Going to Hannover Fair?

This year from April 23 to 27, Hannover Fair opens its doors to visitors from around the world.

Many Modbus Organization members are represented at the fair and are available to answer questions about their offerings. For your convenience, here is a listing of members currently planning on showing at Hannover 2012:

- Belden Electronics: Hall 27, Stand G34
- connectBlue: Hall 8, Stand D37
- eWon: Hall 8, Stand D31
- Fieldbus International, Fint: Hall 9, Stand D05
- Grundfos: Hall 14, Stand L09
- HMS Industrial Networks: Hall 9, Stand D05
- JVL Industri Elektronik: Hall 15, Stand H39
- Kepware Technologies: Hall 9, Stand A15
- Matrikon: Hall 9, Stand A15
- MKS Instruments: Hall 17, Stand E07
- Phoenix Contact: Hall 8, Stand D27
- Schneider Electric: Hall 11, Stand C50
- Softing AG: Hall 9, Booth C33L
- Trebing & Himstedt Prozeßautomation: Hall 9, Stand D05

Modbus Security

Modbus Organization member company Byres Security's most recent blog post discusses Deep Packet Inspection (DPI) .

In this blog entry, Eric Byres talks about use of the new Tofino™ HMRF Honeywell Modbus Read-only Firewall.

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Modbus RTU Video

John Rinaldi, founder of Modbus Organization member company Real Time Automation, presents a brief and informative video all about Modbus RTU.

Questions about RS-232 vs RS-485? Confused about registers? Check out John's explanations and examples to beef up your understanding.

New Additions to Modbus Resources Page

The Modbus Organization's Technical Resources page list of resources for Modbus developers and users continues to grow.

New and updated listings include:

- Ananas — the Modbus TCP diagnostic tool for Windows has been upgraded to now include a 64-bit version.
- WinModbus — a Windows Modbus Server simulator supporting Modbus RTU and TCP, with a free trial version available for download
- CAS Modbus RTU Parser — analyzes Modbus messages when you type in a string of hex bytes. The parser will break the message out showing you destination, function,and data.
- CAS Modbus Explorer — attempts to connect to RTU devices using various permutations of baud, data and stop and data point until it makes a connection.

News about the World's Most Popular Protocol
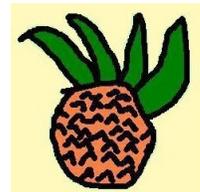
Founded in 1975, **Control Technology Corp.** has a long history of providing innovative automation solutions to its customer base. CTC recently released an upgraded CPU for its 5300 series controllers. The 5300 controller now boasts full Modbus capability as a Client or Server device, or both.

CTC's 5300 supports Modbus Server commands as built-in functions on its Ethernet, RS-232, and RS-485 ports. Users assign the IP Address for Ethernet or node address for RTU in the set up configuration. The controller handles the rest.

For a Modbus Client, a connection block is set up in the 5300 program to configure Modbus Server devices based on IP Address for Ethernet or node address for RTU. This block lets users set unique poll rates for each Server device, and map

device data of interest to internal registers in the Client. The program accesses these registers directly for reads and writes, as if they were native to the controller.

Each 5300 communications port can be configured independently for either Client or Server operation. This means the 5300 can be used as both a Client on one network and a Server on another at the same time.

Model 5300 Programmable Automation Controller

With headquarters in Germany and a North American subsidiary, **Softing Industrial Automation** is a premier provider of industrial communication products and technologies for manufacturing and process automation.

With its focus on industrial communication solutions and products, Softing supports a variety of relevant technologies.

Softing's Modbus TCP/OPC Server enables fast, convenient access to the I/O registers and coils of any Modbus devices via an Ethernet interface. The server supports all OPC client-enabled software, including Citect, GE Cimplicity, GE Fanuc iFix, Iconics Genesis, Rockwell RSView, Siemens WinCC and Wonderware InTouch.

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

Newsletter Editor:
Lenore Tracey (lenore@modbus.org)

The Stichthage Building Reconstruction, The Hague

If you visit The Hague, the third largest city in The Netherlands, by train, the first building you see is the Stichthage — a multi-functional building integrated into the central railway station. It was built in the early 1970s as a typical steel-concrete building with glass facade. It is 60 m high and it has 15 floors hosting offices, shops, and restaurants; floors one and two merge with the railway station hall.

After 38 years of operation, the building was reconstructed in 2011. As with many buildins of similar vintage, the main reason for this was high energy consumption.

The rooms were heated by heat exchangers situated under the windows, controlled by Honeywell R7455A room controllers. These were controllers with individual setpoint correction and presence and window contact inputs (not used here, as the windows could not be opened). The heat exchangers have separate heating and cooling hydraulic circuits. The communication was used for monitoring only.

With the reconstruction, the designers required controllers with outputs for heating and cooling, and a separate temperature sensor to be placed in front of the heat exchanger as a limiting supply air sensor. This solution is quite common at fan-coils, but there was a constant air volume system here with air supply from central air handling units.

A standard fan-coil controller would be rather expensive, because the relay outputs would not be used.

After briefly researching the market, the local distributor for [Domat Control System](#) controllers requested development of a specific controller to fit the application at reasonable price.

The resulting UC230 controller is based on the design of the floor heating controller UC300, which also has an external Pt1000 temperature sensor. One extra triac PWM output, one binary window contact input, and firmware adaptation had to be added. The controlled variable is the internal sensor temperature, external sensor temperature, or average temperature of those two sensors.

It was also important to the customer that Domat Control System offer free addressing and preconfiguration of the controllers so that they could be pre-labeled with their addresses and corresponding room numbers. The tables with addresses and room numbering were supplied by the designer in advance, so the controllers did not have to be addressed on site, which saved time and reduced the possibility of faulty placement.

Primary heating and cooling controls were supplied by Priva.

Thanks to Modbus RTU, it was no problem to integrate the room controllers to the building control and management system.

The communication is used for monitoring and temperature control. Controllers are grouped by floors and floor parts according to usage scenarios and tenants, each group having its own time schedule. This brings significant energy savings.

The development of the custom controllers was completed quickly, and the first samples, together with the bases with terminals, were supplied in May 2011. Then it was possible to install the cabling and to connect the terminals in advance, even before the controllers were supplied. Subsequent installation simply required the controller body to be snapped onto the base with the terminals.

A total of 693 controllers were installed in the building, on floors two to 13. Each floor is linked with a separate bus to its primary DDC process station. After the night depression, all daily setpoint corrections are returned to the original values through a central command. The result of these measures is re-classification of the building efficiency from the highest rating— G — to D+, and, of course, reduced energy bills for the tenants.

Korenix Optimizes Substation SCADA System ...

A power distribution company seeking to build a cost-efficient and reliable SCADA system selected the Korenix JetBox 9300 for its application. The JetBox 9300 is a Modbus-to-SNMP gateway, and combines multiple interfaces and the Linux operating system.

An enhanced, high-quality SCADA solution is essential to ensure effective operation of a utility's critical and costly assets. Use of advanced technologies, data transmission reliability and lower costs are some of the basic requirements for building the interactive smart grid of the future.

Heavy-duty substation environments demand rugged systems that will operate without disruption under the most severe conditions.

Over 150 JetBox 9300 computers were installed as the base of the data acquisition system from main substation plant assets. By integrating LAN, Digital I/O and serial ports into a single compact box, the JetBox 9300 computer fits easily in small spaces, saving physical media costs.

The stored data on the SD card is then sent to the system using the Ethernet ports.

To manage the network easily and efficiently, the system integrator initially chose to use JetBox for the its use as a Modbus-to-SNMP gateway; the JetBox 9300 enabled engineers to check and modify processes at the local sites using the Modbus protocol, while IT staff in control rooms use SNMP to get device data and perform network management.

The JetBox 9300 is designed with reliable RISC processor to provide the stability and reliability required for real-time utility control. The Linux SDK is available for users to develop programmable front-end controller applications. With the Korenix Auto-Run customization setting on SD card, users can configure their own Linux commands and automatically run specific applications.

JetBox's rugged, fanless design allows users to install the units in harsh power distribution sites, while preserving network performance and preventing connectivity loss — to ensure stable, reliable and efficient communication in power substations.
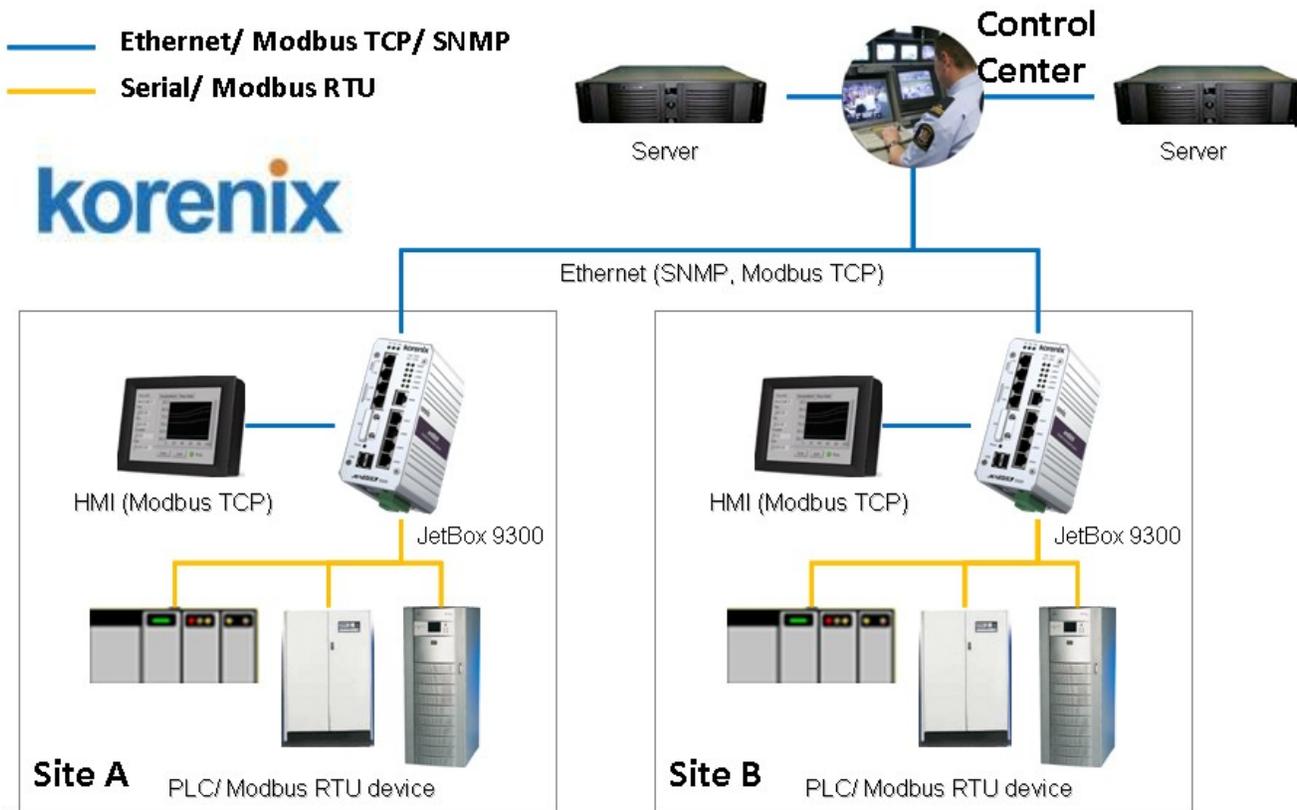
Q&A from the Modbus Discussion Forum...

How to connect two Modbus RTU Clients...

On January 18, jianjian posed the following question:

I have to connect ABB DCS with Emerson DCS. We chose Modbus RTU for this communication. But the problem is now two DCS hardware modules are set as Client. It cannot change. Is there any equipment that can be used to help the two Modbus RTU Clients communicate?

The ABB module can only use Modbus RTU, but Emerson can use Modbus RTU or TCP. So, can I have solution to connect Modbus RTU with Modbus TCP with both sides as Client?

Thanks for your help!

Richard suggested:

Set up a gateway with two Modbus RTU Servers; you can do this with a FieldServer gateway.

Jerry Miille offered:

You could use our Omnii-Comm product for this application. Conceptually, you would define a block of Modbus Holding Registers that can be written to or read from by each Modbus Client at any time. You may contact me off list if you need additional information (713-472-6272).

Darrin Hansen also had a solution:

The ICC XLTR-1000 has two RS-485 ports, each of which can be configured with Modbus RTU Server drivers (thereby allowing two Client devices to exchange information, with the gateway acting as an intermediary).

If you are looking to convert between Modbus TCP and RTU, then the ETH-1000 is from the same product family, but replaces one of the RS-485 ports with an Ethernet port. One of the drivers that can be configured on the Ethernet port as Modbus TCP server, so again you can exchange information between two Clients through the gateway (in this case, one RTU Client and one TCP Client).

Lynn Linse summed it up:

I knew there would be many answers :)

What you must do is buy one of the above devices, then have one of your Client "write" the data share to this device (you can also just buy a small Modbus PLC with two serial ports).

Then the second Client reads from the shared Server. Just be careful how the second Client "validates" that the data is valid. For example, if the link between first Client and device fails, the data will go stale and might fool the second Client.

All of the devices above should offer a solution to this directly (they might include a "health-status register," or even mimic a dead Server with time-outs — check with the vendor as to how this is done.

If you use a small PLC, you'll need to design your own scheme. For example, have the second Client write a value 1 to some register, and have the first Client reset it to 0 any time it updates the PLC. Thus, if the register remains the value 1, then the first Client is no longer updating the data.

Read more or add your comments to this thread.

The Modbus Community

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

Discussion supported by...

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Modbus RTU or Modbus TCP over Radio...

joey e asked the forum:

We need to connect 30 subsystems via Modbus to the main controller over a radio interface. The radio network has a very low bandwidth (max 19 kbps).

Considering that Modbus TCP header size is more than Modbus RTU, does this mean that Modbus RTU over radio is the best solution?

David replied:

In the U.S., Modbus RTU runs over wireless serial modems that have with 19k baud over-the-air throughput rate.

But Modbus TCP can be carried by 900 MHz industrial Ethernet wireless radio modems at 400-500K baud throughput with better range and punch-through than 2.4 GHz WiFi.

Are you sure this radio you're talking about is Modbus TCP slowed down to 19 k?

I suspect your 19 k radio is ready to use with Modbus RTU.

Clay's perspective:

Since the difference between a message in the Modbus TCP and Modbus RTU protocols is five extra bytes in the header, and dropping the two-byte CRC, it's only three bytes more in each TCP message.

This is really insignificant since at 19200 bps, it works out to:

three bytes = 30 bits (approx. with start & stop bits)

30b/192000bps = 0.00156sec = 1.56 msec

This much extra wouldn't really slow things down.

I'm not sure if you can establish a TCP connection over radios.

If you're not going to send over TCP and, therefore, not going to connect through Ethernet and add the TCP wrapper, it makes sense to go RTU, which has the CRC for error detection.

I've seen a handful of RTU radio systems, none as fast as 19200. Slowing it down to 9600 baud can sometimes make it more stable and it's only half speed.

A full 256 byte message would take about a quarter of a second at 9600 baud. Plenty fast enough since they usually don't need to poll that often.

Read more or add your comments to this thread.

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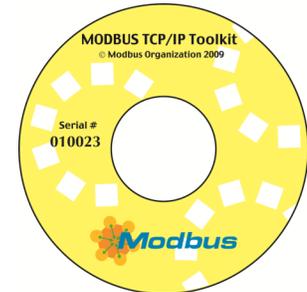
The toolkit is available as a benefit of corporate-level membership in the Modbus Organization or can be purchased separately for US$500 plus shipping and handling. The toolkit contains the following items:

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