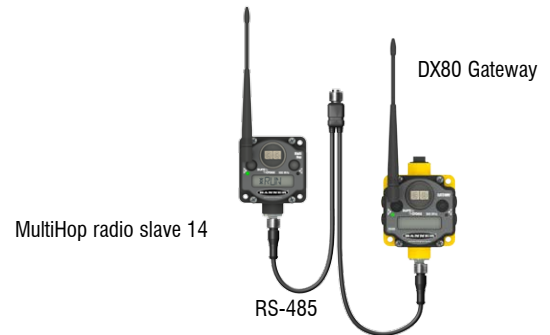
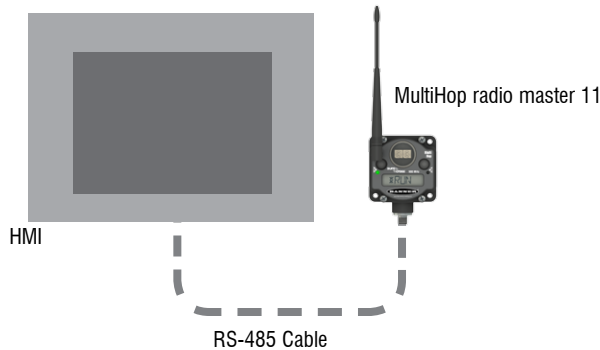
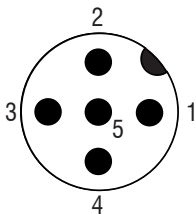


Using MultiHop Radios to Connect RS-485 or RS-232 Devices



CSRB-M1250M125.47M125.73 5-pin Splitter Cable for a FlexPower MultiHop radio and FlexPower Gateway
 CSB-M1240M1241 4-pin Splitter Cable for 10 to 30V dc MultiHop radio and Gateway



5-pin Euro-style Wiring

	Wire Color	RS-485		RS-232	
		10 to 30V dc Gateway, GatewayPro, DX85*	FlexPower Gateway**	GatewayPro, DX83 Ethernet Bridge*	FlexPower Gateway**
1	Brown	+10 to 30V dc Input	+10 to 30V dc Input	+10 to 30V dc Input	+10 to 30V dc Input
2	White	RS-485 / D1 / B / +	RS-485 / D1 / B / +	RS-232 Tx	RS-232 Tx
3	Blue	dc common (GND)	dc common (GND)	dc common (GND)	dc common (GND)
4	Black	RS-485 / D0 / A / -	RS-485 / D0 / A / -	RS-232 Rx	RS-232 Rx
5	Gray	Comms grnd	3.6 to 5.5V dc	Comms grnd	3.6 to 5.5V dc

5-pin Euro-style Wiring (MultiHop)

	Wire Color	RS-485		RS-232	
		MultiHop Radio (10 to 30V dc)*	FlexPower MultiHop Radio**	MultiHop Radio (10 to 30V dc)*	FlexPower MultiHop Radio**
1	Brown	+10 to 30V dc Input	10 to 30V dc	+10 to 30V dc Input	10 to 30V dc
2	White	RS-485 / D1 / B / +	RS-485 / D1 / B / +	RS-232 Tx	RS-232 Tx
3	Blue	dc common (GND)	dc common (GND)	dc common (GND)	dc common (GND)
4	Black	RS-485 / D0 / A / -	RS-485 / D0 / A / -	RS-232 Rx	RS-232 Rx
5	Gray		3.6 to 5.5V dc	Comms grnd	3.6 to 5.5V dc

* Connecting dc power to the communication pins will cause permanent damage.

** For FlexPower devices, do not apply more than 5.5V dc to the gray wire.

OVERVIEW

This TechNote describes how to connect a SureCross 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.

STEP ONE: CONFIGURE THE WIRED DEVICES TO USE THE SAME PARAMETERS

The hard-wired devices should use the same communication parameters:

Parameter	Gateway and MultiHop Radio Default	Other Options
Baud rate	19.2k	38.4k, 9.6k (DIP switch selectable on MultiHop radios)
Data bits	8	-
Parity	None	Even, odd (DIP switch selectable on MultiHop radios)
Stop bits	1	-

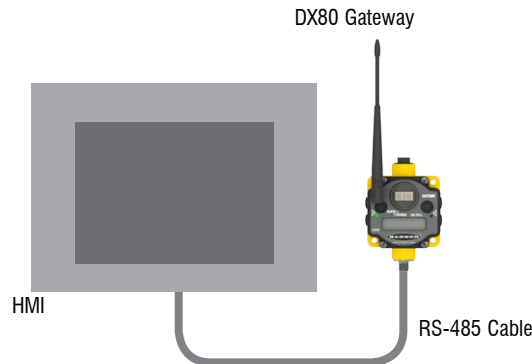
STEP TWO: CONFIGURE THE COMPUTER'S SERIAL PORT

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. Set the Flow Control type to none.

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.

STEP THREE: CONNECT THE HOST TO THE GATEWAY OR OTHER SERIAL DEVICE

Use a RS-485 cable to connect the host system to the Gateway. Verify that the host system and Gateway/serial device communicate without the MultiHop radio.



When using a third party device, refer to the wiring tables on page one 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.

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 FlexPower Gateway to a FlexPower MultiHop radio. Use Banner's 4-pin splitter cable, model CSB-M1240M1241 to connect a 10 to 30V dc Gateway to a 10 to 30V dc MultiHop radio.

STEP FOUR: DISCONNECT THE GATEWAY FROM THE HOST SYSTEM



DX80 Gateway



STEP FIVE: SET THE MULTI HOP APPLICATION MODE

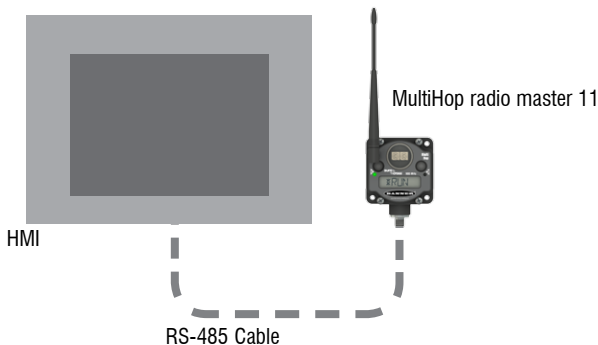
For Modbus RTU devices, select Modbus Mode on the MultiHop radio (DIP switch 6 is OFF, default). For all other connections, select Transparent Mode (DIP switch 6 is ON). Banner recommends using Modbus Mode when possible. The MultiHop radio understands the Modbus data telegram, allowing messages to be routed and acknowledged at the wireless physical layer.

Configure the MultiHop radio that is connected to the Modbus master as a radio master. Apply power to both MultiHop radios and follow these binding instructions:

1. On the MultiHop radio master, triple click button 2.
2. On the other MultiHop radio slave, triple click button 2.
After the MultiHop radio slave completes the binding procedure, it will automatically exit binding mode and begin running.
3. Assign a radio ID to the MultiHop radio slave. In our example shown below, the slave is assigned radio ID 14.
4. Exit binding mode on the radio master by double-clicking button 2.

STEP SIX: CONNECT ONE MULTI HOP RADIO TO THE HOST AND ONE TO THE GATEWAY.

Use the cable shown to connect the MultiHop radio to the host system. When using third party devices, refer to the wiring tables shown on page one.



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After the host and MultiHop master radio (and Gateway and MultiHop repeater/slave radio) are connected, the MultiHop's LED 2 should flash yellow to indicate active Modbus communication is occurring. If LED 2 is not blinking yellow, there is no Modbus communication. Verify the following items:

- The host system is periodically transmitting data
- One MultiHop radio is configured as a master radio and all other MultiHop radios are either a repeater or slave
- The MultiHop master radio is connected to the Modbus master radio
- The Modbus slave (Gateway in this example) address is between 11 and 60
- The MultiHop radios are set to RS-485
- The MultiHop radios (master and slave in this example) are bound and the Site Survey results showed fewer than 30 missed packets
- The A and B signal wires may be reversed

If LED 2 is flashing red, corrupt data packets were received. Possible problems are:

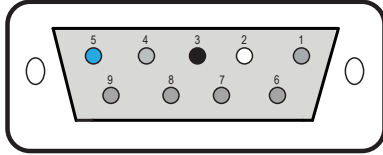
- The baud rate, parity, or stop bits are set up incorrectly
- Short, low-speed RS-485 cables do not need to be terminated. Cables longer than 10 meters can be terminated with 120 ohms between the A and B signal lines to improve noise rejection.

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 SureCross radio to power and to a 9-pin serial port on a computer or other industrial device.

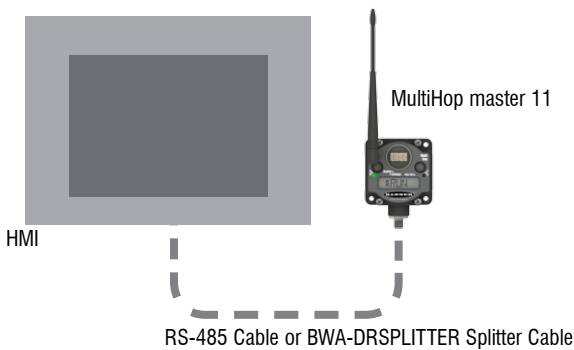
The DB9 female cable connection uses the following pin configuration:

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



After verifying the host to Gateway connection works, connect the MultiHop radio to the Gateway.

Disconnect the RS-232 device from the host system. Connect one MultiHop radio to the host system and one to the Gateway or other serial device as shown below.



MultiHop Radio to Gateway or Other Serial Device



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