Realization of Frequency Synthesizer and Control through Matlab Interface

Description:
In a new project, the propagation of microwave signals inside an office room is investigated. The microwave signals can be generated by expensive laboratory equipment for first trials. However, for a full system demonstration, a large number of signals are required which have to be produced by dedicated low-cost hardware. Suitable frequency synthesizer circuits are available as inexpensive ICs which also provide a 3-Wire Bus as a digital interface circuit for external control of the signal frequency. In a simple implementation, this bus can be interfaced through the parallel port of a PC while the parallel port can be controlled using Matlab.

Thesis Task:
The thesis task is to build a synthesizer circuit using a commercially available IC which is integrated into a printed circuit board. The frequency control of the synthesizer IC is to be realized using the 3-Wire Bus and a dedicated interface to the parallel port of a PC which is controlled through a Matlab code. A suitable Matlab code can be compiled and adapted from available example files.

The task entails the following steps:
1. Design and realization of a printed circuit board for a synthesizer ADF 4350 using the EAGLE CAD system.
2. Implementation of a Matlab code for the control of the parallel port of a PC.
3. Programming of 3-Wire Bus serial data for transmission to the synthesizer registers suitable for the control of frequency and other software controlled functions based on the information given by the IC manufacturer (data sheet).
4. Final demonstration of the functionalities of the PC controlled RF frequency synthesizer circuit