

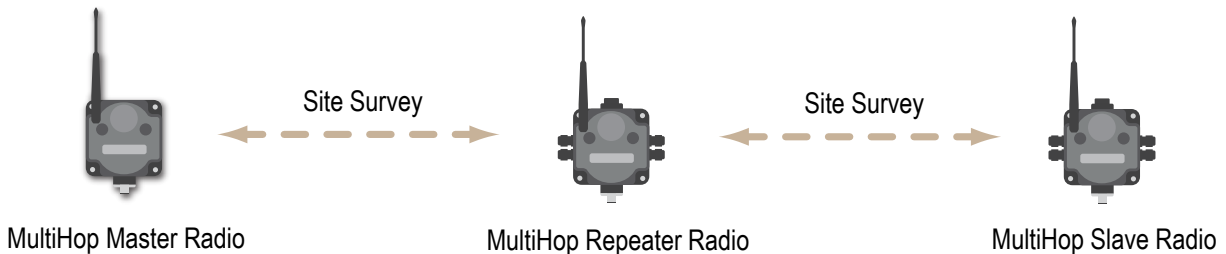
Technical Note

MultiHop Network Formation

At the root of the wireless network is the MultiHop radio master. The radio master contains the initial network routing data and the translation data for the Modbus Address IDs. If the MultiHop radios are running in transparent mode (non-Modbus protocol), network routing information is not used and transactions are broadcast to the entire network.

As the MultiHop radios power up, all MultiHop radio repeaters or slaves within range of the MultiHop radio master connect as children of the radio master, which serves as their parent. After radio repeaters synchronize to the radio master, additional radios within range of the repeater can join the network. The radios that synchronize to the repeater form the same parent/child relationship the repeater has with the radio master: the repeater is the parent and the new radios are children of the repeater.

The network formation continues to build the hierarchical structure until all MultiHop radios connect to a parent radio. A MultiHop radio can only have one designated parent radio.



After MultiHop radios are communicating to their parents, the network formation information is transmitted back to the radio master, creating a path that is stored in each parent radio's routing tables. Each parent radio stores only one link or step along a path to an end radio. The routing information for non-MultiHop Modbus slave devices is stored as the devices are accessed by the host system.

Only the MultiHop radio master understands Modbus Address IDs. The conversion from Modbus Address ID to a MultiHop device address is done in the radio master as a Modbus message is received. After the Modbus Address ID to MultiHop device address conversion is determined, all network routing uses the device address, not the Modbus Address ID. A device address is similar to an Ethernet MAC address (sometimes the MultiHop device address is referred to as the MAC address).

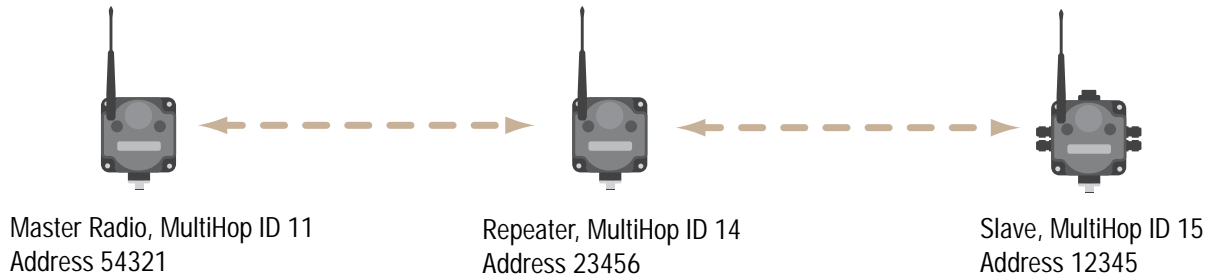
Building MultiHop Formation Tables

As the network is formed, new device addresses are placed in the Network Formation Table in the MultiHop radio master (starting at register 47002). The new radios are stored in the order in which they synchronized to parent radios.

Register 47001 stores the number of radios in the Network Formation Table. Associated by position to the device address in the Network Formation Table is the routing data (starting at register 47302). The actual routing data is the next device address in the path to get to the end radio. The example below shows a Network Formation Table on the radio master for three radios in the network.

Register	Data	Description	Register	Data	Description
47001	03	Defines the number of radios in the network			
47002	54321	First device address in the network formation table	47302	54321	The same device address indicates that the target device is connected to this radio.
47003	12345	Second device address in the network formation table	47303	23456	A different device address indicates the first step in the route is going to device 23456.
47004	23456	Final device address in the network	47304	23456	Link indicates the device is connected to this parent radio.

Register 47302 is associated to register 47002 by its position in the table. Therefore, the link for the device address stored at register 47002 is stored in register 47302.



Correlating Device Address to Modbus Address IDs

The Modbus Address ID table defines the association from a Modbus Address ID to the MultiHop device address. (The Modbus Address ID for a MultiHop radio is usually defined by the rotary switches whereas the device address is a 5-digit number assigned by the factory.)

Register 46502 defines the Modbus Address ID offset for wireless Modbus Slaves. An '11' in this register would mean that wireless Modbus Slave devices start at Address ID 11. Any messages referring to Modbus Slaves 1 through 10 will be ignored by the wireless devices.

Registers 46504 through 46604 store the MultiHop device addresses in order, starting with the Modbus Address ID defined by the offset register (46502). In the example below Modbus Slaves 11, 14, and 15 are in the table. Register 46503 defines the maximum number of Modbus slaves for this system.

Register	MultiHop ID	Data	Description
46502		11	Wireless Modbus Slave IDs start at 11
46503		50	The number of Modbus Slaves defined for the system
46504	11	54321	MultiHop device address 54321 is Modbus Slave ID 11
46505	12	65535	Modbus slave ID 12 is not used
46506	13	65535	Modbus slave ID 13 is not used
46507	14	23456	Device address 23456 is Modbus Slave ID 14
46508	15	12345	Device address 12345 is Modbus Slave ID 15