

认知无线网络基于空分复用的机会频谱接入

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Space Division Multiplexing Based Opportunistic Spectrum Access in Cognitive Radio Network

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摘要

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摘要 传统的认知无线电技术采用机会频谱接入, 认知用户的通信质量难以得到保证。通过利用多天线技术提供的空间信号处理能力, 该文提出一种基于空分复用的机会频谱接入方法, 当存在频谱空洞时, 采用传统的机会频谱接入; 无空闲频率资源可用时, 认知系统利用空域信息完成发射预编码与接收滤波, 从而以空分复用的方式实现通信。文中对认知系统天线配置要求进行了分析, 当满足该要求时, 认知系统能够与授权系统在同一个授权频道实现无互扰共存。仿真结果表明, 与传统的机会频谱接入相比, 所提方法能够在不影响授权系统性能的情况下有效改善认知系统的通信性能。

关键词: 认知无线网络 多天线 预编码 空分复用 阻塞概率

Abstract: Traditional cognitive radio employs Opportunistic Spectrum Access (OSA), the quality of cognitive transmission could not be guaranteed. By exploiting the spatial signal processing ability provided by multiple antennas, a Space Division Multiplexing based OSA (SDM-OSA) scheme for cognitive radio networks is proposed. When spectrum holes exist traditional OSA is employed. While there is no idle spectrum available cognitive system utilizes spatial information to implement transmit precoding and receive filtering, so that cognitive transmission is carried out using SDM. Antenna requirements in cognitive system are further discussed. When this demand is met, cognitive transmission could coexist with the primary (licensed) in an occupied authorized frequency channel with mutual interference eliminated. Compared with traditional cognitive radio which employs OSA to utilize the temporally spare frequency resource, the proposed scheme could effectively improve the performance of cognitive system and impose no interference on the primary.

Keywords: Cognitive Radio Networks (CRN) Multiple antennas Precoding Space Division Multiplexing (SDM) Blocking probability

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