DESIGN

A LOW COST HIGH DATA RATE HARMONIC IMPULSE GENERATOR FOR PACKET TRANSMISSION

A unique method of dual band packet transmission which offers signal format diversity and spacial multipath diversity - trade-off with data rate. The system uses no PLL or DR elements and generates two differentially synchronous carriers.

High speed data rate transmission requires adaptive modulation formats. The harmonic impulse technique can be employed to make possible a wide range of application associated performance tradeoffs with impulse period. Both synchronous carriers are generated from a single free running source making absolute frequency stability unnecessary. Both carriers are bipolar modulated and transmitted with opposite polarization.

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Wideband radio offers high data rates. The use of discrete components operating over a broad bandwidth is both difficult and cost prohibitive. Matching theory clearly demonstrates the broadband problem. However it is possible to circumvent the above limitations by employing Dual Band operation. Two separate carriers are utilized for information transmission. It is well known that distributed elements exhibit repetitive periodic responses over frequency. This effect can be utilized when the carrier and it's second harmonic are purposely used to generate impulse transmission. It is then necessary that each block in both the transmit and receive section have dual responses. This includes the transmit and receive antennas as well. It therefore represents a design challenge to create acceptable component responses in two separate bands f1 and 2xf1. In this design the carriers are at 3.1GHz and 6.2GHz. In the transmit chain the second harmonic is boosted in level equal to the fundamental. This is done using an optimized dual mode filter and dual mode modulator amplifier. A special dual mode antenna is employed to transmit both carriers. On the receive side the signal is selectively filtered into three components, f1, f2 and the sum f1+f2. Each component is detected and processed for identification and validity. The low cost and novel universal nature of this approach is the subject of the article.

1. The use of Bipolar balanced modulation lines is used to create a suppressed trnasmit carrier for more efficient use of the bandwidth

2. The oscillator is specifically designed to have a high second harmonic content.

3. Signal conditioning is necessary to emphesize the second harmonic generated by the transmit oscillator.