


## Visit Modbus-IDA & Modbus Members at ISA EXPO 2007

## Enter Your Ticket to Win One of Five iPod nanos

Plan to attend the ISA EXPO next week? Cut out the "Modbus Ticket" (shown left), and have it stamped at each of the Modbus member's booths at the show. Then visit the Modbus booth (#1148) and enter the ticket for one of five drawings at the show to give away a new 4-GB iPod nano. All entries will be eligible for a grand prize drawing in the week following the show. See you in Houston!



ISA Expo October 2007  AT THE BUS STATION!

<p><input type="checkbox"/> connectBlue AB #1148</p> <p><input type="checkbox"/> Hirschmann Automation &amp; Control #2270</p> <p><input type="checkbox"/> Matrikon #2367</p> <p><input type="checkbox"/> Moxa Technologies #2450, 1148</p> <p><input type="checkbox"/> Phoenix Contact #2216, 1148</p> <p><input type="checkbox"/> PCN Technology #1148</p>	<p><input type="checkbox"/> ProSoft Technology #2358</p> <p><input type="checkbox"/> Real Time Automation #1248</p> <p><input type="checkbox"/> Sealevel Systems #1425</p> <p><input type="checkbox"/> Schneider Electric #1148</p> <p><input type="checkbox"/> Spectrum Controls #1254</p> <p><input type="checkbox"/> Weed Instrument #2836</p>
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**Modbus-IDA**  
www.modbus.org

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Email \_\_\_\_\_

**Visit all stops and enter to win an iPod Nano!**

## Help Celebrate 30 Years of Modbus Communications

Modbus-IDA will celebrate 30 years of Modbus communications in 2009. As we prepare for this, we are turning to users and suppliers to gather information about the far-flung uses of the most popular industrial communications protocol in the world. What can you tell us about your Modbus experience?

- Who has the oldest application that is still working?
- What is the installation with the largest number of Modbus nodes?
- What is the oddest or most bizarre application of the Modbus communications?

Write in to tell us about your Modbus application. We will be selecting stories for future publication as part of the upcoming celebration.

Send your story to [info@modbus-ida.org](mailto:info@modbus-ida.org).

# Organization News • Organization News

## Meet Some of Our Members...



**Fieldserver Technologies** develops and manufactures gateways and protocol translators that interface with building automation systems, fire alarm panels, process controls and other devices and networks using the Modbus network and systems.

FieldServer also has over 75 different drivers interfacing to over 350 different devices. When an integrator needs to interface LonWorks, BACnet, Metasys, DH+, Ethernet/IP, Profibus or a wide range of other protocols to a Modbus system, FieldServer has a solution.

In addition to stand-alone gateways, FieldServer also has ProtoCessor, an embedded Protocol Coprocessor, for device design engineers to use to provide proven Modbus output (serial or TCP) from their devices. Check out Fieldserver's website for further information on its various gateways and driver protocols.

([www.fieldserver.com](http://www.fieldserver.com))

**AquaSensors™** designs and manufactures analytical measurement systems for process control applications. The company's product design reduces equipment and installation costs while improving reliability in a wide



variety of applications. Current measurements include pH, ORP, two-electrode conductivity, toroidal conductivity, dissolved oxygen, dissolved ozone, resistivity, drinking water turbidity, and suspended solids.

The patented DataStick measurement system features pre-calibrated, plug-in sensor heads that provide 24-bit data and can be calibrated, configured or diagnosed directly from a PLC or computer system. No intermediate analyzer boxes are necessary.

For local display and calibration of any DataStick system, the low-cost AV38 display interface can be used.

Aquasensor's AnalogPlus line of analytical measurement systems features cabled sensors with improved reliability and accuracy. The differential pH and ORP sensors work with any industry standard analyzer. All AnalogPlus

sensors can also be used with the company's AV88 Universal Analyzer.

AquaSensors support all its measurement systems with a full line of mounting hardware including tees, union mounts, ball valves, sanitary fittings, and immersion hardware. Sensor head wash units are also available.

([www.aquasensors.com](http://www.aquasensors.com))

**KepwareTechnologies** develops communication products that are known worldwide for their quality, reliability, and ease of use. Kepware has earned a reputation for supplying high-performance software solutions for the connectivity needs of the industrial automation market. Users can download free demo software from Kepware's website and reach the company's knowledgeable sales and technical support associates by phone or e-mail.

([www.kepware.com](http://www.kepware.com))



# Modbus-IDA Discussion Forums

## Q&A

### *Echo on a Modbus over RS485 Network...*

**In July Pankaj Sharma posed this question:**

I have an application running on my PC, which implements the Modbus protocol. This application sends standard commands to a device running Modbus over RS485.

The way the application connects to this device is through a USB-to-RS485 converter. I am programming this USB-to-RS485 converter. Both the application on the PC and the device on the other end are tested and work properly with a commercial USB-to-RS485 converter.

However, with my converter, I see that the PC software is receiving an echo of whatever is being sent on the bus by it. If I put a sniffer on the bus, I don't capture any echoes. So it seems like my converter is generating an echo. Also, if I run at higher baud rates, the data received on the PC becomes more and more incorrect. Could anybody tell me what could be wrong?

**Bruce Durdle replied:**

I came across a similar problem a few years ago, with an RS232-RS485 converter. The RS485 system was two-wire, meaning the TX and RX lines were paralleled. The "echoes" turned out to be the system reading the transmitted message as the response from the server. The problem was solved by using CTS or RTS to disable the receive part of the converter during transmit.

**An anonymous poster suggested:**

Looks like a Frame Start/End problem or Flow Control problem or silence time problem between Modbus messages or function asks and responses. Check at <http://www.lammerbries.nl/comm/info/modbus.html#tran>.

## From the Modbus Discussion Forum...

**Muzammal Baig added:**

If [the] RS485 line is too long and not terminated you can get echoes. You must terminate long RS485 lines with 120-Ohm resistors.

As you said, the commercial converter works fine, so the fault doesn't seem to be in the line.

The higher baud rates causing more problems means that the fault is in hardware or the 485 programming. Remember you must disable TX while receiving and you must disable RX while transmitting because 485 is a two-wire half duplex protocol (not full-duplex).

**Conclusion:**

- 1) Your microcontroller program is not disabling RX while transmitting, which is causing echo.
- 2) Your circuit does not have a termination resistor or it is poorly assembled so higher baud rates will get corrupted.

**Bob M. questioned:**

Sounds simple, but perhaps you have left the 485 transceiver "Receive Enable" bit ON during transmit.

### *RS485 Nodes in Star Configuration...*

**In May Steven French wrote:**

Could anyone tell me if it is acceptable to connect multiple Modbus nodes in a star configuration? Ideally I would use a ring, but would like to take a single power and single RS485 cable to each junction box. Are there any performance issues associated, and is there a maximum drop length?

**Tom Tran suggested:**

You can run one cable to each PLC and still maintain a ring network that is compliant with RS485 standard. For example, you have two PLCs:

1. Start with a terminal block.
2. Terminate one end of a 4-conductor comm cable to terminals 1 (black), 2 (white), 3 (orange) and 4 (red).

3. Pull the cable to the PLC#1.

4. At the PLC #1, terminate both black and orange on the DATA+ terminal.

5. At the PLC#1, terminate both white and red on the DATA- terminal.

6. At the terminal block, terminate one end of a 4-conductor comm cable to terminals 5 (black), 6 (white), 7 (orange) and 8 (red).

7. At the PLC #2, terminate both black and orange on the DATA+ terminal.

8. At the PLC#2, terminate both white and red on the DATA- terminal.

9. At the terminal block, jumper 3 and 5, then 4 and 6.

10. At the terminal block, connect the Modbus Master's Data+ to terminal 1 and Data- to terminal # 2.

**D. Parks cautioned:**

RS485 optimally [can] be configured in a daisy chain configuration, and at worst in a trunk and spur configuration. Using these configurations, depending on your baud rate, it is possible to extend the network up to 4000 ft.

I have experience trying to install a Modbus RS485 network in a star configuration. I can assure you if you do this, it will cause you nothing but trouble, and I highly recommend you not attempt it. (The network which I speak of is now a trunk and spur design for this reason.)

There is probably a way to make a ring configuration using fiber optic converters, but this is probably more trouble than it is worth.

Add your comments to this thread, at [modbus.control.com/1026235042](http://modbus.control.com/1026235042).

*Ask your question or help out a fellow engineer on the Modbus Discussion Forum:  
[modbus.control.com](http://modbus.control.com)*

# Modbus Products and Innovations

## ProSoft Announces New Industrial Hotspot

ProSoft Technology announced the addition of a new 802.11abg Industrial



Hotspot to its growing line of RadioLinx products. The RLX-IHW functions as a wireless access point, repeater, or client and is designed for global installations. It offers high-speed wireless Ethernet communications including EtherNet/IP, Modbus TCP, and DNP over Ethernet for linking automation systems, Ethernet I/O, video cameras and plant network access for mobile workers.

The RLX-IHW uses OFDM (Orthogonal Frequency Division Multiplexing) for multi-path interference rejection, RF multicast packet filtering, and dual frequency bands, which make it the ideal solution for demanding, high-speed industrial networks needing reliable performance.



OFDM modulation provides excellent noise immunity at maximum speeds. This technique distributes data over multiple carriers that are assigned individual frequencies, so that each carrier only sees its own, translating into less distortion or interference.

ProSoft Technology wireless products come with a three-year minimum warranty and unlimited technical support. For information call +1 661-716-5100, e-mail [prosoft@prosoft-technology.com](mailto:prosoft@prosoft-technology.com) or visit [www.prosoft-technology.com](http://www.prosoft-technology.com).

## Control Solution's Newest Embedded Server with 32 I/O Points, Modbus RTU & Modbus TCP

Minnesota-based Control Solutions, Inc., announced the newest member of its embedded server family, the AddMe III model AM3-IP-MB. The AM3-IP-MB includes 32 I/O points plus a Modbus RTU port and Modbus TCP in a full-featured web appliance. The AM3-IP-MB includes time/date and astronomical scheduling, data logging and trending with log files automatically e-mailed, event notifications via e-mail, simple logic via templates and complex logic via programming language, SNMP agent, and user-defined web page capability. The server also supports dynamic DNS and HTTP Get data logging.

The AM3-IP-MB is ideal for remote monitoring and control applications, because it includes I/O, control, and web server features in a single DIN-rail mounted box. Users can incorporate dedicated controllers such as VFDs, or additional server I/O or PLCs to create a larger system. Users can also configure alarms and alarm responses, change setpoints based on time/date,



perform scheduled control sequences, or create their own HTML wrappers around the provided web site to customize the user interface.

For more information, contact Control Solutions at 800-872-8613 or e-mail [sales@csimn.com](mailto:sales@csimn.com). Visit the company's website, [www.csimn.com](http://www.csimn.com), for complete details including a guided tour and demonstration of the AM3-IP-MB's embedded web site.



CONTROL SOLUTIONS, INC.

## Advertise Your Modbus Products on the Modbus-IDA Website

With our growing number of site visitors and the increasing popularity of our device directory, what better place to advertise your Modbus devices and software than at [www.modbus.org](http://www.modbus.org)?

All banner ads must conform to the following specifications:

- File size: 20k maximum
- Maximum dimensions: 468 pixels x 68 pixels
- File type: Graphics Interchange Format (GIF) or animated GIF
- Resolution: 72 dpi
- Color depth: 8 bit (256 colors)
- Every banner must include a working URL.

Please note that we will not post ads. with cycle rates or animation modes that are irritants to our visitors. We would be happy to help you design an effective Web ad with acceptable cycle rates and types of animation.

Contact [lenore@modbus-ida.org](mailto:lenore@modbus-ida.org) for a rate sheet.

# Modbus Products and Innovations

## SeaI/O Wireless - Solutions for What Used to Be Impractical or Impossible

Earle Foster, VP Sales and Marketing for **Sealevel Systems**, describes the new SeaI/O W-series as ideal for monitoring devices that are impractical or impossible to monitor with traditional cable solutions. That's a primary advantage of the new wireless SeaI/O™ modules.

The SeaI/O W-series is compatible with industry standards, communicating over 802.11b/g wireless networks using WEP, WPA-TKIP and WPA2-AES encryption standards.

"The SeaI/O W-series opens a new set of really cool possibilities when combined with other SeaI/O modules," Foster said with enthusiasm. "A SeaI/O W-series module can be daisy chained with up to 247 SeaI/O expansion modules using convenient pass-through connectors. So you have this incredibly expansive, versatile distributed control and monitoring network connected wirelessly to the host.

All SeaI/O modules operate from 9-30VDC, are powered by terminal block or DC jack, and are available with host connection options including Ethernet, USB, RS-485 and RS-232.

## SEALEVEL

They also boast features that have solidified the SeaI/O product line as the industry leader in field-friendly implementation: software or switch addressing, removable screw terminals for field wiring, and comprehensive software configuration/diagnostic tools. SeaI/O modules are ideal for a wide

variety of applications including process control, data acquisition, broadcast automation, security, and facility management. They have an operating temperature range from 0° to 70°C and optional extended range from -40° to +85°C.

### SeaI/O W-series Highlights

- Modbus TCP compliant
- 802.11b/g wireless networking standards
- WEP, WPA-TKIP, and WPA2-AES encryption
- Daisy chain up to 247 SeaI/O expansion modules for abundant configuration possibilities
- Bundled with software configuration and diagnostic tools

SeaI/O W-series module prices start at \$589 and product is available immediately from stock. All SeaI/O products are covered by Sealevel's lifetime warranty.

Sealevel Systems, founded in 1986, provides industrial computing solutions in addition to a variety of communications and I/O products including PCI Bus cards, Ethernet serial servers, USB serial adapters, PCMCIA cards, and PC/104 modules.

The product line includes multi-port RS-232, RS-422/485, RS-232/422/485 multi-interface high-speed sync/async, and digital/relay I/O.

For more information, visit [www.sealevel.com](http://www.sealevel.com).



## more from the Modbus Discussion Forums ...

### Modbus and Citect

In September, [yan\\_comm](#) asked:

I am planning to put up a monitoring system using Citect SCADA software and existing ION 7300 meters in our location. I know that I can connect the meters in daisy chain using RS485. The meters are configured to communicate using Modbus RTU protocol.

The computer to be installed with CitectSCADA is one km away from the meters, and it can be connected to the meters using the local area network.

What do I need to make this setup work? Can I use a Modbus gateway to convert Modbus RTU to TCP? Do I need OPC to get the data correctly?

**Fred Loveless** suggested:

As long as you have a Modbus Ethernet-capable comms package you can do this. There are several manufacturers that make Modbus Serial-to-Modbus Ethernet converters.

You could also use an OPC/DDE server such as Kepware's KEPServerEX, which supports Ethernet Encapsulation on its serial drivers. With Encapsulation, a basic Ethernet Header and Footer are wrapped around the serial packet. There would be a serial-to-Ethernet converter attached to the serial device.

For more information go to [www.kepware.com](http://www.kepware.com) or contact Kepware Technical Support.

Additional responses to this thread can be found at

[modbus.control.com/1026239087](http://modbus.control.com/1026239087).



Visit [Modbus.org](http://Modbus.org) or see page 7 for details about membership, conformance testing, and the Modbus TCP toolkit.

# Modbus Application Stories

## Philadelphia Waste Project

Modbus-IDA member company **Data & Design** has developed various packages involving embedded systems, and Windows interfaces, including a PLC interface for the City of Philadelphia's water department. The system was designed to replace a Wonderware Factory Link application.

The system monitors and controls the flow of waste water. Consisting of a Windows NT 4 server using RAID level 5 running on SQL Server 7.0, a data collection computer with a digi-board that interfaces with 16 modems is used to call the PLCs located at approximately 260 sites throughout the city. The computer calls the sites, triggering them to report alarms in real time.

A Data Concentrator server was written in VC++ and calls Modicon PLCs using a bank of 16 modems. This multithreaded application uses Modbus protocol, collects all the information and stores it in the SQL server database. The information is then used for trending, reporting and alarms.

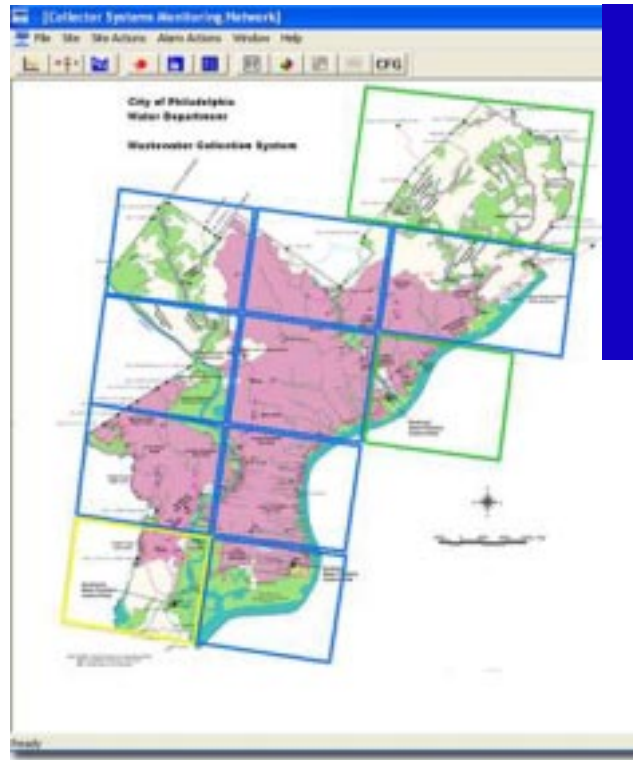
The HMI interface, written in VC++, replaces an older Factory Link application. Visual C++, Visual Basic and Crystal Reports were used, with Access and SQL Server as the databases. Sockets were used to develop the real-time portion of the system, which transmits the information to the client computers. Prototypes were developed to demonstrate how to upgrade the present system using Microsoft .Net technologies as well as a PocketPC interface.

Data & Design Enterprises is a control systems integrator based in Beaver Falls, Penn. Send questions or inquiries to [inquiry@dataanddesign.com](mailto:inquiry@dataanddesign.com).

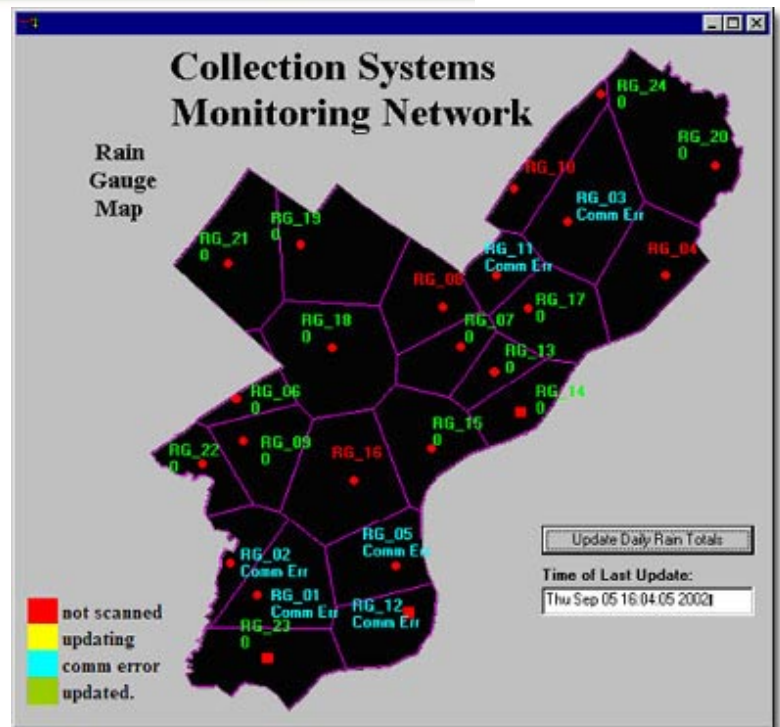


([www.dataanddesign.com](http://www.dataanddesign.com)).

## Water



The Trend Server creates graphs based on data collected from the PLCs. It also provides hooks into all the other applications associated with the monitoring system



Rain Gauge map.

This selection on the Trend Server displays the daily rain totals for all the rain gauge sites in the city.

# Join! Design! Test! Promote! Apply!

We're with you. Modbus-IDA exists to help suppliers and users of Modbus protocols succeed. Our members range from suppliers of Modbus-compliant products, to system integrators, end users, and educational institutions.

The common link? They all value the information and services provided by Modbus-IDA, and they all play a role in determining the future of the world's most broadly applied protocol.

To join Modbus-IDA, order a Toolkit, or arrange conformance testing, visit our website:

**WWW.  
modbus-  
ida.org**

## Designing with Modbus

Each day, Modbus developers turn to Modbus-IDA for valued assistance with their projects:

- Start with downloading specifications and other design documents from the modbus-ida.org website.
- To really save time, purchase the Modbus TCP Toolkit CD (FREE with general membership); it contains source code and a myriad of other resources.
- Then, if you come across technical issues that have you stumped, post your question on our active developer's forum. One of the many experienced Modbus implementers who frequent this forum will likely have your answer.

## Conformance Testing

When your project's done, what then? How do you know it really conforms to Modbus specifications? How do your users know?

The answer starts with running the conformance test suite included with your Modbus TCP Toolkit. This self-test helps you check your design assumptions and catch the subtle

"gotchas" that might otherwise slip through your design review.

To make the definitive statement of your company's commitment to open protocols, submit your product for testing to the independent Modbus-IDA Conformance Test Lab. We'll certify your product as compliant, and post that information on the Modbus website for the world to see.

## Visibility for You and Your Products

Your products, your membership in Modbus-IDA also opens the door to a powerful range of visibility options to highlight your company as a supplier of Modbus-based products.

Exposure on our website, in our newsletter, and through our various trade show appearances are all options that allow you to make the most of your Modbus-IDA membership.

If your company is truly on the cutting edge of new technology, you'll likely also value the opportunity to participate in our technical committees. There, your company's knowledge, experience and technology can help guide future enhancements, extensions and adaptations of Modbus to keep it the world's leader for decades to come.

## Time to Apply

When it comes time to get your Modbus network up and running, it's comforting to know that hundreds of thousands of applications have preceded yours. But what if things don't go as planned?

The modbus-ida.org users forum is ready to answer your questions and provide guidance. Thousands of users from diverse backgrounds read the forum, giving you a powerful base of experience from which to draw.

## The Future is Yours

So, whatever your role in the use of Modbus, consider joining Modbus-IDA. You'll get the support you need today, and have opportunities to help guide Modbus to a dynamic future.

## The Modbus TCP Toolkit

The Modbus TCP Toolkit provides all the necessary pieces to develop a Modbus-compliant device, including documentation, diagnostic tools, sample source code, and pre-test software to prepare for Modbus-IDA conformance certification. The toolkit is available as a benefit of membership in Modbus-IDA or can be purchased separately for US\$500 plus shipping and handling.

### Toolkit Contents



### Modbus Documentation

- Modbus Application Protocol Specification, V 1.01b
- Modbus Messaging on TCP Implementation Guide, Rev. 1.0b

### Tools

- Modbus/TCP Client Diagnostic Tool
- Modbus/TCP Server Diagnostic Tool

### Sample Source Code

- Modbus/TCP Sample Client Code for Visual Basic Win32
- Modbus/TCP Sample Client Code for C/C++ Win32
- Modbus/TCP Sample Server Code for C/C++ Win32
- Modbus/TCP Sample Server Code for C VxWorks
- Modbus/TCP Sample Server Code for C++ VxWorks

### Conformance Testing

- Modbus/TCP Conformance Test Software