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算法研究

Ad Hoc认知网络中基于梯度算法的协作压缩频谱感知方法

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摘要:

ad hoc认知网络(CRAHNs)比起传统ad hoc网络有很多优势,如分布式多跳结构及动态变化的网络拓扑等。频谱感知是认知无线电技术的基础,采用压缩感知方法以低于奈奎斯特采样率的速率来获得较好的重构信号,同时可减轻数字处理设备的压力。本文使用多跳模型,每个认知用户感知的频谱不仅包括主用户的主频谱,也包括认知用户自身收到其他认知用户干扰的更新频谱。由于具有动态特性的ad hoc网络缺少融合中心,所以本文中提出一种基于梯度的分布式协作感知算法。该算法基于能量检测,具有可靠的感知性能和较少的能量消耗,并能快速收敛。仿真实验验证了算法的有效性。

关键词: 认知无线电; ad hoc网络; 压缩感知; 分布式协作感知; 基于梯度法

Cooperative Compressed Spectrum Sensing for Cognitive Radio Ad Hoc Networks Based On Gradient-based Scheme

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Abstract:

Cognitive radio ad hoc networks(CRAHNs) have several advantages over traditional ad hoc networks, like distributed multi-hop architecture, variant network topology and so on. Spectrum sensing is a foundation in the cognitive radio technology. We adopt the compressed sensing approach to attain high-resolution signal recovery at lower than Nyquist sampling rate. In this paper, we use the multi-hop architecture. Each CR sense its individual spectral map that consists of both common spectral components from primary users and individualized spectral innovations arising from interference of other CRs. CRAHNs are dynamic and have no central entity for data fusion. Therefore in this paper, we adopt a gradient-based distributed cooperative scheme. The proposed scheme is based on energy detection. These distributed algorithms converge fast to the globally optimal solutions and have little energy consumption. Simulation results show the effectiveness of the proposed scheme.

Keywords: cognitive radios ad hoc networks compressed sensing distributed collaborative sensing gradient-based scheme

收稿日期 2012-05-11 修回日期 2012-09-24 网络版发布日期 2012-10-25

DOI:

基金项目:

国家自然科学基金项目(60972039); 江苏自然科学基金(BK2010077)

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