NIGHTHAWK

Technical Description

Model: MeshERT 006

FCC ID: YJC-MESHERT006

Single Board Radio Module

Module Operational Description

The Nighthawk Model MeshERT 006 Module is designed to provide supplemental drive by read capabilities to the standard Nighthawk RDM-950 cell technology based electric meters, the CEO-950 cell technology based disconnect collars for electric meters, and to serve as a data collector, radio repeater, and load control end point radio. It consists of a conformal coated single PCB with and integrated PCB antenna. It is designed to be powered through a connection to a Host board. The Host board provides and receives data from the Host board, but controls all radio functions and communications autonomously.

It operates in two modes:

1) A 915 MHz band Frequency Hopping Spread Spectrum Transmit only mode designed to be compatible with the Itron® ERT reading system. It is capable of transmitting a standard consumption message (SCM) that can be read by a utility's existing meter reading equipment.
2) A 915 MHz band Frequency Hopping Spread Spectrum Transceiver that operates as an addressed mesh network radio. Each radio has a unique identification number (ID) that is used as the modules address. The module will also listen and keep a record of all of the surrounding ID's that it can receive and use those IDs to create a network path to route messages that it receives on to the intended module based on ID number hierarchy scheme. Messages are relayed in packets with routing information embedded in each packet. Data contained in each packet can be of any nature or purpose. The entire mesh system design is for low priority information that is compatible with a long latency network.

Since the MeshERT 006 Module is designed to operate only with or in conjunction with other Nighthawk equipment, it uses a proprietary unique control and power interface to connect to a control and power source. The interface connector meets the following criteria:

1) Power is supplied from the Host board and is a filtered and regulated 3.3 volt DC up to 250 milliamps. Ground for the module is shared with the Host board.
2) Serial communications is hosted by the Host board and is typically 19200 baud half duplex TTL level signals.

3) Data and select lines are 3.3 VDC level

PCB Design and Construction

The MeshERT 006 Module is comprised of a Texas Instrument MSP430 microcontroller connected to a Texas Instruments CC1101 RF transceiver chip. The design employs a balun connected PCB folded monopole ¼ wave antenna. The antenna exhibits an average -3 dB loss from 902 to 928 MHZ. All digital and RF components are on the same side of the PCB and share a common ground with the host board interface connector located at the opposite end of the PCB from the antenna. The PCB is a four layer FR4 board with ground planes on each layer. Grounding is reinforced with a large number of vias connecting all of the grounding copper throughout the board. The digital section is not surrounded or placed over grounding planes to reduce interjected noise switching noise in the RF circuits. Isolation resistors are employed to de-couple digital noise from the processor and prevent it from reaching the RF chip. Inductors and filter capacitors filter any remaining noise from the 3.3 VDC power at the processor and RF chip power supply pins.

Typical Data:
Meter ID
ERT ID
Cell Phone ID
Meter Address
Account Numbers
Longitude & Latitude
Meter Reading
Meter Factor
Meter Units
Meter Rate
Meter Errors
Meter Tamper Flags
Meter Mode
Meter Status