

The Sage Advisor

SCADA & Industrial Automation Newsletter
A Publication of Sage Designs, Inc. Fall/Winter 2002

Locus DIN-Rail-Mounted Serial & Ethernet Spread Spectrum Radios



Due to ever increasing demands on SCADA system communications channels, Sage Designs has added the Locus line of high-speed, spread spectrum serial and Ethernet radios. With their DIN rail mounting and wide ranging power supplies, the industrial nature of the design of these products is clear from the start. Simple to install, and easy to set up, you will find the Locus line to be well conceived.

We found many of the features of the Locus OS line to be of interest. In particular, the Locus setup software enables you to configure any of the Locus radios as a master, repeater or slave, reducing the number of radios in many systems and only requiring one radio spare for any node. Another strong feature is the ability to use the radios with a peer-to-peer communications protocol such as DNP3, or in an Ethernet network with peer-to-peer nodes. While most radio systems require that a master radio pass through every transmission, the Locus radios allow peer-to-peer communications without routing the data through the master.

The Windows-based setup software for the OS series is so simple to use, you'll have your radios configured in a matter of minutes. The icon-based setup program graphically shows how all of the radios are connected and work together in your system. Simply drag-and-drop an icon for each type of radio in your system, click on the icons to configure each radio, then download your setups, and as quick as that, your system is ready to operate. Call today for pricing or an on-site demonstration.

TID Implements SCADA on Cell Phones

The Turlock Irrigation District (TID) provides water to 150,000 acres of fertile farmland within a 307-square-mile service area in central California. TID field representatives, known as water distribution operators, control the delivery of water to 5,800 individual parcels of land. Water is a valuable commodity, and all field representatives must know exactly how much water is flowing in their delivery canals at any given time to avoid spillage and to coordinate the carefully monitored use of chemicals that control plant growth in the canal system.

The Challenge

Water flow throughout TID's extensive irrigation system is monitored by a Lookout SCADA Server inside Turlock's corporate network. Water distribution operators out in the field do not have access to this important data because they work remotely from canal sites.

To do their jobs effectively, water distribution operators must have access to this data anytime, anywhere. TID officials wanted to develop and deploy a cost-effective solution that would allow water distribution operators to access critical telemetry data while working at the canal sites. They wanted a solution that was mobile but secure, robust enough for field use, and required minimal training.

To provide field access to telemetry data, TID's Information Systems (IS) Department first explored having its field representatives use notebook computers to access a secure Web page. The cost of four notebooks and the trial application was about \$60,000. In addition to the high cost, this solution presented other challenges. TID's IS Department was also concerned about the learning curve required to train the field representatives, the durability of the laptops, the ongoing cost of maintaining the laptops, and the cost of Internet access for each field representative. TID officials determined that distributing laptops with Internet access to 30 field representatives would not be cost-effective, and so they sought out another solution.

Cisco CTE 1400 Series Content Transformation Engine Solution

TID's Lookout HMI exports information about its irrigation system in HTML format. The Cisco CTE 1400, powered by Net6, enables TID to transform HTML pages into cellular-phone-compatible formats, such as Wireless Application Protocol (WAP). TID water distribution operators now carry WAP-enabled cellular phones out in the field. The CTE 1400 transforms the telemetry data by transforming and delivering content to WAP-enabled cellular telephones, allowing water distribution operators working in the field to access telemetry data whenever and wherever they need to.

When looking for a solution to mobilize and deliver the telemetry data to representatives working in the field, TID's IS team investigated other appliances and applications in addition to the CTE 1400. *"During solution testing, TID could not find another solution as practical or cost-effective as the CTE 1400 that did not also require ongoing application support. We needed a solution that provided the*

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FREE SCADA SEMINARS

November 6
Bakersfield, CA

November 7
Morgan Hill, CA

Sage Designs is teaming up with Control Microsystems and Locus, Inc. to provide a forum to introduce the new SCADAPack PLCs/RTUs and Locus Wireless Spread Spectrum Radio products and to educate the SCADA community on the advantages of using open-architecture products. While we do not provide systems integration services directly, we can provide you with on-site training to assist you in managing your own SCADA system, or refer you to integrators throughout California and Nevada who can meet your needs. *See the enclosed flyer for registration information.*

Using the DNP3 Communication Protocol in the Municipal Waste Water Industry

DNP was originally created by Westronic, Inc. (now GE Harris) in 1990. In 1993, the "DNP 3.0 Basic 4" protocol specification document set was released into the public domain. Ownership of the protocol was given over to the newly formed DNP Users Group in October of that year. Since that time, the protocol has gained worldwide acceptance, including the formation of Users Group Chapters in China, Latin America, and Australia. In January 1995, the DNP Technical Committee was formed to review enhancements and to recommend them for approval by the Users Group. One of the most important tasks of this body was to publish the "DNP Subset Definitions" document, which establishes standards for scaled-up or scaled-down implementations of DNP3.

DNP3 is an open, intelligent, robust, and efficient modern SCADA protocol. It can:

- Request and respond with multiple data types in single messages,
- Segment messages into multiple frames to ensure excellent error detection and recovery,
- Include only changed data in response messages,
- Assign priorities to data items and request data items periodically based on their priority,
- Respond without request (unsolicited),
- Support time synchronization and a standard time format,
- Allow multiple masters and peer-to-peer operations,
- Report by exception (RBE) allows better throughput in low bandwidth connections by including only changed data in response messages (faster display updates),
- Allow user definable objects and file transfer.

DNP3 vs. Modbus

Modbus was developed in the process-control industry. It typically permits access to the inputs and outputs on a Programmable Logic Controller. It has the data types of "coils" (digital outputs), "status" (digital inputs), "Holding Registers" (analog outputs) and "Input Registers" (analog inputs). Each input or output has a unique identifier number, and these are broken up into special ranges (e.g. Holding Registers have addresses 40001 to 49999). Modbus treats all data as a "present value". It reads values from ranges of inputs (and outputs) by issuing a single request to read each range or type, and can write to outputs. Standard Modbus has no concept of events (transitory indications) or time. Any data that is not collected by reading it is lost when it is overwritten by new field data.

The advantage of Modbus is its simplicity for small devices and the very large range of devices that have some sort of Modbus interface.

DNP3 was developed for use in Electrical Utility SCADA. It permits a device to report digital inputs, counter inputs and analog inputs; and to receive digital and analog controls. It explicitly allows for common electric utility functions such as pulsed pairs of outputs for circuit breaker trip/close control.

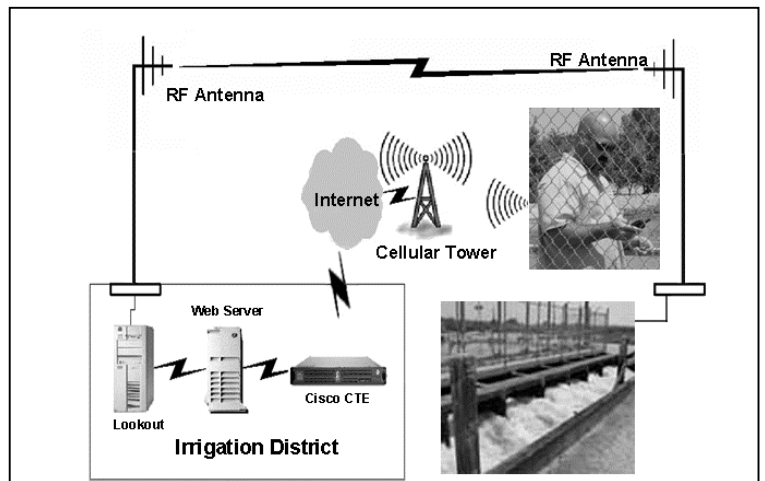
DNP3 supports reporting of data quality information, and the reporting of field events (changes of state of digital, counter and analog input data). It supports high-security 2-pass controls. DNP3 permits multiple types of data to be encapsulated in a single message to improve efficiency. To further improve efficiency it permits a method of operation where only changes are reported, reducing communication bandwidth usage. DNP3 permits events to be time-tagged so that the sequence of events occurring in the field can be accurately identified.

DNP3 is highly standardized, with relatively high compatibility and inter-operability between devices from different manufacturers. The DNP3 Users Group is an independent Technical committee that is constantly working to ensure interoperability and create standards for new functionality. Modbus has no independent Technical committee to ensure interoperability and create standards for new functionality.

Cost Savings Demonstrated in Electrical Utility Industry

The DNP3 industry standard has proven to save money in the Electric Utility industry over the last few years. The ability to rely on the assistance of Technical Committees and Working Groups have allowed the Utility Vendors the ability to promote the features they require in their products while still allowing robust communication protocols that will interoperate between equipment from different vendors. This high level of conformance enables any DNP3 equipment to be "plug and play" compatible directly into a SCADA system.

This method also assists large and small companies with their growing development budgets. It is much easier and safer to implement a protocol that is considered a worldwide standard instead of requiring an in-house staff to continually update a collection of proprietary protocols.



Cell Phone SCADA Application

TID Implements SCADA on Cell Phones (continued from page 1)

functionality to get the job done without requiring intense application support and maintenance. The CTE 1400 was clearly the most practical solution for TID because of minimal training and time to deploy," said Wayne Turnbow, IS Operations Manager.

When the CTE 1400 solution was implemented, TID's IS team was pleased with the simplicity of the CTE Design Studio. Andrew Postma, Systems Analyst for TID, was able to transform the telemetry data in less than a day. TID saw many benefits after deploying the CTE 1400, including improved employee productivity and reduced costs.

With the CTE 1400, TID's Lookout system updates water flow rates throughout the system every five minutes. This enables TID water distribution operators to access water flow information directly from their cellular phones no matter where they are working in the field. "The CTE 1400 is practical, secure, and robust and was deployed to the entire Turlock field in less time and at less cost than a trial system serving only four users. We are completely impressed with the solution and plan to utilize it for additional applications," said Mike Kavarian, Water Records Manager for TID.

The CTE 1400 also enables other applications, such as e-mail, field service, and customer service, to be transformed for interaction on wireless devices.

What are the main advantages in a Wastewater application?

The main benefits of switching to the DNP3 protocol are faster data monitoring rates, the ability to receive time stamped sequence of events reports, easier integration based on improved interoperability, and better data security.

DNP3 supports an "Unsolicited" reporting mode, where remote devices can report field events without being polled by the master station. This is useful when a high-priority condition occurs at a site that is normally polled at a very low rate (e.g. every few hours). If an alarm condition such as a pump failure or leak is detected, a response message can be immediately sent to the master without waiting for the next cyclic poll.

DNP3 is able to support a "sequence of events" history for alarms (binary data), measured quantities (analog data) and counters (volume per unit time, custody transfer, etc.). This means that even if a remote site is polled infrequently, all significant changes in the data since the previous poll can be reported at that time, possibly including time stamps that indicate the precise order of the field events. This provides functionality normally found in flow computers.

DNP3 supports a high-security two-pass control procedure known as "Select Before Operate" or SBO. SBO controls provide a very high level of assurance that no inadvertent control operation can occur as a result of interference on the communication channel. This reduces operational risks to personnel and the environment.

Conclusion

There are already several companies in the Water and Waste industry using DNP3 in addition to Modbus. We have seen a growing interest in these companies for switching to standard protocols and believe that the use of DNP3 will continue to grow over the next decade.

Provided by: Triangle MicroWorks, Inc., Raleigh, North Carolina,
www.TriangleMicroWorks.com

Lookout is a trademark of National Instruments Corporation. SCADAPack, TelePACE, SCADACare are trademarks of Control Microsystems.



SCADA & Industrial Automation Products

New Products
Locus Radios
SCADAPack32
SCADAPack 100
SCADAPack LP

Free SCADA Seminars

November 6, 2002

Best Western Hill House
700 Truxton Avenue
Bakersfield, CA
661-327-4064

November 7, 2002

The Inn at Morgan Hill
16115 Condit Road
Morgan Hill, CA
408-779-7666

In these seminars, we will cover a wide variety of products and services for your open architecture SCADA system. Guest speakers will be Jim Quist, Industry Director, Power & Utilities for Control Microsystems and Roger Cherry, Regional Sales Mgr. for Locus, Inc.

- See the latest Control Microsystems products — the SCADAPack 100, the SCADAPack 32 and the SCADAPack LP. These products have been designed with solar and UPS systems in mind and have been ruggedized for severe environmental conditions. The Control Microsystems' SCADAPack line has been proven in SCADA systems throughout the west and the world.
- Learn how you can use spread spectrum serial and Ethernet radios for high speed, reliable SCADA communications with bandwidth for security camera applications.
- See how you can use licensed radios to solve complex radio path issues using store-and-forward and clear channel scanning.
- See a demonstration of the latest version of National Instruments' Lookout SCADA software, version 5.0, which is powerful, yet easy to configure. Lookout provides all the flexibility and power of the other top HMI/SCADA products without the complexity that generally accompanies this type of program.

AGENDA

8:00 Continental Breakfast
 8:15 New Products from Control Microsystems
 9:15 Open Architecture SCADA
 9:45 Break
 10:00 Spread Spectrum / Ethernet Radios
 11:00 Licensed Radios
 11:15 Lookout HMI/SCADA
 12:00 Adjourn

R.S.V.P.

Please fax to 1-888-FAX-SAGE or call toll-free 1-888-ASK-SAGE.

NAME: _____ Phone/Fax: _____
 COMPANY: _____
 ADDRESS: _____

I WILL ATTEND : ___ Bakersfield Seminar on November 6, 2002
 ___ Morgan Hill Seminar on November 7, 2002

Others from my company who will also attend:

1: _____ 3: _____
 2: _____ 4: _____

There is no charge for these events, but we would appreciate a call if you need to cancel your reservation.

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Your #1 Source

for
SCADA

Control Microsystems' SCADAPack PLCs & RTUs
National Instruments' Lookout HMI/SCADA Software
Teledesign Systems' UHF/VHF/Microwave Radios
Locus Ethernet & Serial Spread Spectrum Radios
Remote I/O Systems
Security Web Cams with Alarm Paging
Operator Interface Panels & Industrial PCs
Leased-Line & Dial-p SCADA Modems
Net6 Wireless Web Access

...Everything to meet your SCADA system needs

Seminars & Events

- Sept. 26 **Monterey Bay Water Works Association**, Annual BBQ & Vendor Show, Castroville, CA. Stop by our booth.
- Oct. 15 - 16 **CA-NV American Water Works Association**, 2002 Annual Fall Conference, Reno, NV. Stop by our booth.
- Oct. 23 - 24 **Advancements in Remote Monitoring, Control & Automation Conference**, Denver, CO. See the new SCADAPacks at Control Microsystems' booth.
- Oct. 30 - Nov. 1 **SCADAPack Controller & TelePACE Programming Training Course**, Fresno, CA. Call to register.
- Nov. 6 **Free SCADA Seminar**, 8:00-Noon, Bakersfield, CA. Call to register.
- Nov. 7 **Free SCADA Seminar**, 8:30-Noon, Morgan Hill, CA. Call to register.
- Nov. 20 - 22 **Association of California Water Agencies**, 2002 Fall Conference, Anaheim, CA. Stop by our booth.
- April 22-26, 2003 **California Water Environment Association**, CWEA Annual Conference, Ontario, CA. Stop by our booth.

Sage Designs, Inc.

SCADA & Industrial Automation Products

Return Service Requested