

Multiple Masters Sharing Serial Modbus Slaves

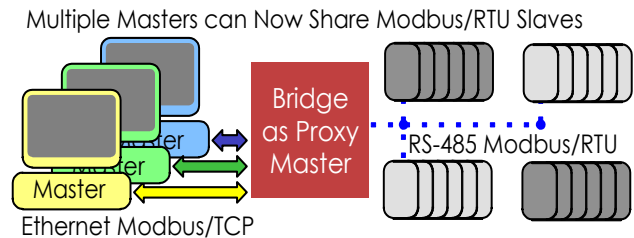
By: Lynn.Linse@digi.com

The Modbus serial protocols are supported on more industrial products by more vendors than any other protocol. Modbus is likely 5 or even 10 times more prevalent than its nearest competitor. Modbus is a fundamental common-interface in many multi-vendor systems.

A powerful new ability in the Modbus world is the use of Modbus TCP to Modbus serial bridges. Ethernet and

Modbus TCP become more popular by the day - yet how can users continue using their existing Modbus serial products?

The answer is simple: use a bridge to make them all look like Modbus TCP slaves. Both Modbus TCP and Modbus RTU share the same command structure, so it is clean and efficient to map between the two. **With a single Ethernet card and Modbus TCP, a SCADA, DCS, or HMI can easily support thousands of Modbus serial slaves.**



Each bridge device has a single IP address and can support any serial multi-drop of Modbus slaves. Addressing a specific slave is now defined by an IP address plus a slave address. This slave address in Modbus TCP is formally called a “unit id” - or a “bridge destination index” in some products. The bridge accepts a Modbus TCP request, converts it to Modbus RTU (or Modbus ASCII). The serial response is converted to become a Modbus TCP response. In most situations the Modbus TCP master can be completely unaware that it is talking to a Modbus serial slave.

But the use of bridges for TCP to serial has an interesting side effect – a wonderful case of “two + two = five”. Serial Modbus is limited to a sole master lording over a group of slaves. Since Modbus TCP allows many concurrent sessions (or sockets), many Modbus TCP masters can connect to the bridge at the same time. To the serial slaves, the bridge acts as the sole Master. To the remote Modbus TCP Masters, the bridge acts like the group of slaves, transparently managing the many concurrent transactions so that each Master thinks it has sole access to all the slaves. The only real impact between the Masters is that they compete for the limited serial band-width – likely only 2 to 10 messages per second per serial line can be handled. This shows itself to the Masters as increasingly sluggish slave responses when more Masters access the Bridge.

Modbus TCP to Serial bridges are available from many sources, but they are not all created equal. Make sure you carefully evaluate your needs before making an investment. Some of the common features that differentiate products:

- Mounting: DIN-rail, plate-mount, or free-standing
- Power: AC mains, 5-9Vdc or central 24Vdc supplies
- Isolation between power supply and serial: none, 1Kv, or 2Kv (isolation is critical on DC-powered products!)
- Serial media: EIA-232, EIA-422, EIA-485 2 or 4-wire (some support only one, some support many)
- How many concurrent Modbus TCP sockets? 4, 8, 32, or more (many Masters require 1 socket per serial slave, so this limits the size of your multi-drop)
- Are exception responses 0x0A/0B supported? (critical for long-term stability)

In final analysis, it is buyer beware. Creating a robust bridge requires years of field exposure to understand the subtle expectations built into most 3rd party Modbus products. While some vendors understand these details and create a trouble-free bridge, others barely understand the published Modbus spec and have many lessons yet to learn – along with their customers who help expose the problems.

Digi's Modbus Bridge – Digi One IA RealPort™

See full details are available at www.digi.com

- Supports up to 28 remote clients/masters or one client/master opening 28 connections to 28 EIA-485 slaves.
- DINRail Mount, 12V/24Vdc power, internally isolated.
- Serial port supports field-selectable EIA-232/422/485
- Easy configuration by Web Browser
- Does NOT suffer the network over-run problem common in older Modbus Bridge products (including Modicon CEV).
- Second serial port can be enabled to allow a local serial master to share serial slaves – very useful for local HMI or technicians accessing by notebook.
- Supports Modbus/TCP, Modbus/RTU-in-TCP (or UDP), plus has Windows drivers to emulate a remote serial port for older application that do not support Modbus/TCP

