Radio Spectrum scarcity is a known problem in the telecommunication world. As a solution for this scarcity, Cognitive Radio has been proposed. Orthogonal Frequency Division Multiplexing (OFDM) has been known as a suitable candidate technology for realization of cognitive radio because of its spectrum efficiency and flexibility. Channel estimation for OFDM in the cognitive radio context is a significant issue. The channel estimation could be done by using training symbols called pilots. The way pilots are organized and implemented in the data stream is called the pilot pattern. Designing suitable pilot patterns which provides precise channel estimates for MIMO OFDM, is a challenging task. In this thesis, for a cognitive radio system a MIMO OFDM scheme to transmit and receive two signals over the mobile wireless channel is designed. To estimate the MIMO channel, three different pilot patterns suitable for implementation in the MIMO are developed. Within the pilot patterns, the novel Virtual Pilots concept is introduced, which simplifies the filtering process and saves energy as well. For the MIMO-OFDM cognitive radio system, performance of different pilot patterns in terms of Bit Error Rate and Mean Square Error are compared and the optimal pilot pattern which gives the best performance is selected.