

Modbus-IDA at Hannover Fair

The Modbus Organization will be at Hannover Fair this April focusing on Modbus devices that help customers in wireless applications. Of course, we are there to help with standard, wired installations of Modbus networks as well.

This year you will have the opportunity to learn more from member companies such as:

- Afcon Software and Electronics Ltd,
- Schneider Electric,
- connectBlue, and
- Hirschmann Industries.

Afcon, which will be in the Modbus Booth this year for the first time, is the company behind P-CIM SCADA Software and Solutions for Automation Systems. Afcon will be at the show to unveil the latest revision of P-CIM, with its new, built-in data integration and reporting tool, the P-CIM Supreme Report.

Visit the Modbus Stand to learn about Afcon's P-CIM SCADA software, Rev 7.70 and Dart 4.0, remote alarm management software.

You will also find many other Modbus members exhibiting at the show. We will be happy to direct you to Modbus members' booths elsewhere on the show grounds when you stop by.

See you there!

**Visit Modbus-IDA
Hannover Fair 2007
April 16 - 20
Hall 9, Stand A59**

Modbus & OPC: Communicating from Plant Floor to Boardroom

(Excerpted from Fred Cohn's presentation at the Fall Matrikon OPC Users Conference.)

Everyone knows the impact the Internet has had on businesses and individuals. Many people are less aware that this technology has had a similar impact on the plant floor. The combination of Ethernet networking, OPC, and the Modbus TCP protocol have combined to bring tremendous value to plant floor operations in their goal of increasing efficiency, minimizing downtime, and improving quality.

Manufacturers are judged by their productivity. Productivity means the ability to track production information, maximize equipment uptime, and reduce overhead associated with running the facility. To improve productivity, information about how the facility is operating is crucial.

Baseline information is first necessary to identify improvement opportunities and later monitor the effect of changes. How long is a machine in a given process? Where are the bottlenecks? How effectively is the equipment being utilized? What are the major causes of downtime? To get this information, networks are deployed to reach controllers and plant floor devices that store this data in their memories. However, the data is often in a raw format and must be transformed from data into information.

This transformation used to be challenging and cumbersome because of incompatible networking solutions and inconsistent data formats. Leveraging new networking technologies and OPC architectures has made this job easier and provided manufacturers with up-to-the-minute, information at much lower cost. These new technologies combine Ethernet networking technologies, low-cost Modbus protocol, and OPC data access. Combining these solutions improves data access and enables manufacturers to make improvement decisions.

Why was this so difficult in the past? Previously, plant

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Organization News • Organization News

Meet Some of Our Members...



MYNAH Technologies manufactures products and solutions to reduce the cost, risk, and complexity of connecting the digital plant. Products include:

- MiMiC Simulation Software, a leading solution for acceptance testing and operator training in process automation systems.
- Virtual IO Module Network Gateway, providing open plant Ethernet networks and devices that use the Modbus TCP and Ethernet/IP protocols.
- PLC IO Interface Products, allowing connectivity to Allen-Bradley 1771 Remote I/O, Modicon, and GSE S908 Remote IO, and GE Genius IO and ABB TRIO Networks.
- 50+ Serial Drivers, which allow read/write connections to laboratory instruments, Programmable Logic Controllers (PLCs), weigh scales, and remote I/O systems.

(www.mynah.com)

Open Control Solutions is a division of Data Flow Systems, Inc., the manufacturer and turn-key supplier of the TAC II SCADA System since 1981. Open Control Solutions supplies open-architecture products to industries such as petroleum, power generation, fluid transmission, food and beverage, and compressed gases. The company's PLCs are easily programmed and installed by the end user.

The Florida-based company also offers systems integration services and is a member of the Control Systems Integrator Association.

(www.opencontrolsolutions.com)



Ascon is a leader in the manufacture and sale of industrial temperature and process controls, data acquisition hardware and software.



Additional products include transmitters, valves, actuators, SCRs, recorders, and process indicators. Ascon Corporation was established in 2004 as the sales and support center for customers in North America. Located in Batavia, Illinois, Ascon Corporation offers sales and technical support, local inventory, just-in-time rapid shipping, and more.

(www.asconcorp.com)



Become a Member

see back cover for details...



Finesse was founded to develop and introduce process control software and hardware solutions and in-line analytical measurement tools to enable improved management of complex process applications. The company's initial focus has been on improving measurement and control in bioprocess applications most commonly associated with the biotechnology and pharmaceutical industries.

Finesse has articulated the goal of providing unequalled measurement and control solutions that deliver improved accuracy, reliability and quality. The company's products include next-generation digitally enabled control systems and disposable optical sensors.

(www.finesse.com)



Q&A

Modbus Serial Link to Ethernet...

On Nov 11, 2006 Michael Batchelor described an upcoming project:

Hey gang, I'm quoting a new job that has a Modicon PLC already in the pump control house. It all works well, the customer is happy with it, and I sure don't want to rock the boat on a part that's already done for me.

But I do need to get data from [the] PLC to a SCADA screen, and the pump house is a million miles away. (OK, it's really only 3 miles, but it's not at all in the control room.)

There is an Ethernet link already existing that I can get to, with about 30 feet of cable and a hub.

The Modicon has the serial port available on the front as well. My first thought was to use a serial to Ethernet converter that plays well with Modbus and not monkey with adding a card to the PLC. I know people have done this, and at least three vendors are willing to tell me that their solution is the best one.

The vast majority of my background has been with A-B/Rockwell, and I haven't really had much experience with Modbus. Can people give me their experience with specific converters they've used, please?

Peter Chipkin responded:

There are two ways you can solve this of course.

1. Modbus to Ethernet
2. Wireless Modbus

Modbus to Ethernet. There are dozens of solutions. It was a circus a few years back with all sorts of

Ask your question or help out a fellow engineer on the Modbus Discussion Forums: modbus.control.com

From the Modbus Discussion Forums...

problems, e.g., devices that only supported rx/tx and no other 232 control signals. Today there are few that are bad. We represent a solution from FieldServer. It a good solution — so good that the Modbus Conformance Lab has used it for test and development work.

Wireless Modbus. This might be your easiest solution as it doesn't even require a new cable. Again there are lots of vendors and lots of technologies. A word of caution here — there is a difference between wireless data transmission rate and the data throughput rate.

There is a relationship between them, but the one that's most important to you is the data transfer rate. Some vendors report their devices as capable of baud rates of up to 115k, but when you start using meshing networks with lots of nodes, the actual rate might be a lot slower. We represent one product that could be used as a solution. It's called Modhopper.

It can range up to 1500 feet in a single hop. Each unit is also a repeater. Up to 128 nodes are supported. More info at <http://www.chipkin.com/a/products/modhopper>

Jason L. Block, of HMS Industrial Networks, offered:

HMS Industrial Networks has a couple of gateways that may do the job for you.

One is a Modbus TCP/IP to Modbus RTU Gateway that you would use if all you need to do is convert from Modbus RTU to Modbus over Ethernet (<http://www.anybus.com>)

The other product you would use if you need to go from Modbus RTU to a non-Modbus TCP/IP Ethernet application layer (e.g., http) (Anybus Communicator).

Two anonymous posters suggested:

The Schneider Electric TSXETG100 gateway is a Modbus to Ethernet

converter. It is simple to use and can connect modbus RS232, 2-wire RS485 or 4-wire RS485. It has an onboard webpage through which you can read Modbus registers, etc. This unit has replaced the 174CEV30020.

David added:

Does the SCADA have a Modbus TCP Master driver? Typically SCADA is the master, requesting data from the PLC, the Modbus slave, and the SCADA's on a PC talking Modbus over Ethernet.

Modicon uses Modbus Plus hardware. Is the serial to Ethernet "serial server" Modbus Plus compatible?

My experience with serial servers is that I buy those specifically labeled as Modbus compatible, because early Modbus TCP implementations assumed one Modbus slave per IP address (unique to the serial server), whereas later implementations allow multi-drops on the serial side of the serial server, but only Modbus-specific serial servers have the configuration capability to handle either option.

Your scenario has only one slave, and wouldn't be affected, but in general, if I have to go through the learning curve to understand the ins and outs of converters, I stick with the one that covers the most bases.

Carl Burgess mentioned three vendors and two solutions:

Depending on your what protocol the SCADA can handle.

1. Prolinx Gateway will do Modbus TCP to Modbus serial conversion, and a lot of other clever stuff. My first choice for any Modbus work, but pricey. In my experience, if a Prolinx can't do it, nothing else will....

2. Advantech has some Ethernet to serial converters, and also some Modbus/TCP kit. We've used their Ethernet/serial converter to create a remote serial port with no problems — needs a driver on the PC to create a virtual com port. *contin'd on page 7*

Modbus Products and Innovations

Peer-to-Peer Modbus TCP: Can It Be Done?

Yes — with Control's DeviceMaster UP gateway.

Polling, master/slave — the Modbus model. So, how about peer-to-peer Modbus/TCP? Sounds great, doesn't it?

The Modbus TCP/IP specification infers that it's possible, but can it be done and how? Control answered that challenging question by developing a peer-to-peer Modbus TCP application for raw/ASCII data on its DeviceMaster UP gateway.

Control implemented this by allowing the receive channel (device to the PLC) and the transmit channel (PLC to device) to be configured independently as either Master or Slave. This allows the DeviceMaster UP to operate in the standard Modbus TCP Slave and Master device modes, but also in true peer-to-peer Modbus TCP communication in Dual Master Write and Dual Master Read modes. Figure 1 demonstrates peer-to-peer Modbus TCP communication.

What are the benefits of this capability?

- No more polling: Data received from either serial or Ethernet devices can be written directly into PLC memory with no PLC data requests.
- Decreased receive latency: No more polling-rate-induced latency issues.
- Decreased PLC overhead: By removing the need for polling, you can use your PLC to control more devices.
- Decreased Ethernet bandwidth

The Control device also offers easy-to-use interfaces designed to simplify configuration and PLC programming and increased flexibility. Each serial or Ethernet device interface on the



DeviceMaster UP can be configured independently.

The following scenarios put the advantages of this new capability to good use:

- Data received from a barcode scanner, RFID reader, or weigh scale can be written directly into PLC memory with minimal latency. The PLC only needs to monitor a sequence counter for new data.

- Easily control read/write devices, such as printers, from a slave Modbus/TCP PLC.
- Control time-critical devices such as servos or robotic arms by being able to transmit commands and receive responses with minimal latency.

Control's DeviceMaster UP gateway also includes the patent-pending DualConnectPlus technology. This provides dual connectivity between your serial or Ethernet device and a PLC and/or application at the same time. The filtering and data extraction engine can filter a string, barcode, and RFID data and extract those UPC/EAN barcode and EPCglobal RFID tag parameters so you don't have to.



DeviceMaster UP Gateway

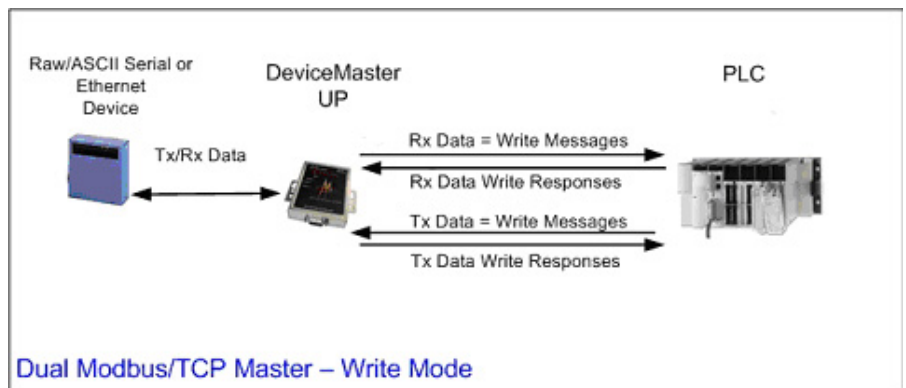


Figure 1: DeviceMaster UP operates in the standard Modbus TCP Master/Slave modes, but also in peer-to-peer Modbus TCP communication in Dual Master Write and Dual Master Read modes.

Modbus Products and Innovations



Endress+Hauser Proline Promass 84 Coriolis Flowmeter Certified

The **Endress+Hauser** Promass 84 Coriolis Flowmeter is a measurement device suitable for measuring virtually all fluids (other than water), gases and liquefied gases in a custody transfer application.

The Coriolis measuring principle operates independently of physical fluid properties such as viscosity and density. It provides extremely accurate, verified measurement of liquids (other than water) and gases under high pressure (> 100 bar). Designed to work with fluid temperatures up to +350 °C and process pressures up to 350 bar, the Promass is appropriate for mass flow measurement up to 2200 t/h.

The Promass measuring devices make it possible to record simultaneously several process variables (mass/density/temperature) for various process conditions during the measuring operation.

The Proline transmitter concept allows diagnostic ability and data back-up for increased process quality using Promass sensors, which have been tried and tested in over 100,000 applications. Further, the Proline system offers multivariable flow measurement in a compact design and insensitivity to vibrations based on a balanced two-tube measuring system. The system is designed to be immune from external piping forces with its robust design. It offers easy installation without taking inlet and outlet runs into consideration.

The Promass 84 was tested for conformance to Modbus-IDA Conformance Test Policy Version 2.1.



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?

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 for a rate sheet.

Modbus & OPC

continued from page 1

floor controllers talked to intelligent devices through proprietary networks or hard wiring. Meanwhile the information systems used IT-based networking solutions such as Token Ring, SNA, Novell, or Ethernet. To get information from the plant floor, controllers collected it from the devices through their I/O families. They would see discrete points as ones and zeros or analog values as 12-bit integers.

These data items would be transformed inside the PLC and made available to the SCADA using proprietary communication interfaces on the controllers, PC-based communication cards, and custom-written drivers. These cards were commercially available from control manufacturers, but tended to be expensive and sole-sourced. Low volume and specialty chips did not permit much improvement on the cost basis, and limited competition kept prices high.

Another major problem occurred when control schemes were changed or

upgraded. Reprogramming was necessary to remap important information to the SCADA. This was often done years after the original installation, and the programmers were unfamiliar with the original scheme. Getting these systems to work was expensive, risky, and time-consuming.

Today Internet technology has made its way to the plant floor and dramatically changed the way information is accessed, transported, and used. The cost of Ethernet interfaces went from expensive to virtually free. For plant floor controllers and devices, the cost of Ethernet circuitry is now as low or lower than other fieldbus technologies. Direct network access means that one level of transformation can be eliminated.

Two other technologies have made the transformation even more productive: Modbus TCP, the packaging of the simple, low-cost Modbus protocol on Ethernet TCP/IP, and the development of OPC to standardize the way host computers and SCADA software

access those devices. This combination has virtually eliminated the need to design custom communication drivers, significantly reducing the barrier to entry for small and large application programs, while making the availability of an Ethernet interface on a device low cost and easy to implement.

The simplicity of the Modbus protocol means the processor has little work to do and few functions to manage. The combination implies a small footprint on the device itself; normally a critical parameter to successful device design. Real-time operating systems now are offered with complementary Ethernet stacks with TCP/IP services built-in, making the product designer's job easy.

With the combination of Modbus TCP and OPC, new and interesting applications are becoming readily available. They have brought tremendous value to factory operations by collecting data and packaging it into useable information that allows decision makers to understand what is occurring and implement changes necessary to optimize their systems.

No more custom drivers, no more debugging individual applications for individual devices, and no more challenging upgrades or control system redesign.

OPC communicates to the devices with protocols such as Modbus TCP. OPC servers collect the information and make it available to the applications. Modbus TCP, embedded in the controllers and plant floor devices, is the protocol actually used to extract the machine or process status, while the OPC Server transforms the data so application programs see the information they need. This combination has transformed the factory floor from individual silos with disparate, incompatible information to a streamlined information system enabling decision makers to get what they need, quickly, easily, and at much lower cost.

Fred Cohn is president of Modbus-IDA (fcohn@modbus-IDA.org).

The Modbus-IDA Newsletter

This is the newsletter of Modbus-IDA, the international nonprofit organization devoted to the evolution and support of the Modbus and IDA protocols.

For more information about membership and other services of Modbus-IDA, please refer to our website: www.modbus-ida.org

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The Modbus-IDA Mission

Modbus-IDA is a group of independent users and suppliers of automation devices that seeks to drive the adoption of the Modbus communication protocol suite and the evolution to address architectures for distributed automation systems across multiple market segments. Modbus-IDA will also provide the infrastructure to obtain and share information about the protocols, their application and certification to simplify implementation by users resulting in reduced costs.

from the Modbus Discussion Forums...

Use this approach to send Modbus serial — but watch the timings — RTU might be problematic compared to ASCII.

3. Westermo also does serial/Ethernet convertors — also used their kit with success. Again this would create a virtual remote com port — similar solution to the Advantech kit.

Finally — there's no substitute for getting to grips with the Modbus protocol — it's delightfully simple and in the public domain — which is more than can be said for a lot of other PLC protocols.

Lynn Linse's advice:

Your best bet is to use some form of Modbus/TCP to serial bridge — I can think of at least 25 companies making such products. Digi is one of them (<http://www.digi.com>).

You could try to tunnel serial Modbus via TCP/IP, but unfortunately not all host apps support this. Plus Modbus RTU can have issues with mismatching responses even if reliable TCP/IP is used since most vendors who have enabled Modbus RTU via TCP *FAIL* to change the assumptions of their polling algorithm related to time outs.

Modbus TCP to serial bridges work amazingly well and transparently. In fact as a “free bonus” you'll inherit multimaster access to the PLC such that an OPC server can be polling at the same time you go on line with the PLC.

The only “issue” you'll have is a few tools (Modicon REFLASH tools come to mind) make bad assumptions about the command ability of the PLC, based on the fact it “appears to have an Ethernet port — ergo is big/fancy model.” So you cannot reflash some PLC via such a bridge ... but how often do you reflash PLC firmware?

To read more, go to:

<http://modbus.control.com/thread/1026228356>

MatrikonOPC Webcast March 28, 2007: Reduce Your Hardware Costs with OPC

What if there was a way to replace line hardware while increasing the quality of your data and saving money? Sound like fantasy? MatrikonOPC offers a very real solution to rescue you from the high costs of line hardware.

This webcast will show viewers that a combination of MatrikonOPC products can be the answer for systems that need to be upgraded or are simply overworked. The presenter will demonstrate an application where MatrikonOPC Data Calculator is paired with the MatrikonOPC Server for Modbus to form a virtual PLC and take the load off the existing hardware.

After a brief overview of OPC and Modbus, Webcast attendees will learn:

- About the MatrikonOPC Data Calculator
- How to consolidate and automate process calculations
- How this solution interfaces with your current system
- How you can reduce hardware costs
- The value of the world of possibilities that OPC opens up for calculation data

Reserve your space for the webcast, which takes place on Wednesday, March 28, 2007 1:30 pm - 2:30 pm Eastern Time (USA, Canada) (GMT -05:00)

To register for the webcast, go to <https://www.matrikonopc.com/portal/training/webcasts/register.aspx?wbId=78>



Sign Up for the MatrikonOPC Webcast: Using OPC to Maximize Your Modbus Device

Date: March 28, 2007

Time: 1:30 – 2:30 pm Eastern Time

URL: <https://www.matrikonopc.com/portal/training/webcasts/register.aspx?wbId=78>

After you register for the webcast, log-in details will be sent to you automatically. This webcast will be recorded and stored on the MatrikonOPC site for download.

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, educational institutions, and even individuals.

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 (hint: it's FREE with membership), which 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 highly 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.

But 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-IDA website for the world to see.

Visibility for You and Your Products

And, speaking of the world seeing your products, your membership in Modbus-IDA 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?

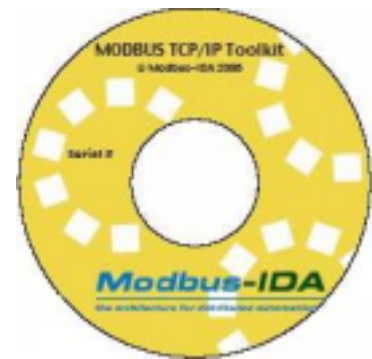
The modbus-ida.org users forum is ready to answer your questions and provide guidance. Thousands of users from diverse backgrounds read the forum, giving you a powerful base of experience from which to draw.

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 CD

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 1.01a
- Modbus Messaging on TCP Implementation Guide, Rev. 1.0a

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