PERFORMANCE STUDY OF THE COEXISTENCE OF WIRELESS SENSOR NETWORKS (WSN) AND WIRELESS LOCAL AREA NETWORKS (WLAN)

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ABSTRACT

Wireless sensor networks (WSN) are composed of large numbers of tiny networked devices, which are called sensor nodes. Current WSN are assigned to a fixed spectrum assignment policy by The Malaysian Communications and Multimedia Commission (MCMC). Large portion of the assigned spectrum is used by licensed user in particular geographic areas. Only a few, small, unlicensed bands were left open for anyone to use as long as they followed certain power regulations. With the recent demand in personal wireless technologies, these unlicensed bands have become crowded with everything from wireless networks to digital cordless phones. The basic idea to solve this overcrowding in unlicensed band is to manage the available bands through spectrum sharing. Spectrum sharing is one of the dynamic spectrum access (DSA) technique used to optimize spectrum utilization by suggesting an interference temperature model (ITM) at the data link layer for controlling spectrum use. This scheme will be deployed by combining the interference temperature multiple accesses (ITMA) on top of existing slotted/unslotted CSMA/CA. To implement WSN integrated with cognitive radio technology, a new algorithm that provides access mechanism is needed to interactively working with sensor nodes hardware. This project proposes a special state machine of ITMA, a novel that characterizes both interference and noise with single parameters in WSN application. Measure the current interference temperature (T_I) before each transmission. It can then determine what transmit power and data rate that should be used to achieve desired capacity without violating an interference temperature limit (T_L) at other transceiver. The simulations of NS-2 are shown to simultaneously satisfy the three main objectives of extending battery life of sensor nodes through optimum transmit power provision, maximizing the traffic carrying of the sensor nodes, and limits interference to other co-channel nodes. Hence, sensor nodes are viable to provide quality of service (QoS) provisioning, high efficiency and fairness among users.

CHAPTER 1

INTRODUCTION

1.1 A Review of Spectrum Policy in Malaysia

The Malaysian Communications and Multimedia Commission (MCMC) is a new regulator for the communications and multimedia industry in Malaysia. MCMC is responsible for allocating the specific spectrum bands and to fulfil the need to regulate an increasingly convergent communications and multimedia industry [1]. Assignment of spectrum involves the issuance of radio frequency spectrum in forms specified by MCMC. Each type of assignment contains the scope and limits on the assignment holder's ability as well as validity period of the assignment and conditions. MCMC has divided spectrum assignments into four categories as follows [2].

- Class Assignment
- Apparatus Assignment
- Spectrum Assignment
- 3G round 2

A class assignment confers rights on a person to use a frequency band or bands for a specific purpose. There is no requirement for registration or prescribed fees for class assignment. A class assignment is valid until it is cancelled by MCMC. This band is also called unlicensed band. Examples of class assignment are Wireless LAN, Bluetooth and Walkie Talkie [3].