

Ultra-wideband Interference Resistant System for Multi-User Communication *by*

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Abstract— In the emergence of high frequency systems comes the opportunity to investigate the possibilities of ultra-wideband (UWB) techniques. These UWB capabilities give presence to higher data rates and opens a door for techniques to ensure communication security. Secure communication is vital for mission critical scenarios, environments abundant with malicious interference, and areas with congesting transmissions. Being able to have a variety of techniques available to counteract these unfavorable scenes and as well satisfy high data rates of current technology is a goal that this paper aims to contribute in.

We present here an investigation into an ultra-wideband system that is resistant to interference and is capable of accommodating a plethora of users. The system exploits the high data rate capabilities of orthogonal frequency division multiplexing (OFDM), implemented with 16-ary quadrature amplitude mapping (16-QAM). An interference resistant quality is then supplied by implementing frequency-hopping spread spectrum (FHSS). The frequency hopping scheme implements orthogonal pseudo-random sequences in order to ensure not only interference resistance but also to prevent inter-user interference. The system is simulated at 5 gigahertz (GHz) and, at these frequencies, we show that bit error rate (BER) degradation is minimal among users in the presence of interference.