Characteristics of Wi-Fi

Group 13

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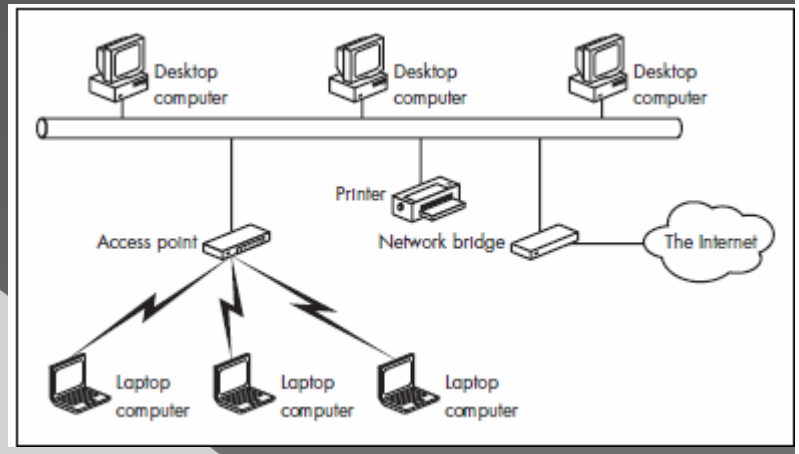
Introduction

- Wi-Fi is a form of wireless communication that uses IEEE 802.11 networking standards.
- We will be analyzing 802.11g, which is the most common standard.
- Wi-Fi is very flexible, it could be used in a simple home to a large campus.
- We will be using a simple infrastructure network



Infrastructure Network Sample

Motivation

- Our motivation came from every university student using a coffee shop for Wi-Fi as a place of hibernation.
  - Why does the speed of wireless network vary in a coffee-shop from one day to another?
  - Is there a significant delay increment if more users are joined in same Basic Service Set?
  - Can more APs reduce the delay and provide better quality of service?

Overall Related Work

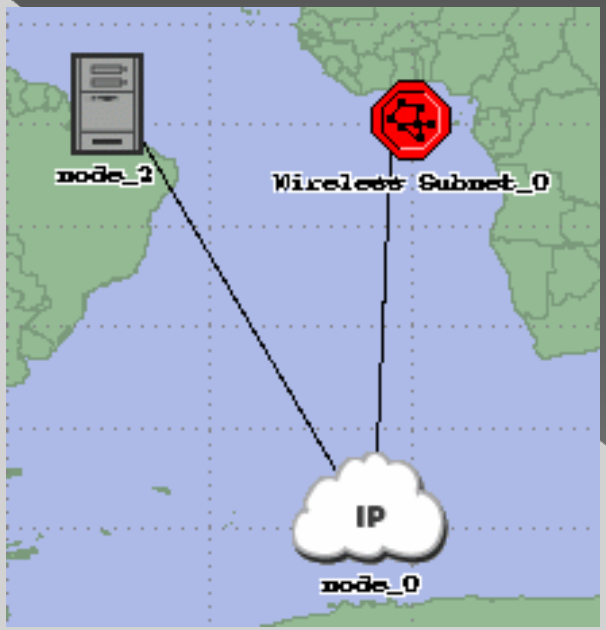
- Previous work from last spring 2009:
  - Find network traffic of various scenarios in an office network
  - Network delay by various number of user and data traffic

Project Description

- To analyze different scenarios with Wi-Fi:
  - Case 1: Analyzing Number of Users
  - Case 2: Analyzing Distance
  - Case 3: Analyzing Number of Access Points

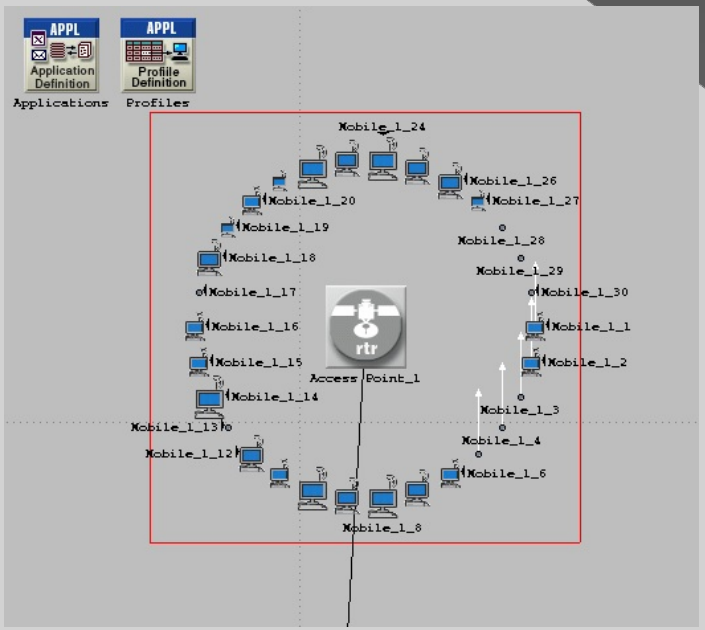
Implementation

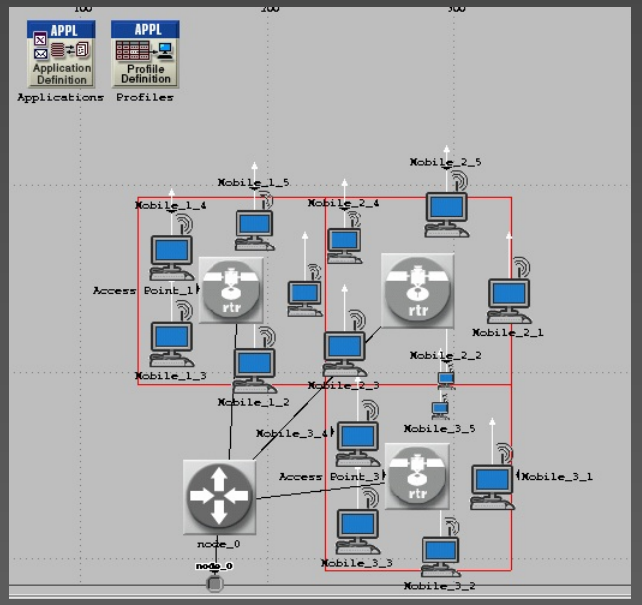
- Topology of Overall Network

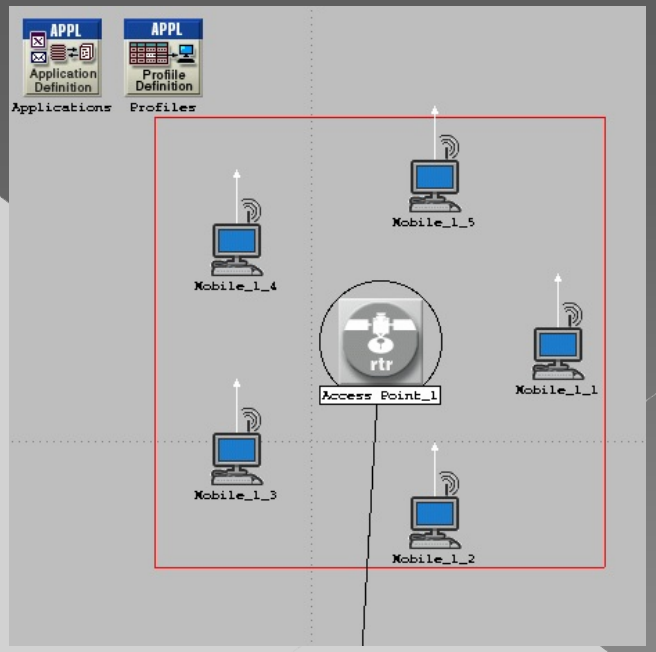


Implementation

- Subnet Topology

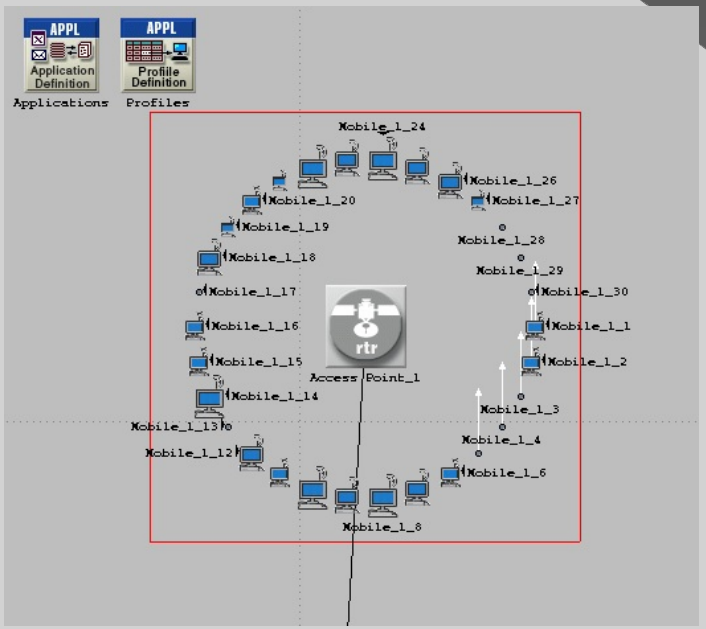




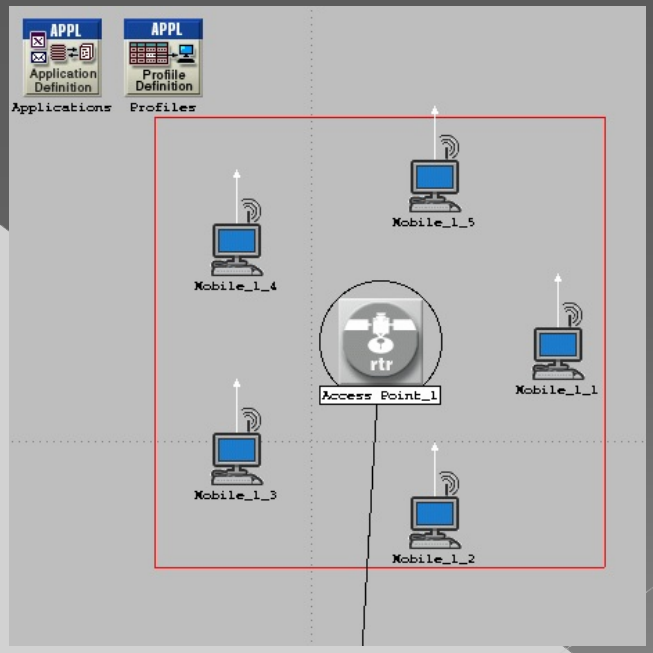


Case 1: Analyzing Number of Users

- Topology of 30 users vs. 5 users



30 users



5 users

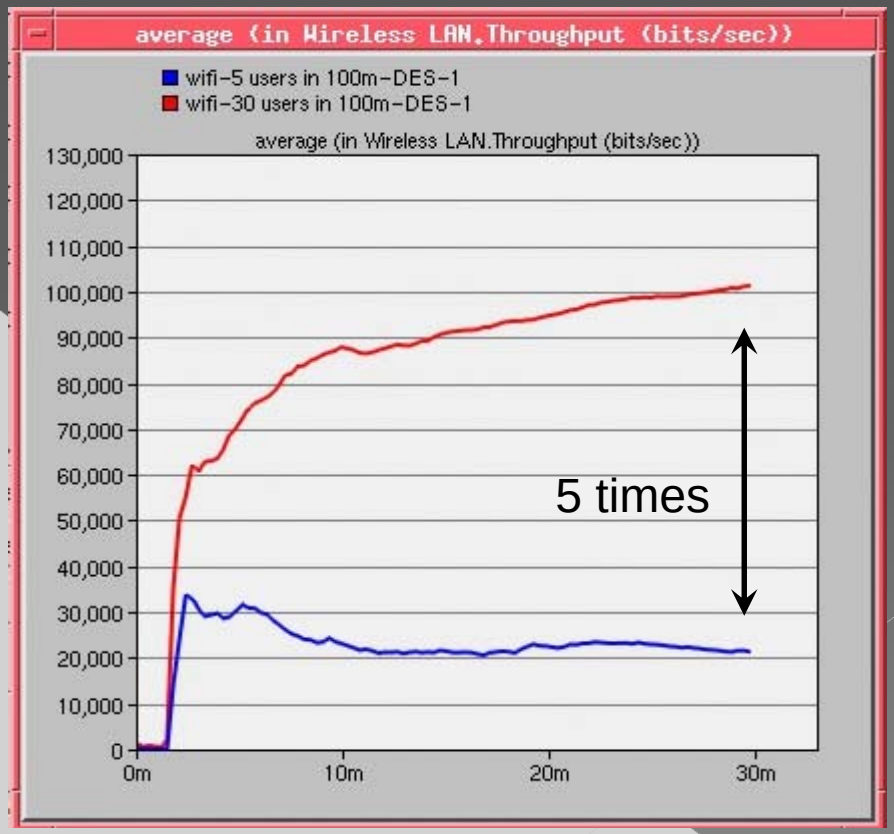
Case 1: Analyzing Number of Users

Delay

30 users (100m)

5 users (100m)

Throughput

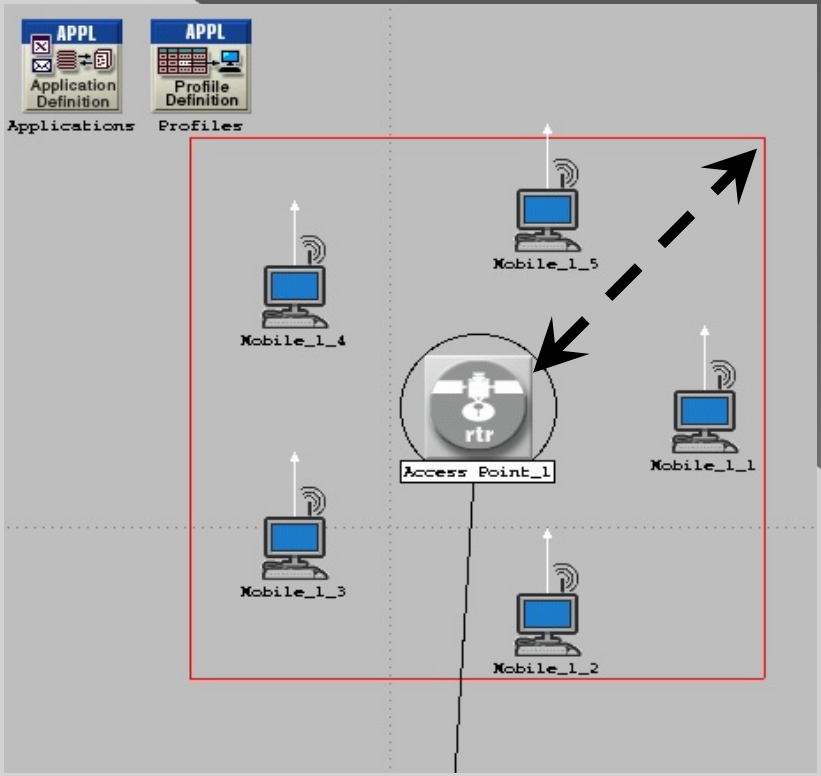


30 users (100m)

5 users (100m)

Case 2: Analyzing Distance

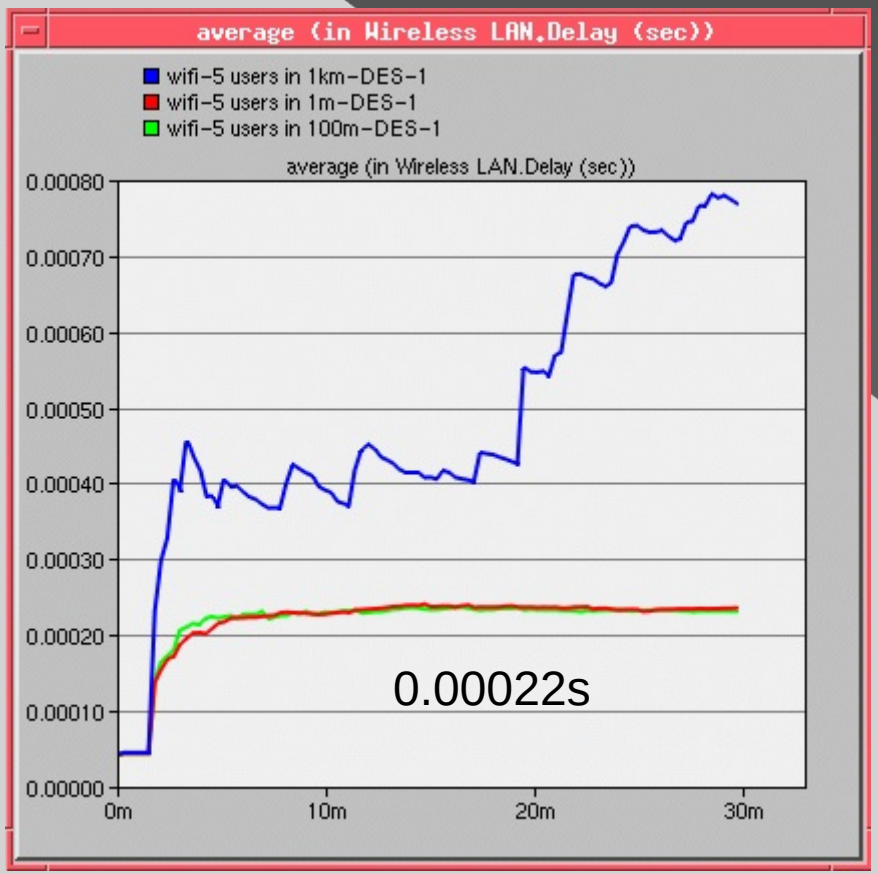
- Topology of Workstations to AP Distance



Distance between AP and Workstations varies

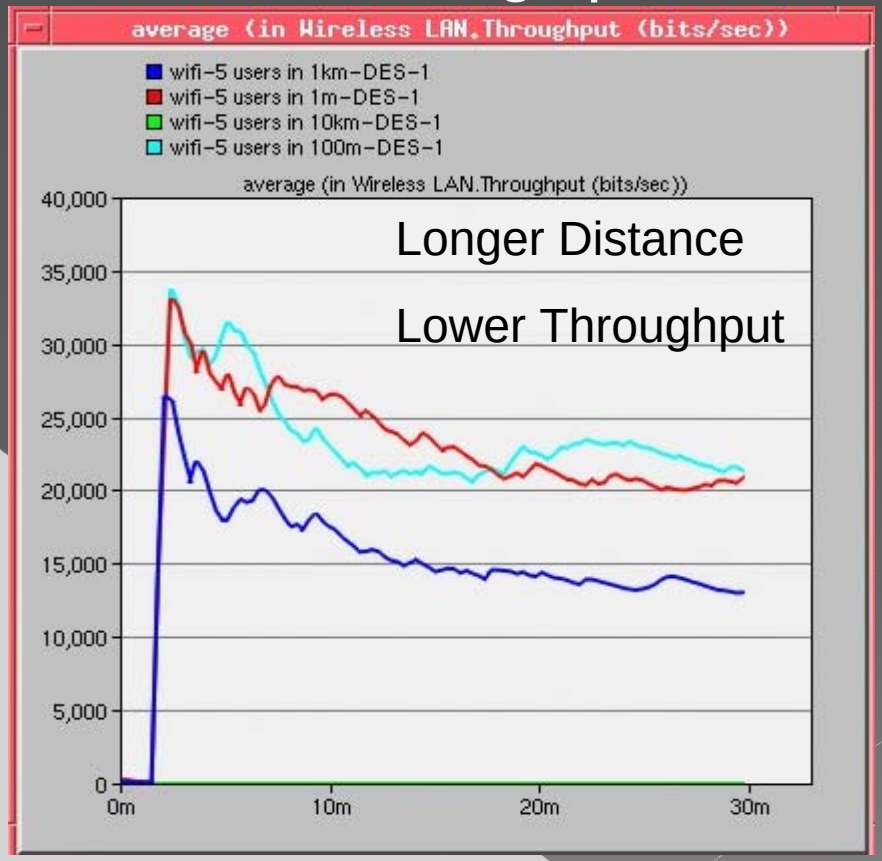
Case 2: Analyzing Distance

Delay



5 users 1km
5 users 100m
5 users 1m

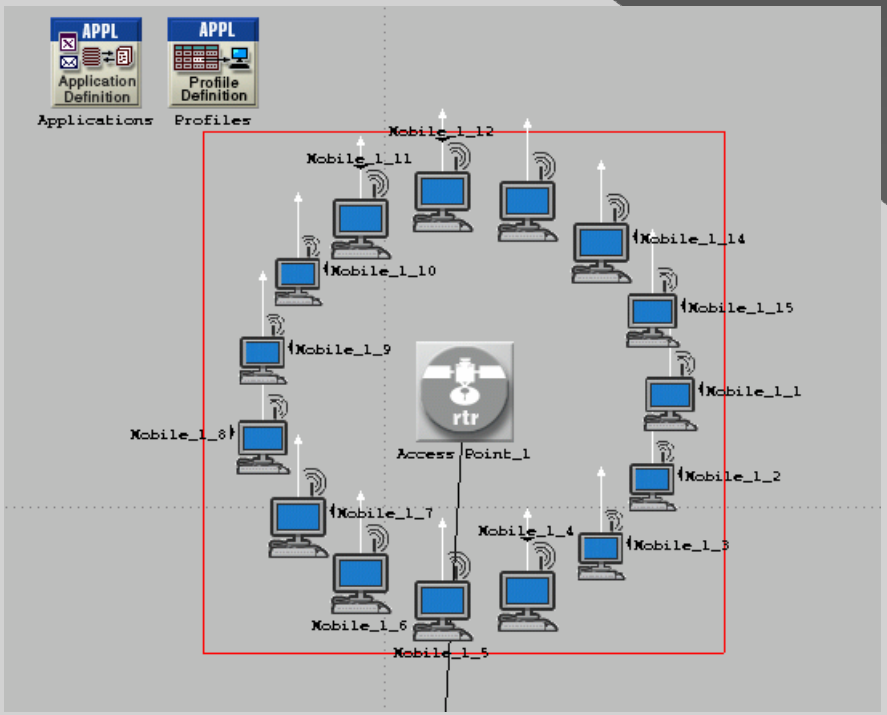
Throughput



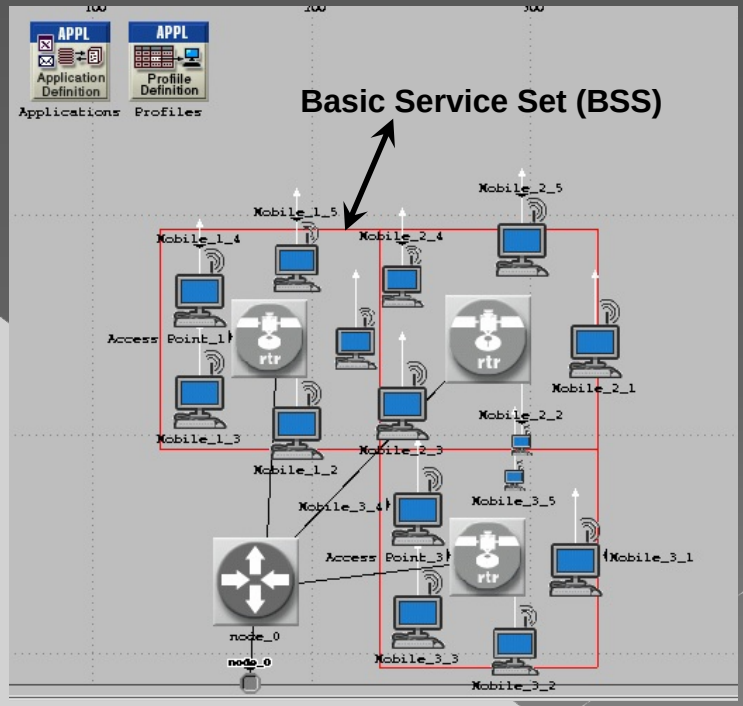
5 users 1m
5 users 100m
5 users 1km
5 users 10km

Case 3: Analyzing Number of APs

- Topology with Different Number of APs



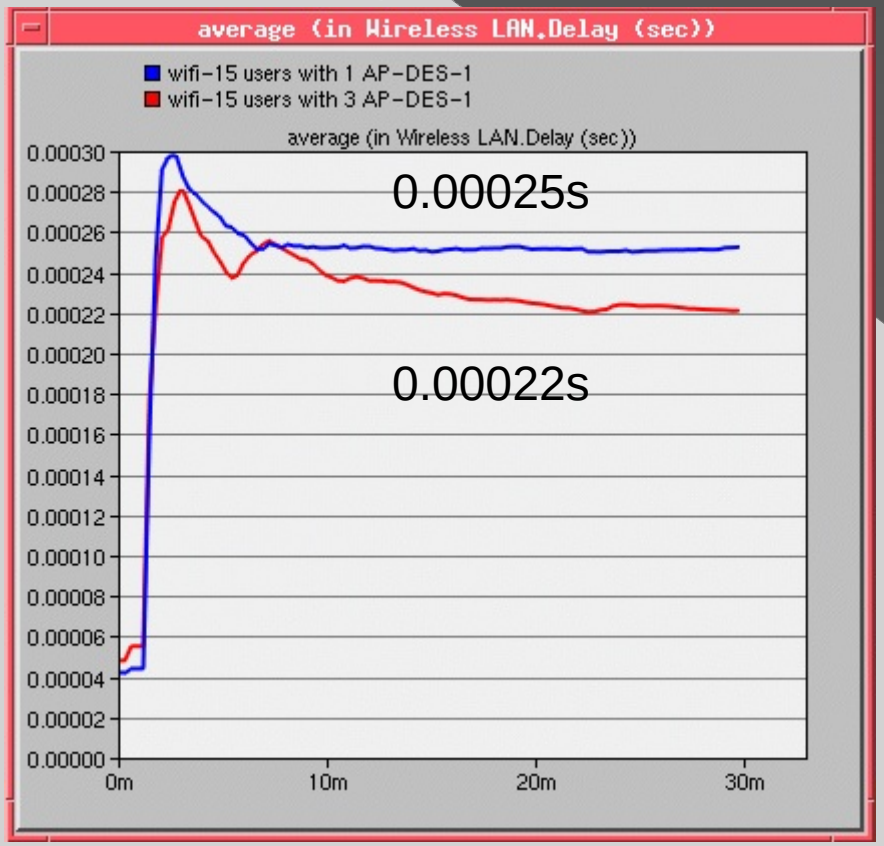
1 AP with total 15 users



3 APs with total 15 users in 3 BSS

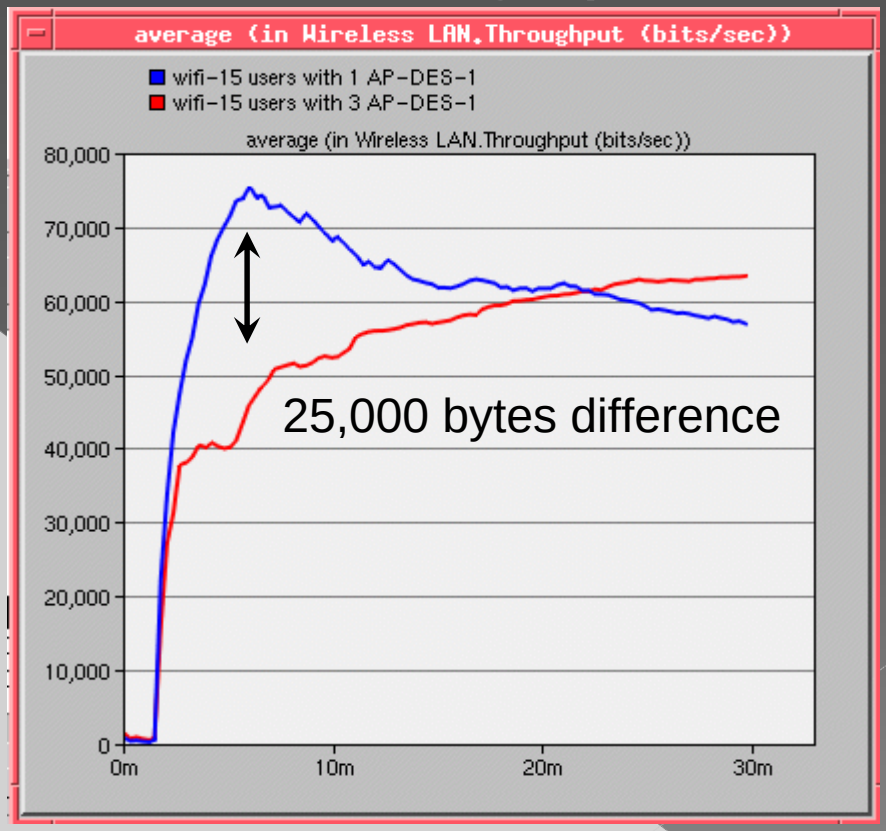
Case 3: Analyzing Number of APs

Delay



- 15 users 1AP
- 15 users 3AP's

Throughput



- 15 users 1AP
- 15 users 3AP's

Conclusion

- More users would cause higher delay, but the throughput has higher ratio of growth comparing with delay ratio
- There is a certain range that each router can provide good service. The shorter distance gives lower delay and better throughput in short time
- More BBS can reduce the overall time delay, but unable to process large amount of bytes in a short time.
- Low-Delay combination should be: Few users with several designated AP in short distance
- Good-Throughput-in-short-time combination should be: Few users with 1 AP in short distance

Reference

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