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Sommario	The scarcity of spectral resources in wireless communications, due to a fixed frequency allocation policy, is a strong limitation to the increasing demand for higher data rates. However, measurements showed that a large part of frequency channels are underutilized or almost unoccupied. The cognitive radio paradigm arises as a tempting solution to the spectral congestion problem. A cognitive radio must be able to identify transmission opportunities in unused channels and to avoid generating harmful interference with the licensed primary users. Its key enabling technology is the spectrum sensing unit, whose ultimate goal consists in providing an indication whether a primary transmission is taking place in the observed channel. Such indication is determined as the result of a binary hypothesis testing experiment wherein null hypothesis (alternate hypothesis) corresponds to the absence (presence) of the primary signal. The first parts of this thesis describes the spectrum sensing problem and presents some of the best performing detection techniques. Energy Detection and multi-antenna Eigenvalue-Based Detection algorithms are considered. Important aspects are taken into account, like the impact of noise estimation or the effect of primary user traffic. The performance of each detector is assessed in terms of false alarm probability and detection probability. In most

	experimental research, cognitive radio techniques are deployed in software-defined radio systems, radio transceivers that allow operating parameters (like modulation type, bandwidth, output power, etc.) to be set or altered by software.In the second part of the thesis, we introduce the software-defined radio concept. Then, we focus on the implementation of Energy Detection and Eigenvalue-Based Detection algorithms: first, the used software platform, GNU Radio, is described, secondly, the implementation of a parallel energy detector and a multi-antenna eigenbased detector is illustrated and details on the used methodologies are given. Finally, we present the deployed experimental cognitive testbeds and the used radio peripherals. The obtained algorithmic results along with the software-defined radio implementation may offer a set of tools able to create a realistic cognitive radio system with real-time spectrum sensing capabilities.
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