System Architecture for a Dynamic-Spectrum Radio

Allen Petrin[1], Paul G. Steffes[2]

[1] Georgia Institute of Technology, 324341 GA Tech Station, Atlanta, GA, USA, 30332-1005 me@allenpetrin.com; 404-894-5280 (phone); 404-894-5935 (fax)

[2] Georgia Institute of Technology School of Electrical and Computer Engineering, 777 Atlantic Dr., Atlanta, GA, USA, 30332-0250; ps11@prism.gatech.edu; 404-894-3128 (phone); 404-894-5935 (fax)

Abstract:

The increasing demand for wireless services necessitates a reassessment of how radio spectrum is allocated. This paper will propose the system architecture of a dynamic-spectrum radio. Such a radio system will seek out underutilized spectrum, and for a short period of time operate on these frequencies. With adequate available temporary spectrum, a moderate-cost, high-data rate radio network can be realized. Finding spectrum that is not being used either passively or actively in a propagation environment is the leading requirement for the system's design. The preliminary results of a 500 MHz to 6 GHz spectrum search in urban Atlanta, Georgia demonstrates the existence of usable temporary spectrum. Intermodulation from receiver components, and non-linearities from transmitter components will limit performance of a dynamic spectrum radio system. Radio frequency filtering, amplifier predistortion, and intelligent control software can mitigate the impact of intermodulation. The resulting architecture will consider these effects, in addition to results from the spectrum studies.