

Performance analysis of voice traffic over WiMAX using Qualnet Simulator

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Abstract—Competitive environment has led popularity of VoIP over WiMAX due to its large transmission bandwidth coverage, and Quality of Service (QoS) support. For voice calls applications such as MSN Messenger, Google Talk, and Skype, VoIP is an emerging technology for WiMAX networks. In this kind of network, performance analysis of node mobility depends on network connectivity. This paper has considered horizontal as well as vertical handover of nodes with multiple WiMAX network. The basic handover functionality of node mobility with multi cell environment and high mobility. The key performance parameters like multiple rate capability, throughput considering with different modulation of code and frequency, link utilization, end to end delay, number of handovers performed and throughput with handover. This paper is also discussed basics feature of Wimax such as data rate, supported service type and etc. A WiMAX 802.16 network model is simulated in Qualnet version 4.0 considering four different cases having different wireless subnets along with different base stations.

Keywords—Qualnet, WiMAX, Handover, VoIP, Handover, Throughput, Delay.

I. INTRODUCTION

In modern era, an increased use of portable computers and wireless network has demanded for flexibility, quality data transfer rate, which open market for WLAN and WiMAX. WLANs enormously successful for data traffic and not suitable for voice traffic. Voice over WiMAX has potential of wireless local area networks with large transmission bandwidth coverage, and Quality of Service (QoS) support.

In VoIP voice is transmitted as packets over Internet Protocol voice in IP networks. This is achieved by voice digitization, filtering of noise signals and compression of voice signal with the help of suitable algorithms/codecs. This compressed voice is then sent over an IP Network in packet form. Each packet requires a destination address and sequence number and checksum for error checking, which is achieved using signaling protocols. At destination sequencing of voice packet are done and then data recovery carried out by decompression algorithms with proper spacing. Packets arriving out of order and delayed packets are stored in Jitter buffer [1].

The IEEE MAC 802.16 network provides high range and high bandwidth for Wireless Metropolitan Area Network (WMAN). IEEE MAC 802.16 is also called as WiMAX. Base Stations (BS) and Subscriber Stations (SS) are basic components of WiMAX. Public networks and registered subscriber stations are connected with base stations. Local area networks are served by Subscriber Stations (SS). Mobility support for BS and SS are provided by IEEE MAC 802.16e, while The MAC 802.16 support for static SS and BS [3].

Mainak Chatterjee, Shamik Sengupta, Samrat Ganguly has exploited flexible features of WiMax and observed delay performance considering acceptable limits for rate of lost packet [4]. Jupinder Singh, Sachin Majithia has showed performance of node mobility in terms of network throughput, delay and MOS Value [5]. It was also observed that performance of node mobility is much more in single WIMAX network as compared to two WIMAX networks. To improve service quality in heterogeneous network, Nimrat Kaur Kehal, Maninder Singh has made an attempt with seamless handoff in the network [6].

Deepali Gawali has described impact of security in WIMAX networks [7]. Md. Alimul Haque, Yashi Amola, N. K. Singh had discussed performance in terms design, management and security issues for WiMAX over WiFi [8]. These performance issues are useful for up gradation of existing technology over a wide region. This paper has incorporated following features:

- Multiple rates capability of 802.16 using different burst profiles of different coding and modulation combinations.
- Basic handover functionality of IEEE 802.16e in multi cell environment and with high mobility.
- Comparison of throughput produced by Unsolicited Grant services (UGS), extended real time polling services (ertPS), Real time polling services (rtPS), Non real time polling services (nrtPS) and Best effort (BE) [9].