Reconfigurable Distributed Networking for Terrestrial and Space Applications

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Dynamically reconfigurable sensors have wide ranging applications in terrestrial- and space-based networks. Described here is a networking protocol that can serve as the infrastructure for these types of networks.

The design is based on the Microhard MHX-2400 spread spectrum transceiver, which operates in the 2.4000 to 2.4835 GHz ISM band. The emphasis on network redundancy and reconfigurability in the design results in an autonomous and self-healing network. In this network architecture, each transceiver may be configured to serve either as a master or slave. Each slave may serve as a repeater. The network address and unit address must also be user specified. Once each transceiver is configured, the radio's architecture automatically forms master-centered networks of localized slaves possessing the same network address as the master.

The network design is based on the built-in networking capabilities of the MHX-2400 and consists of an algorithm for reconfiguring the transceiver autonomously to form ad hoc networks. Each node in the network is assigned a unique unit address and is initially configured as a master awaiting the connection of slaves. Gradually those masters that have not established a network are reconfigured to become slaves and iterate through all known network addresses until matching the address of a reachable master. In this fashion small network clusters are formed. A method for merging these small clusters to create a larger network will also be discussed.

This presentation will focus on the network design, but will also describe other aspects of its application to reconfigurable nanosatellite networks.