Modbus-IDA News
the architecture for distributed automation
ARC Forum 2005 • Special Issue

Modbus Accepted as Chinese Standard

In a striking affirmation of the ubiquitous Modbus protocol, the Standardization Administration of China (SAC) has formally launched the following three standards for industrial automation in the People's Republic of China:

GB/Z 19582.1-2004 Modbus Industrial Automation Network Specification Part 1 – Modbus Application Protocol,

GB/Z 19582.2-2004 Modbus Industrial Automation Network Specification Part 2 – Modbus Protocol Implementation Guide over Serial Link, and

GB/Z 19582.3-2004 Modbus Industrial Automation Network Specification Part 3 – Modbus Protocol Implementation Guide over TCP/IP.

Mr. Ouyang Jinsong, Director of Standardization, Department of Instrumentation Technology & Economy Institute, People's Republic of China, and General Secretary of the National Standardization Technical Committee on Industrial Process Measurement and Control, confirmed the standards were effective October 26, 2004.

The news was welcomed by Modbus-IDA, the international organization for suppliers, implementers and users of Modbus and its companion protocols. The Chinese standardization authorities have been working closely with Schneider Electric as they develop and propagate the use of standards in their industrial infrastructure. In conjunction with launching the Modbus standard, a conformance test laboratory is anticipated to open in China within the next few months.

Ken Crater, president of Modbus-IDA, noted, "It makes sense that the Chinese industrial market adopt Modbus as its fieldbus standard. Simplicity and ease of integration make it a natural choice. The fact that it is already widely used in China was also an important factor in the standardization decision."

Modbus-IDA at ISA EXPO 2004

Modbus-IDA opened for the third year in a row at ISA EXPO with an expanded presence in more ways than one. In a 400-square-foot booth, **Show Partners** ACT'L, Control Technology Corporation, Harting USA, HMS Industrial Networks, Niobrara R&D, and Schneider Electric met with customers, prospective clients, and fellow exhibitors to showcase their Modbus-based products.

With more than twice the number of members as this time last year, Modbus-IDA promoted its own activities and its members. The booth featured a 20-foot-high multi-colored banner display and a presentation that illustrated the organization's growth and its members' logos on an 8 x 8 foot rear projection screen suspended over the main aisle.

Members Precision Digital Corporation and Scadaware participated through the organization's **Show Visibility** Program, which allowed Precision Digital to augment its presence in its own booth elsewhere in the show. Scadaware, one of Modbus-IDA's systems integrator members, took advantage of this program to meet with customers and chat with visitors looking for expert assistance solving challenging applications problems.

(*continued inside back cover*)

Modbus-IDA Technical Committee News

Modbus-IDA's technical committees are now actively working in several areas.

The **IT Infrastructure** group had its first meeting in November 2004. Chaired by Dominic Iadonisi of Hirschmann Electronics USA, the group began to lay out issues on which it plans to focus. These include:

- Types of identified networks (e.g., standalone, non-interlocked);
- Network topologies (daisy-chain, tree, mesh, ring, star);
- Required switch support (port autonegotiation, auto cross, 10/100);
- Desired switch requirements (e.g., SNMP, traffic thresholding, port mirroring);
- Standard LED requirements;
- Alarm signal contact requirement;
- Redundant power inputs; and
- Specifications for cable types and connector types, for both copper and fiber cables

The group plans to meet again during Q1 2005. Please contact Modbus-IDA by e-mail if you wish to join (info@modbus-ida.org).

The **Conformance Test Policy** group has been meeting monthly to further define and develop Modbus-IDA's conformance testing program. In recent discussions, the group has elected to suspend the Conformance Test Program and redesign it, adding some physical layer testing and considering more options for interoperability testing. Additional work on conformance testing for Modbus over serial line is also underway.

The group is considering a self-test option, which would allow companies to purchase the test suite and certify devices under a strict set of requirements. Devices certified under the self-test option would be identified by a separate certification seal. An outside test laboratory option will still be available for those companies desiring third-party certification and to verify the validity of self-test program operations.

Technical Committees Work on Modbus' Future

Join one of Modbus-IDA's technical groups:

IT Infrastructure

Conformance Test Policy

Device Description

Safety Layer

Real Time

Contact Ken Crater [ken@modbus-ida.org] for more information or to join a Modbus-IDA committee or technical group.

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.

Your Website Ideas are needed!

In an effort to make more Modbus information available to you more easily, we are redesigning the Modbus-IDA website. We are adding more product announcements, more device listings, more news.

E-mail any ideas you have for features, functionality, or other useful information for Modbus users and developers to info@modbus-ida.org. We look forward to making the website work for you.

Q&A

From the Modbus User Forum...

Modbus frames: serial vs. TCP...

Sentekin Can wrote: How does serial Modbus message, which is variable length, form into fixed length Ethernet frame?

Jiri Baum replied, "The TCP part of TCP/IP simulates a continuous connection. Just ignore the whole frame thing and send your data. The TCP/IP stack will break it into packets, send them, retransmit them if they get lost or corrupted, etc."

Another reader suggested, "Modbus TCP is Modbus RTU that has been enveloped into a TCP data header. Layer 1-6 is all TCP/IP data header. Layer 7 is the application layer, which holds the Modbus RTU data frame. The only difference is that NODE ADDRESS=1 as default.

"Function code is Modbus function code to read or write same as RTU; target register is the same as RTU; number of registers is same as RTU; data out is same as RTU and data in is same as RTU; and the CRC check is the same as RTU. The Modbus message is not fixed. Many people will send a Modbus TCP message over Ethernet to serial converter, which strips out the TCP/IP header and sends the Modbus RTU message to the remote serial device. By changing the Node address to the remote node address this makes it possible to communicate to serial devices over Ethernet."

Lynn Linse added, "I am not sure what you mean by 'fixed length Ethernet frame.' Ethernet has a minimum size to enable collision detection (I think it's 64 bytes?). However the link, IP, and TCP headers occupy most of this. Any Modbus/TCP message will be larger than this min size.

Max Modbus serial message is 255 bytes (3 + 250 + 2); Max Modbus/TCP message turns out to be 259 bytes (6 + 3 + 250); Max Ethernet frame is 1500 bytes (given no fragmentation). So Modbus creates no size problems under Ethernet.

"Or perhaps you mean since Modbus RTU's length is 'felt out' by watching for time gap; how is Modbus/TCP length detected? The Modbus/TCP header includes a length byte, so it is explicitly defined within the first six bytes.

"In other words, the client in your case does not have the slightest idea of where the 'reply' came from (the store & forward machine in your case) – it simply assumes it is from the server and processes it as such.

"As a practical solution, you may want to insert a delay, so your client is 'deaf' for the amount of time the store & forward machine 'talks'."

Ask your question or help out another user on the Modbus-IDA Community Forums.

For users:
modbus.control.com

For developers:
modbus.control.com/dev

Modbus TCP/IP over Satellite Nework...

Gregoire Belliveau wrote to the Forum:

"We are looking for information about running Modbus TCP/IP over a satellite network. Our network typically has a 590-ms round trip delay time. We are looking at running GE's Multilin software communicating to various GE MultiNet (or similar) devices at the far end. As for the MultiNet, we believe that a device with remote IP programming ability (similar to Lantronix) would be a better fit. Any suggestions here?î

Rainer Lehrig answered, "The Modbus protocol works with request/response. Thus you will have a big delay because of your round trip time.

"It would be better to implement a more intelligent server(s) at the local places. These server(s) could talk to Modbus. e.g., read your variables cyclically and send them to your remote site without request/response. Only send data across the satellite network in one direction! î

John Rinaldi responded, ì Have you tried it yet? I can't think of any reason why it wouldn't work. There are two timeouts to consider. One, the TCP connection timeout. This is typically in the neighborhood of two seconds. The other is of course the Client timeout. What kind of trip time will the satellite give you? Can you modify these timeouts to be 20-50 percent more than the trip time?î

Finally, Micahel Weaver suggested, "You should go to industrial standard TCP/IP configuration and you should [have] no problem with communication. It would be transparent to the processor.î

Modbus Products and Innovations

Prosoft Technology Helps Take Out the Ash

A thermal power station in Mexico needed Modbus communication between Allen-Bradley PLC5 processors and the pneumatic transport system for light ash.

The hot light ash is retained from flue products and discharged into special containers, which are emptied by air into a larger bin. The system also consists of compressors, fans, and air filters. Once the ash is placed in the bin it is transported to either an ash disposal area or to a cement works for cement production.

The system is very sensitive to control system outages. If a failure occurs, pipes can be filled with hot ash, which will harden. To avoid outages, the system was equipped with a redundant processor.

The control system was a redundant solution of PLC5s communicating over a ControlNet bus with RIO modules.

System Integrator, AUTEL knew that since Modbus was the communication protocol between the PLC and the DCS supervisory system, a Modbus Communication Module was needed. Autel selected the Prosoft 3100-MCM. A 3100-MCM, functioning as a server, was placed in each PLC. The 3100-MCM modules contain two ports.

HMS Releases FIPIO and ModbusRTU Server Versions of Anybus Communicator

The addition of FIPIO and ModbusRTU on the fieldbus side of the Anybus Communicator extends the gateway concept to a total of nine different fieldbuses.

The ModbusRTU server side is available for both RS232 and RS485.

The AnyBus Communicator Gateway is an external DIN-rail mounted gateway that provides fieldbus network connectivity on one side and a configurable serial interface on the lower side, e.g., Modbus RTU client. The gateway can therefore work as a data concentrator on a Modbus network being Modbus RTU client on one side and a Modbus RTU server on the other side.

In the sub network side it has serial protocol support for Modbus RTU client Mode and Generic Data Mode, which is fully configurable through the ABC Config Tool for Windows and the configuration port on the AnyBus Communicator. Other protocols can be implemented by HMS on request.

Modbus Products and Innovations

Sealevel Systems I/O Device Certified

Sealevel Systems, Inc. (www.sealevel.com), recently submitted the **SeaI/O™** for Modbus conformance testing. The South Carolina-based company has manufactured quality Serial and Digital I/O products since 1986.

The SeaI/O is a modular I/O system that offers selectable connectivity and a wide variety of I/O types for distributed control and data acquisition requirements. An array of configurations is available, each designed for maximum flexibility and easy field wiring. Ordering options allow connection to the host device via Ethernet (Modbus/TCP), RS-485 (Modbus/RTU), USB, or RS-232 (Modbus/RTU). SeaI/ O modules are designed for a wide variety of applications and environments including process control, data acquisition, broadcast automation, security, and facility management. I/O models offer a choice of optically isolated inputs, Reed relay outputs, Form C

Seal/O

relay outputs, and TTL interface to industry standard solid state relay racks. Field removable terminal blocks are standard, facilitating fast, flexible field wiring. SeaI/O modules operate from 9-30VDC, and power can be input via terminal block or DC jack. Both table mount and DIN rail mounting options are available, and configuration is made easy using Sealevel's software tools.

CTC Releases Enhanced Web-Enabled Controller

Hopkinton, Mass.-based **Control Technology Corporation** (www.ctc-control.com) has added the **Model 5200** to its **Blue Fusion™** line of web enabled automation controllers. The Model 5200 features a built-in web server, enabling users to securely monitor, control and upgrade processes via Internet access. The unit also includes multi-unit expansion racks to allow users to control larger applications with more I/O with a single CPU and control strategy. A single Blue Fusion system can now

Blue Fusion Model 5200

control up to 192 I/O points and up to six axes of motion.

Bi-directional e-mail support lets the Blue Fusion controller send alerts or production data in an e-mail message. Users can also send an e-mail to the Model 5200 with customized instructions to modify the controller's operation.

The Model 5200 supports UDP, TCP/IP, HTTP, and Modbus TCP Client/Server. Through DHCP support, the controller can be named and appear like any other node on the network. The Model 5200 can additionally be set up as an FTP server for upgrades, support or for propagating control strategies from one control unit to others.

Acksys Introduces OEM Serial to Wireless Ethernet Module

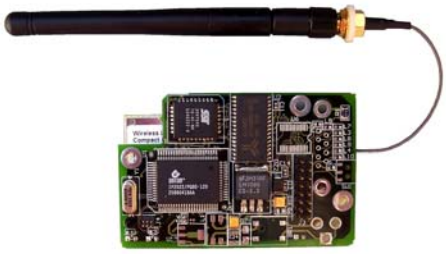
ACKSYS Communications (www.acksys.com) widens its range of wireless solutions by introducing a serial to Ethernet WiFi module for the OEM market.

The product relies on the IEEE 802.11b standard (2.4 GHz) and is IEEE 802.11g-compatible. It features a high-speed serial interface (up to 250 Kbps) available on a SUBD 9 connector for RS232 model or on a 16-pin HE10 connector for the TTL model.

It can be powered from the DC power source (+3.3VDC or +5VDC); consumption doesn't exceed 3W.

This module supports TCP Client/Server, TELNET RFC2217, COM port redirection, TELNET server, raw, point-to-point and the serial Modbus-to-MODBUS/TCP gateway.

The device is administered over a web browser or with TELNET.



WL-Dongle-OEM

Meet Some of Our Members...

Based in Raleigh, North Carolina, **Triangle MicroWorks** provides communication protocol software libraries, conformance testing software, protocol gateways, and OPC drivers for industry-standard communication protocols such as Modbus, DNP3 and IEC 60870-5. Its source code libraries are used by equipment vendors to implement Modbus, DNP3, and IEC 60870-5 communication protocols directly in the target hardware. The communication protocol test harness is a Windows application that can easily be configured as a typical client or server device. Tcl/TK scripts are available to perform conformance test procedures published by the technical committees of each protocol. Triangle MicroWorks makes available a full 21-day evaluation version of its SCADA data gateway and communication protocol test harness applications directly on the company website www.TriangleMicroWorks.com.

D&D Automation teams with machine builders, integrators and end users to provide digital and analog solutions that meet and exceed productivity objectives. The company has expertise in all areas of automation engineering from systems design and documentation through fabrication, programming, start-up services, and training. It designs and implements systems ranging from islands of control, such as single machines and processes, to fully integrated, plant-wide automated and networked information systems. D&D's knowledge of industry-standard hardware and software allows the company to offer integrated solutions that meet the exacting needs of its clients and the markets they serve. Through strategic systems integration, D&D strives to help customers achieve their business goals faster and more cost-effectively than ever before.

Known as the Springfield Automation group from 1994 through 2000, **SCADAware, Inc.** is located in Bloomington, Illinois. The company's experienced workforce provides product sales, control system integration, software design, service, and support. Scadaware specializes in PC-based control systems, field-bus I/O systems, PC-based client server SCADA systems, custom communication drivers and utilities, custom software design, PLC controls and enterprise-level data acquisition and reporting. Most products required to build each system are available from SCADAware, along with the engineering and programming necessary to complete a turn-key solution.

ProSoft Technology, Inc. specializes in the development of in-chassis, protocol interface products for automation platforms, in-rack flow computers, stand-alone gateways, and wireless communication networks. The company's first product - a firmware solution providing Modbus server communications - was developed in 1988. Since then, ProSoft product lines have grown to over 400 communication modules supporting more than 50 different protocols. ProSoft Technology is headquartered in California, USA with local offices in Europe, Latin America, and Asia Pacific.

Mesco Engineering realizes complete product development for measurement and automatic control technology. The company's software engineering services include PC programs, real-time operating systems, WEB technology, and industrial communication. Hardware engineering services include tasks with embedded controller, embedded WEB servers, DSP technology, EMC, and intrinsic safety. Efficient project development is accomplished by qualified engineers and a consistent application of planning methods.

Schneider Electric Adds Over 100 Devices to Database

This month, Schneider Electric is adding more than 100 Modbus- and Modbus TCP/IP-enabled devices to the Modbus-IDA device database.

This significant announcement demonstrates the Schneider Electric commitment to the Modbus protocol suite and Modbus-IDA and also affirms that Modbus is the backbone network of the Transparent Ready "web-enabled Power & Control" system.

Schneider Electric Transparent Ready® provides customers with the power to access any data, at any time, from anywhere through its communication architectures.

Through the Web, with the right security levels, a user is able to use Transparent Ready to access data to solve business problems and improve performance. Product and equipment manufacturers are able to integrate their products or equipment in a Transparent Ready® architecture over Ethernet and Modbus TCP/IP. Further information is available from Modbus-IDA and also the Collaborative Automation Partner Program of Schneider Electric at www.collaborativeautomation.com.

Modbus-IDA currently lists over 125 Modbus-enabled devices on its website, including both Modbus serial- and Modbus TCP-enabled devices. To learn more about how you can list your company's Modbus devices, e-mail us at info@modbus-ida.org.

Modbus-IDA at ISA EXPO

(*cont'd from page 1*)

Feedback from members exhibiting in the booth was very positive. Based on show partner's comments, Modbus-IDA plans to offer similar opportunities at Hannover Fair and next year's ISA EXPO (October 25 - 27 in Chicago). Separate, lockable kiosks topped by a broad table-top gave show partners space to display product and chat with booth visitors with enough elbow room to take notes, sketch diagrams, and exchange vital information.

Visit Modbus-IDA in Hall 9 at Hannover Fair 2005

For a second year, Modbus-IDA will exhibit at Hannover Fair. The 2005 show is scheduled for April 11 through 15. In the Modbus-IDA booth at Hannover Fair, we plan to put our members and their products on prominent display as the most compelling way of demonstrating the overwhelming popularity of Modbus in the industrial world.

Look for information about opportunities to exhibit at Hannover Fair with Modbus-IDA's **Show Partner** and **Show Visibility** Programs.

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, to end users and 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 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