

**Design and Implementation of OFDMA MAC and PHY Layer Module
for WiMAX Networks (IEEE 802.16e) in NS2 Simulator**

by

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ABSTRACT

The Network Simulator 2 (ns-2) is a popular and powerful simulation tool for the simulation of packet-switched networks, which provides substantial support for simulation of TCP, routing, and MAC protocols over wired and wireless networks, such as wireless LANs, mobile ad hoc networks (MANET's), and satellite communications, etc, and is widely used in both academia and industry. Although many protocol modules have been implemented in the ns-2, the IEEE 802.16e broadband wireless access networks (BWAN's) or WiMAX module has not been contributed. Though there are few modules available but they either lack in lot of features or have not been accepted or used widely.

This thesis report discusses some of the specifications of the WiMAX Mac and PHY layer based on the IEEE 802.16e standard and provides our detailed design and implementation for the ns-2. We try to model accurately and cover the basic features of WiMAX. The implemented module comprises fundamental functions of the MAC common part sub-layer (CPS) and the PHY layer. This work is an extension to the OFDM work carried out at National Institute of Standards and Technology (NIST). We mostly focus on OFDMA based MAC and PHY layer. The report also briefly discusses the implementation details of a basic MIMO module. We also present a preliminary performance evaluation and capacity analysis of our WiMAX NS2 module.