Abstract

Several electrical applications use signals with high carrier frequency (up to many GHz), but relatively low bandwidth (a few kHz). Examples of such applications include radio broadcasting stations, wireless remote controls and many other general applications where a physical medium is divided into multiple simultaneous data channels by using the method of Frequency Division Multiple Access (FDMA). If we are to process these signals digitally, direct sampling of the high-frequency signal would be highly inefficient, as it would require very fast analog-to-digital converters and even faster processing units.

A much more efficient method is to transpose the spectrum of the high-frequency signal by an analog front-end circuit before sampling. This means lowering the carrier frequency while conserving the essential information that the signal carries, allowing the use of much slower digital-to-analog converters and processing units.

This bachelor's thesis discusses the process of designing and constructing a circuit that connects to an *Analog Devices ADSP-21364* digital signal processor (DSP) development board and utilizes programmable frequency transposition, thus allowing the DSP to sample and process high-frequency signals.