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International Journal of Advancements in Technology

Editorial

Energy Harvesting Cognitive Radio Networks with Multichannel Spectrum

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EDITORIAL

A low power, Energy Harvesting Cognitive Radio Network (EH-CRN) to explore spectral gaps and improve EH-CRN lifetime, Secondary Transmitter (ST) captures energy from broadband Radio Frequency (RF) signals during the Energy Harvesting (EH) phase, and sequential capture and sequential capture of the collected energy for sequential sensing and packet transmission during the rest of the time slot. Under power constraints, second order throughput is improved by optimizing the timing between the EH, acquisition, and transmit phases. We formulate the quadratic throughput in terms of the duration of the three phases, prove the existence of the optimal time allocation, and discuss the quadratic throughput in the three cases of EH-CRN. Finally, numerical results validate the theoretical results for secondary throughput and explore the influence of key system parameters.

With the fast development of Internet of Things (IoT), huge amounts of data are generated every day, increasing the pressure on frequency scarcity and energy consumption issues. Researchers are investigating new access methods for wireless communications, such as Multiple Input Multiple Output (MIMO) and Cognitive Radio (CR). To improve spectrum efficiency under fixed spectrum allocation policies, CR is proposed as a promising technology to allow Secondary Users (SU) to opportunistically access spectrum licensed to Primary Users (PU). Energy Harvesting (EH) collects energy from renewable energy sources in the environment, such as solar, wind, and Radio Frequency (RF) signals, to extend the life of IoT devices and alleviate the problem of energy shortages and proposed as an important technology. RF signals have a bright future due to their predictable, stable nature and low cost compared to other energy sources. The incorporation of CR and EH technology raises concerns about EH-CR Networks (EH-CRN). EH provides more power for SU to capture the state of the licensed spectrum.

In general, CRNs have multiple licensed channels that SUs can access opportunistically without affecting primary transmission. By reducing complexity, reducing the computational cost of SU, and providing access to a wide range of frequencies, network performance can be significantly improved. Multichannel is therefore an important aspect for CRN to achieve better performance and cover the primary transmission. Proposed a sequential spectral acquisition algorithm to reduce the required sample size, meet the specified reliability goals, evaluate the SU collision limit, and protect the primary transmission. Investigating dynamic frequency access in multi-channel CRNs by formulating the channel information market as a two stage Stackelberg game. Development of a full duplex based framework to improve resource utilization in multi-channel CR ad-hoc networks. Improves the number of successful transmissions without interrupting the primary transmission in multi-channel wireless networks.

Considering SU energy supply issues, network performance can be significantly degraded. Therefore, the strategy and details of multi-channel spectrum acquisition should be carefully designed to mitigate the power shortage problem. More specifically propose energy efficient Cooperative Spectrum Capture (CSS) guidelines for green multichannel CRNs to minimize overall power consumption and maximize overall throughput. Aiming to be to minimize the power consumption of the acquisition given the acquisition accuracy requirements, we formulated an optimization problem to determine the minimum number of channels to acquire in the multiband approach. To minimize acquisition time and maximize the amount of energy collected.

Together has optimized the acquisition sample number and acquisition threshold for multi band CRN. Battery limited SU maximized security for cognitive multi-channel systems powered by solar energy harvesters. With the aim of reducing power consumption and evaluating network longevity, presented a probabilistic approach in cognitive sensor networks using multichannel CSS.

As mentioned above, several previous studies have shown the benefits of CSS in extending network lifetime through multiple SUs and minimized power consumption. However, to our knowledge, only a few factories have built EH functionality into their SUs. The advantage of RF EH and solar EH is that more energy is consumed by CSS because multiple SUs are involved in PU recognition. EH duration, perceptual performance, and EH-CRN perceived available channels with multichannel.

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Received: 27-Dec-2022, Manuscript No. IJOAT-22-18971; **Editor assigned:** 29-Dec-2022, PreQC No. IJOAT-22-18971 (PQ); **Reviewed:** 12-Jan-2023, QC No. IJOAT-22-18971; **Revised:** 19-Jan-2023, Manuscript No. IJOAT-22-18971(R); **Published:** 27-Jan-2023, DOI: 10.35248/0976-4860.23.14.229.

Citation: Goyal C (2023) *Energy Harvesting Cognitive Radio Networks with Multichannel Spectrum*. Int J Adv Technol. 14.229.