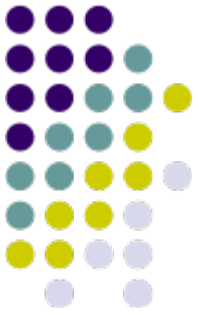# HTTP over WiMAX

Team 7

Daphne Mui
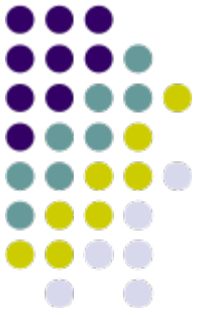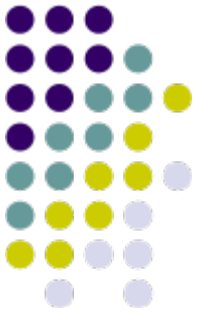
Outline

- Introduction to WiMAX
- HTTP
- Project Motivations
- Past Work
- OpNet Modeling
- OpNet Simulation Results
- Future Work
- Conclusion

WiMAX

- Worldwide Interoperability for Microwave Access
- Wireless technology
- 2 main components
  - Base stations
  - Clients
- Multiple clients connect to single base station
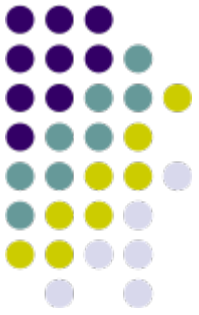- Base stations can connect one-to-one

WiMAX Advantages

- Long range capability
  - Up to 50km radius for fixed clients
  - Up to 15km radius for mobile clients
- Fast transfer rate
  - Up to 75 Mbps per channel
- Potential to replace ADSL wire lines

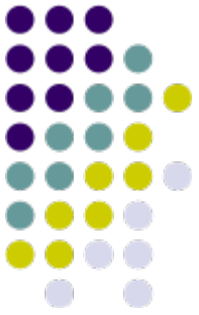ADSL - Asynchronous Digital Subscriber Line

HTTP

- Hypertext Transfer Protocol
- Application layer protocol
  - Runs on TCP over IP
  - Runs on UDP over IP
- Used to browse web pages

IP - Internet Protocol
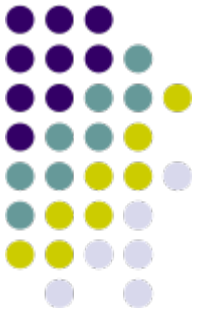TCP - Transmission Control Protocol
UDP - User Datagram Protocol

Project Motivations

- WiMAX gaining popularity among Internet Service Providers

- Everyone browses the Internet

- Want to see if WiMAX can replace ADSL

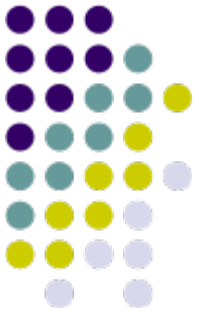ADSL - Asynchronous Digital Subscriber Line

Past Work

- OpNet v14 video streaming over WiMAX model by Will Hrudey
- Other OpNet v14 WiMAX models
  - VoIP
  - Gaming traffic
  - Video conferencing

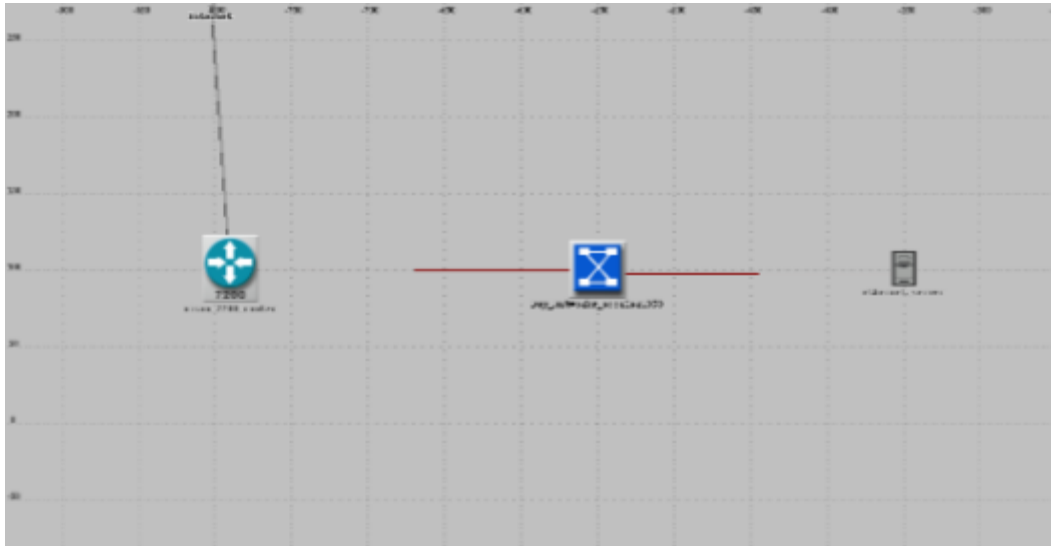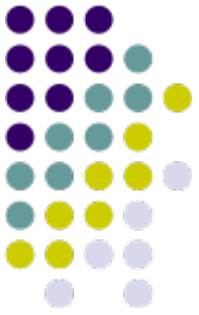VoIP – Voice over Internet Protocol

OpNet Modeling

- 2 subnets connected by Internet cloud
- Server subnet
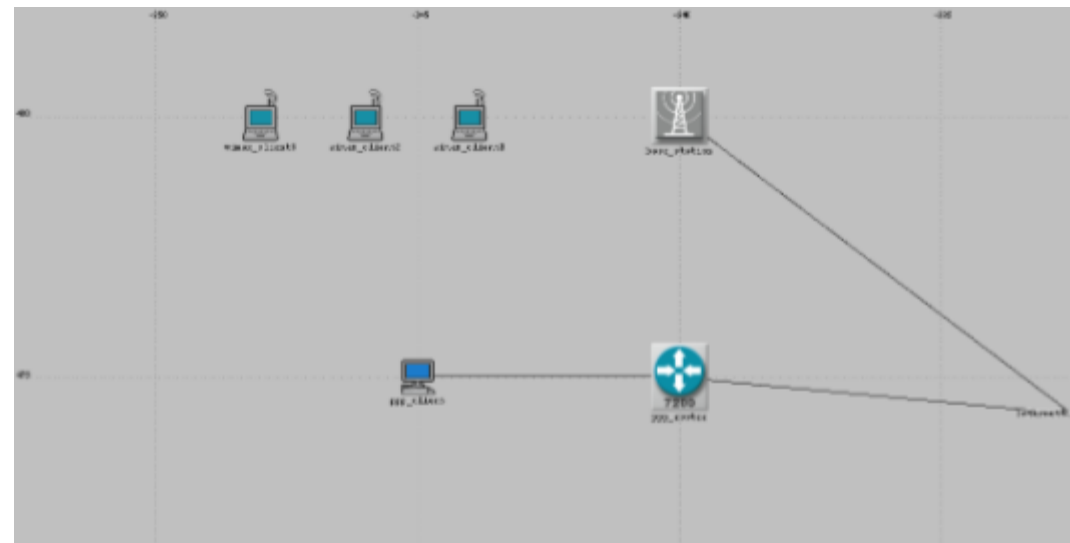 - HTTP server
- Client subnet
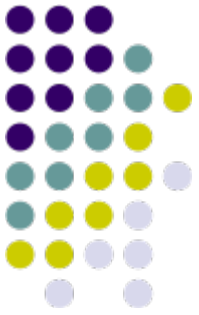 - WiMAX base station
  - 3 fixed WiMAX workstation clients

OpNet Modeling
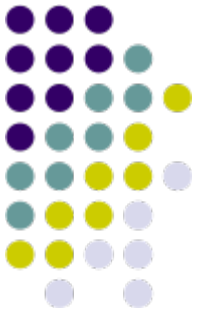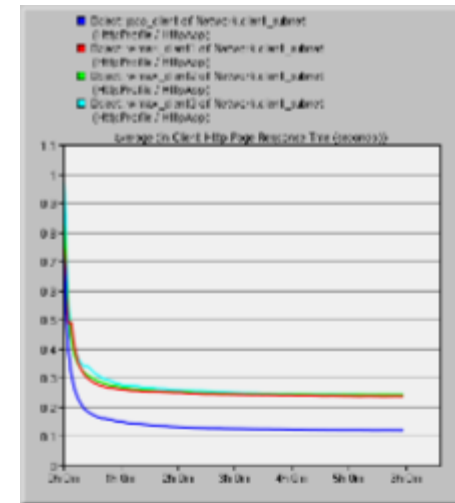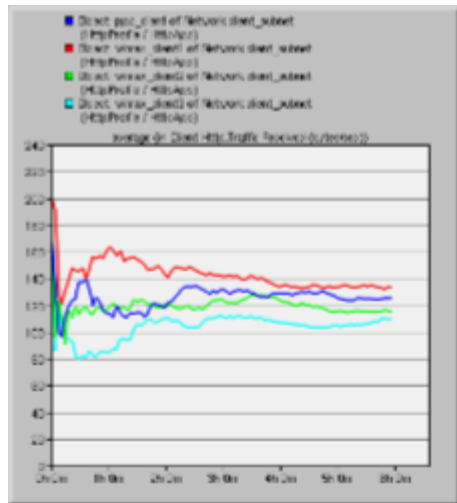

Server Subnet

Client Subnet

OpNet Simulation

- WiMAX configuration allows physical impairments in network
- Added PPP client for comparison
- Simulated 6 hours heavy Internet browsing
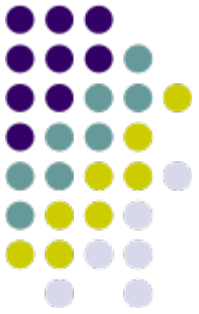 - Actual simulation time: 6-8 minutes

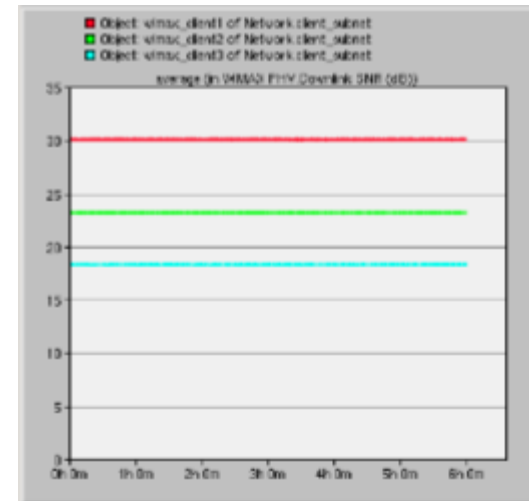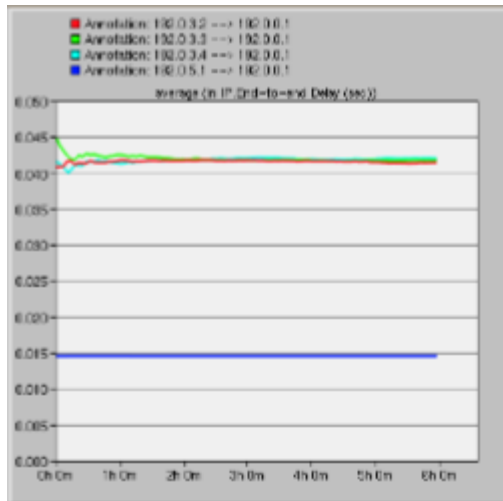PPP – Point-to-Point Protocol

OpNet Simulation Results

- Throughput
  - Packet loss factors include: IP cloud, WiMAX physical layer

- Page response time
  - PPP Client faster response time
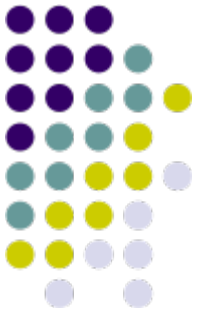
OpNet Simulation Results

- End-to-End Delay
  - PPP Client much lower delay

- SNR
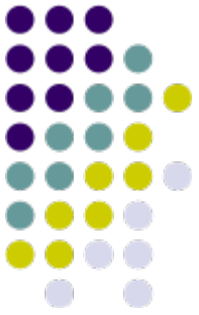 - Greater distance from base station means lower SNR

SNR – Signal to Noise Ratio

Future Work

- Mobile WiMAX clients
- Multiple base stations
- Background traffic
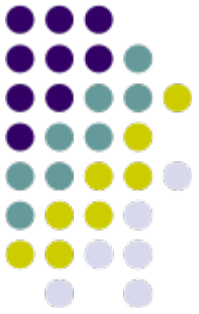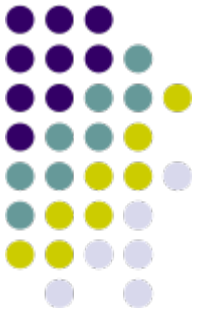- Larger number of WiMAX clients

Conclusion

- WiMAX may not perform as well as wired technology
- WiMAX still a good option if implemented correctly
  - Proper distances between base stations
  - Factor in cost of implementation and maintenance

References

[1] IEEE Standard for Local and Metropolitan Area Networks, IEEE Standard 802.16, 2009.

[2] Hypertext Transfer Protocol -- HTTP/1.1, IETF RFC 2616, 1999.

[3] W. Hrudey and L. Trajkovic, "Streaming Video Content Over IEEE 802.16/WIMAX

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[4] WiMax Forum [Online]. Available: http://www.wimaxforum.org/ (Feb. 2011).

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Questions?