

Infrared Modulation Method: Baseband Return to Zero with Bit Insertion

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1. Estimated transceiver cost factor = 0.85 (Manchester = 1.0)

There are two functions that are less complex or demanding compared to Manchester – clock recovery and pulse width control. Since there is no timing ambiguity in the rising edge of the signal the clock recovery is quite simple. Since no data information is contained in the falling edge of the signal there is no need to control the width of the IR pulse in either the transmitter or the receiver. For example, the receiver amplifier rise and fall times do not have to be matched.

2. Automatic data rate detection could most easily be accomplished by inserting a string of “ones” in the preamble. Since each one will result in a pulse, the receiver could detect the data rate by measuring the time between the beginning of successive pulses.

The receiver filters would have to be switched for good random data signal recovery at different speeds. Switching filters would add significant complexity to what can be a simple receiver.

3. To be determined.

It is acknowledged that RZBI doesn't have as good a theoretical BER versus SNR curve as some other baseband modulation methods. RZBI does offer a performance choice in implementing the detector. It can be a simple level detector or a high performance integrate and dump detector.

4. Multipath sensitivity = 250 nanoseconds at 1 Mbps and 82 nanoseconds at 4 Mbps

Using the following assumptions:

1/4 bit time pulse located in the first quarter of the bit time

the detection scheme is simple level detection so there is no signal information extracted from the trailing edge of the pulse

it can be seen that a signal spreading of 1/4 bit time will result in a pulse of 1/2 bit time. Since IR travels at approximately 1 foot per nanosecond the differential path length is about 250 feet at 1 Mbps and 82 feet at 4 Mbps. These distances are well beyond the expected operational range

5. NO. Unless IR frequency division becomes economically possible.

6. Power consumption of transmitter = 0.26 (Manchester transmitter = 1.0)