



industrial/wireless/performance

APPLICATION BULLETIN

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MDS9810

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A BETTER PEER-PEER-or-COLLISION AVOIDANCE SYSTEM

INTRODUCTION

The 9810 manual describes using these radios in SIMPLEX mode in order to allow peer-to-peer communications. In Simplex, the TX and RX frequencies of all radios in the network are the same. All radios in such a network could hear each other or have knowledge of each other's transmission (by watching pin 10, RUS) for CSMA collision avoidance mechanisms. CSMA means "Carrier Sense Multiple Access" and is used by DNP3 and other protocols for detecting channel busy to avoid self interference.

LIMITATIONS

The SIMPLEX scheme is simple to implement and may be appropriate for small physically close systems. It does suffer the limitation that all radios in the system must be in radio range of all others that need to communicate together or have carrier sense of each other. This usually means that omnidirectional antennas are used throughout the system increasing the possibility of interference, the possibility of interference to others and reducing the total system coverage. High gain omnidirectional antennas also cost more than Yagi antennas, require stronger supports, and are more difficult to install. Low gain omnidirectional antennas will reduce the range further.

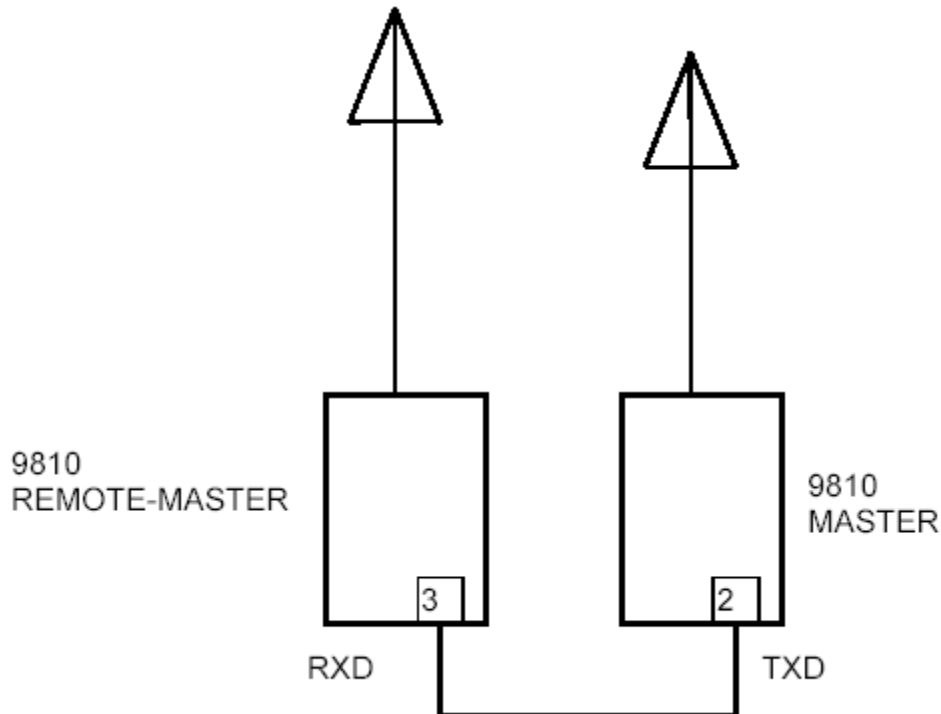
A BETTER WAY

If we could install a full duplex repeater for 9810 radios at a suitable location, high on a hill for instance, all radios in the system could hear each other as the repeater would re-transmit all data it hears. If this Repeater is also the master, then we can construct a wide range Peer-to-Peer system where all remote radios can hear each other while still running half duplex (split frequency) and using directional antennas all aimed at the hilltop repeater. This Master/Repeater could also operate as a full duplex master that could receive from one remote while requesting data from another all at the same time, just as a standard licensed MAS master can.

IMPLEMENTATION - The Remote-Master Mode

There is an additional MODE in the 9810 that is called Remote-Master. It is programmable in the radio with the command "MODE R-M". When a radio is in this mode, it acts as a remote (does not transmit sync messages) but operates on Master frequencies except at sync time where it switches to the next sync frequency to obtain synchronization from the system master.

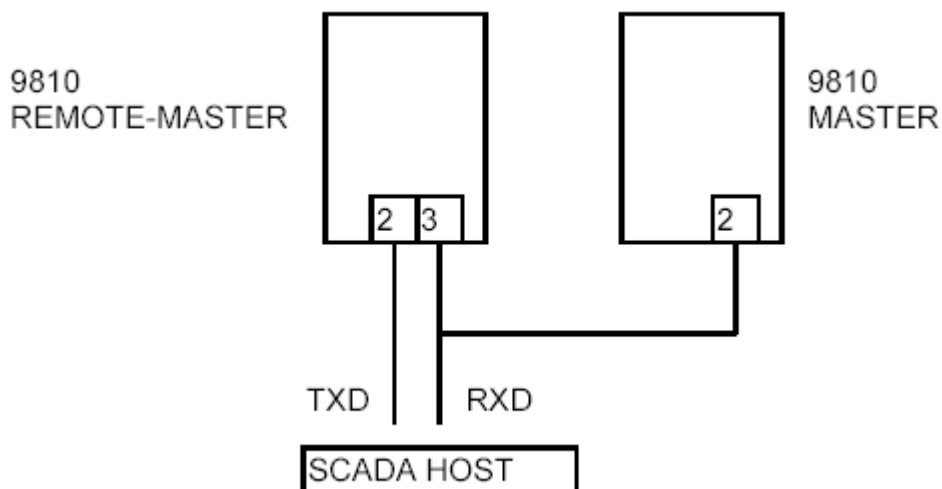
By using a radio in this mode in conjunction with the system master, a full duplex repeater or full duplex master may be constructed



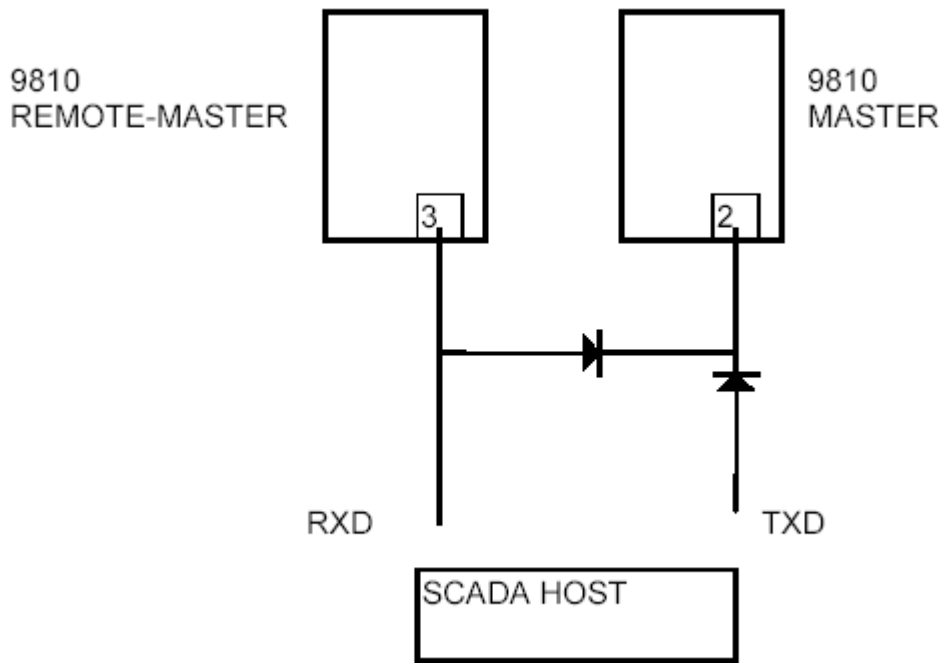
Install a pair of radios in this configuration on a hilltop and point all other radios (remotes) at them. All transmissions heard by the REMOTE-MASTER will be re-transmitted by the Master radio for all other remotes to hear. The SCADA host may be connected to any remote radio in this configuration.

The radios need separate antennas and should be mounted one above the other just a few feet apart. This yields enough isolation between the two radios. Since the master is now in a centrally located high location, the range of this type of a system is enhanced over a system where the Master is located at the SCADA host which might not be in such an ideal location.

You could locate the repeater at the SCADA host if desired or if the host location is central to your application. The connections then would look like this:



If it would be desirable to have a Full Duplex Master you can also hook it up like this:



Simple diodes are used as the “OR” function for data to be transmitted either from the SCADA HOST or the Remote-Master.

If the Repeater location needed to include a local RTU, configuring the RXD and TXD is the same as for a SCADA HOST.

All of these configurations will result in all units (both the HOST and the RTUs) to not only hear each other, but they will also hear themselves as an echo. This may be a problem in some implementations if the devices are not internally capable of withstanding such occurrences.

For more information, contact MDS Technical Services at techsupport@microwavedata.com, or by phone at +1-585-241-5510.