# ENSC 835: Communication Networks
# Spring 2011

Final Project Presentation
Simulation and performance evaluation of WiFi and WiMAX using OPNET
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# Roadmap

- **Introduction**
- WiMAX and WiFi
- Motivation
- Project Setup
- Results
- Conclusion
- Future Work
- References

# Introduction

- **Project Idea**

How does WiMAX differ from WiFi in a small scale network?

- **Issues to Analyze**

- Video conferencing
- Throughput
- Load
- Voice
- HTTP
- FTP
- Traffic sent/Traffic received

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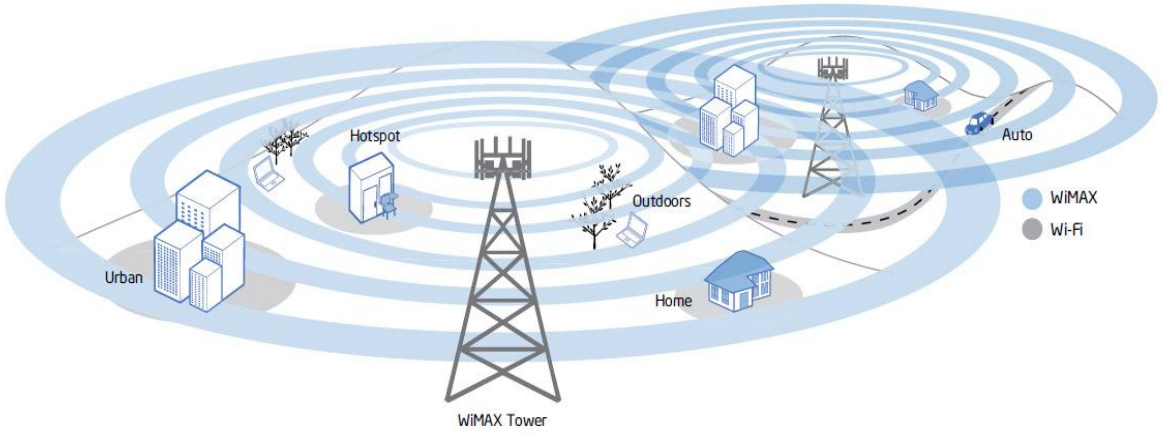
# What is WiMAX?

- Worldwide Interoperability for Microwave Access
- Based on IEEE 802.16 standard
- Point-to-Multipoint (PMP)mode
- Connection oriented
- Flexible QoS supports voice and video
- Channel bandwidths from 1.2-20MHz
- Provides fixed, nomadic, and mobile usage
- Provides wireless broadband access to large areas
- WiMAX uses Time Division Duplexing (TDD) and Frequency Division Duplexing (FDD)

QoS-Quality of Service

# What is WiFi ?

- Wireless Fidelity
- Based on the IEEE 802.11 standard
- Wi-Fi signal occupies five channels in the 2.4 GHz band
- WiFi has two types of components, one is a wireless client station and the other one is an access point (AP).



# Comparison between WiMAX and WiFi

- WiFi range is in order of tens of meters while WiMAX range is in order of kilometres.
- There are few WiMAX enabled devices and majority have WiFi capability.
- WiMAX provides the last mile of internet access; it can connect WiFi hotspots to the Internet.
- WiMAX provides multi-media and telecommunication services.

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# Motivation

- WiMAX  is readily available. As of April 2011, WiMAX forum claims there are over 582 WiMAX networks deployed in over 147 countries.
- Today, in every continent, one in ten people around the world use Wi-Fi at home, at work,and in countless ways.
- Video conferencing is becoming very popular, which enables face-to-face and real-time communications.

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- Motivation
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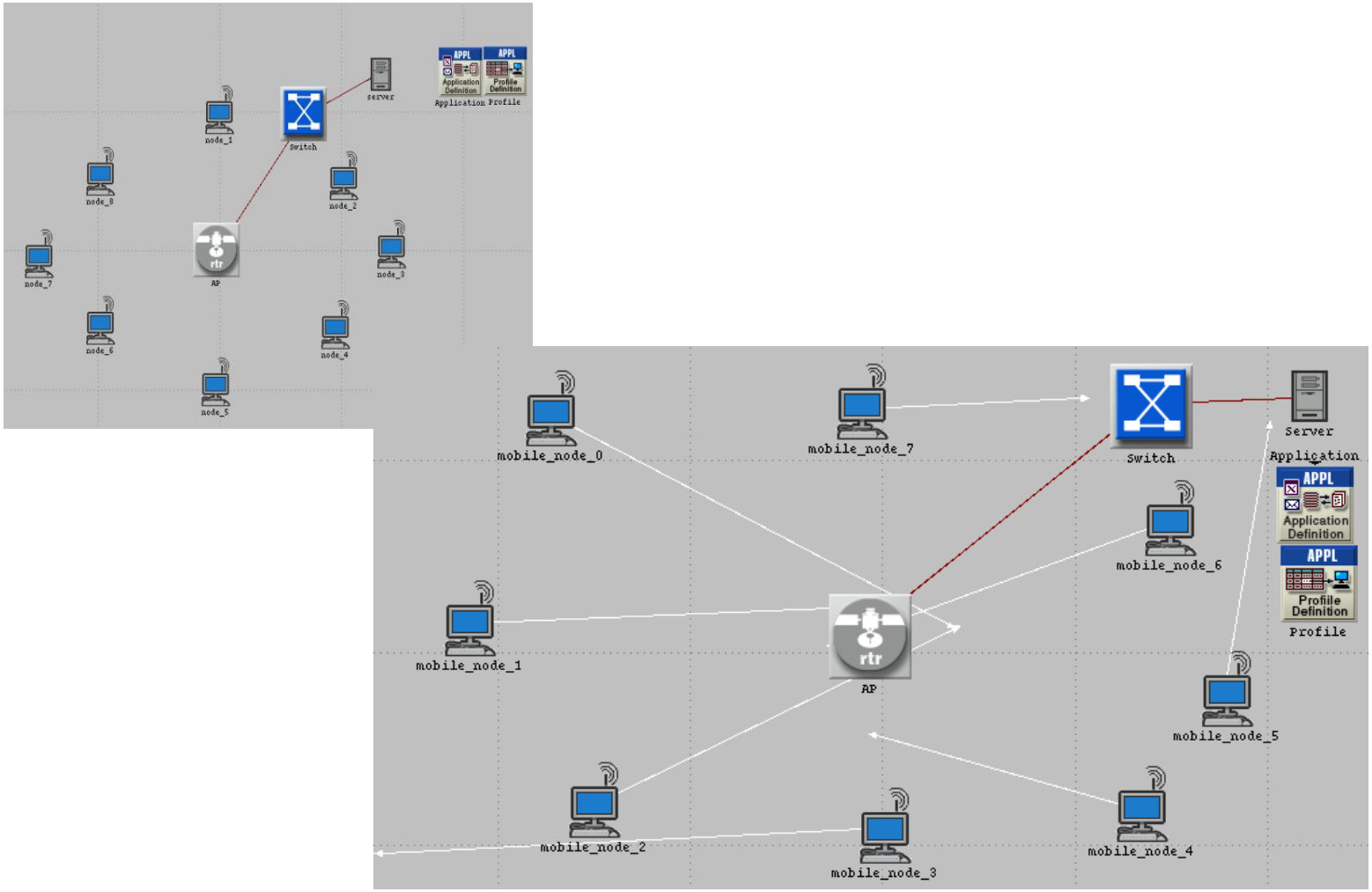
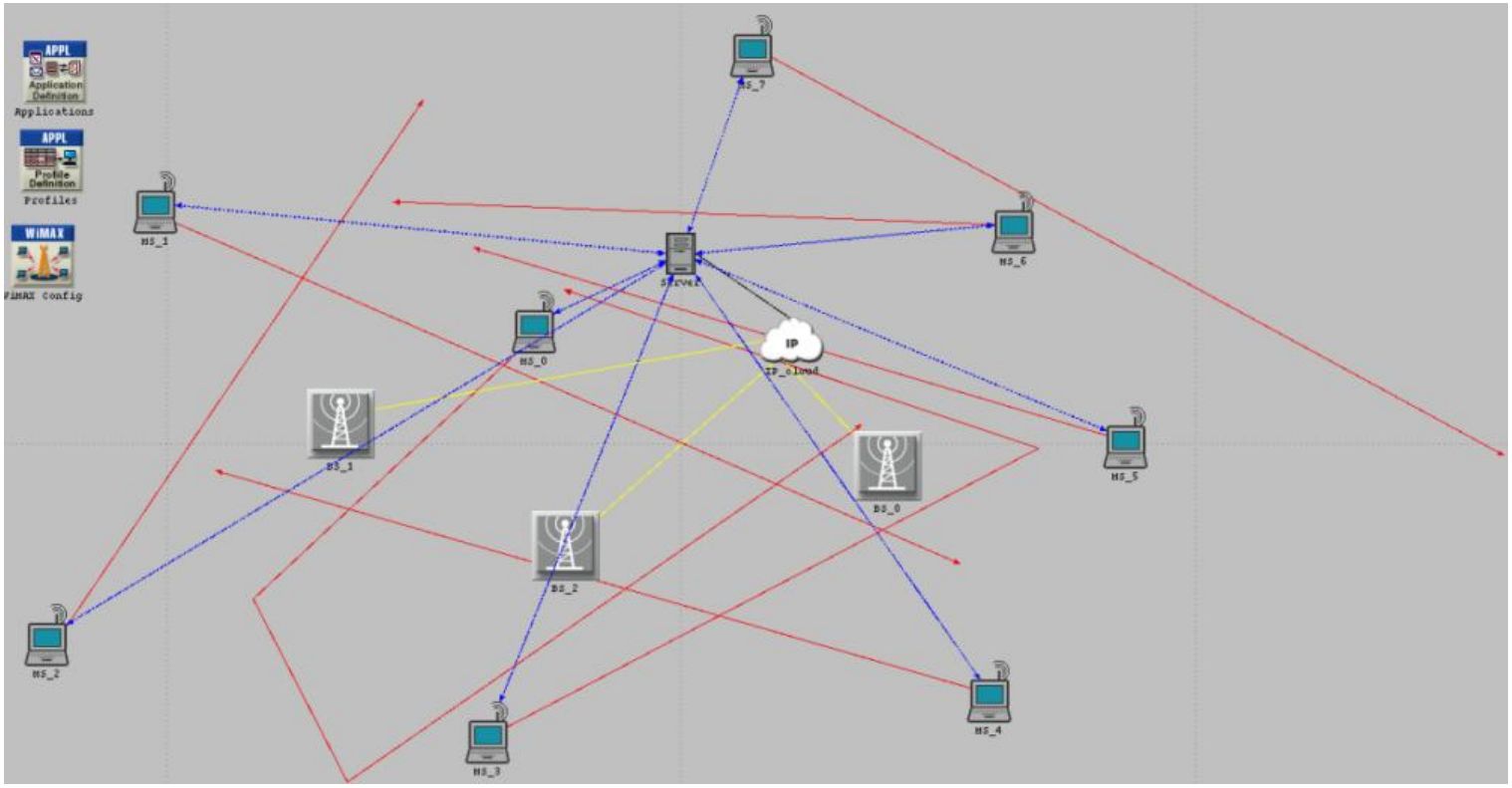
- Conclusion
- Future Work
- References

# Project Setup

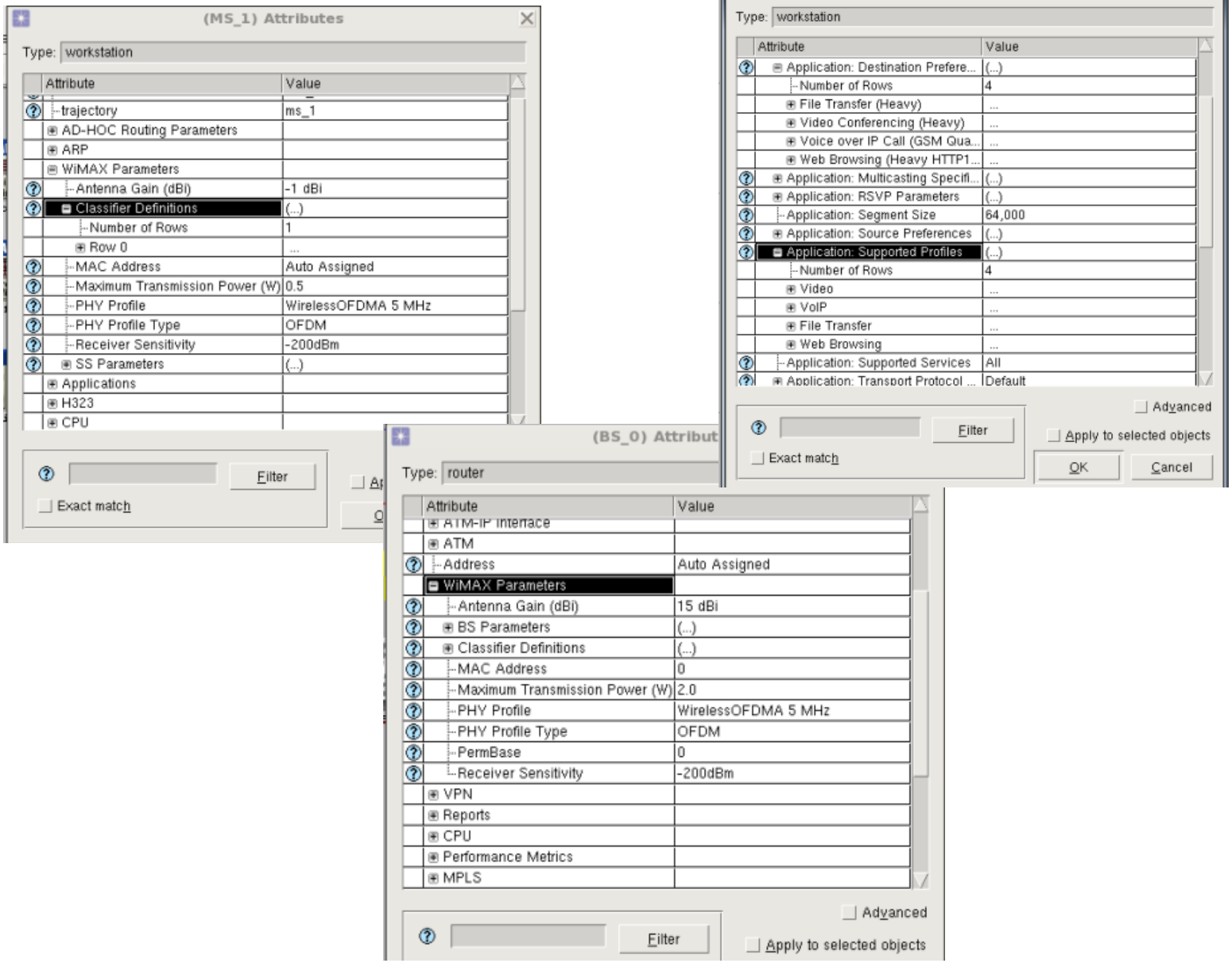





We created two scenarios for WiFi, first with eight fixed WS and second having eight MS's and one scenario for WiMAX with eight MS's and three BS's where MS's are randomly located.

MS- Mobile Station
WS- Work Station
BS- Base Station

# Parameter Setup



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- Introduction
- WiMAX and WiFi
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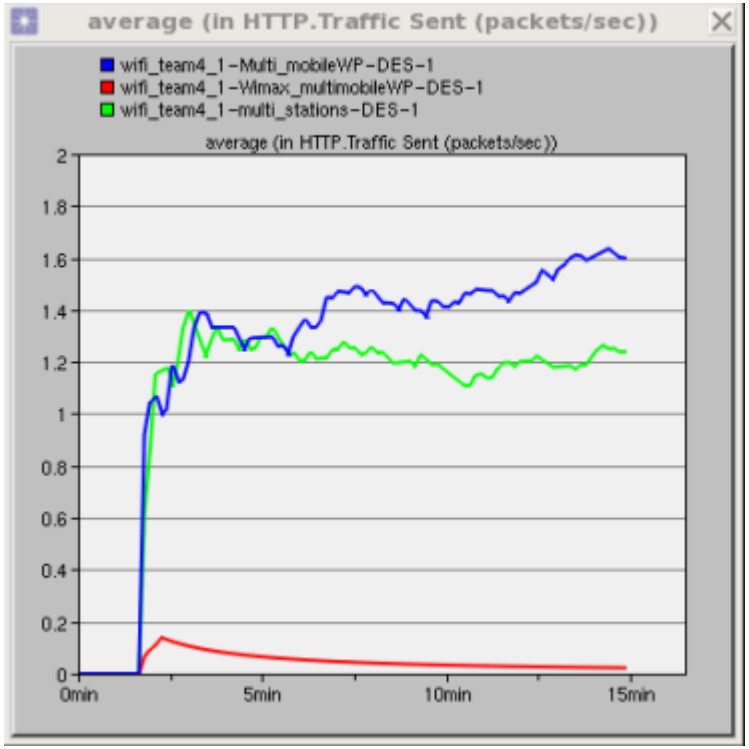
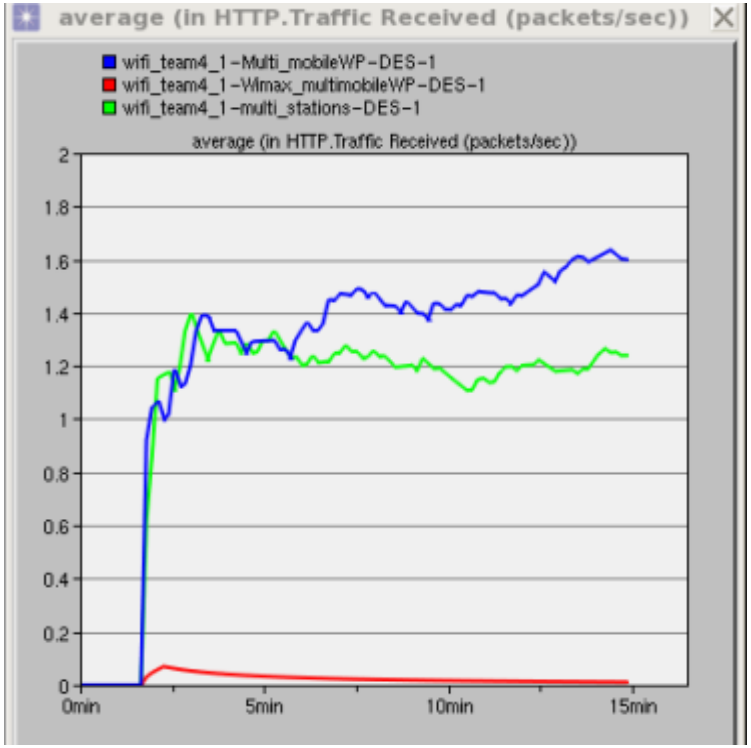
- Conclusion
- Future Work
- References

# Results

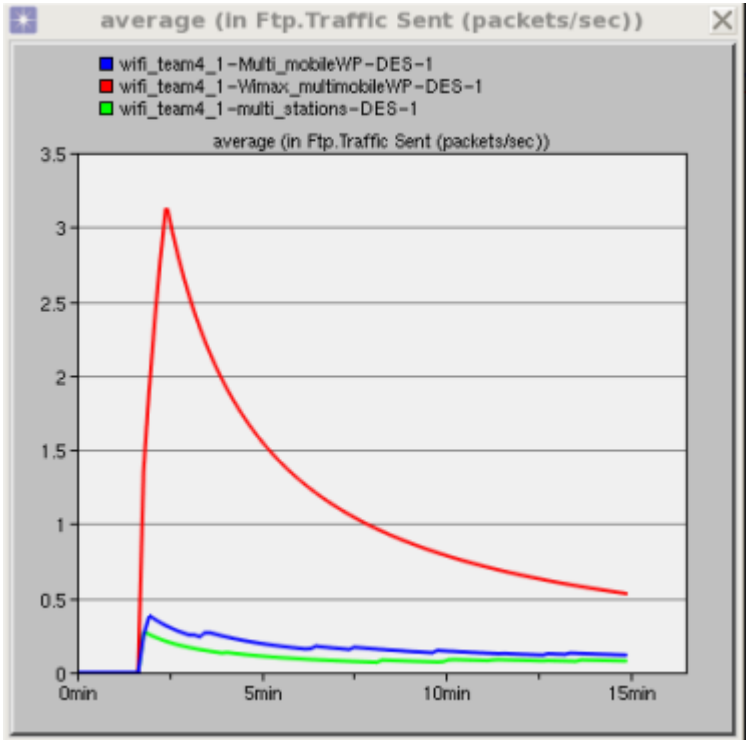



HTTP traffic sent

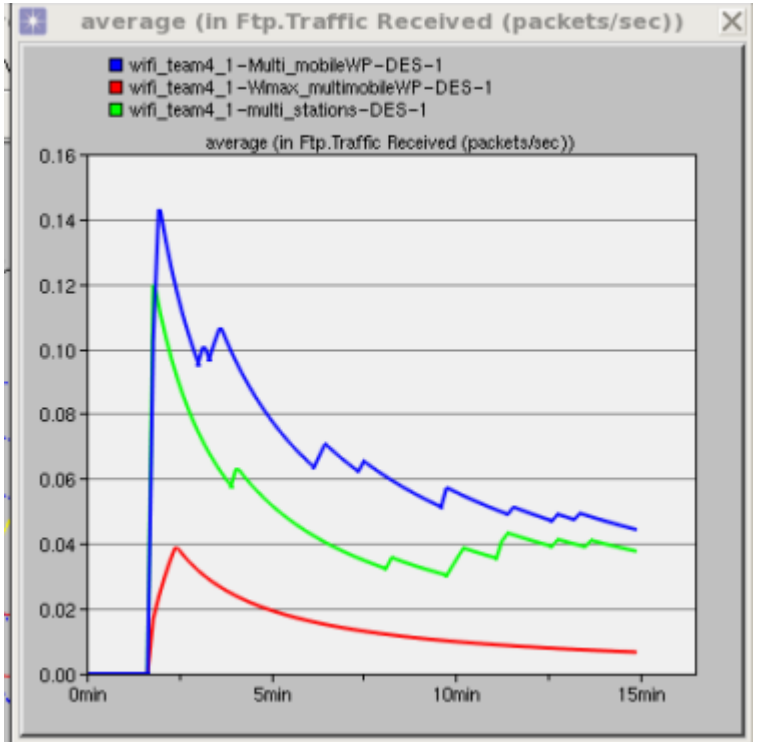



HTTP traffic received

# Results

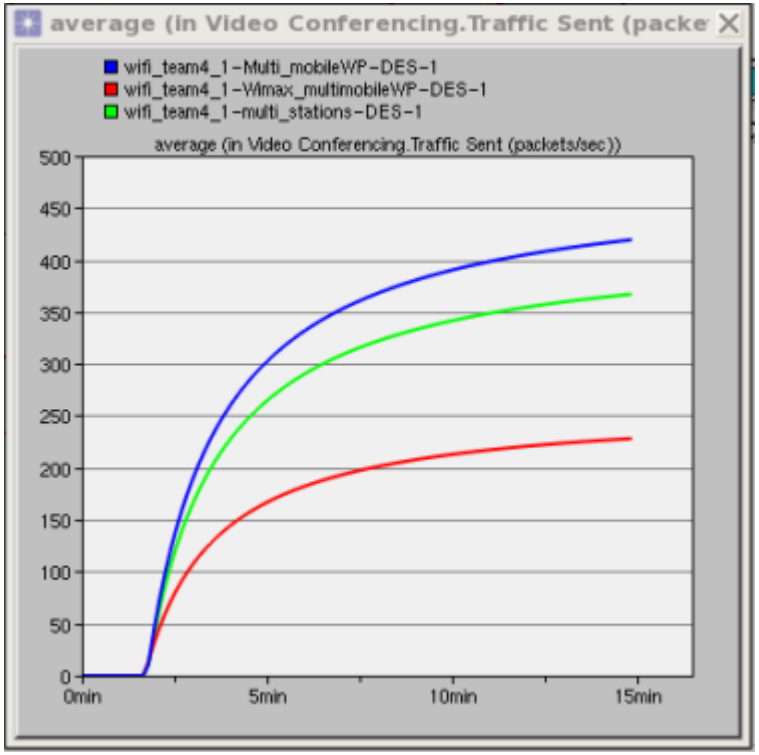


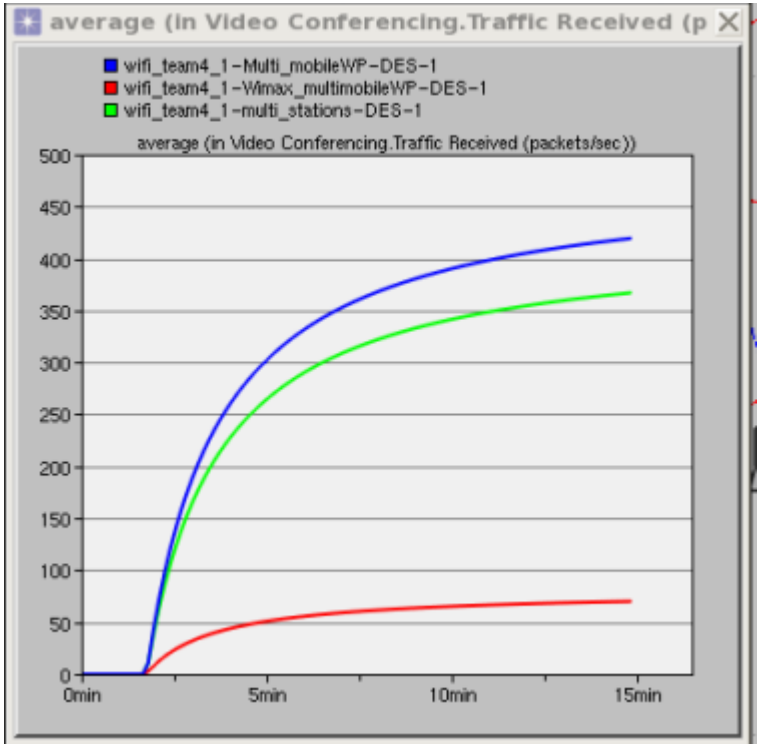

FTP traffic sent




FTP traffic received

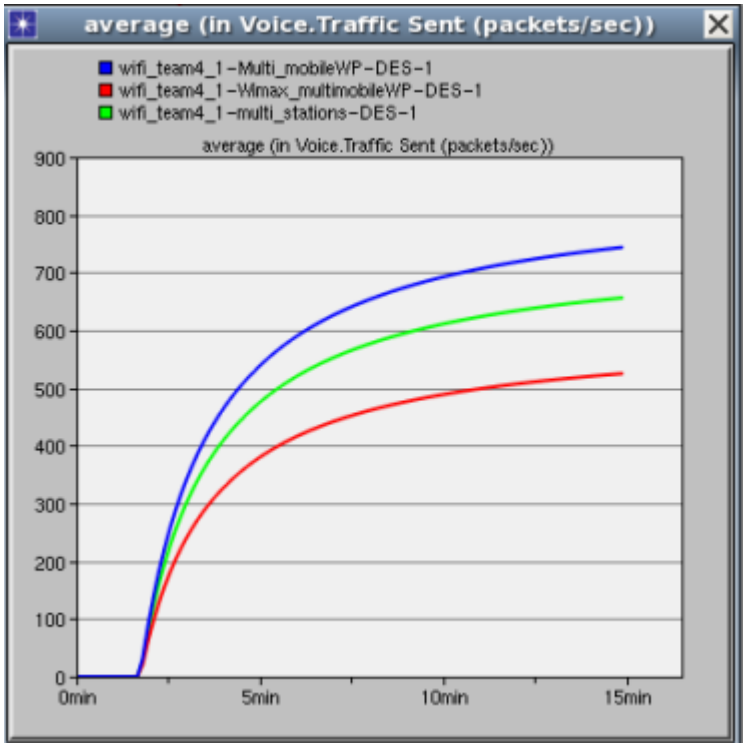
# Results



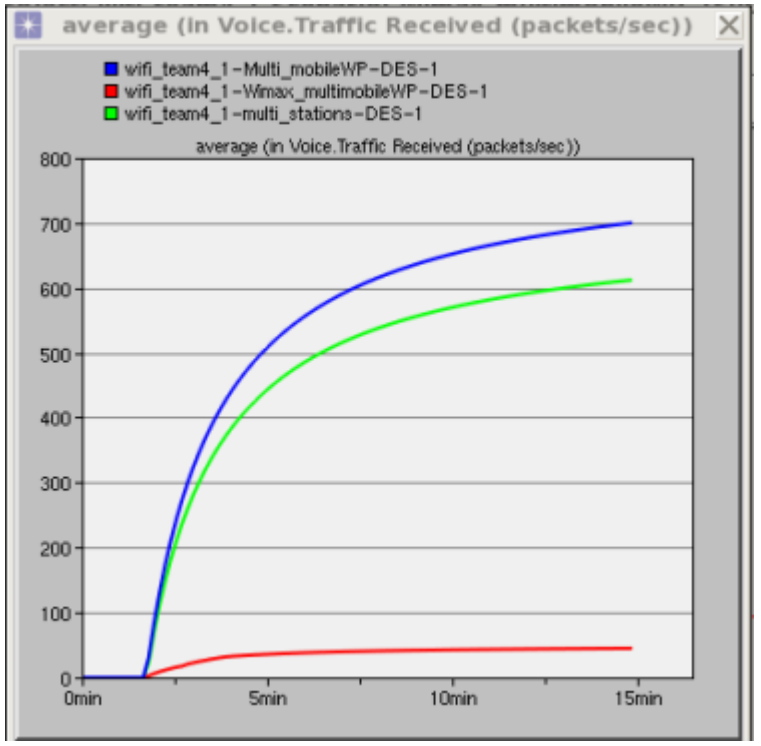




Video Conferencing: There is no loss in packets in WiFi

# Results

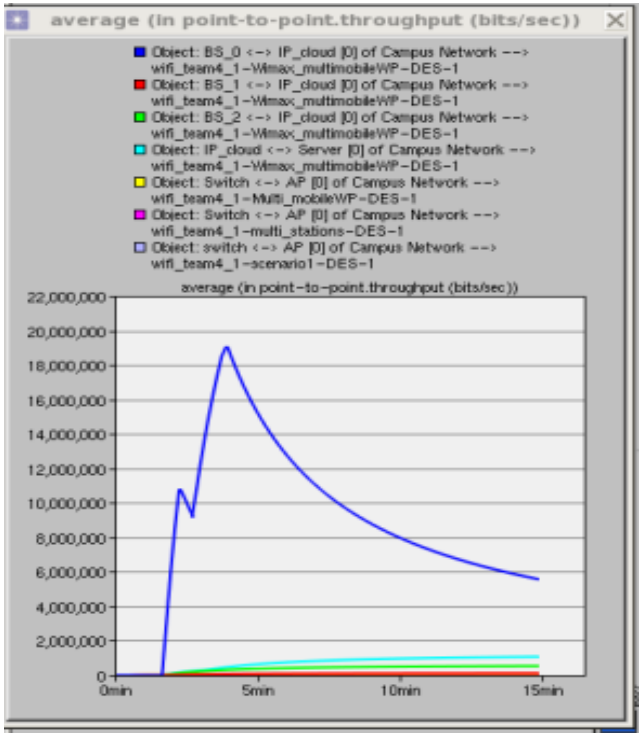


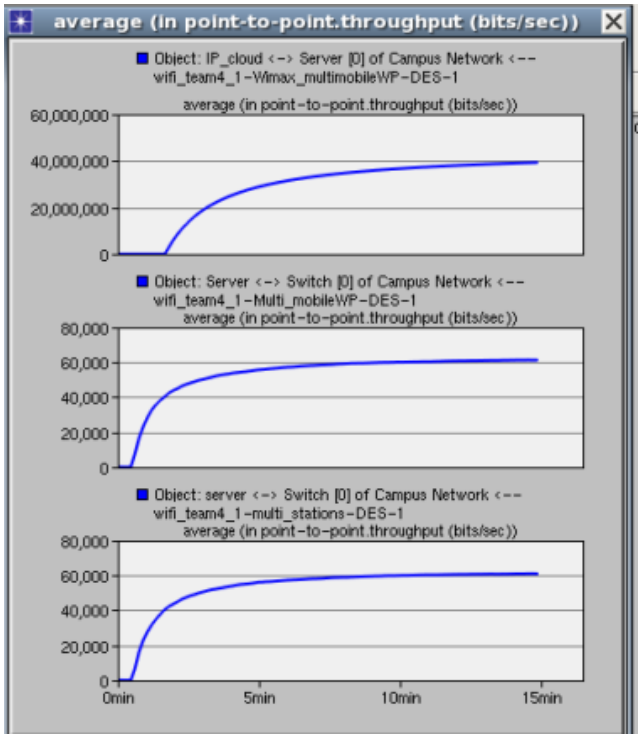

Voice traffic sent




Voice traffic received

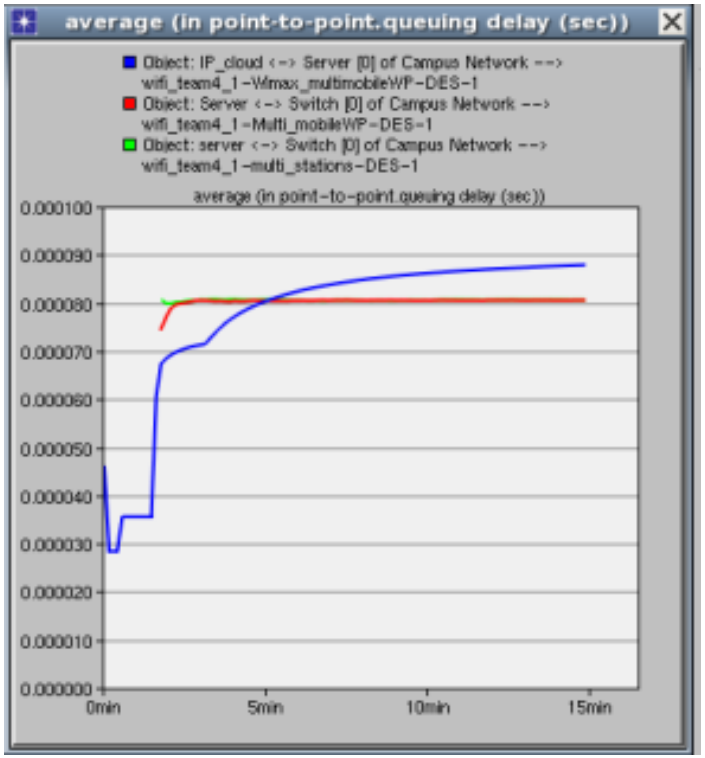
# Results

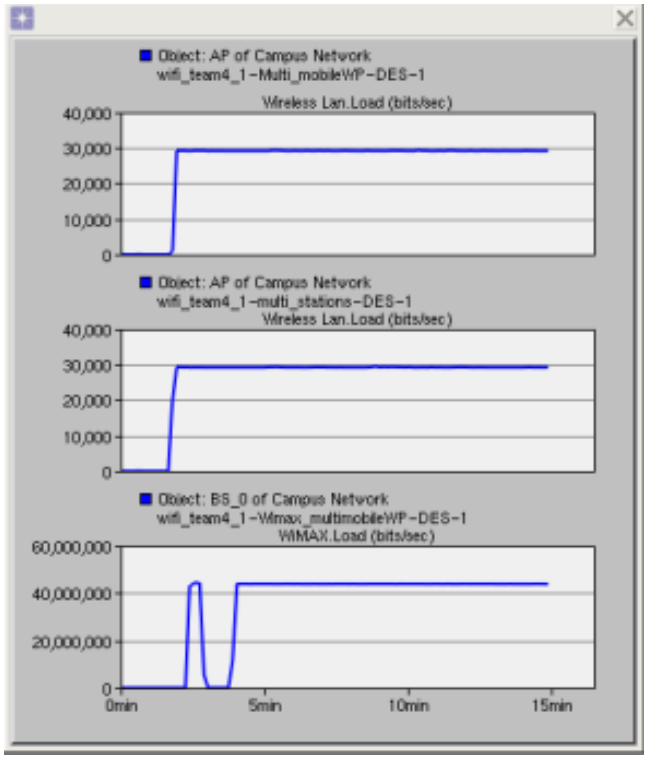



Average throughput of BS of WiMAX scenario and Access point (AP) of two WiFi scenario is shown on left and server Throughput received of campus network is on the right.

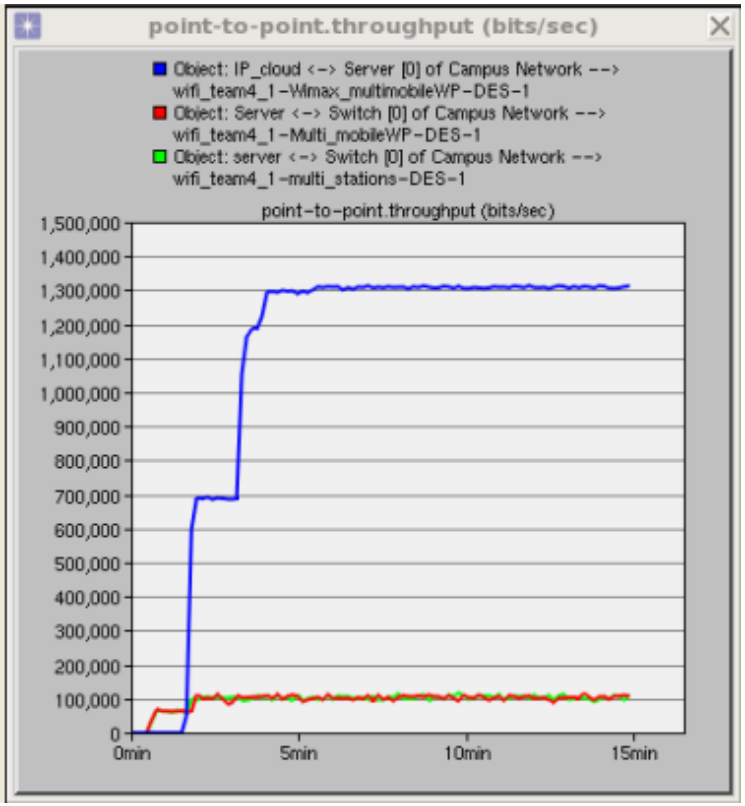
# Results




Queuing delay in WiFi scenarios is almost identical but for WiMAX it increases with the time as the mobile station starts to move in the area. Load of AP in WiFi and BS in WiMAX is shown on right.

# Results




Throughput is the average rate of successful message delivery over a communication channel. It is much larger for WiMAX as compared to WiFi.

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# Conclusion

- Throughput of WiMAX is better incase of larger traffic and wide area range.
- WiFi have less packet loss in small area network.
- Queuing delay in WiFi does not depend on mobility of the MS but in case of WiMAX it increases as MS start moving.
- There is packet loss in WiMAX when MS start moving with trajectory.
- WiMAX can handle more load as compared to WiFi.

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# Future Work

- Comparison of WiFi and WiMAX can be done on a larger network.
- Handoff comparison of small network vs. large network can be done.
- QoS of WiFi and WiMAX can be compared.
- Performance optimization with Request-to Send (RTS) and fragmentation.

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# References


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# Questions????

Thank You!!!!