Modbus Joins Wireless Cooperation Team

We are delighted to announce that the Modbus Organization has become the fourth member of the Wireless Cooperation Team (WCT). Modbus has joined with Fieldbus Foundation, PROFIBUS Nutzerorganisation e.V., and the HART Communication Foundation to work cooperatively on the development of wireless gateway specifications based on WirelessHART and the emerging ISA SP 100.11a standard.

In the course of the project the team is developing use cases, requirements, and specifications for wireless communication with intelligent field devices in process measurement and control applications in the automation industry. The goal of the project is to design specifications as common as possible, while ensuring complete compatibility with the existing wired versions of each participant's technology.

As the newcomer to the Wireless Cooperation Team, the Modbus Organization's initial work will be to map the Modbus protocol to WirelessHART to support the development of a specification for a gateway whose field side will accommodate WirelessHART field devices and whose output uses the Modbus protocol.

New Set-up Video for ProSoft i-View

ProSoft Technology is offering a new tutorial to demonstrate how to implement the ProSoft i-View for use on a Modbus TCP network quickly and easily. The ProSoft i-View transforms iPad, iPhone, or iPod touch devices into mobile human machine interfaces, enabling live monitoring of process control data for engineers and plant floor operators. The mobile app uses ProSoft Technology's industrial 802.11 or cellular wireless solutions to grant access to control information by authorized users from virtually anywhere.

Another Project on Modbus

Technical Resources Page

According to developer Petri Tuomio, Ananas — technically Modbus TCP Server — is a mighty fruit supporting two simultaneous TCP connections. Full scale of 16-bit input and holding registers are supported (0-65535). Modbus TCP client is also included (using the server's address space). Server and client can be used independently. Ananas also supports DDE connection to registers. Why the project is called Ananas, which means pineapple in German, remains a mystery.

Based in the north of Spain, Ingeteam's industry division integrates mechanical engineering, electrical, and automation companies. With over 30 years experience in the industrial sector, **Ingeteam** has a long history of developing products for diverse automation industries.

The company's INGESYS® family of products are used in a wide range of applications including continuous processes, power generation, energy distribution and transport, rail and marine transport, water treatment and distribution, and the chemical sector.

Ingeteam works closely with qualified integrator and distributor companies to offer its INGESYS® automation solutions around the world.

MatrikonOPC provides equipment data connectivity software based on the OPC standard. The MatrikonOPC promise is to empower customers with reliable data access to all major automation vendors' systems, provide practical OPC training, and deliver superior client care.

With offices in North America, Europe, Asia-Pacific, and the Middle East, MatrikonOPC provides local presence on a global scale. MatrikonOPC is a vendor-neutral connectivity supplier.

The company's Modbus OPC Server provides secure, real-time data access between Modbus devices and any OPC-enabled applications such as historians, HMIs, and SCADA.

PiiGAB develops, markets, and sells software and hardware for data communication, data acquisition and tracking for both industrial settings and building automation.

The company introduced its M-Bus 900 gateway series in June 2010. The product allows simultaneous remote reading of M-Bus meters with up to four clients. Meter reading can be mixed using local network, city network, Internet, normal serial communication or using an existing M-Bus client.

The M-Bus 900 gateway allows parallel connection to a Modbus client to read values from the M-Bus meter to a remote device or to be shown on a local display.

The M-Bus reads all types of meters including electricity, heat, and water meters.

The Modbus Organization Mission

The Modbus Organization, Inc. 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 Organization also provides the infrastructure to obtain and share information about the protocols, their application, and certification to simplify implementation by users resulting in reduced costs.

Modbus Newsletter

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

For more information about membership and other services, please refer to our website: www.modbus.org

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ProSoft Technology Gives NASA a Boost

Adrienne Lutovsky & Danetta Bramhall

On July 20, 1969, Apollo 11 successfully touched down on the moon's surface and people sat glued to their television sets waiting for Neil Armstrong and Buzz Aldrin to be the first men to walk on the moon. The unflappable news anchor, Walter Cronkite took off his glasses, rubbed his hands together and shot a boyish grin at the camera. His body language spoke volumes to the millions of people watching with bated breath to see what is considered by many to be one of man's greatest feats.

In April 1981, the first Space Shuttle, Columbia, launched and orbited the earth 37 times before landing on a runway at Edwards Airforce Base in California. It was also the first U.S. manned space vehicle launched without an unmanned powered test flight. NASA described the mission as: "The boldest test flight in history."

The NASA space program has accomplished feats that have sparked the imaginations of children and writers for the past half century. But each of these missions is preceded by years of stringent adherence to safety and production requirements.

Safety, Precision & Accuracy

After each countdown to ignition, a shuttle is propelled into space by trademark twin flames streaming from Solid Rocket Boosters (SRB), which provide 80 percent of the shuttle launch thrust before they burn out, separate, and jettison into the

ocean. NASA recovery ships retrieve the boosters and tow them to Hangar A/F Cape Canaveral Air Force Station (CCAFS) in Florida, where they are disassembled.

The refurbishing of the boosters for reuse takes place in two locations. The entire process from retrieval to completion takes approximately a year.

Refurbishment & Reuse

The engineering teams at the Assembly and Refurbishment Facility are bound by incredibly rigid production specifications, because anything more than a hairline deviation can severely affect the safety of a mission. Of the SRB's total weight of 1.25 million pounds, propellant accounts for 1.1 million pounds, which burns hot enough to damage the structural integrity of the boosters.

One of the materials used to protect the rocket boosters during ascent, descent and splashdown, is a USA-developed thermal protection system called booster trowelable ablative (BTA). Its consistency resembles that of automotive body filler, but it has much better thermal properties, which is important because it protects the booster components from damage, enabling them to be reused time and time again.

The mixing of the insulation used on the flight components is automated. The batching process is handled by two functionally identical machines, using
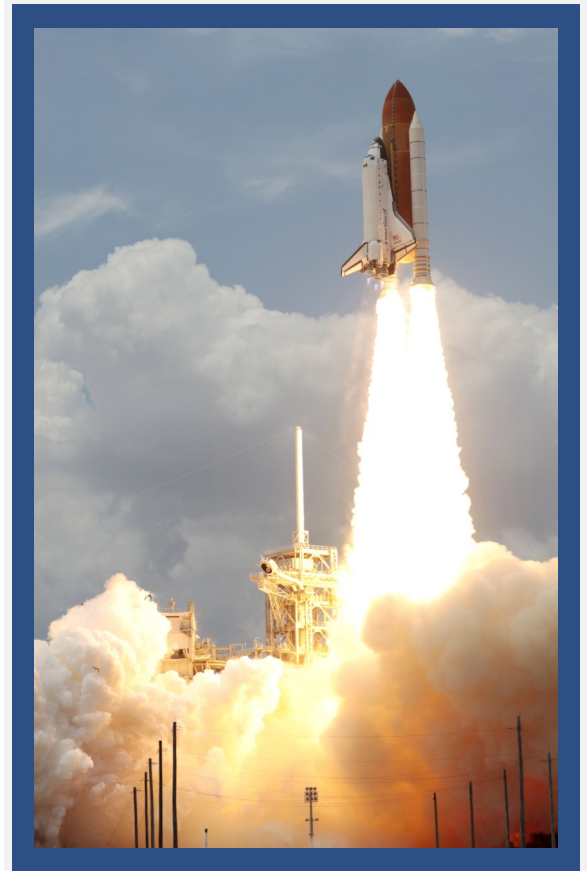
Micro Motion flow meters to release precise measures of resin and catalyst into a mixing vessel, where a Charles Ross mixer blends them to form the BTA insulation. The Kennedy facility sees an average of five 3000 gram batch cycles per day.

Controlling the process for each machine are a Rockwell Automation Allen-Bradley ControlLogix PAC and an SLC-500, respectively. USA tried using a 4-20 mA feedback between the controller and the flow meters, but found they were unable to obtain the required level of accuracy and precision.

NASA...

"We contacted Micro Motion and they pointed us to ProSoft Technology's Modbus communication modules, which integrate directly into the ControlLogix and SLC-500 platforms," explained Dan Dermody, Control Systems Engineer at USA and the machine builder for this application. "We tested them out and quickly discovered that they provided the accuracy and precision we needed."

"The module collects flow data and feeds it directly into the ControlLogix data tables," Dermody continued. "This type of flow control system maintains all the process parameters, ensuring that nothing goes out of specification during mixing. The ProSoft module made the architecture we wanted to use possible, and we've stuck with that type of philosophy on our flow meters ever since."

Challenges

With specifications allowing for only plus or minus 2% deviation on any given batch, USA has a challenging job.

"In normal industry you can produce a similar product and get away with being 10 - 15% off and it wouldn't make any difference. But because of the environment that these Solid Rocket Boosters operate in, there is absolutely no room for error."

The initial challenge was reaching the data transfer rates required, which could not be accomplished using a standard 4-20 mA analog input module.

Once we brought the information over digitally it was a night-and-day difference. Still, we were only barely achieving our goal, and I knew something wasn't right with the update rate. So we worked with ProSoft to identify a controller programming problem that essentially caused the controller to write over data within a millisecond of when I was trying to read it. We now have the performance we need."

"Now we're getting millisecond update times and we can control down to the gram level in a 2000 gram batch."

Because of the level of repeatable precision USA is able to accomplish with this solution, it is not required to continually test the adhesive delivery system to prove its accuracy.

The Future

NASA and the space program are currently undergoing a major directional shift with the end of the space shuttle program.

Presently, USA is building up the parts for a second test flight for the Ares Program. While there has been no official decision on the exact architecture of the post shuttle human spaceflight program, one fact will remain; the demanding environment in which rockets must perform will require materials with the highest quality standards made possible by innovative solutions.

New ASComm.NET Modbus Client Driver

Automated Solutions recently announced its new [ASComm.NET Modbus Client Driver](). The package provides

high-performance connectivity to Modbus RTU and ASCII server devices via serial port, encapsu-lated TCP/IP and encapsulated UDP/IP, and allows .NET appli-cation to read/write registers on Modbus RTU and Modbus ASCII server devices.

Key benefits include:
- No requirement for third-party drivers.
- x86, x64, and any CPU compatible
- Visual Studio.NET 2005, 2008 and 2010 compatible
- Most .NET targets supported, including Web, Windows, console, and service apps.
- 10-15 mSec typical transaction time
- Optimizes multiple register configurations into minimal transactions
- Tag database can be configured via code or visual designer
- Abstract base classes allow you to write generic code that works with all drivers
- Synchronous and asynchronous read/write methods
- Data change notifications
- Common user interface across all driver classes

Q&A from the Modbus Discussion Forum...

How to calculate silent interval in Modbus RTU?

Satoshi Sakai asked:

I assume the calculation of silent interval in 9600 bps is as below. 1/9600(bps) * 11(bits)*3.5(ct) = 4.01 [ms].

A certain manufacturer's server device calculates as below because Modbus RTU is binary. 1/9600(bps) * 4(bits)*3.5(ct) = 1.46 [ms].

Both seem to be reasonable, but I would like to know which is [the] correct calculation.

Jerry Miille answered:

Your first calculation is correct, 4.01 msec.

But beware that there are some implementations that may not do their timing so precisely! If you are implementing a new Modbus driver, then you should consider making this time "adjustable."

In the end, if your device strictly adheres to 4.01 msec and my device does as well, then there will certainly be synchronization problems because your clock and mine are not synchronized exactly. My recommendation is to have default timing values calculated as you have shown them but also be able to override them.

Lynn Linse concurred:

Jerry speaks from experience: Suppose your customer uses a cheap "packet radio" to bridge your 9600 baud signal across a 25-mile gap, then you could find gaps of from 50 to 500 msec between every 32 or 50 bytes, and if satellite is used, these gaps can be five minutes or more!

Sure it violates the Modbus RTU spec., but if you cannot handle these gaps, then your product cannot be used by the customer; you don't make the sale.

Not sure about you, but my wife certainly likes me get paid every two weeks.

Remember that by watching the bytes arrive you can estimate the expected size of the message. For example, a Modbus RTU function code 3 request will always be 8 bytes. The response will be five bytes plus the byte count in third byte.

You really only need this idle-gap for unknown function codes.

Any other way of expressing addresses is simply some manufacturer's idea of how to write their manuals or software user interface. It has nothing to do with what actually gets sent through the wires.

Read more or add your comments to this thread.

Modbus TCP/IP server device to Profibus?

Chris wrote to the forum:

I have two controllers that have Modbus TCP/IP communication ports. I want to put both of the controllers on a single bus line and convert to Profibus to communicate with the network. Does anyone have any ideas?

James Ingraham suggested:

In no particular order:

HMS Anybus X-Coupler (www.anybus.com)

ProSoft Technology stand-alone gateway (www.prosoft-technology.com)

Hilscher netTap (www.hilscher.com)

Russ Bartels wrote:

Yes, get two new controllers, it will save you time, money and many headaches in the future.

The Modbus Community is where it's happening:

- **Active technical discussions**
- **Knowledge aggregation**
- **Contact with other Modbus users**

Discussion supported by...

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Modbus to Profibus

Patrick Lansdorf offered:

I work for HMS. The Anybus X-gateway will be able to do the job.

If there is a Profibus client, you will need the **ModbusTCP Server - Profibus Server**

If you need to communicate with one or more Profibus servers, you will need the **Profibus Client - ModbusTCP Server**

If you have any technical questions, contact our support center at support@hms.se.

AJ added:

Please have a look at the Hilscher product: **netTAP – Pro-tocol Converter**.

If you need any assistance please get in contact with Hilscher's hot-line (hotline@hilscher.com)

Read more or add your comments to this thread.

Modbus Library for C++ dos/Windows?

Mike Fahey asked:

Any C++ libraries available for embedded PC to WORLD via Modbus**?**

Mark had this to offer:

We have customers that use our products with embedded XP.

Not the same as a PIC application but, a reduced hardware footprint.

**Michael Griffin provided a recommendation and link:**

Try this one: http://libmodbus.org/

libmodbus - A Modbus library for Linux, Mac OS X, FreeBSD, QNX and Win32

Read more or add your comments to this thread.

Questions? Comments? Need Help?

The Modbus discussion forum offers users and developers the opportunity to ask and answer questions about Modbus communications and applications. **Post a message** and your peers can offer their opinions and expertise to help you solve a problem, understand a principle, or debate the conventional wisdom.
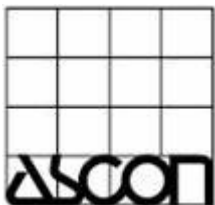
We're with you. The Modbus Organization is there to help suppliers and users of the Modbus protocol succeed. Our members range from Modbus device suppliers, to system integrators, end users, and educational institutions.

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

Designing with Modbus

Modbus developers rely on the Modbus Organization for valued assistance with their projects:

- Start by downloading specifications and other design documents from the modbus.org website.

- To save time, purchase the Modbus TCP Toolkit CD (FREE to general members); it contains source code and a myriad of other resources.

- If you come across technical issues that have you stumped, post your question on the modbus.org forum. One of the many experienced Modbus implementers who frequent this forum will likely have your answer.

Conformance Testing

When your project's done, how do you know it really conforms to the Modbus specification? 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.

Then submit your product for testing to the Modbus Organization for conformance testing. We'll certify your product as compliant, and post that information on the Modbus website for the world to see.

Visibility: Your Company & Your Products

Your membership in the Modbus Organization 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, our newsletter, and through our various trade show appearances are all options that allow you to make the most of your Modbus Organization membership.

Your company will 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?

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

The Future is Yours

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

Download the Modbus Organization Membership Application to learn about the different membership levels and their associated benefits.

Modbus TCP Toolkit v3.0

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 conformance certification.
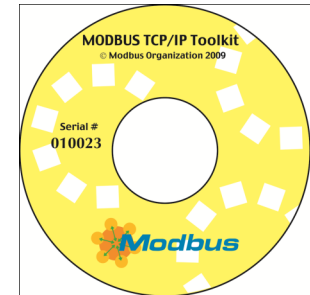
The toolkit is available as a benefit of corporate-level membership in the Modbus Organization or can be purchased separately for US$500 plus shipping and handling. The toolkit contains the following items:

Modbus Documentation

- Modbus Application Protocol Specification, v1.1b
- Modbus Messaging on TCP Implementation Guide, v1.0b

Tools

- Modbus TCP Client & Server Diagnostic Tools

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

Modbus Conformance Testing

- Conformance Test Tool v3.0
- Conformance Test Tool v2.1

Additional Resources