

APPLICATIONS OF SURFACE ACOUSTIC WAVE DEVICES TO SPREAD SPECTRUM COMMUNICATIONS

Charles E. Wheatley, III
Autonetics Div., Rockwell International
Anaheim, California 92803

Abstract

The use of spread spectrum signaling structures, achieved either through instantaneous spreading techniques (e.g., pseudo-noise modulation) or piecewise spreading techniques (e.g., frequency hopping) is being proposed for an ever increasing number of electronic systems. These systems cover a wide field of applications, including analog and digital communications, position identification.

Many of these systems can make use of surface acoustic wave devices (SAWD's) for performing the necessary task of signal processing (and signal generation in some cases). As such, the system design often involves a tradeoff between SAWD capabilities and true signal requirements.

The subject of system requirements and SAWD capabilities is discussed here so as to provide both system engineers and device designers with a mutual frame of reference. Specific examples are provided for several signaling techniques, all of which employ a wide instantaneous bandwidth relative to information rate, and which therefore employ spread spectrum to achieve increased performance measures. Signaling formats are divided into two parts; a synchronization preamble, used for timing and time of arrival estimates, and signal structure used to transfer information. SAWD processors for data extraction and time of arrival estimates are discussed, both in terms of theoretical limits as well as practical achieved results.