

An Energy Meter Monitoring Network using Modbus Routers

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A network that allows a SCADA Server to collect metering data from electrical meters connected over multiple RS485 bus chains using CYGNUS MODBUS Router

Networked energy meters are typically accessed over a RS485 network using MODBUS Protocol. Up to 32 energy meters can be connected to each RS485 network segment. Multidrop Serial MODBUS protocol (also called “MODBUS ASCII” or just “MODBUS” protocol) is used to access the meters. In this protocol a master system (MODBUS Client) sends queries to the devices being monitored, i.e., energy meters (MODBUS Servers). Each Server has a non-zero 8-bit address to independently identify it on a RS485 bus.

Fig 1 shows two CYGNUS 1110 MODBUS Routers in a scheme which allows a SCADA server to access Energy Meters over a campus LAN. Each CYGNUS 1110 MODBUS Router connects to the SCADA server over an Ethernet interface. It converts the MODBUS-TCP protocol (typically used by SCADA servers), to MODBUS Serial protocol which is used by energy meters. Four RS232 ports on CYGNUS 1110 provide the physical serial ports necessary to access the meters using MODBUS Serial protocol. Since energy meters typically have a RS485 physical interface, external RS232-to-RS485 converters (available from CYGNUS) can be used to convert the 4-wire RS232 protocol on RS232 ports of CYGNUS 1110 into a 2-wire RS485 bus.

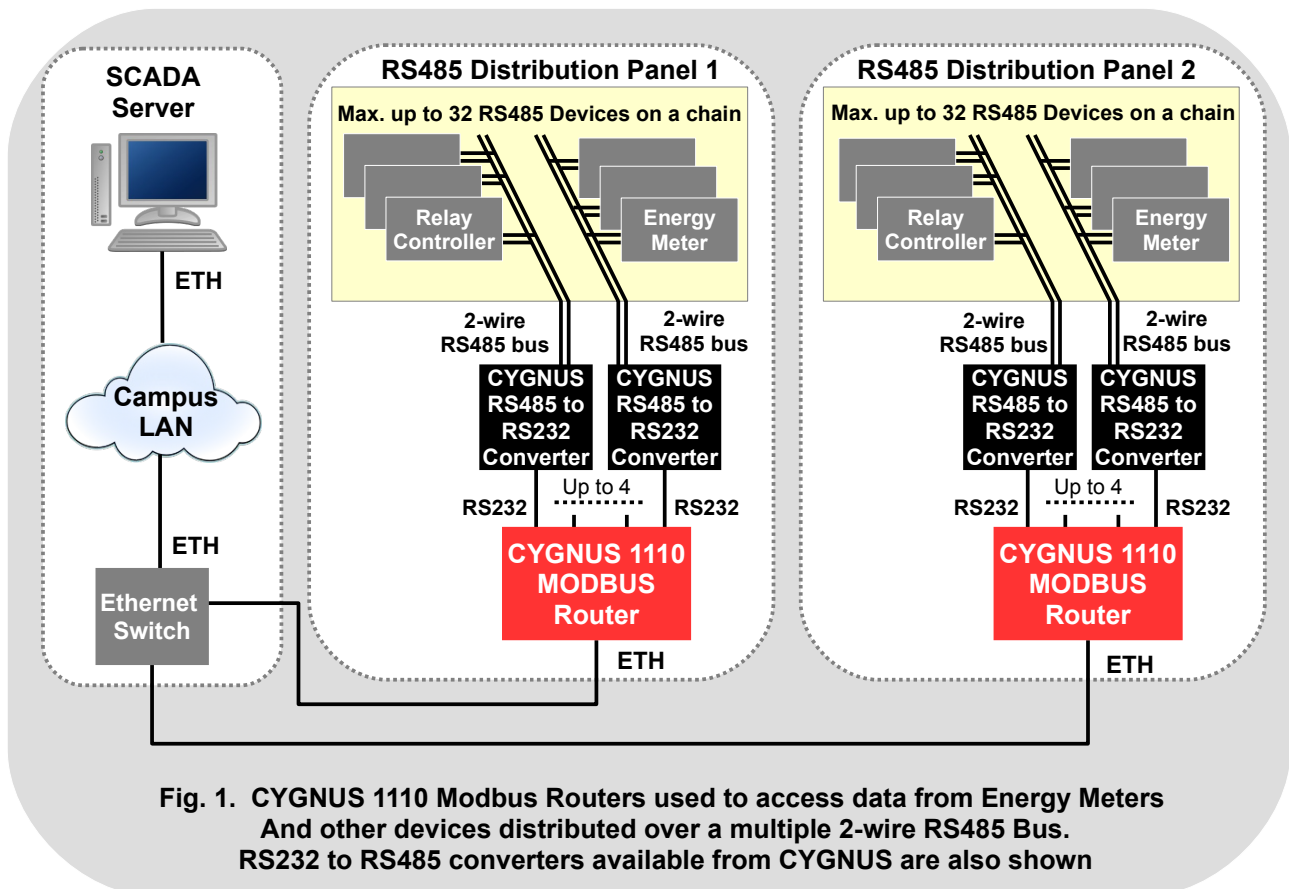


Fig. 1. CYGNUS 1110 Modbus Routers used to access data from Energy Meters And other devices distributed over a multiple 2-wire RS485 Bus. RS232 to RS485 converters available from CYGNUS are also shown

The four RS232 ports of CYGNUS 1110 allow up to four RS485 chains to be set up. The MODBUS addresses of energy meters on all these four RS485 chains however have to belong to the same pool of 255 addresses supported by MODBUS protocol. As far as the SCADA server is concerned, it does not matter to which RS485 bus an individual meter is connected.

When an energy meter (or other device on the RS485 bus) responds to a query from the SCADA server, CYGNUS 1110 MODBUS Router collects the data in the form of a frame, and sends it to the SCADA server using MODBUS TCP protocol.

It is not necessary that the SCADA server be located in the same premises as the energy meters. It may even be at a distant place, away from the site where the meters are installed. To allow this CYGNUS 1110 is equipped with two V.35 compatible “WAN” ports, which allow the CYGNUS 1110 to operate as a standard IP router and connect to the remote SCADA server using a wide area network of IP routers. The scheme is shown in Fig 2. The WAN link between the IP router at the SCADA server location and the CYGNUS 1110 MODBUS Router at the energy meter site may be leased from service providers, and may be up to 2 Mbps in speed (such leased lines typically require the use of leased line modems on copper or Fiber local media for last mile access from the service provider’s termination point to user premises. Both fiber and copper modems required for this purpose are also available from CYGNUS).

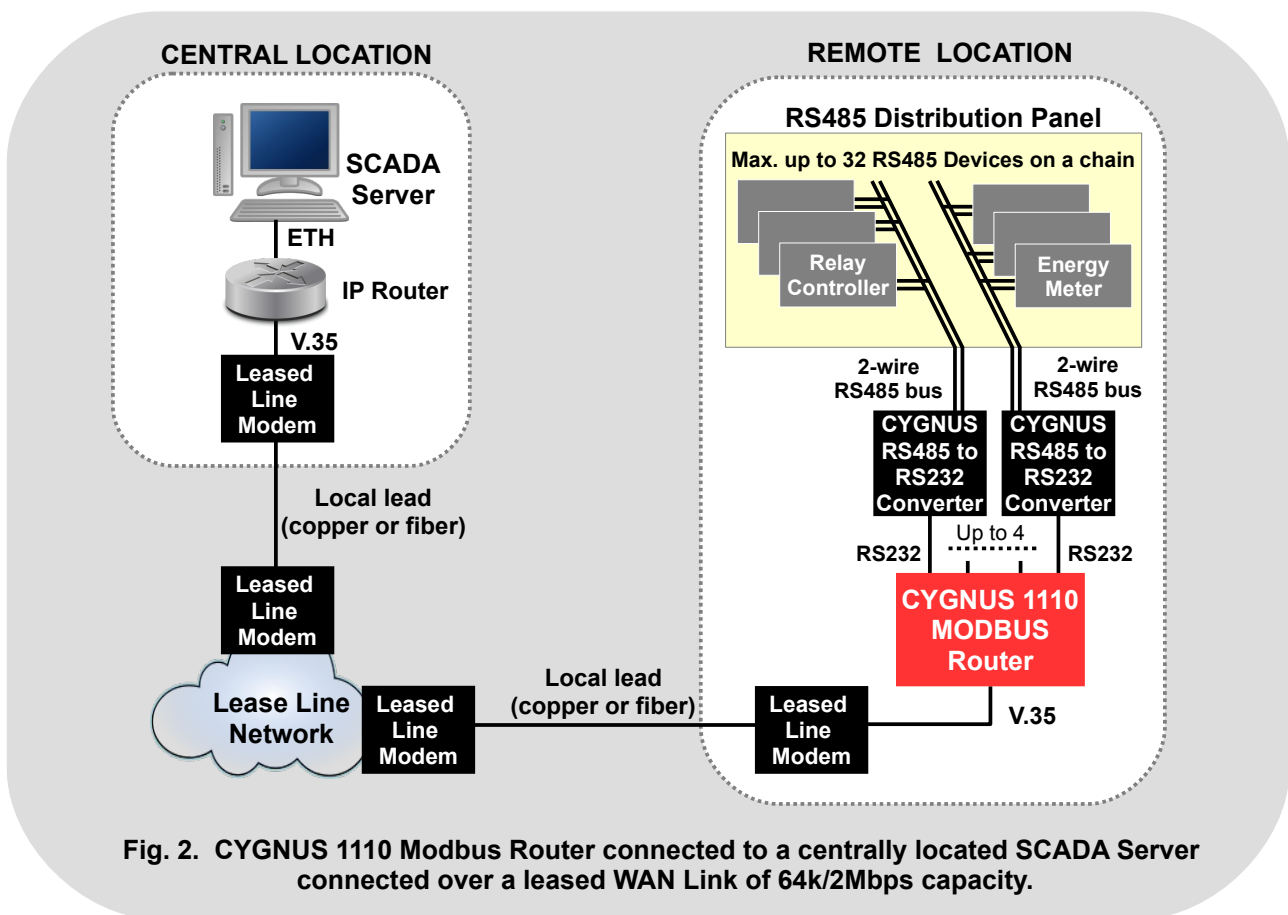


Fig. 2. CYGNUS 1110 Modbus Router connected to a centrally located SCADA Server connected over a leased WAN Link of 64k/2Mbps capacity.

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