

Wireless Powered Cognitive Radio Network to Reduce Path Handoff

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Abstract: This work deals with an asynchronous channel access model performed by a primary ad hoc network overlaid with a cognitive secondary wireless-powered ad hoc network. Specifically, we consider that the primary transmitters are connected to the power grid whereas the cognitive secondary transmitters have radio frequency energy harvesting capabilities and their asynchronous channel access is established based on certain energy and interference-based criteria. The sporadic channel traffic is modeled by time-space Poisson point processes and we provide an analytical framework, based on stochastic geometry, for the performance of this asynchronous system.

Keywords: Cognitive network, energy harvesting, Poisson process.

1. INTRODUCTION

Previous technologies are independent types. There are different technologies like Wi-fi, WiMAX, Bluetooth, 2G, 3G... etc. The problem of previous network technologies in communication is possible only in its technologies of the communication device (Bluetooth to Bluetooth).

1.1 Infrastructure mode

An Infrastructure mode network requires the use of an Access Point. The Access Point controls Wireless communication and offers several important advantages over an Ad-hoc network. For example, an Infrastructure based network supports increased levels of security, potentially faster data transmission speeds and integration with a wired network. To improve the infrastructure communication, researchers implemented the cellular concept and handoff schemes. A cellular network or mobile network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a cell site or base station. In a cellular network, each cell uses a different set of frequencies from neighboring cells, to avoid interference and provide guaranteed bandwidth within each cell. The transfer of a cellular phone transmission from cell to another adjacent cell is called as a handoff. Handoffs occur when a cellular phone user passes out of the range that the cell can handle and into another cell range, and the signal is passed from one base station to the next.

1.2 Ad-hoc mode

An Ad-hoc network allows each device to communicate directly with each other. There is no central Access Point controlling device communication. Ad-hoc networks are only able to communicate with other Ad-hoc devices, they are not able to communicate with any Infrastructure devices or any other devices connected to a wired network. Besides, Ad-hoc mode security is less sophisticated compared to an Infrastructure mode network. An already available new technology is a heterogeneous network with a vertical handoff scheme. The previous scheme used in cellular communication is like a 2G-3G communication model. The researchers implemented the same technology for WiMAX and WLAN but the problem in the WiMAX communication area is larger than WLAN, the same technique hand off is not efficient like some other network (2G-3G). The main reason is whenever it's getting another network signal also there is no hand off from home station. If the node moves from home station to another station then the only node participated in the hand off. Cognitive radio technology proves the efficient spectrum usage. In the existing vertical hand off scheme, when the user is available in the home station then it can't participate in hand off, so communication (spectrum) problem will occur due to an increased number of users. To solve this problem, we are proposing an optimized proactive vertical hand off named as cognitive radio. In the next generation of wireless communication systems, there will be a need for the rapid deployment of independent mobile users. Significant examples include establishing survivable, efficient, dynamic communication for emergency/rescue operations, disaster relief efforts, and military networks. Such network scenarios cannot rely on centralized and organized connectivity and can be conceived as applications of Mobile Ad-Hoc Networks. Cognitive radio (CR) will lead to a revolution in wireless communication with significant impacts on technology as well as regulation of spectrum usage to overcome existing barriers.

1.3 Problem Statement

In the base, the model author has considered only the Spectrum hand off in static mobility (within a region). By this model, we can achieve effective spectrum hand off but if node moment occurs between different