ENSC 427: Communication Network Spring 2014

Comparison Between WiFi and WiMAX On OPNET

http://www.sfu.ca/~luodil/427project.html

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Roadmap

- Introduction
- OPNET simulation setup
- Simulation results
- Conclusion and discussion
- Future work
- References

Introduction

- Goal of this project:

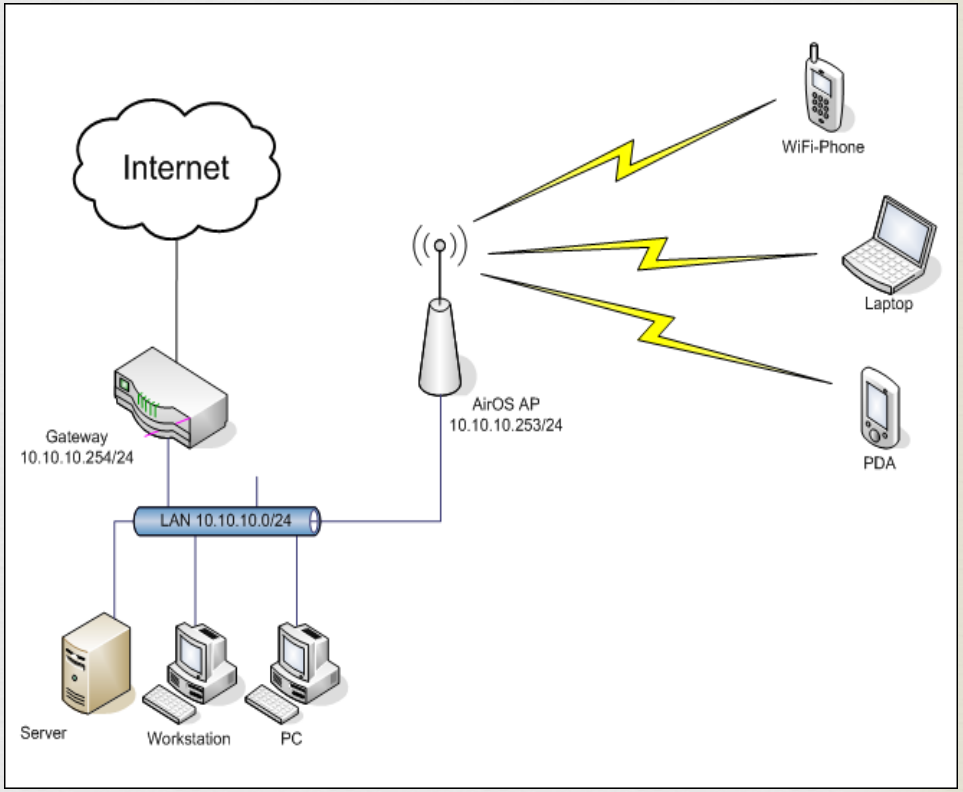
  Performance evaluation of Wireless Fidelity (WiFi) and Worldwide Interoperability for Microwave Access (WiMAX) networks through streaming video and browsing. We will compare the quality of services on two wireless networks respectively, such as delay, data-drop rate and throughput.

WiFi Overview

- IEEE 802.11 standard
- Describes only narrow range of connectivity ensuring Wireless Local Area Network
- Speed up to 50 Mbps
- Range up to 30 Meters

WiFi Network Architecture

- **Access Point**: Acts like a transceiver of wireless signal
- **Server**: Provide network services upon network users' requests
- **Gateway**: Transfer data packets between networks on different layers
- **Workstation**: Wireless devices that can receive and transmit data packets of requested service

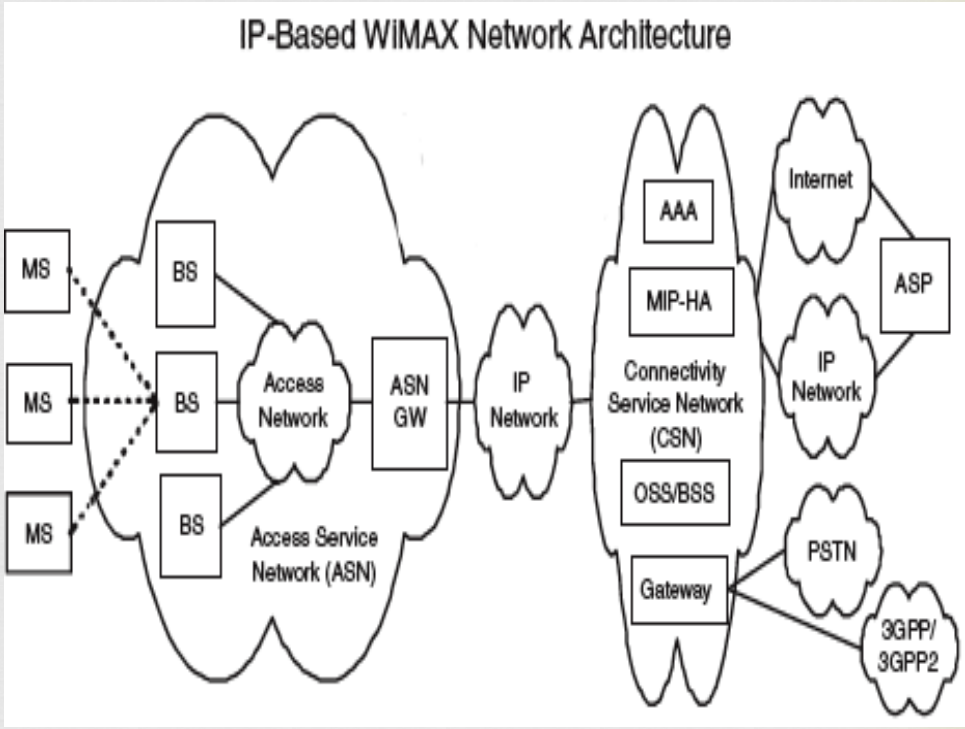


WiMAX Overview

- IEEE 802.16 standard
- IP based, wireless broadband access technology
- Speed up to 70 Mbps
- Range is about 50 Kilometers
- Protocol that provide fixed & mobile Internet Access

WiMAX Network Architecture

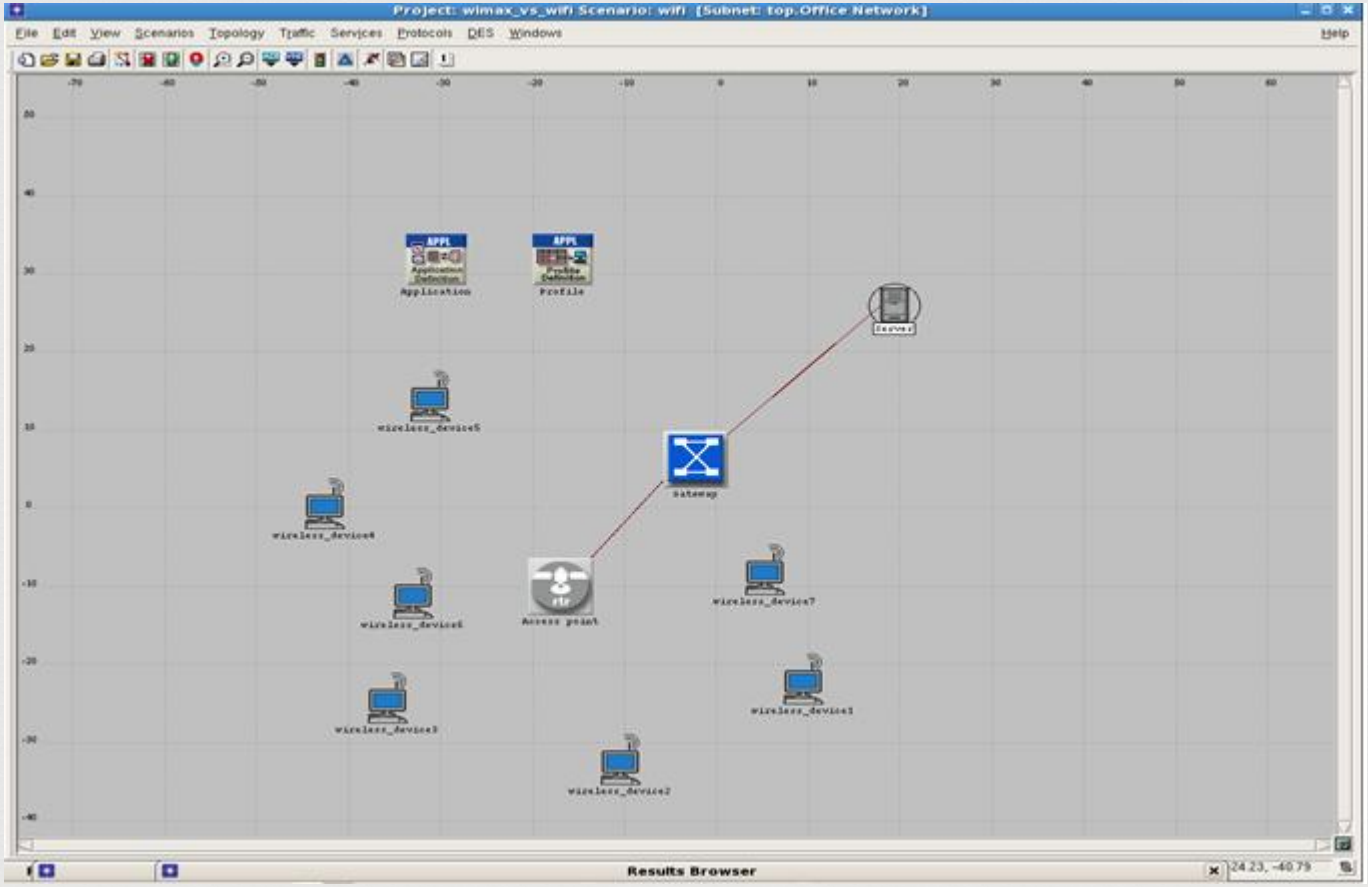
- **Access Service Network (ASN)**: It is a transition part in order to connect those mobile stations or wireless devices to internet service provider
- **Connectivity Service Network (CSN)**: Provide management and control for those WiMAX subscribers with services
- **IP Backbone**: Interconnect network and core routers on the internet



WiFi Topology on OPNET

- **Access Point**: WLAN_ethernet_slip4_adv
- **Gateway**: Ethernet4_Slip8_gtwy
- **Server**: Ethernet_server
- **Workstation**: WLAN_skstn_adv
- **Link Model**: 100BaseT

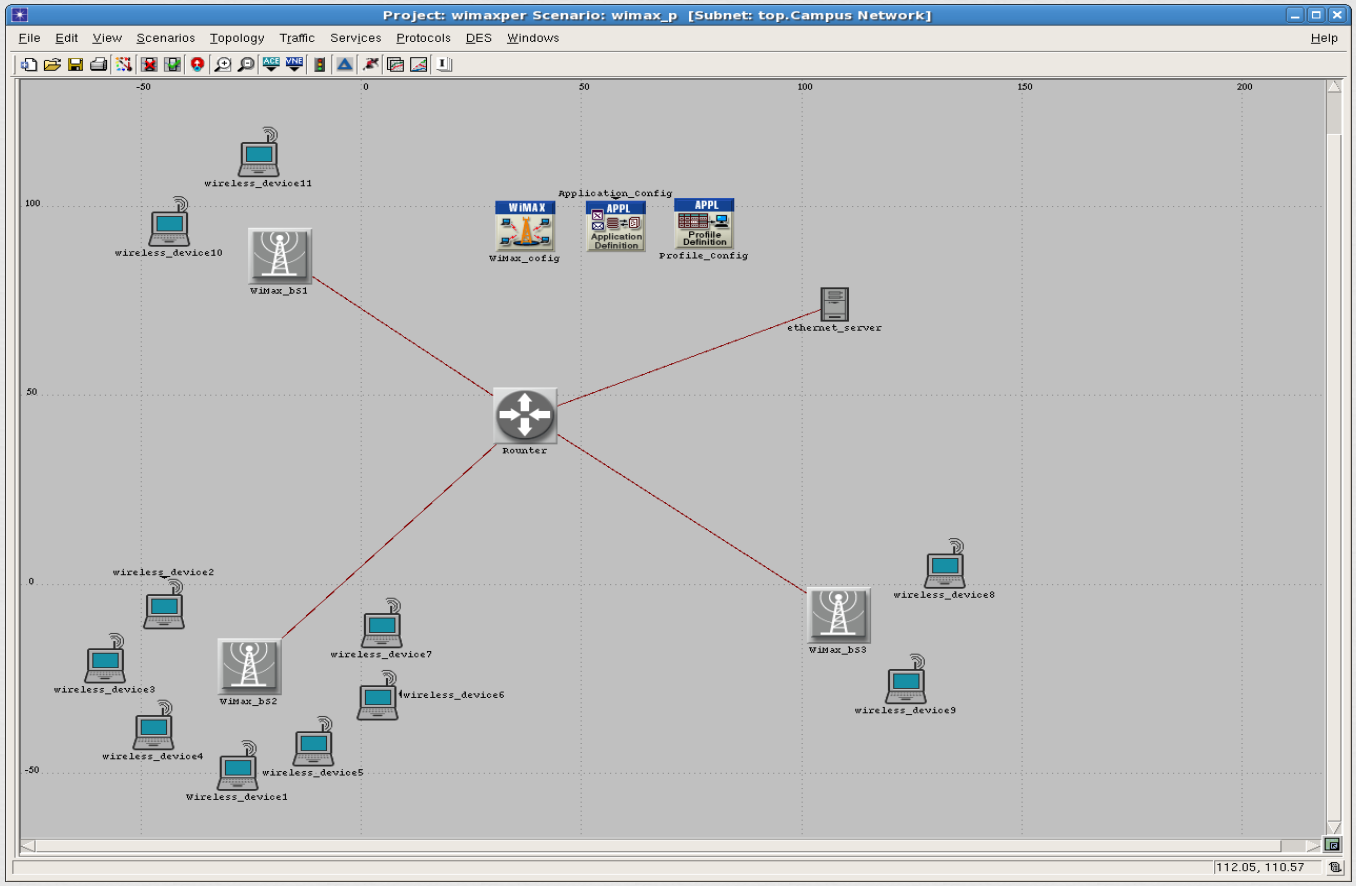
WiFi Topology on OPNET



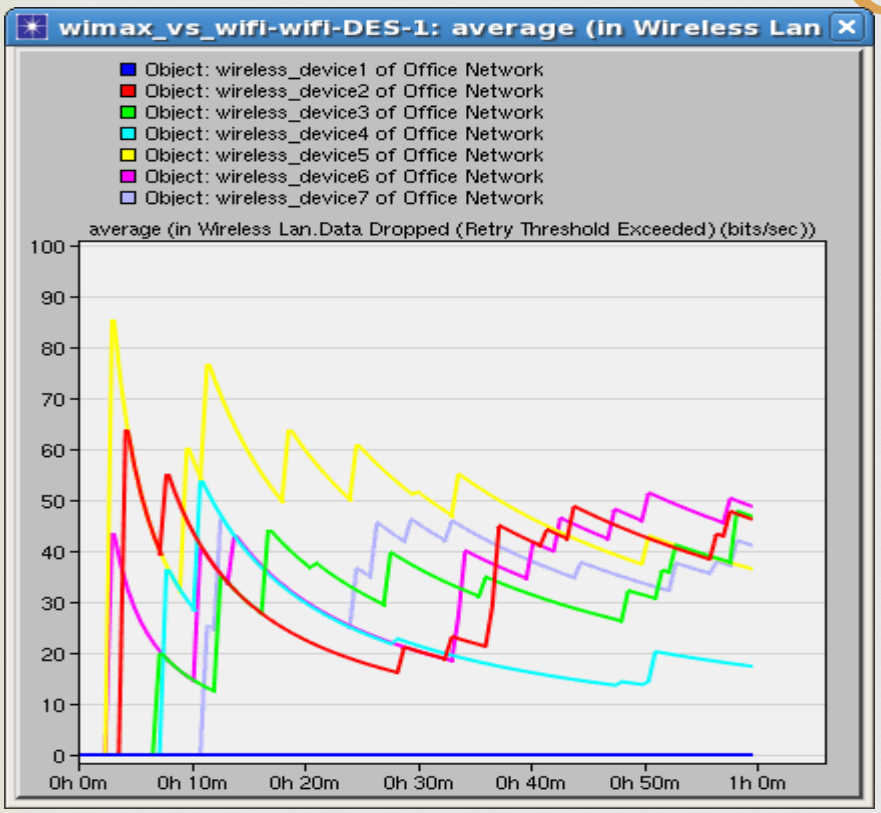
WiMAX Topology on OPNET

- **WiMAX Base Station**: Wimax_bs_ethernet4_slip4_router
- **Gateway**: Ethernet4_Slip8_gtwy
- **Server**: Ethernet_server
- **IP backbone**: Rounter_slip64_dc
- **Workstation**: Wlan_skstn_adv
- **Link Model**: 100BaseT

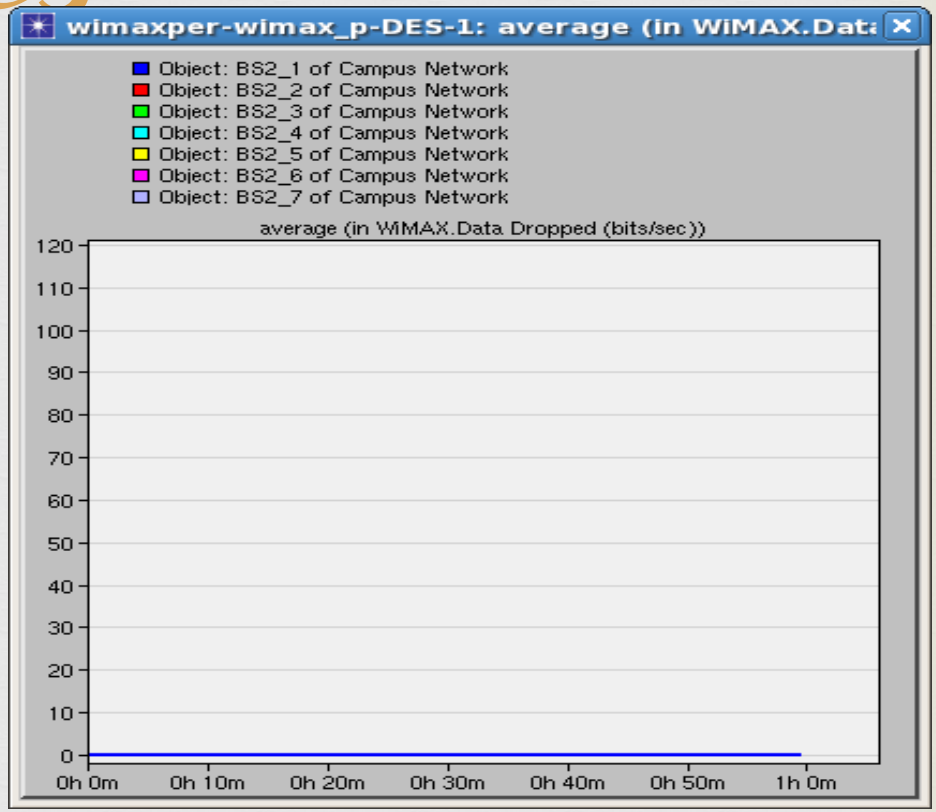
WiMAX Topology on OPNET



Simulation Result (Streaming Video)



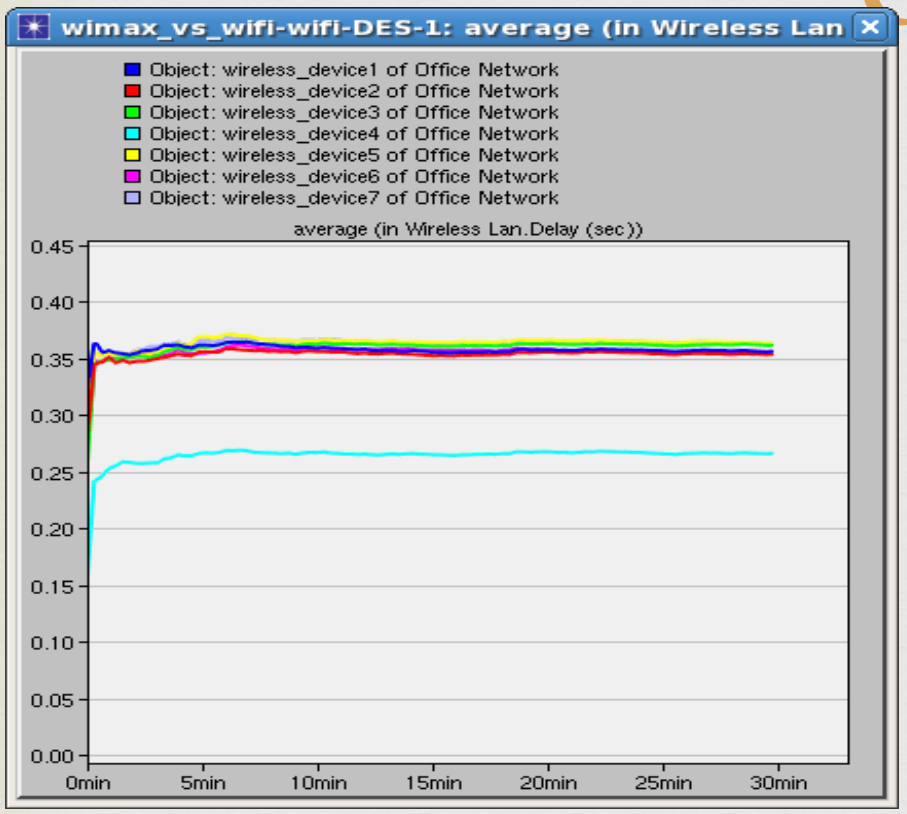
WiFi

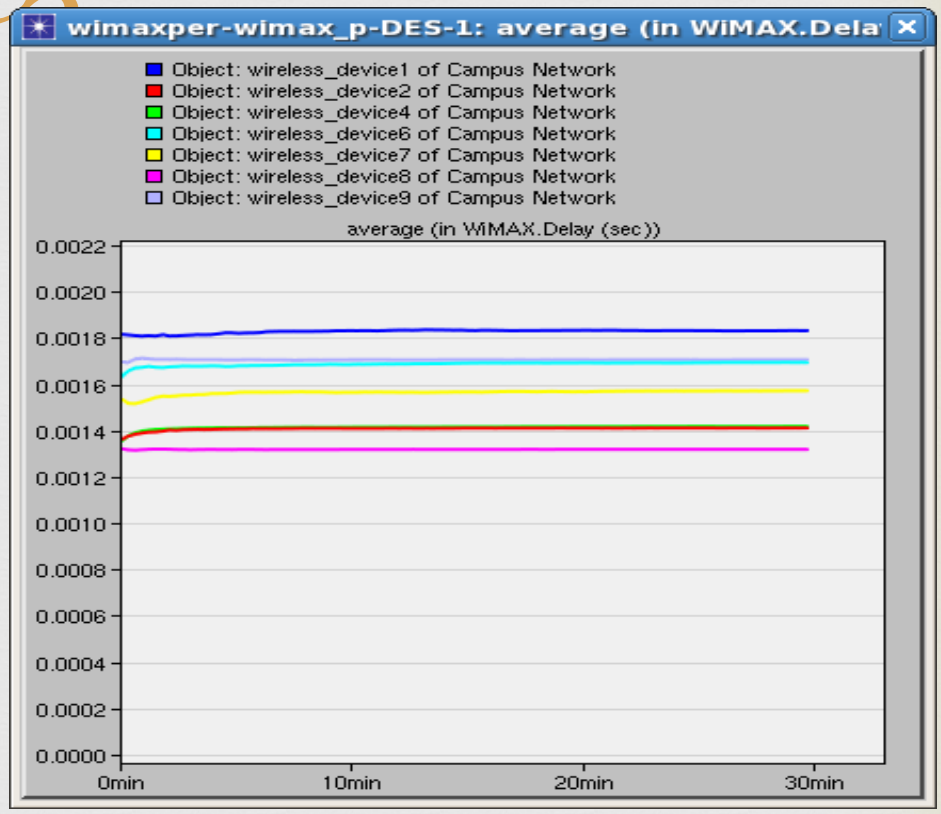


WiMAX

- WiMAX has a significant lower data drop rate than WiFi due to QoS

Simulation Result (Streaming Video)



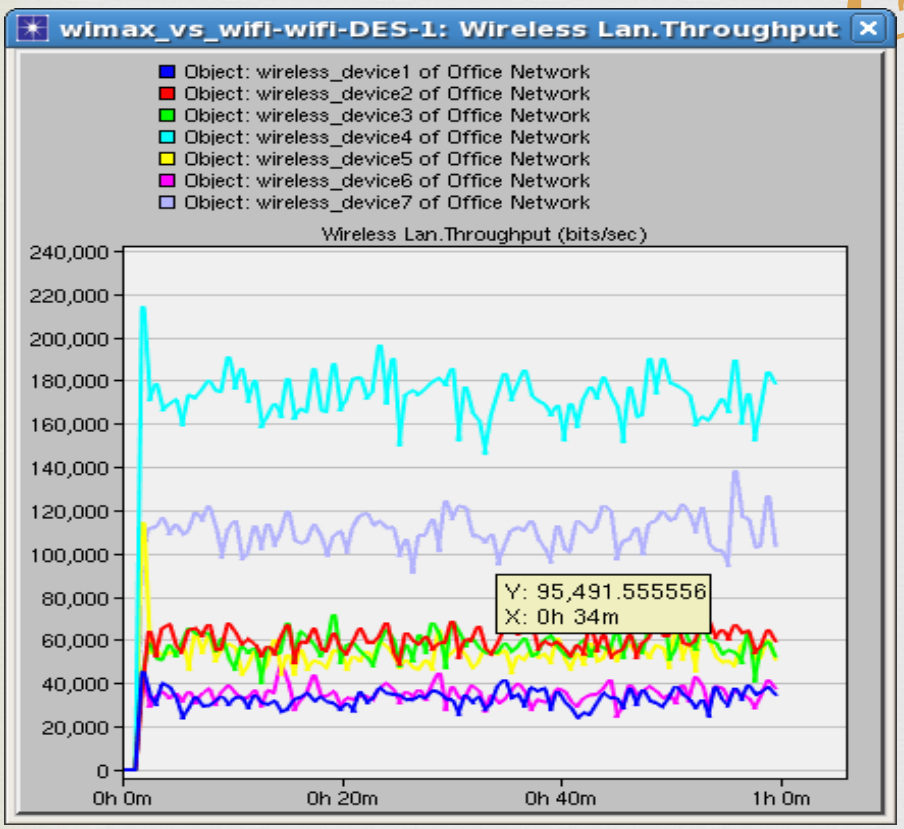


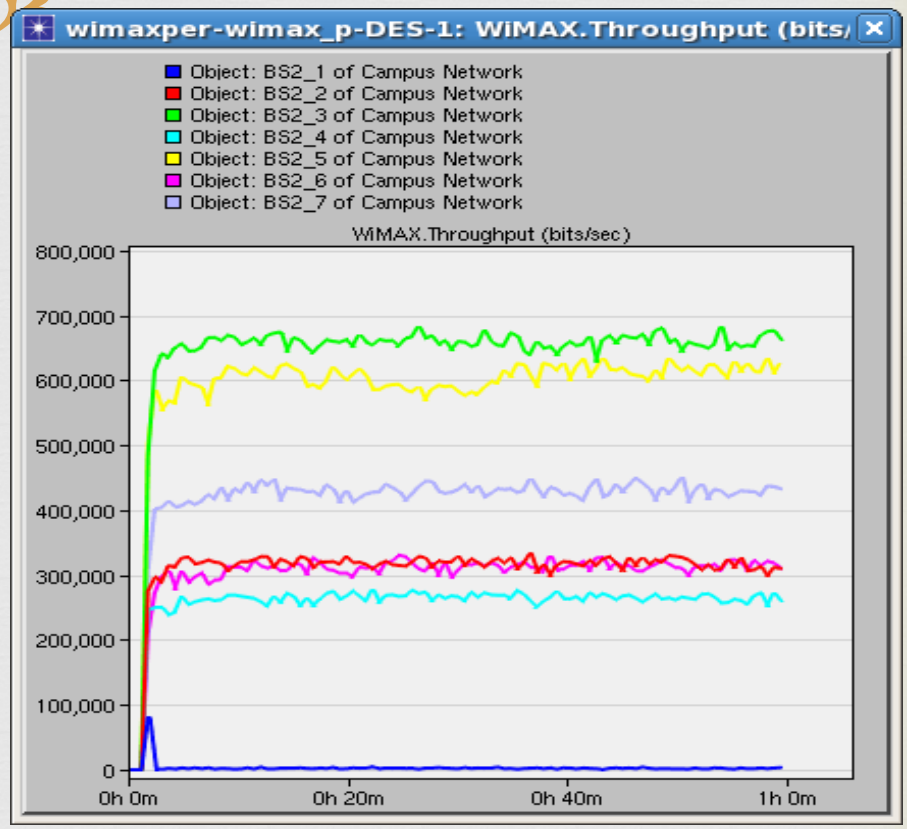
WiFi

WiMAX

- WiMAX has a better performance on Delay than WiFi due to the QoS

Simulation Result (Streaming Video)



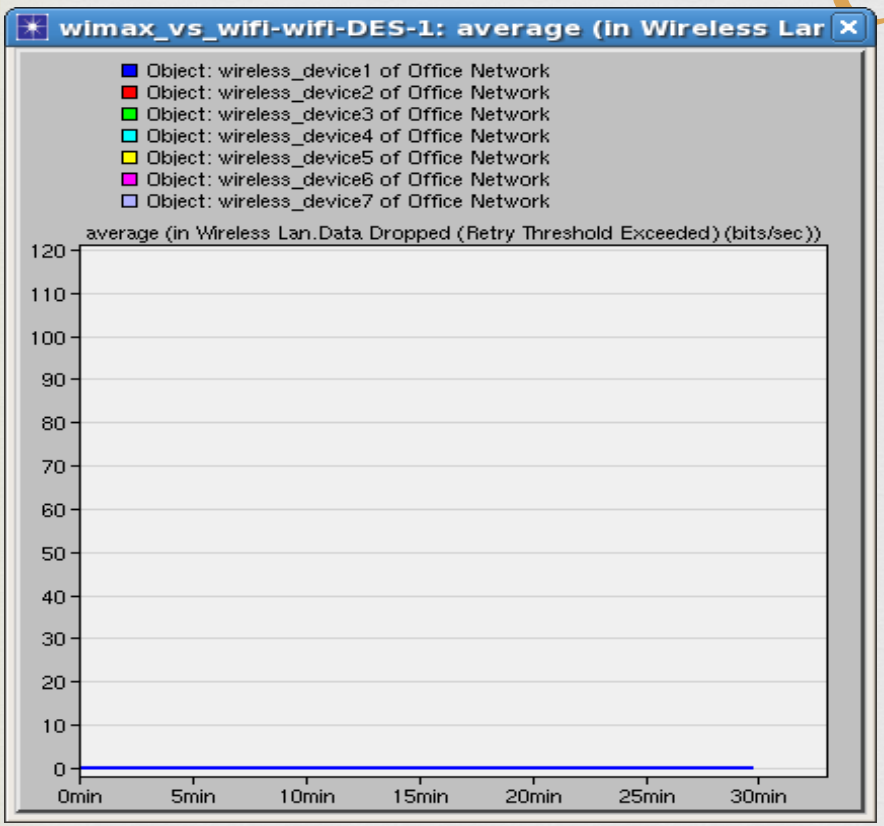


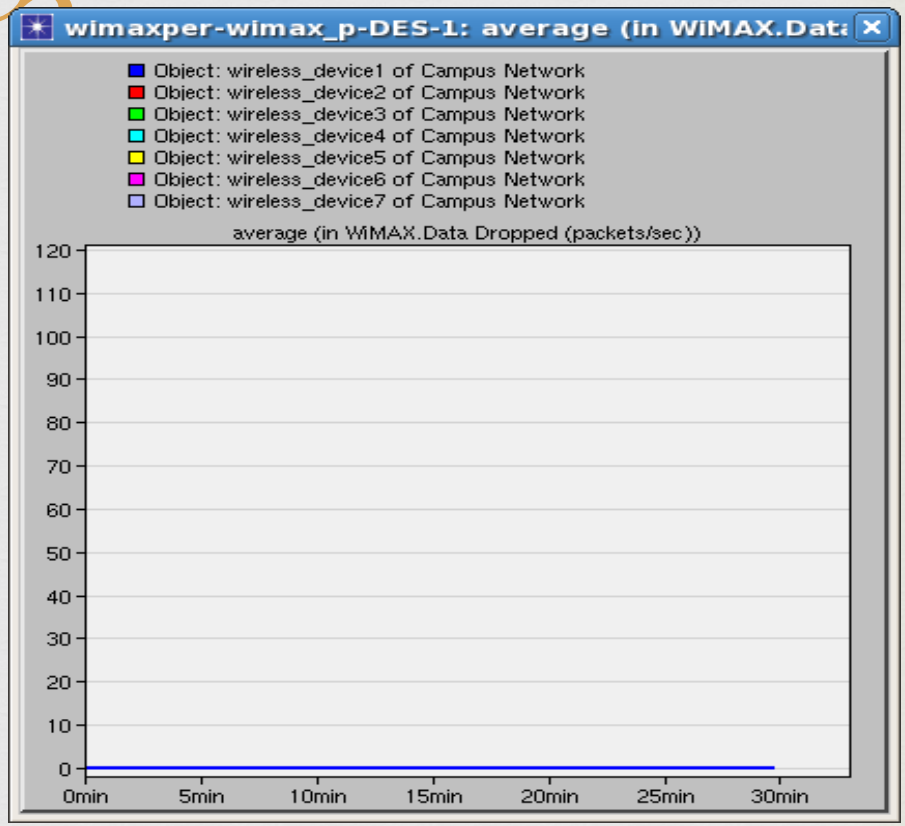
WiFi

WiMAX

- Unstable throughput on every MS due to the multipath effect and range
- WiMAX has a higher throughput than WiFi

Simulation Result (Heavy Browsing)



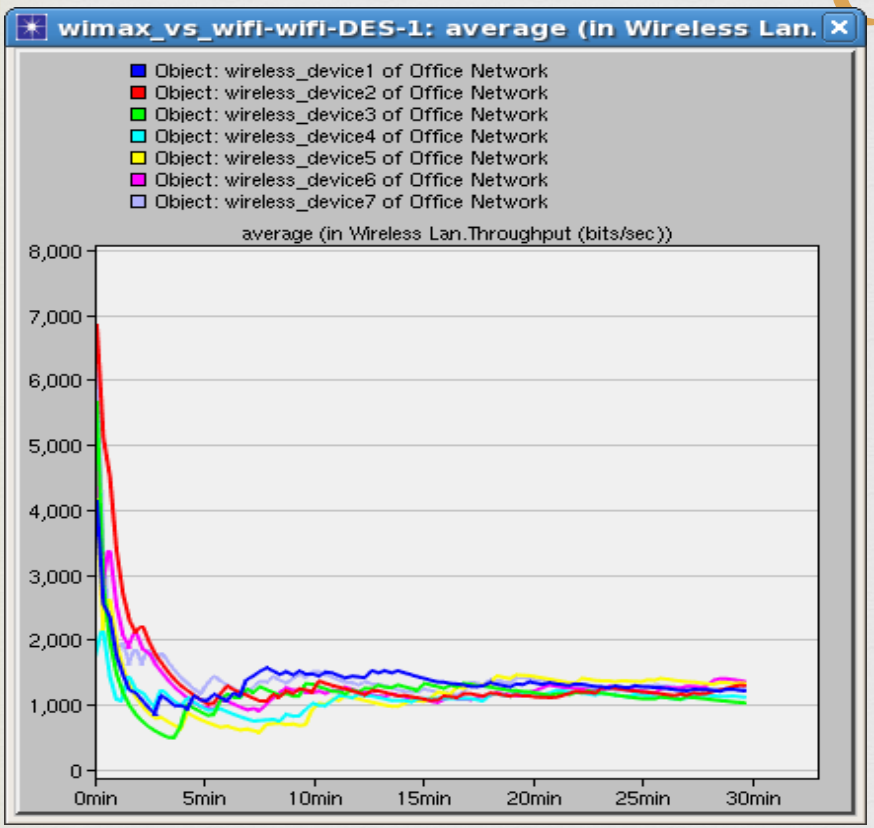


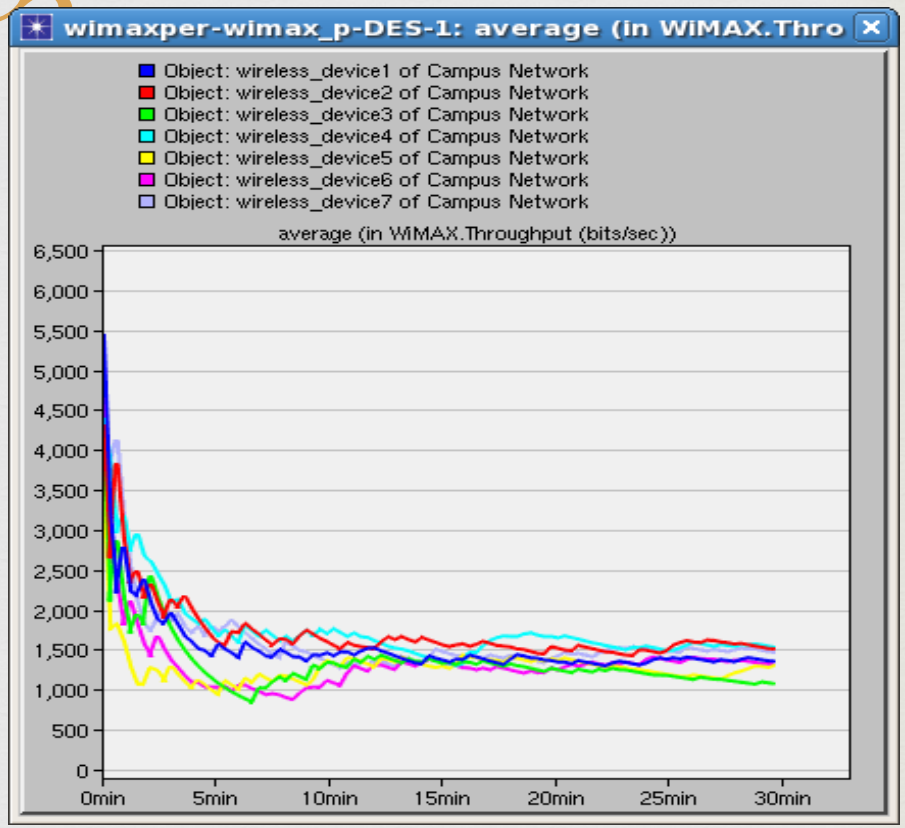
WiFi

WiMAX

- Similar data drop rate for WiFi and WiMAX due to low transmission rate

Simulation Result (Heavy Browsing)



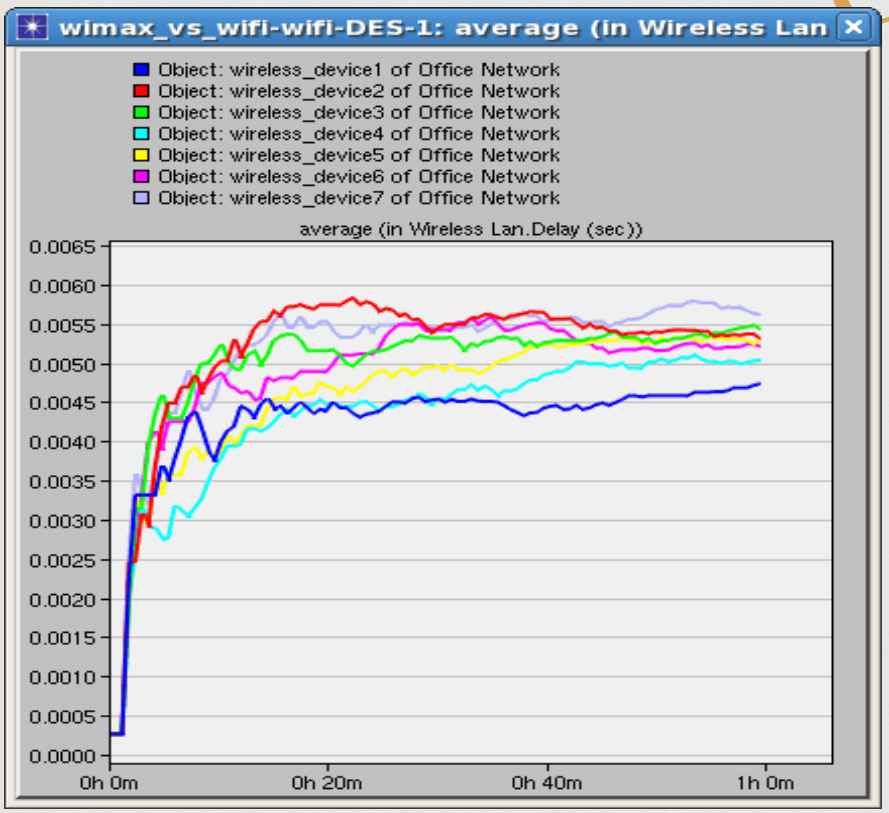


WiFi

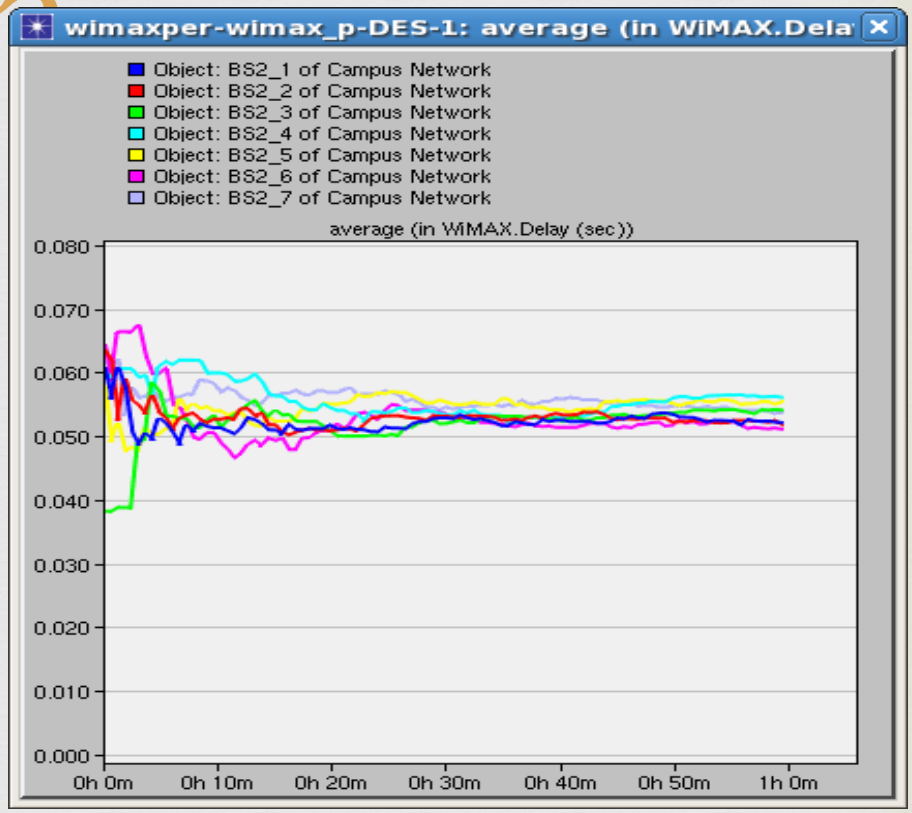
WiMAX

- Similar throughput for WiFi and WiMAX due to low transmission rate

Simulation Result(Heavy Browsing)



WiFi



WiMAX

- WiMAX has a lager delay than WiFi due to absent of QoS

Conclusion and Discussion

- WiMAX outperforms WiFi
  - WiMAX provides Quality of Service (QoS) to ensure better performance such as data dropped rate, delay and throughput
- Cost of building WiMAX network is expensive
- Most wireless devices are compatible with WiFi technology, but incompatible with WiMAX technology.

Future Work

- Integration of WiFi and WiMAX in order to achieve better performance by connecting WLAN router to WiMAX base station
- Comparison of WiFi and WiMAX with a large number of network users

Question?

References

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