

Cognitive Radio in Low Power Wide Area Network for IoT Applications: Recent Approaches, Benefits and Challenges

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ABSTRACT

Some recent survey statistics suggest that low power wide area networks (LPWANs) are fast becoming the most prevalent communication platform used in many applications of the Internet of things (IoT). However, because most LPWANs are generally deployed in the presently congested industrial, scientific, and medical bands, they are invariably plagued by problems associated with spectral congestion, such as increased interference, reduced data rates, and spectra inefficiency. These problems are solvable by integrating cognitive radio (CR) technologies in LPWAN (termed CR-LPWAN), for which some pioneering solutions now exist in the literature. Consequently, the present paper takes an early look at some of these pioneering efforts pertaining to the development of CR-LPWAN systems. We discuss a general network architecture and a physical layer front-end model suitable for CR-LPWAN systems. Then, some notable state-of-the-art approaches for CR-LPWAN systems are discussed. Potential advantages of CR-LPWAN systems for IoT-based applications are also presented, and the paper closes with a few research challenges and future research directions in this regard. This paper aims to serve as a starting point for most budding researchers who may be interested in the development of effective and efficient CR-LPWAN systems for the enhancement of different IoT-based applications.