Simple Microwave Oscillator and Phase Locked Loop Projects For a High Frequency Electronic Design Laboratory

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Wireless technology in the microwave and millimeter wavelength range is enabling broadband connectivity for individuals, organizations and the internet of smart things. This paper demonstrates a range of high performance and low-cost projects that can demonstrate wireless communication concepts in a high frequency electronic design laboratory. The emphasis is placed on designing and understanding what is "under the hood" for wireless communication components. Students may end up working with communication system components at a higher level of abstraction but it is important to de-mystify how these devices operate. Microwave oscillators, modulators, receivers and phase locked loops are designed and fabricated using soldering irons, surface mount components, semi-rigid coaxial cable and home-brew PC boards. This presentation will include both the poster and a full working demonstration of the laboratory with components, interconnections, and electronic test and measurement equipment. Session participants will be able to modify experimental parameters and directly see the outcomes on instrumentation in a live setting.