PERFORMANCE ANALYSIS OF THE IEEE 802.16J WIMAX RELAY NETWORK

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ABSTRACT

WiMAX MMR (Worldwide interoperability for micro wave access technology) is a new technology in enabling access of wireless network widespread. The IEEE 802.16j for Mobile Multi Hop relay (MMR) network was approved in 2009 by the IEEE 802.16 working committee. Other than mobility support, IEEE 802.16j also implements relay stations (RS) to the network which helps packets transfer by connecting the base station (BS) and a mobile station (MS). Once a mobile station is obstructed by building or terrain, the mobile station will experience a low quality channel headed for the base station. Implementation of the relay can improve the condition and enabling it to achieve higher throughput transfer from or to the base station. As the IEEE 802.16j is a new standard, knowledge on the performance of the network has become valuable. Hence, this study focuses on analyzing and evaluating the performance of real time traffic applications. This research will examine the performance of throughput, packet loss, and fading type of the WiMAX standard. It will also be focused on the transparent mode of the relay. The NCTUns 6.0 is used as a tool to simulate the network environment. Results from the simulation show that video conferencing and VoIP delivering performance are in compromise to the performance metrics thus, proving the ability of WiMAX MMR to handle real time traffics in the network environment.

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

An IEEE 802.16 standard, or better known as WiMAX, is one of the most innovative methods developed in recent times to support expanding demand for high-speed wireless broadband networks. Other than supporting various mobile applications, IEEE 802.16j provide relay stations (RS) for the network in helping packets transfer among base station and mobile station. It helps to solve problem on reception, e.g. to improve penetration into or inside a room, coverage hole, mobile access, shadow of a buildings, underground, coverage extension at cell edge, and coverage extension to isolated area. It will enhance the low quality channel to the base station, thus improving the condition and enabling it to attain higher throughput from or to the base station as shown in Figure 1.1.

Multihop Relay WiMAX (MMR WiMAX) is intended to sustain emerging applications as voice over internet protocol (VoIP), media streaming, multicast broadcast service, online gaming, or other related applications. It is divided into two different modes of relay station (RS) types which are transparent and non-transparent [1]. The main diffrence between the two types of operation is in the transmission of information framing [2]. The modes of relay are further discussed in chapter two.