PERFORMANCE ANALYSIS OF WIMAX FOR VOICE AND VIDEO CONTENT

www.sfucomnet.weebly.com

Team Number: 3

Anttal, Arshvir Kaur
(aanttal@sfu.ca)

Kaur, Gurleen
(gurleenk@sfu.ca)
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Introduction

- Worldwide interoperability for microwave access is an IEEE 802.16 standard.
- Wireless Internet Service
- Formed in April 2001
- Based of Wireless MAN technology.
- Provide fixed and portable usage.
- Maximum data speed: 70 Mbps
- Range: Line-of-sight ~ 50 km
  Non-line-of-sight ~ 10 km
WiMAX features

- Provides a high speed over greater distances for a large number of users at reasonable cost

- Seamless interoperation between various network types

- Provides wide area coverage and Quality of Service for wide variety of applications
Figure 1: WiMAX Subscribers (Source: Senza Fili Consulting, 2007)
WiMAX Broadband Access

Figure 2:

Video Services

- Video is organized as sequence of frames.
- Video frame packets are transmitted at constant rate.
- Video content characterized by several parameters: Video format, Pixel color depth, Frame inter-arrival rate.
- Video frame inter-arrival rates range from 10 fps to 30 fps.
- Video source is delivered to video clients over an IP network.
- Video trace file (Tokyo Olympics) taken from Arizona State University [1][8].
- 30 frames per second and frame resolution 352*288 used.
- Video is loss tolerant but delay sensitive.
VoIP

- VoIP (Voice over Internet Protocol) enables voice communication to be delivered over Internet Protocol networks.
- Voice traffic is loss and delay sensitive.
- VoIP provides services at low costs as compared to the traditional phone services.
- VoIP is available on many smartphones, personal computers, and on Internet access devices.
- Voice quality may suffer when compression is done but compression reduces bandwidth requirements.
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Related work

  - Performance of WiMAX was studied using fixed nodes placed at different distances from the base station for video traffic

  - Audio and video content and fixed nodes used to analyze WiMAX performance

- Rufai, Syed Hamza Mehmoood, Qingye Ding, and Ljiljana Trajkovic. “Comparison of VoIP and Video Content Performance Over WiMAX and LTE.” [10]
  - WiMAX with mobile stations is analyzed for VoIP and video traffic using only two cells.
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Objectives

- We implemented WiMAX network on Riverbed Modeler 18.0.
- Analysis of WiMAX with fixed nodes as well as during handover.
- Impact of distance of workstations from base station on performance.
- Study the effectiveness of WiMAX while streaming video and during voice calls.
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Simulation Scenario 1

Figure 3: Fixed nodes
Simulation Scenario 2

- Mobile workstation moving from one cell to other.
- When mobile station is moving across the region of base station, it should be served by that base station.
- Mobile workstation is moving at a speed of 10 m/sec
Simulation Scenario 2

Figure 4: Mobile Nodes
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Scenario 1: Fixed Nodes

Figure 5: Traffic Received (packets/sec) and Throughput (packets/sec)
Fixed node nearer to the base station receives more data and has greater throughput
Scenario 1: Fixed Nodes

Figure 6: Delay(sec) and Jitter(sec)
Fixed node nearer to the base station has less delay and jitter
Scenario 2: With Video

Figure 7: Throughput (packets/sec) during handover
Scenario 2:

Figure 8: Delay(sec) and Jitter(sec) during handover
Scenario 3: With VoIP

Figure 9: Delay(sec) of a mobile node
Scenario 3:

Figure 10: Handover Threshold value as 0.4dB and 6dB respectively
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
Conclusion

- Extensive simulation of WiMAX wireless networks under different scenarios have been conducted.
- Distance plays an important parameter in performance output.
- Handover threshold affects the performance of WiMAX.
- WiMAX is an efficient system to transfer video and voice over IP networks.
Future Work

- Simulate the WiMAX network when a large number of users are trying to access the network and analyze the performance.
- Analyzing how background traffic impacts the performance of video streaming in WiMAX.
- Other application like remote login and network printer can also be incorporated.
- Performance can be improved by changing different parameters.
Outline

- Introduction
- Related Work
- Objectives
- Simulation Scenarios
- Results and Discussion
- Conclusion
- References
References


[10] Rufai, Syed Hamza Mehmood, Qingye Ding, and Ljiljana Trajkovic. "Comparison of VoIP and Video Content Performance Over WiMAX and LTE."
Questions?