Connect a Gateway to a Modbus Network Using MultiHop Radios

Overview

This Technical Note describes how to connect a Sure Cross® DX80 Gateway to a Modbus master device using a pair of MultiHop radios. These same steps will work with any RS-485 device. Connecting to a RS-232 device is described at the end of this document.

Banner's MultiHop radios and Gateways use non-isolated RS-485 circuits and must have their grounds connected.

- Use Banner's 5-pin splitter cable, model CSRB-M1250M125.47M125.73 to connect a *Flex*Power Gateway to a *Flex*Power MultiHop radio.
- Use Banner's 4-pin splitter cable, model CSB-M1240M1241 to connect a 10 to 30 V dc Gateway to a 10 to 30 V dc MultiHop radio.

Configure the Communication Parameters

The hard-wired devices and PC should use the same communication parameters.

1. Verify the following communication parameters on the Gateway and MultiHop Radio are the same.
   - Baud rate (default 19.2 k)
   - Data bits (default 8)
   - Parity (default none)
   - Stop bits (default 1)

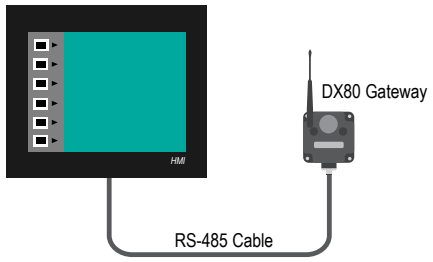
   Refer to the Gateway or MultiHop radio datasheets for other communication parameter options. The baud rate and parity are set on the MultiHop radios using DIP switches.
2. Save any changes to the settings and reboot the device.
3. Using your computer's device manager, set the baud rate, byte size, parity, and stop bits to the same as the Gateway and MultiHop radios.
4. Set the flow control type to none.
5. For Modbus mode, set the Timeout parameter to about 2000 milliseconds for most MultiHop radio networks. Larger systems with many hops may need more time.
6. Save your changes.

Connect the Host to the Gateway or Other Serial Device

When using a third party device, refer to the wiring tables to connect the devices. Some RS-485 lines are isolated (the RS-485 ground can float with respect to the device's chassis ground). Isolated RS-485 lines may not have an RS-485 GND terminal available. If there is no GND, omit this connection.

1. Using an RS-485 cable, connect the host system to the Gateway.

2. Verify that the host system and Gateway/serial device communicate without the MultiHop radio.



3. Disconnect the Gateway from the host system.

Set the MultiHop Application Mode

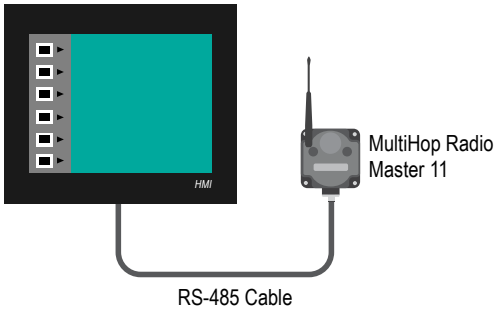
1. Set the mode on the MultiHop radios.

   Banner recommends using Modbus Mode when possible. The MultiHop radio understands the Modbus data telegram, allowing messages to be routed and acknowledged at the wireless physical layer.

   - For Modbus RTU devices, select Modbus Mode on the MultiHop radio (DIP switch 6 is OFF, default).
   - For all other connections, select Transparent Mode (DIP switch 6 is ON).
2. Configure the MultiHop radio that is connected to the Modbus master as a radio master.
3. Apply power to both MultiHop radios and follow these binding instructions:
   a) On the MultiHop master radio, triple-click button 2.
   b) On the other MultiHop slave radio, triple-click button 2.
   After the MultiHop slave completes the binding procedure, it will automatically exit binding mode and begin running.
   c) Assign a radio ID to the MultiHop slave. In our example shown below, the slave is assigned radio ID 14.
   d) Exit binding mode on the master radio by double-clicking button 2.

Connect the MultiHop Radios

1. Connect the MultiHop master radio to the host system using an RS-485 cable. When using third party devices, refer to the wiring tables (*Wire the Gateway and MultiHop Radio* on page 3).



2. After the host and MultiHop master radio (and Gateway and MultiHop repeater/slave radio) are connected, check the MultiHop radio's LED 2.

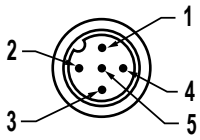
   - If LED 2 flashes yellow, active Modbus communication is occurring.
   - If LED 2 is not blinking yellow, there is no Modbus communication.
   - If LED 2 is flashing red, corrupt data packets were received.

3. If there is no Modbus communication, verify the following:
   a) The host system is periodically transmitting data
   b) One MultiHop radio is configured as a master radio and all other MultiHop radios are either a repeater or slave
   c) The MultiHop master radio is connected to the Modbus master radio
   d) The Modbus slave (Gateway in this example) address is between 11 and 60
   e) The MultiHop radios are set to RS-485
   f) The MultiHop radios (master and slave in this example) are bound and the Site Survey results showed fewer than 30 missed packets
   g) The A and B signal wires may be reversed
4. If LED 2 is flashing red, possible problems are:
   a) Baud rate, parity, or stop bits are set up incorrectly.
   b) Short, low-speed RS-485 cables do not need to be terminated. Cables longer than 10 meters can be terminated with 120 ohms between the A and B signal lines to improve noise rejection.

Wire the Gateway and MultiHop Radio

Wiring the 5-pin M12/Euro-style male connector depends on the model and power requirements of the device. Connecting power to the communication pins will cause permanent damage.

To wire a FlexPower device, wire 3.6 to 5.5 V dc to the gray wire. For *Flex*Power devices, do not apply more than 5.5 V to the gray wire.

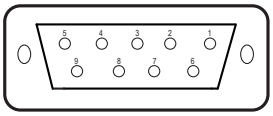
5-pin M12/Euro-style Male Connector	Pin	Wire Color	RS-485 Mode	RS-232 Mode
	1	Brown	10 to 30 V dc	10 to 30 V dc
	2	White	RS485 / D1 / B / +	RS-232 Tx
	3	Blue	dc common (GND)	dc common (GND)
	4	Black	RS485 / D0 / A / –	RS-232 Rx
	5	Gray	Comms Gnd *	Comms Gnd *

* RS-485 mode on the MultiHop radio is not wired. RS-232 mode on the MultiHop radio is wired to 3.6 to 5.5 V dc (FlexPower).

RS-232 Connections

For RS-232 connections, use accessory cable BWA-DRSPLITTER. This cable has a a 4-pin Euro-style male trunk, one DB9 (serial) female branch, and one 5-pin Euro-style female branch. The trunk and each branch is 0.3 meters long.

This cable is typically used to connect a Sure Cross radio to power and to a 9-pin serial port on a computer or other industrial device. The DB9 female cable connection uses the following pin configuration:

Pinout	Pin	Connection
	2	RS-232 Rx
	3	RS-232 Tx
	5	Ground