**Step 1: Select the Master, Repeater, and Slave Radios**

Before beginning operation, you must select one radio to be the master radio. Set the other MultiHop radios to operate as either repeaters (default setting) or slaves.

1. Remove the top covers of the MultiHop radios.
2. Set one unit to be the master radio.
3. Set the other MultiHop radios to be repeaters or slaves.
4. Set additional DIP switches now. (See the DIP switches section of your specific devices’ datasheets for the positions and descriptions. Battery-powered radios may have different DIP switch settings than shown below.)

**DIP Switches**

<table>
<thead>
<tr>
<th>DIP Switches</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeater (default)</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Master</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Slave</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Default configuration**
- Serial baud rate: 19.2k OFF OFF
- No parity OFF OFF
- 1 Watt transmit mode (900 MHz only) OFF
- Modbus application mode OFF

**Step 2: Apply Power**

The FlexPower MultiHop radios operate when powered from the brown or gray wire. It is not necessary to supply power to both.

Apply power to the radios by connecting the cable as shown in the wiring diagram.

<table>
<thead>
<tr>
<th>5-pin M12 connector pin</th>
<th>“C” model terminals</th>
<th>Wire color</th>
<th>10-30 V dc powered radios*</th>
<th>Solar or battery-powered radios**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V+</td>
<td>Brown</td>
<td>+10–30 V dc</td>
<td>do not apply power</td>
</tr>
<tr>
<td>3</td>
<td>V−</td>
<td>Blue</td>
<td>dc common (GND)</td>
<td>do not apply power</td>
</tr>
<tr>
<td>5</td>
<td>B+</td>
<td>Gray</td>
<td>3.6–5.5 V dc</td>
<td></td>
</tr>
</tbody>
</table>

* Only use pin 5 (gray wire) for radios capable of being powered by solar or battery modules.
** For solar and battery-powered radios, do not apply more than 5.5 V dc to pin 5 or the B+ terminal.

For the communication pin configuration or more details, refer to your specific devices’ datasheets.

**Step 3: Bind the Radios to Form Networks**

Binding MultiHop radios to the master radio ensures the MultiHop radios only exchange data within their wireless network. MultiHop radios will not communicate until they are bound. Bind the radios before installing them to their final locations.

**On the Master radio**

1. **Triple-click** button 2 to enter binding mode. For models with only one button, **triple-click** the button.

2. **For the two LED/button models**, both LEDs flash red. For single LED/button models, the LED flashes alternatively red and green.

**On the Repeater or Slave radios**

1. **Triple-click** button 2 on the slave/repeater radio. For models with only one button, **triple-click** the button.

2. The child radio enters binding mode and searches for any Master radio in binding mode. While searching for the Master radio, the red LEDs flash alternately. After the child radio finds the Master radio and is bound, both red LEDs are solid for four seconds, then both red LEDs flash simultaneously four times.

3. Use both rotary dials to assign a decimal MultiHop Radio ID between 11 and 61. The left rotary dial represents the tens digit (1–6) and the right dial represents the ones digit (0–9) of the MultiHop Radio ID.

4. Repeat steps 2 and 3 for as many slave or repeater radios as are needed for your network.

**On the Master radio**

5. After all MultiHop radios are bound, exit binding mode on the master by **double-clicking** button 2. All radio devices begin forming the network after the master data radio exits binding mode.

**Step 4: Verify Communications**

When testing the devices before installation, verify the radio devices are at least two meters apart or the communications may fail.

**LED 1**

- Green on, then green flashing: Slave/repeater: entering RUN mode
- Green flashing: Master: in RUN mode
- Amber on: Slave/repeater: detected parent radio and searching for other parents within range
- Amber flashing: Slave/repeater: searching for a parent radio

**LED 2**

- Red on: Slave/repeater: selecting a suitable parent
- Red flashing: Master: power applied
- Red on: Slave/repeater: transmitting between master and its parent
- Red flashing: Slave/repeater: transmitting between master and its children

**Status**

- Slave/repeater: synchronizing to selected parent radio
Step 5: Conduct a Site Survey Using the Menu System

Perform the site survey before installing your network to pre-screen a site for its radio communication potential, compare link quality in different locations, or assist with final antenna placement and aiming.

The MultiHop Configuration Tool requires the USB to RS-485 converter cable, BWA-UCT-900. Site surveys can be conducted from the master, repeater, or slave radios. For a more detailed description of the parent-child relationships, refer to the device’s datasheets.

1. On a data radio, press button 1 until the display reads "SITE."
2. Single-click button 2 to enter the Site Survey menu.
3. From the master radio: Single-click button 2 to display the child radio’s device address. (A radio’s device address is displayed under its "RUN menu.") Single click button 1 to scroll between all the master radio’s children. When you reach the child radio you want to run the Site Survey with, single-click button 2.

From the repeater radio: Single-click button 1 to cycle between PARENT and CHLDRN. Single-click button 2 to select PARENT or CHLDRN. If conducting the Site Survey with one of the repeater’s children, single-click button 1 to scroll among a repeater’s children radios. (Each data radio’s device address is displayed under its "RUN menu.) Single-click button 2 at the device address screen to select the child or parent and begin the Site Survey.

From the slave radio: Single-click button 2 to display PARENT. Single-click button 2 to begin the Site Survey.

4. The site survey begins. LED 2 on both the parent and child radios flash for every received RF packet. To indicate the parent is in site survey mode, LED 1 is a solid green. The radio analyzes the quality of the signal between the parent and child by counting the number of data packets received and measuring the signal strength (green, yellow, and red).
5. Examine reception readings (G, Y, R, M) of the devices at various locations. M displays the percent of missed packets while G, Y, and R display the percent of received packets at those signal strengths.
   - GRN = GREEN excellent signal strength;
   - YEL = YELLOW good signal strength;
   - RED = RED marginal signal strength;
   - MIS = Percentage of missed packets.

6. During a site survey, single-click button 2 to pause/resume autoscrolling the results. While paused, button 1 advances through the four signal strength categories. Double-click button 2 to exit the results display.
7. Double-click button 2 on either the child or the parent device to exit site survey. The devices automatically resume operation.

Step 6: Installing Your Sure Cross Radios

For most outdoor applications, we recommend installing your Sure Cross devices inside a secondary enclosure. If not using an enclosure, mount the radios where rain or snow will drain away from the unit.

To minimize the damaging effects of ultra-violet radiation, avoid mounting the radios facing intense direct sunlight.

MultiHop Configuration Tool (MHCT)

Banner’s MultiHop Configuration Tool offers an easy way to configure and view your MultiHop radio network.

The MultiHop Configuration Tool requires the USB to RS-485 converter cable, BWA-UCT-900.

For additional information, including installation and configuration, weatherproofing, device menu maps, troubleshooting, and a list of accessories, please refer to the Sure Cross® MultiHop product manual, Banner p/n 151317.