Modbus Newsletter

Rinaldi's Book Positions Modbus for the Future...

With his inimitable style and sense of humor, founder and president of Real Time Automation, Inc., John Rinaldi has published a new book about Modbus.

Dedicated to "the Automation Engineer, the unsung hero of American Manufacturing," the book follows the history of Modbus, from its inception in the 1970's to current and future applications.

Why is Modbus positioned to last for the foreseeable future? It has earned its place, because of its original attributes.

Rinaldi cites six major reasons Modbus is here to stay:

1. It's small;
2. It's cheap;
3. It works with any processor that has a UART;
4. It's easy to deploy;
5. It has simple data typing, memory maps, and operating functions; and
6. It's everywhere!

With a few shameless plugs for RTA's own Modbus offerings, and a nice nod to the Modbus Organization, we suggest you check it out.
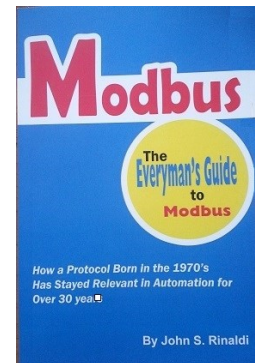
Modbus: The Everyman's Guide to Modbus is available for purchase from this link on Amazon.

Modbus Client to Modbus Client...

A large oil and natural gas platform in the North Sea was expanding its facility's capabilities by adding a massive module (over 1.5 million lbs) to the existing platform infrastructure. The two systems needed to communicate seamlessly with one another.

Control systems on each structure were configured to communicate with each other through a serial Modbus RTU RS-232 or RS-485 channel. However, the Modbus device configuration on each side was designed to communicate as a client, while traditional Modbus communication takes place between a client and a server.

Each structure's respective developers had invested substantial resources into its control systems, so the systems integrator had to find a way to overcome this obstacle by converting one configuration to act as a server in the most cost-effective way possible – or by making two Modbus client devices communicate with one another. Comtrol had available an innovative solution to allow a Modbus client communicate with another client.

The systems integrator assigned to the task researched client-to-client connectivity and ultimately discovered Comtrol's DeviceMaster UP's capabilities on a respected online forum. Hesitantly beginning the application, the integrator was highly satisfied with the end result. Comtrol was able to address this integrator's problem using the DeviceMaster UP 2-Port 2E Modbus gateway. By running Modbus Router firmware, an

Meet Our Members...

Kepware Technologies is a private software development company headquartered in Portland, Maine. The company provides a portfolio of software solutions to help businesses connect diverse automation devices and software applications.

Kepware's software solutions help businesses improve operations and decision making. Visit Kepware online to learn more and download free, fully-functioning demonstration software.

Kepware's Modbus Suite works with the company's communications solution, KEPServerEX, to provide OPC Data Access to Modbus-compatible devices. KEPServerEX enables users to configure reliable Modbus connections quickly.

It supports communications with multiple protocol networks, including Modbus Plus, TCP/IP Ethernet, RTU Serial, and ASCII Serial. The Modbus Suite provides access to multiple Modbus networks all from a single license.

Joining the Modbus Organization is easy and affordable. Download the membership application to learn more.

Advanced Micro Controls Inc. (AMCI) is a U.S. company focused on PLC-based automation. AMCI designs and manufactures rotary and linear position sensing products and motion controllers. AMCI's expertise includes specialty I/O, position sensing, and motion controls that communicate via Modbus, Ethernet/IP, Profibus, and other leading industrial networks. AMCI is located in Terryville, Connecticut, and sells products worldwide through a global network of authorized distributors.

Define Instruments has a long history developing and manufacturing high-quality control instruments for both local and international buyers. The company's product line includes digital panel meters and DIN controllers, data loggers, transmitters, and wireless gateways with mesh networking capabilities.

Define Instruments products can be found in industrial applications, from simple status monitoring and retransmission, to complex, multi-channel control.

The company's Modbus devices include:

- RIO-MOD-RTU, a Modbus Server device that can be used as an RTU for any Modbus system, providing 16 isolated relay outputs and 16 digital inputs, and

- Pathfinder Dual Function Wireless Base/Remote, a solution for applications that require low data rates and Wireless Mesh Networking across large areas. The dual function Wireless Pathfinder can be used as either a base node or a remote node.

Modbus Client to Modbus Client, continued

internal server that resides in RAM is established to respond to commands from any properly connected external Client. The connected Client(s) can be serial- or Ethernet-based, and there can be multiple clients (more than 50).

Each Client can read or write data into or out of holding registers or coils. For memory management and accessibility convenience, the server memory is divided into eight blocks of 200 registers, and eight blocks of 160 coils for a total of 1600 holding registers and 1280 coils. By default, the server ID is 252, but it can be customized to any valid Modbus server ID (1-255.)

Present values for all the registers and coils can be viewed or cleared by the user directly from the embedded web page, providing a convenient way to monitor the system or determine that a write was successful even with only one Client (writing) connected.

The Modbus Router firmware was developed to provide innovative network-wide Modbus connectivity from a wide variety of Modbus clients to a wide variety of local and remote Modbus servers. Advanced fea-tures include the above-described client-to

-client communication and also private serial bus connectivity, write protection, and device ID aliasing. With simplified configuration pages and advanced routing, Modbus Router provides unmatched Modbus connectivity.
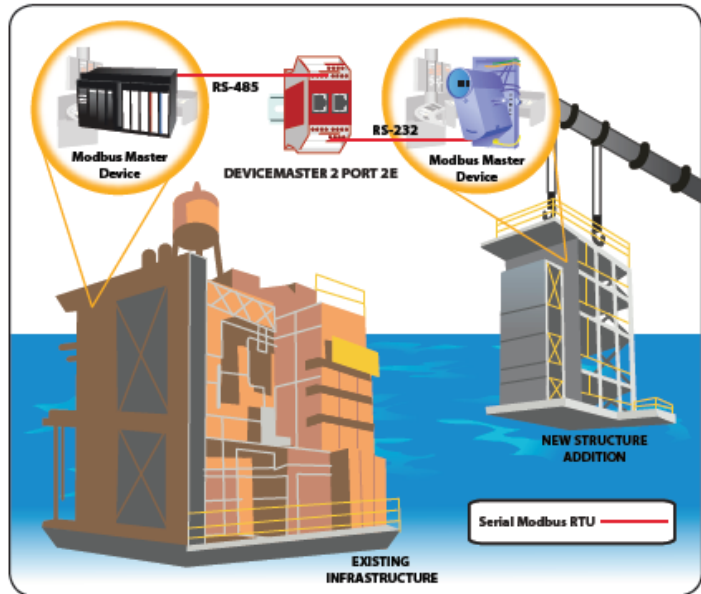
New Gateways Connect Modbus Instruments to Profibus or Foundation Fieldbus Networks

Fieldbus International, Fint, presents a set of new protocol converters that makes it straightforward to connect a Modbus RTU device to a Profibus DP, Profibus PA or FOUNDATION Fieldbus (FF) network or control system.

Instrument vendors who have implemented Modbus RTU, are now in the position to extend the market for their existing products. They can now enter the Profibus and FF market without any investment. The devices support easy configuration from a PC. No special tools are required.

These converters are especially suitable for sys-

tem integrators who need to incorporate legacy equipment into a design and end-users who want to interface already installed instrumentation.

The protocol converters are available as DIN rail-mounted gateways. You can connect up to four Modbus RTU (RS-485) instruments to each gateway. There are slide/DIP switches for easy termination and address (Profibus) setting.

The same protocol converters are available as built-in (embedded) versions. Please see www.fint.no for more information.

Fieldbus International AS

Q&A from the Modbus Discussion Forum

Modbus Response Time Calculation...

Abraham Februano wrote:

I have a problem with communication Modbus RTU, for engineering and construction phase for oleo chemicals plant.

We have idea to use Modbus RTU with RS485 serial communication line for load-shedding system in power generation. We have Power logic control in each of Low/High Voltage panel, and I want to try to communicate between subsystem (Power logic metering Schneider PM5035 and main system DCS Yokogawa Centum VP on (IFAT-integration test), with no issue.

But I have worries, because actually we have a lot subsystems on the site including PLCs (Modicon). Could somebody tell me know to calculate the response time (bidirectional)? Let's say the data is 100byte/subsystem and speed is 19600 kbs. How to calculate if:

1. Single subsystem connected.

2. Multiple subsystems connected.

Patrick L answered:

The actual response time of a device will usually vary from time to time. I think that the easiest way to find out is to ask the manufacturer. If they do not know, I am afraid that you may need an oscilloscope and measure. Send a command to the device and see how long it takes for it to answer.

A few years ago, I made an Excel sheet that calculates line time on Modbus, but one needs to know the response time for the server and the client. email me at pal@hms.se, if you want a copy.

Lynn August Linse replied:

Response time can also be affected by unexpected events. I'm not sure if the vendors in these cases would even acknowledge the odd behavior, so you should also do some field tests.

For example, I once linked to a Modbus/RTU inspection machine which normally answered in less than 1/2 second. However, if it was busy doing a "rejected inspection," then it took up to 5 seconds to respond. This did NOT mean it ignored comms for 5 seconds; it means it buffered any requests and answered them ALL after the delay in a very non-Modbus flood. So if you polled every 1 second, it would return 5 responses in a burst.

Another example: I once worked on a device which (for some reason — reduce IRQ load?) disabled its serial port for ~250 msec if it saw a request for ANOTHER server address. So a single device could be polled flat out, but a multi-drop had to be polled with care not to poll subsequent nodes too fast.

[Read more or add your comments](#) to this thread.

Modbus RS485 Loop...

rjcarreiro asked:

I am attempting to install a system of six controllers, each of which sends and receives data from two sensors, on an RS485 loop. I am using a Modbus address for each of the controllers.

When connecting the 2-wire RS485 in one direction (A to B), I can only read half of the sensors. When the 2-wire is reversed (B to A), I can read the other half of the sensors.

Is there any known cause of this problem?

David_2 commented:

I assume that one group of sensors is manufacturer/model X and that the other group of sensors is manufacturer/model Y.

There is no "standard" for labeling the data lines. Every manufacturer picks its own labels.

I've had an RS-485 Modbus product from one division within a company label the opposite of another division.

Wire the network so that all the (+)'s are on one line, all the (-)'s on the other, even if you must wire A to B.

This happens all the time when mixing brands on the same multi-drop network.

ICP DAS added:

It may also be a biasing issue or termination resistors. If you measure the voltage across the D+ and D- terminals, you should see a static voltage when no communication is happening. Check for significant voltage drops. Ideally, you should see about 5 VDC. When you start to communicate, you will see a fluctuation in voltage. If the range drops too low, you can add a repeater to strengthen the signal or a hub to just separate the 2 sets of devices.

[Read more or add your comments](#) to this thread.

Modbus Organization, Inc.

5 Cedar St
PO Box 628
Hopkinton, MA 01748
USA

E-mail: info@modbus.org
Phone: +1 508-435-7170
Fax: +1 508-435-7172

www.modbus.org

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 Resources

Modbus Q&A...

The Modbus Community is the premier on-line engineering discussion forum. Sponsored by the Modbus Organization and supported by Control.com, check out Q&A from the Modbus Community website or log-in and have the threads you want emailed directly to you.

The Modbus Community

- Technical discussions
- Knowledge aggregation
- Contact with Modbus users

supported by...

Modbus conformance certification...

The Modbus Conformance Testing Program provides independent verification that a broad array of qualifications has been met in compliance with Modbus specifications. It provides verification that a device's design and configuration process will proceed smoothly and that products were developed in accordance with key Modbus criteria. Learn more...

Looking for the Modbus specifications and implementation guides?

The Modbus specifications and guides for implementing Modbus over serial line or Modbus TCP can be downloaded freely from the Modbus.org Technical Resources page.

Order the Modbus TCP Developer Toolkit

The Modbus TCP Toolkit provides all the necessary pieces to develop a Modbus TCP/IP-compliant device, including documentation, diagnostic tools, sample source code, and pre-test software to prepare for Modbus conformance certification.

Learn more...