secured from unauthorized access.
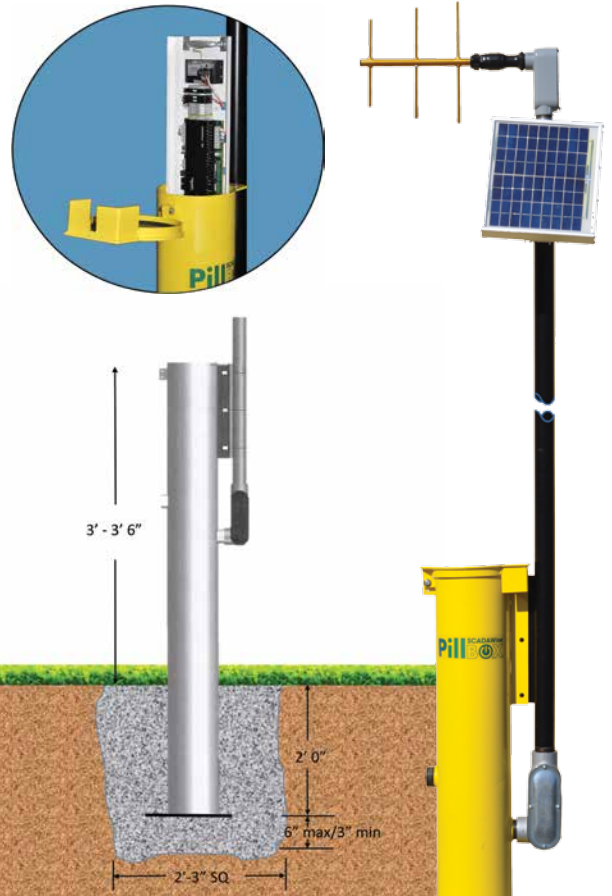
—Keith Webb, *SCADA Manager, Tesco Controls*

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Make the most of your remote assets with complete end-to-end solutions for monitoring and controlling field operations across a widely dispersed infrastructure
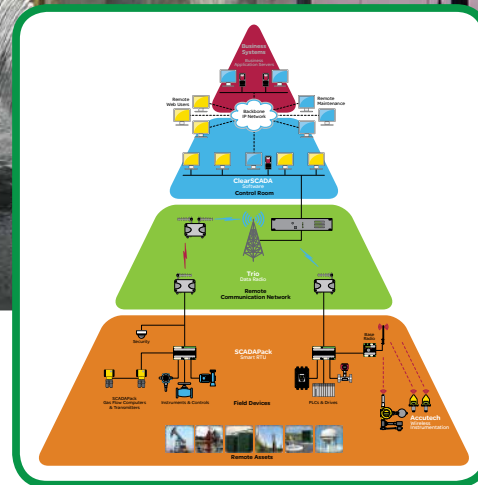
Controlling cost of ownership

The installation, operation and maintenance of remote site SCADA operations is often the most significant overall long term expense factor. With scalability, flexibility and ease-of-use in mind, Schneider Electric's Telemetry and Remote SCADA Solutions are tailored to help lower this total cost of ownership.

Secure and Reliable SCADA

Safety and availability are must-have characteristics of critical infrastructure. This especially holds true when considering security for SCADA systems that monitor and control remote operations across a wide array of communications technologies. At Schneider Electric, our Telemetry and Remote SCADA Solutions incorporate solid security at all levels, from the field to the enterprise.

Minimising risk by improving safety and regulatory compliance

Many industries are challenged with increasing requirements for operational safety, compliance with environmental regulations and the overall security of assets. Schneider Electric's Telemetry and Remote SCADA Solutions address all of these critical requirements through flexible end-to-end integration and comprehensive feature sets.

Innovation at work

ClearSCADA Software – Providing functions to reliably and securely manage remote SCADA assets across a wide range of communication options, with easy integration into business systems.

Trio Data Radios – Ensuring data integrity over short and long-haul distances with versatile and reliable data transmission options.

SCADAPack Smart RTUs -The monitoring and communication capabilities of a Remote Terminal Unit (RTU) combined with the processing and data-logging power of a Programmable Logic Controller (PLC).

Accutech Wireless Instrumentation – Configurable startup and failsafe conditions, enhanced diagnostics and years of maintenance free operation.

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The Sage Advisor

SCADA, SECURITY & AUTOMATION NEWSLETTER

Calendar of Events

September, 23-25, 2014	**Tri-State Seminar On-The-River,** Las Vegas, NV
September 23-25, 2014	**Telepace Studio Ladder Logic Training Course*,** Mill Valley, CA
October 6-9, 2014	**ClearSCADA Level 1 Training Course*,** Indio, CA
October 14, 2014	**CWEA- Desert and Mountain Section Vendors Fair,** Big Bear Lake, CA
October 20-23, 2014	**CA-NV AWWA 2014 Fall Conference,** Reno, NV
October 27-30, 2014	**ClearSCADA Level 1 Training Course*,** Mill Valley, CA
November 18, 2014	**Free SCADAWise Seminar*,** Lake Forest, CA
November 20, 2014	**Free SCADAWise Seminar*,** Livermore, CA
December 2-5, 2014	**USCID Agriculture/Urban Water Interface — Canal Automation,** Phoenix, AZ
January 21-23, 2015	**USBR Mid-Pacific Region Conference,** Reno, NV
February 2-3, 2015	**California Irrigation Institute Annual Conference,** Sacramento, CA
February 10-12, 2015	**Telepace Studio Ladder Logic Training Course*,** Mill Valley, CA
February 23-26, 2015	**ClearSCADA Level 1 Training Course*,** Mill Valley, CA

Download the registration form from our website or call for more information.

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WIN-911 Alarm Notification Software

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Teledesign Systems VHF & UHF Licensed
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