

## Proximity Tag Exciter Data Modulation onto 125 KHz Channel

The low frequency channel that implements the wireless link between the Tag Exciters and the Tags operates at 125 KHz. The Tag Exciter (or The Proximity Tag Exciter) transmitter is implemented with discrete components. Data is modulated onto the channel by a microcontroller. At the Tag end of the wireless link data from the Tag Exciter (or The Proximity Tag Exciter) is received and demodulated by a low power LF receiver. The data is then decoded by Tag’s microcontroller. Data is modulated onto this channel at a rate of 4kbps using an On/Off keying modulation employing a differential Manchester encoding scheme (See Figure 1). This reduces the effective data rate down to 2 kbps but gives the benefit of a DC balanced data.

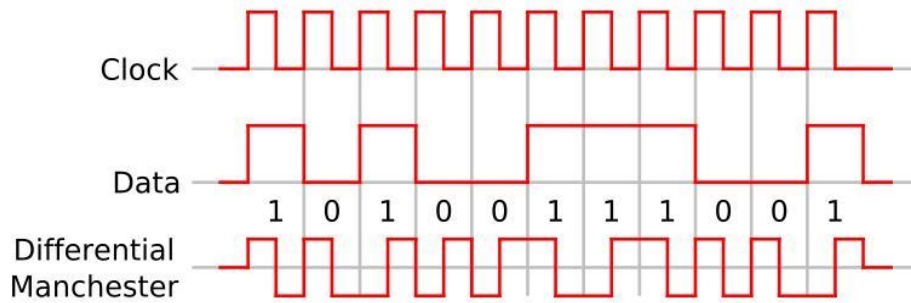


Figure 1: Example of Differential Manchester Encoding

For each message sent on this channel a total of 25 bits are conveyed (24 data bits + start bit). The entire data stream consists of a start bit, eleven bits of Tag Exciter ID, six bits of command data, and 7 bits of CRC. Figure 2 below illustrates a sample LF data stream that would be produced by a Tag Exciter. The start is a normal bit width and shall be high in the first half of the bit and low in the second half of the bit (250 μS high, 250μS low) all other data is modulated onto the channels as per the Differential Manchester encoding scheme.

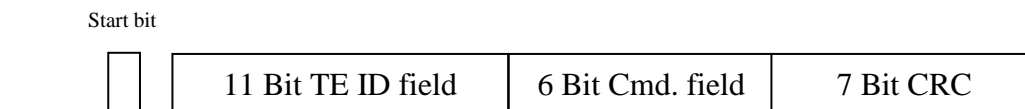


Figure 2: Sample LF Data Packet

## Proximity Tag Exciter communication over 433 MHz channel

The communication between PTE and the rest of the system (Tag Readers) over high frequency channel at 433.92 MHz is implemented using a matched pair of radios. The PTE employs a CC1100 transceiver and the Tag Readers also employ a CC1100 transceiver. The CC1100 devices are highly automated packet radio devices.

PTE transmits beacon message every 30 seconds. In these messages PTE reports its Serial Number, its firmware revision and basic status information. The system uses these messages to monitor if PTE is operational.