

Modbus Board Elects New President

Fred Cohn Leads the Organization into its Fourth Year

At its March 2006 meeting, the Modbus-IDA Board of Directors elected Fred Cohn to succeed Ken Crater as president of the organization. Since its incorporation in November 2002, the Modbus organization has seen much progress:

- Transfer of the Modbus specification from Schneider Electric to Modbus-IDA.
- Acceptance of Modbus TCP/IP by the IEC as a Publicly Available Specification.
- Launching a new website, incorporating database-driven device and company directories.
- Redesigned conformance test program
- Establishment of a new conformance test center in China.

As Fred Cohn assumed office, he thanked Ken for his efforts and successes as Modbus-IDA's founding president. Fred has served on the Modbus-IDA Board of Directors for nearly two years. His stated goals are to make the organization an even stronger community of valuable information around the Modbus protocol and a destination for all companies and individuals deploying and buying Modbus devices.

Specifically he intends to focus on three main areas:

- Membership growth;
- International standardization; and
- Conformance testing.

Fred shared some of his ideas with member companies, "I view membership growth as the best way to strengthen the community by bringing together the best minds in device, controller, and software technologies. We have grown our device library to close to 500 devices, but I know that the actual number of devices in the marketplace is much, much higher. We want to see our library grow to help people make informed purchasing decisions."

Regarding conformance testing, Fred commented on the successful launch of the test laboratory in China and the organization's plans to expand its testing capabilities with other laboratories in Europe and Asia.

Members and users have communicated their interest in further developing the capacity to test Modbus serial devices. Under Fred's leadership, the organization will look into enhancing its capabilities in that area.

Beyond conformance testing, he commented on the potential of developing some level of interoperability testing at Modbus-IDA laboratories.

Fred expressed his excitement at embracing the challenges that lie ahead and the opportunity to lead the organization as it grows and matures.



Fred Cohn, Modbus-IDA President

**Visit Modbus-IDA
Hannover Fair 2006
April 24 - 28
Hall 9 Stand A59**

Organization News • Organization News

Meet Our Members...



The engineering team at **AquaSensors™** has been developing and manufacturing analytical instruments for over 20 years.

It developed the DataStick™ plug-and-play analytical measurement system in early 2003 (*see Modbus products, page 4*). The following summer Aquasensors released a full line of analytical measurements with standard industrial communications protocols designed for direct integration into PLCs and HMIs for remote monitoring, calibration, configuration and diagnostics. The plug-and-play versatility of the system quickly paid off; its users were able to network measurements to a single control screen using standard protocols such as Modbus without the need for intermediate analyzer boxes.

In 2004 Aquasensors introduced the AV38 local display unit in a 1/4 DIN NEMA 4X enclosure. The AV38 can be connected to multiple DataStick™ measurements and provide current loop data reporting, local relays and industrial communications for remote calibration and configuration. They have installed this AV38/DataStick™ solution in many locations with dissolved oxygen, toroidal conductivity, pH and ORP applications. Many plants that currently require 4 to 20 milliamp data want to upgrade to digital systems, and the AV38/DataStick™ solution makes it easy to do so without buying additional equipment.

In 2004 Aquasensors also released AquaComm™, a software package that can be loaded on many computers for monitoring, calibration, configuration, diagnostics and data logging of multiple DataStick™ measurement points. This package supports USB, RS-232, RS-485 and Modbus RTU

communications standards. OPC drivers for this package were developed in 2005.

Aquasensors also offers its AnalogPlus™ line of industry standard sensors that can be used with its AnalyzerBox controllers and other industry standard analyzers. The AnalogPlus™ line of sensors has a number of feature that reduce cost, improve performance and durability.

In addition to the DataStick™ and AnalogPlus™ analytical measurement lines, Aquasensors provides a complete line of sensor mounting options, calibration solutions and refurbishment kits. The company is positioned to provide custom solutions for measurement, mounting and calibration and continues to expand its standard product offerings.
(www.aquasensors.com)

Since **Weed Instrument** was founded in 1968, the company has been a player in defining and growing several unique technology markets. From custom-designed, high-volume temperature sensors for OEM applications to high-performance products for the nuclear power generation and industrial automation markets, Weed Instrument helps keep industry and business around the globe up and running. The company was registered to the ISO 9001:2000 quality standard in 2003. Headquarterd in Round Rock, Texas, Weed Instrument's five product groups include:



- fiber optic converters and switches;
- temperature sensors/transmitters;
- nuclear qualified instrumentation;
- aerospace/military temperature sensors; and
- pressure and temperature switches, pressure transmitters, and alarm annunciators.

(www.weedinstrument.com)



**Join
Modbus-IDA**
see back cover for
details...

Organization News • Organization News

Meet Our Members...

ModemTec, s.r.o. develops and produces communication equipment that uses existing low-voltage power lines (powerline communication). The company specializes in narrow-band powerline communication products, which provide reliable, long-distance data transmission.



ModemTec Company's products are powerline communication devices and modems that are able to transmit data with no further investment into construction of communication channels (e.g., purchase of cables or radio and wireless devices). ModemTec modules can be used in:

- remote metering of electric and non-electric values (temperature, humidity), data processing and management;
- remote metering of M-Bus meters (e.g., water meters, gas meters);
- data transfer in industrial environment (transfer of Modbus and other protocols); and
- remote transfer of I/O status.

In developing its products, ModemTec focused on communication robustness, which is provided through the DBPSK multi-channel modulation, Reed Salomon error correction, and flexible communication feature modifications depending on the power line conditions.

ModemTec's experience suggests that powerline communication will become one of the important communication channels for automated meter readings and other applications in the field of industrial automation and monitoring. (www.modemtec.com)



ModemTec MT23-M



SoftDEL Systems Limited is a global provider of software products and services, focused on engineering applications in selected domains. The company leverages its expertise in real-time, embedded and PC-hosted software development combined with application domain knowledge and CMM-compliant processes to provide customized services to its clients.

SoftDEL partners with companies developing software-based products, by providing software development services and solutions that quickly transform a product vision into reality. Its partners are typically either the software developers or manufacturers of high-technology products that have significant software content. SoftDEL's services are delivered in several domains including process and factory automation, building automation, test and measurement instruments, and RTOS/embedded tool development. (www.softdel.com)



Founded in 1996, **IntelliCom Innovation** provides remote device management solutions to network-enable, monitor and control automation devices from any suitable location. The company's core business is within Machine-to-Machine, Ethernet/web solutions and gateways. IntelliCom has extensive experience with automation and network connectivity, offering Modbus products since 1997. Today its product lines cover embedded boards, development kits, standard networking gateways, web server, and applications for monitoring and control.

Intellicom's NetBiter® webSCADA product is an easy-to-use, web-based SCADA system. Both local and remote monitoring and control is supported over Ethernet, Internet, LANs, telephone modems, GSM and GPRS. The NetBiter® webSCADA hardware has a built-in web server that operates when customizing the graphical user web interface. Everything is done by clicking through the onboard web pages using a standard web browser at any computer. No Windows tools or HTML editors are needed. No licenses or royalties. All software and hardware is included. (www.intellicom.se or www.netbiter.com)



webSCADA Modbus

Modbus Products and Innovations

DataStick Sensors Communicate Over Modbus



AquaSensors has introduced a Modbus version of its patented DataStick family of analytical sensors to the process market. DataStick systems communicate directly with PLCs, PCs, and process controllers using Modbus. They are plug-and-play devices

delivering flawless 24-bit resolution analog data directly over Modbus communications networks to measure pH, ORP, DO, ozone, conductivity, suspended solids, turbidity, and resistivity. This enables PLCs, PCs, and industrial computers to perform in applications that could only be done previously with costly process control and DCS systems.

The DataStick is remotely calibrated, configured and diagnosed with any computer, HMI or PLC through a single cable. With three basic interchangeable parts, reliability and maintenance are greatly simplified.

The DataStick sensor body is common to all applications and accepts DataStick sensor heads and network interfaces. The body automatically detects the sensor head type connected to it and configures itself to send data through the DataStick network interface module.

For more information, visit www.aquasensors.com.



Communications Adaptor



Sensor Body



Sensor Head (Dissolved Oxygen Sensor)

NPort 6110: Modbus Serial to Ethernet Solution



The NPort 6110 supports one Ethernet and one software selectable RS-232/422/485 port that can connect with Modbus devices. By translating Modbus TCP/IP (Ethernet) and Modbus Serial protocols (ASCII, RTU), a PLC with Ethernet can use the RS-232/422/485 interface to seamlessly communicate with instruments.

NPort 6110 has an intuitive Windows utility that automatically searches for all available NPort 6110 units on the LAN. Traffic monitoring within the utility helps troubleshoot any Modbus communication problem, such as connection status check, or address translation error check.

Features include:

- Modbus serial and Ethernet device integration
- Supports Modbus TCP/IP Master device to Modbus ASCII/RTU slave devices (up to 31)
- Supports Modbus ASCII/RTU master device to Modbus TCP/IP slave devices (up to 4)
- Easy-to-use Windows utility for configuration over Ethernet
- 10/100M fast Ethernet with automatic IP setting (DHCP)
- One software selectable RS-232/422/485 interface
- High-speed serial up to 230.4 Kbps

For more information, visit www.moxa.com.



NPort 6110

Modbus Products and Innovations

Control's EdgeWare™ Edge Controller Integrates RFID Readers, PLCs and SAP®

Control Corporation announced a limited release of its EdgeWare edge controller that facilitates real-time communication and transparent integration of controls infrastructure and plant floor devices such as RFID readers with enterprise applications such as SAP. The EdgeWare edge controller made its debut at the RFID World 2006 Annual Conference and Exhibition. Control is working with Sun Microsystems, as the software provider.



The EdgeWare controller extends the reach of enterprise applications such as SAP to a variety of plant floor devices within industrial and building automation, retail, and transportation environments. By embedding and integrating Sun's RFID software and distributed architecture with industrial Ethernet protocols, on-demand business decisions can be made based on real-time information that is gathered from RFID readers, bar code scanners, sensors and other devices.

The EdgeWare controller is easily integrated into existing and future controls infrastructures by communicating to PLCs using their own industrial Ethernet protocol. The EdgeWare edge controller bridges the device-to-enterprise gap by making devices "speak-up" to enterprise applications

EdgeWare Edge Controller's benefits include more informed business decisions as plant floor information is gathered and communicated in real-time, leveraging existing PLCs by communicating over industrial Ethernet and serial protocols, ease of integration into controls infrastructure, plant floor devices and enterprise applications, and increased compliancy with Sarbanes-Oxley requirements.

The devices features include:

- Patent-pending information routing technology
- Embedded Java System RFID Software 3.0
- Embedded industrial Ethernet protocols - Ethernet/IP, Modbus TCP/IP, and PROFINET
- Real-time OS
- Solid-state
- Variable power
- Industrial temperature range
- Micro footprint
- ROHS/WEEE compliant
- Power-over-Ethernet (PoE)

For more information, visit www.comtrol.com.



Control's EdgWare Controller

*List your company's
Modbus compatible
products on the
Modbus-IDA website.*

info@modbus-ida.org

Modbus-IDA Discussion Forums

Q&A

From the Modbus User's and Developer's Forums...

Coils and Registers in Modbus...

On March 4 Dudheer asked a very basic question: "What are coils? What are holding registers?"

GCorr pointed to a good basic tutorial that explains this at <http://www.simplymodbus.ca/FAQ.htm>.

An anonymous poster commented,

"Coils are digital status so (0 and 1), holding registers are analog values which can be read or written using the function code 3 or 6 depending on whether you want to write a single register or multiple registers.

Mudassir shared his experience:

"I saw this terminology first time when working in Honeywell PlantScope/ Experion QuickBuilder interfacing to FSC Controller." He too questioned, "Do you know why do they use such an obscure terminology? Coils?? Registers???" instead of simply stating Digital and Analog points.

Andy began to shed some light on the question: "My old boss used to work at Modicon. I asked about that once. They are there for historical reasons. When they first came out with the PLC using Modbus, the idea was to hide the fact that you are using a computer."

Lynn Linse added, "Yes, but do remember the first Modicon "PLC" was introduced in the 1970s as a replacement for relay boards — long before Apple, IBM PC, or even the idea of a "personal computer."

Consider how happily the average engineer embraces radical "change." I am sure the first engineers facing use of a PLC to build next year's automotive assembly line reacted much as my great-great-grandfather reacted when he saw his first "indoor outhouse" (i.e., first toilet inside of a home). Modicon and Modbus are part of "history" in ways no other PLC or protocol are.

Extended Modbus Addressing...

On April 8, Mike McCafferty posted this message on the Developer's Forum:

This is information about my implementation of an extended address format that I believe to be fully compatible with the existing modbus packet structure. I have tested it for several months and so far it seems to work without a hitch! I am proposing this to become a standard, or maybe as a basis for a future standard. My devices speak with both methods with either the assigned 8 bit (1-247) address and extended addresses.

It is currently being used in my designs where a unique factory serial number is handy to configure multiple devices on the same bus. I used to broadcast a special command to set the slave address for a unit matching the serial number, but this method is more effective for my application.

How I implemented it:

Precede all query and response packets with [0xFA][32bit slave address hi...lo] in place of the slave address: It is only 4 bytes longer than standard packets. The CRC still operates the same way and is calculated for the entire packet.

I do not know much about the reserved addresses above 247, but the reason this works, is because slaves should see address 250 and ignore it. If this is a problem for devices using the reserved address space area then possibly a variation can be implemented instead; or just do not use address 250 in the first place. Other problems such as entire packet length may be an issue with older devices, yet they should timeout accordingly and function properly if they follow the specifications.

Comments are welcome!

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.

Modbus Application Stories

Maximizing Your Modbus Device With OPC

Every day in every company around the world people are looking to optimize their output or get more data out of their devices. “Bigger, better, faster, more” are common demands in 21st Century life. The message to continually upgrade systems with new technology to stay ahead of the competition is everywhere. Companies spend millions of dollars developing custom interfaces and adding new hardware to try to keep pace.

What if there was a way to cost-effectively make upgrades that boost performance and optimize output using an “out-of-the-box” application? The answer for Modbus users lies in a merging of Modbus and OPC technologies. By taking a tried-and-true technology like Modbus TCP/IP, and pairing it with the robust optimizing power of OPC, Modbus users can achieve completely scalable hybrid solutions.

Modbus technology has been in existence since 1979 and is in use in countless plants around the world due to its simplicity and low implementation cost. Because of its simplicity, Modbus lacks the efficiency and robustness to enable easy movement of data into applications such as visualization tools without a considerable amount of configuration. The Modbus protocol is also limited in the fact that it does not provide a timestamp with its data and therefore limits the quality of data produced. OPC requires that all data it produces have a timestamp along with a value and quality. The MatrikonOPC

Server for Modbus provides a timestamp for all data that it serves to any OPC client. This enables users to receive more complete data transferred to their chosen HMI; it empowers users with more accurate knowledge to make better, more timely decisions when solving problems.

OPC is specifically designed to move data from a server into applications such as HMIs, trenders, reports, alarm and event managers, and process control applications. OPC is robust, standards-based technology that enables operations to be flexible and scalable.



Using OPC standards-based technology enables Modbus users to pass more data through a system with an optimized efficiency. Users are not restricted to costly vendor-specific software solutions. OPC technology allows users to become vendor independent and empowers to choose a best-in-breed solution.

A prime example of the true connectivity of the OPC Server for Modbus is illustrated in a recent MatrikonOPC project with Siemens. The scope of the project required the integration of building automation equipment and a Building Management System (BMS). MatrikonOPC's OPC Server for Modbus was used to connect 940 data points from various building devices. The implementation of the OPC Server met with 95 percent of the points being read and the remainder written to. The integration of the MatrikonOPC Server for Modbus went smoothly. It provided robust connections to emergency power generators, water pumps, chillers, air handling units for computer rooms and other devices connected to the BMS.

The Siemens Building Automation project manager reported that MatrikonOPC provided the right OPC product for the project's needs and made the integration go smoothly.

The partnership of these technologies allows users to retain their existing hardware infrastructures and implement low-cost OPC-optimizing solutions to maximize data flow. For Modbus users this means that they can use Modbus TCP/IP to make hardware-to-hardware connections, and allow OPC to make robust software-to-software connections.

The MatrikonOPC Server for Modbus is an OPC-compliant server that enables easy data interchange between OPC clients and Modbus-compliant PLCs. To learn more about how to harness the power of OPC to compliment your existing Modbus infrastructures please join us for the MatrikonOPC webcast “Using OPC to Leverage Modbus Devices”, or check out the MatrikonOPC website at www.matrikonopc.com.

Manny Mandrusiak is OPC Marketing Specialist at MatrikonOPC.

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

Date: May 17, 2006

Time: 1:30 – 2:30 pm EDT

URL: <http://www.matrikonopc.com/training/webcasts/27/index.aspx>

Presented by: Steve Pealstone, MatrikonOPC Development Manager

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

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

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?

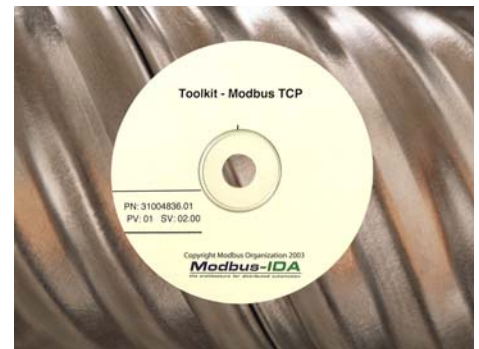
The modbus-ida.org users forum is ready to answer your questions and provide guidance. Thousands of users from diverse backgrounds read the forum, giving you a powerful base of experience from which to draw.

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

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