

Theory of operation - P5055M family of point to point radios

GENERAL DESCRIPTION

The P5055M radio system is a point to point wireless link consisting of a Master unit (-MU) and Remote unit (-RU) functioning as a wireless MAC layer ethernet access solution. Each unit accepts full or half duplex Ethernet IEEE 802.3 data packets from a 10/100BaseT port formats the packets with error coding, and transmits them at 6 to 54 Mbit/sec rate using the ISL3692 zero -IF modem. The modem formats the raw data into Orthogonal Frequency Division Multiplex (OFDM) symbols and sends the symbols to the power amplifier through either a bandpass filter or a fixed attenuator, depending on the frequency selected. The radio operates in a Time Division Duplexing (TDD) mode. The CPU and RF sections are clocked by the same 40 MHz oscillator. The Ethernet port is clocked by a 25 MHz oscillator. The DFS section is clocked by the same 40 MHz oscillator as the main section, except for the ADI microcontroller which uses a 32.768 KHz clock crystal. The switching regulator oscillators are about 1MHz. The entire PCB is shielded by a solid cast aluminum housing. The unit acts as a bridge and will transmit all packets it receives on its port. The unit utilizes either a +19 or +23 dBi integral patch antenna array or an external dish from +27 to +33 dBi (with 1 dB cable loss) to reduce emissions to just the communications path of interest. The RF power level is automatically controlled by the CPU and will be reduced to the minimum level needed to achieve a target receive strength level at the receiver side.

The MU is normally located at the Internet Service Provider's network center (usually mounted on a tower or rooftop) and is connected to the wired Internet via Ethernet cable.

The RU is located on the Internet Service Provider AP tower (mounted outside) and is connected to access points or other Ethernet device.

DYNAMIC FREQUENCY SELECTION (DFS)

The dynamic frequency selection part of the radio is actually a separate receiver that monitors for radar using a threshold detector. This receiver is always active and cannot be turned off by the user. The unit uses simple level detection and a comparator that will trigger if the input radio signal is above a preprogrammed level. The level is different for each of the three models that are available based on the minimum antenna gain for each.

After a radar event, the MU will cease transmission on the current channel and move to a randomly selected new channel. That channel is then declared unavailable for 30 minutes. The uniform spreading requirement is met by using a random number generator with a range equal to the number of available channels. Since the number is random, each available channel has the same probability of being selected. The MU will then perform a channel availability check. After the CAC is successfully completed, the MU will begin transmitting packets to the RU. The RU will respond using a low to high power leveling routine that allows the MU to leave its radar detector enabled.

The radar detector function is not used for the ISM band 5.725 to 5.85 GHz.

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HARDWARE/FIRMWARE CONFIGURATION

Firmware running on the MU and RU manages the flow of information out to the Ethernet port. The firmware is loaded into the FLASH memory on the unit and runs when the unit is powered on. The only difference between the MU and RU is the firmware. The circuitry and antenna, enclosure is EXACTLY the same, The functioning of the hardware is the same for both models, including RF channel changing, RF power output, TX/RX switching, and anything that can affect emissions.

Functionally, the only difference between the units is that the MU is the Master and the RU is the slave. The RU will only transmit AFTER the MU transmits a grant packet to it. The RU cannot establish an ad-

hoc network. The MU also maintains the synchronization on the link and coordination of frequency changes.

The entire system is grounded via the aluminum enclosure which is directly connected to Earth ground using an 18 AWG wire. The patch antenna system is built in and requires no further grounding.