Abstracts

Programmable Frequency-Hop Synthesizers Based on Chirp Mixing

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Frequency-hopped communication equipment require synthesizers capable of providing a large number (N) of discrete frequencies over a wide band. In typical systems N lies in the range of 50 to 10000 and the required bandwidth ranges from 10 to 500 MHz. One technique for implementing a synthesizer is based on mixing chirp signals generated by impulsing SAW filters. Potentially, this method allows fast frequency hop generation over wide bandwidth (<500 MHz) with large numbers of selectable hop frequencies (N< 4000). Furthermore, the hardware can occupy a small volume and dissipate low power compared with conventional synthesizers. This paper examines the techniques and establishes likely parameter and performance bounds. Deleterious mechanisms are identified and their effects on CW spectral purity and fast frequency-hopped link error rate performance is discussed. Experimental results are presented for both a high performance modem, with N equal to 480 across a 96-MHz band and a recent development comprising the basic chirp synthesizer plus phased locked loop (PLL) to provide enhanced slow frequency hop and continuous-wave (CW) spectral purity.

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