

Comparison of VoIP and Video Content Performance over WiMAX and LTE

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Group No. 1

Rufai, Syed Hamza Mehmood

Qingye Ding

Supervisor: Ljiljana Trajković

Roadmap

- Introduction
- Simulation Environment
- Simulation Scenarios
 - WiMAX
 - LTE
- Performance Comparison
- Conclusion
- References

Introduction of WiMAX

- Worldwide Interoperability for Microwave Access
- Provide broadband access to fixed and mobile users on a large-scale coverage
- Two layers: Medium Access Control and Port Physical Layer
- Speed: downlink 128 Mbps, uplink 56 Mbps
- Base station signal strength: 30 miles

Introduction of LTE

- Based on Orthogonal frequency-division multiplexing (OFDM) technique
- Support different carrier frequency bandwidths
- Provide IP backbone services, flexible spectrum, and lower power consumption
- Speed: downlink 100 Mbps, uplink 50 Mbps
- Runs on mobile radio similar to 3G

Aspects of Comparison

- VoIP traffic sent and received
- Throughput
- Jitter in VoIP : undesired factor in design of communications links
- End-to-End delay: time for a packet to be transmitted across a network from source to destination
- Mean Opinion Score (MOS) value: measurement for voice quality

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Simulation Environment

WiMAX

- OPNET 16.0 A
- 1 server: Ethernet_server
- 1 mobile node: wimax_ss_wkstn_adv
- 2 base stations: wimax_bs_router_adv
- 1000 BaseX line

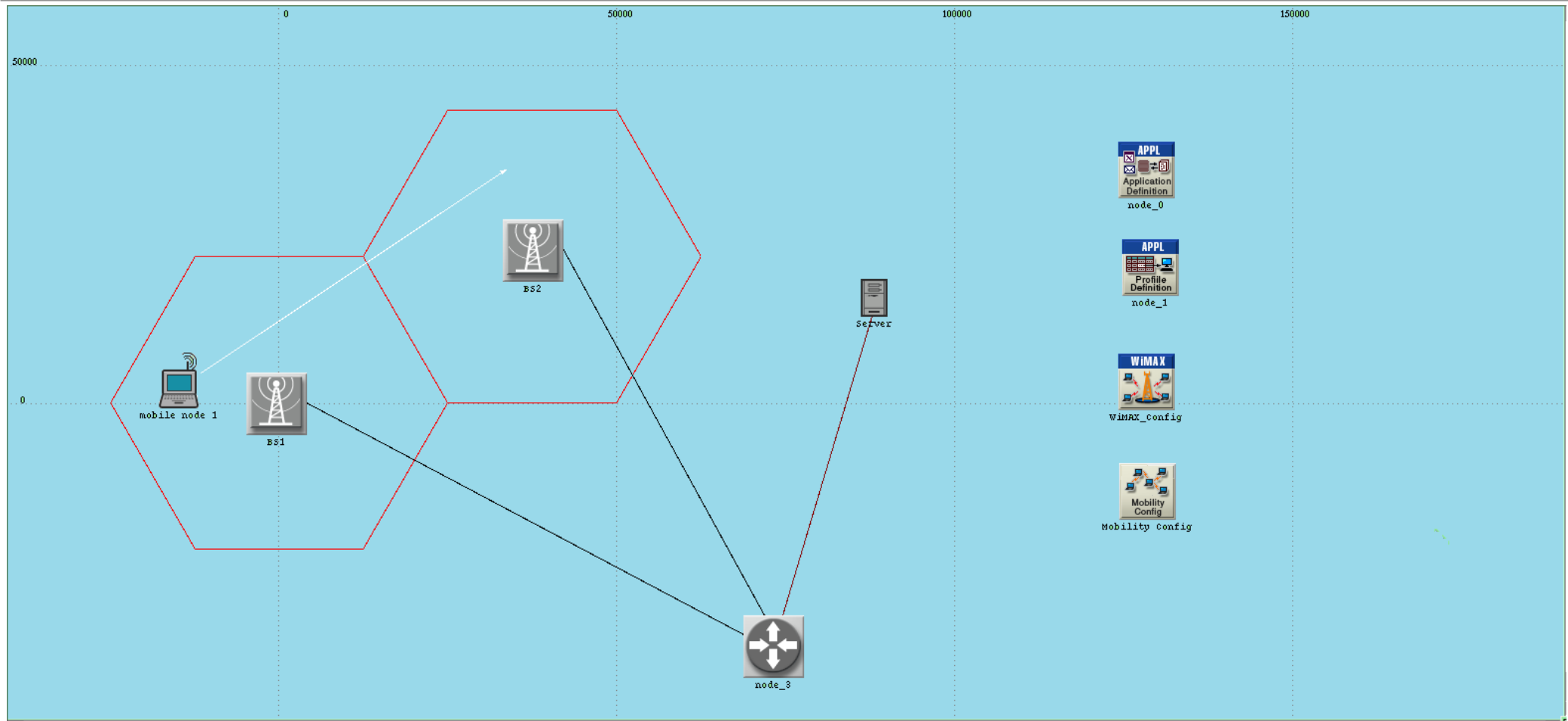
LTE

- Riverbed 18.5
- 1 server: ethernet_server
- 1 mobile node: lte_wkstn_adv
- 2 base stations: lte_enodeb_atm4_ethernet4_slip4_adv
- 1000 BaseX line

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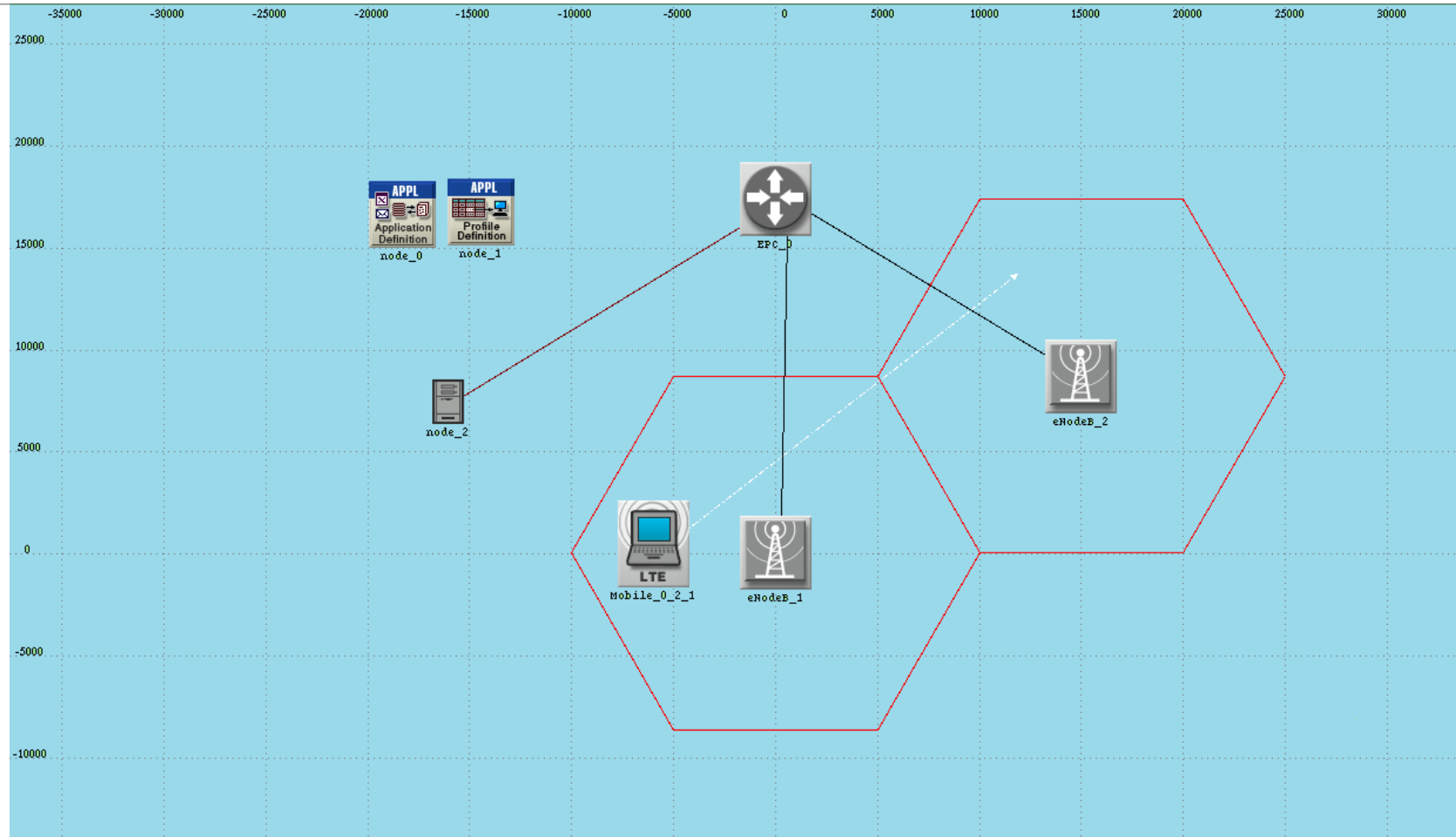
Simulation Scenario for WiMAX



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Simulation Scenario for LTE

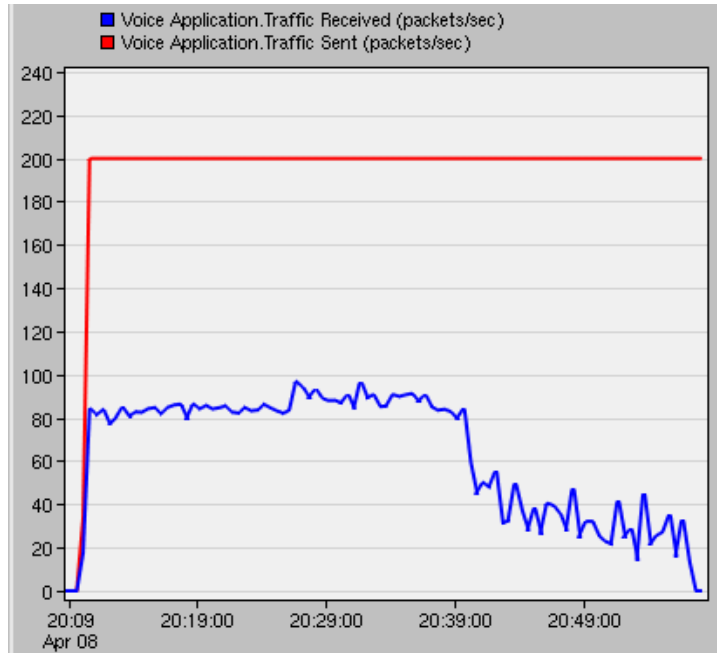


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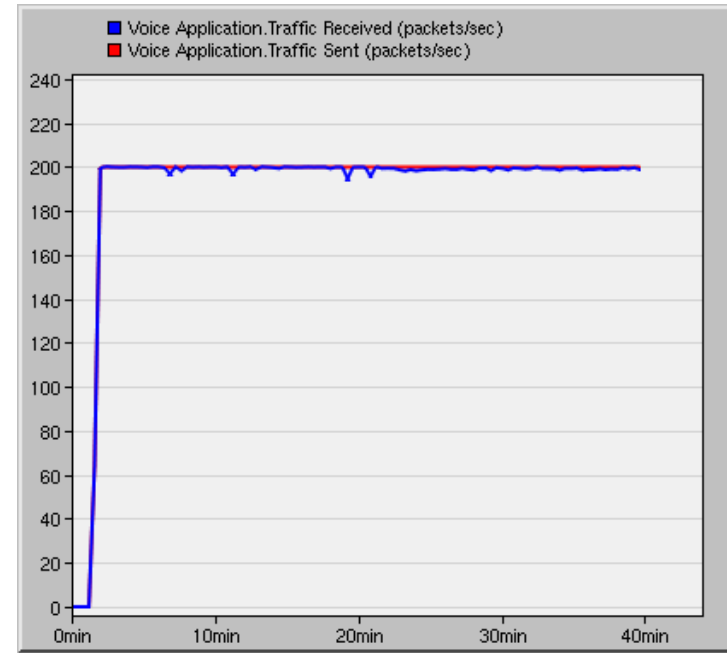
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VoIP Traffic Sent and Received Comparison

WiMAX traffic sent and received
(packets/sec)

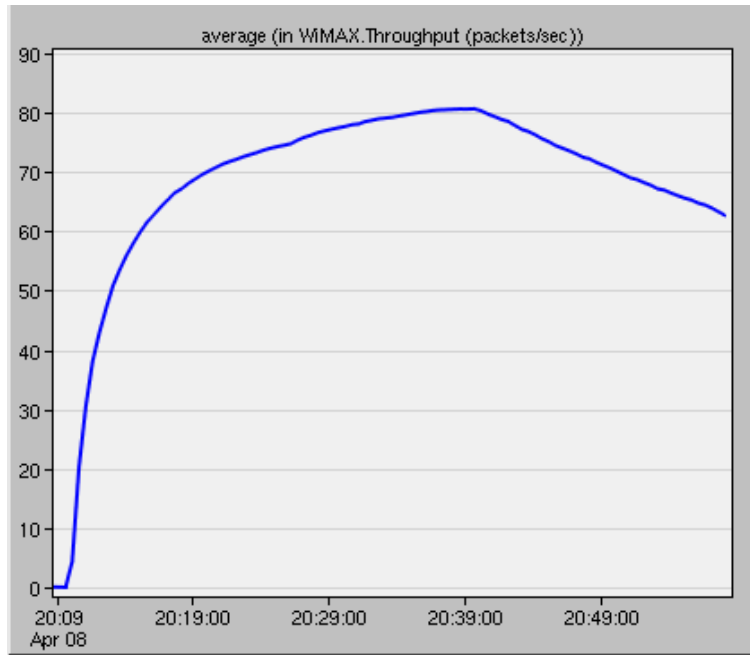


LTE traffic sent and received
(packets/sec)

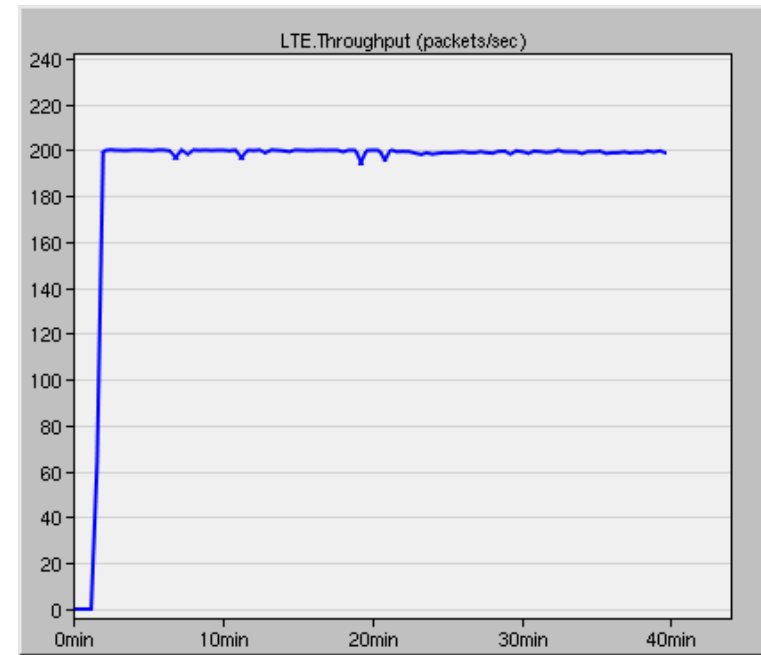


Throughput Comparison

WiMAX traffic throughput:
Maximum 80 packets/second

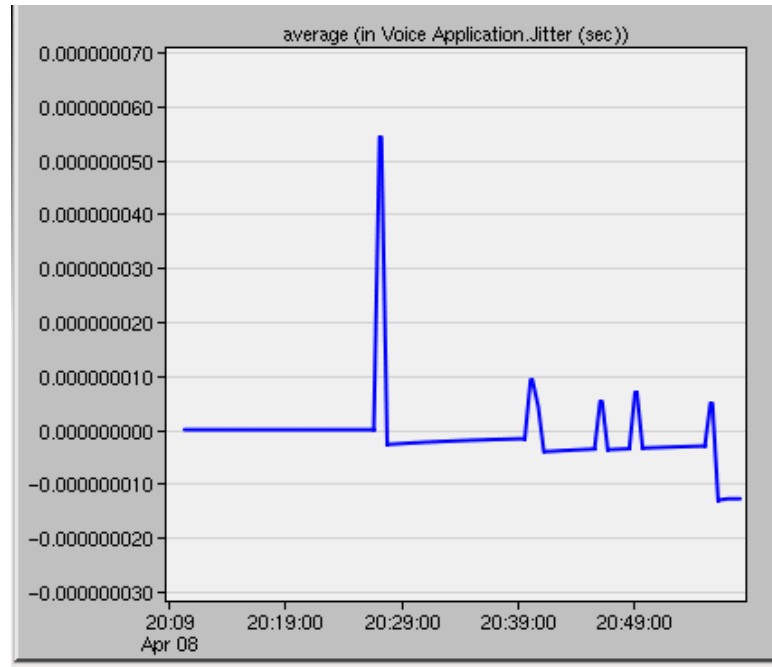


LTE traffic throughput:
Maximum 200 packets/sec

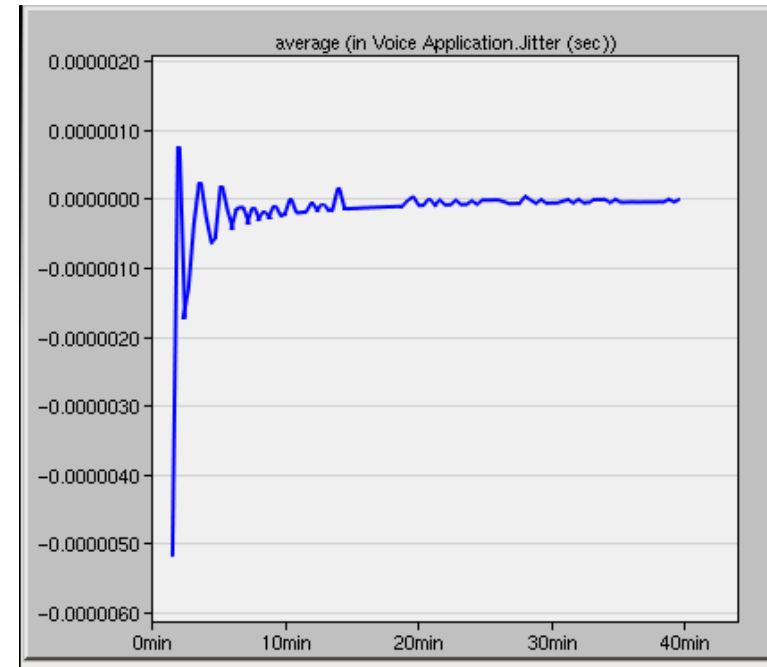


VoIP Jitter Comparison

WiMAX Jitter in VoIP (Sec)

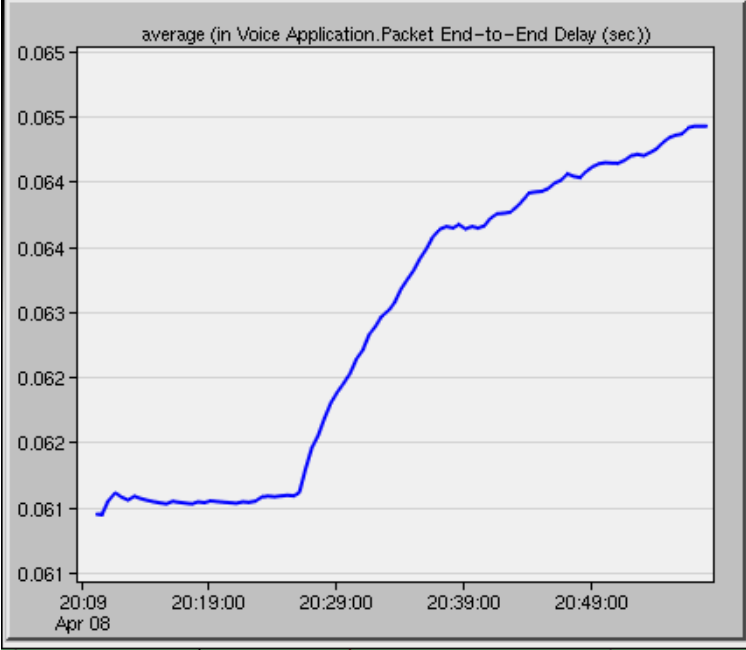


LTE Jitter in VoIP (sec)

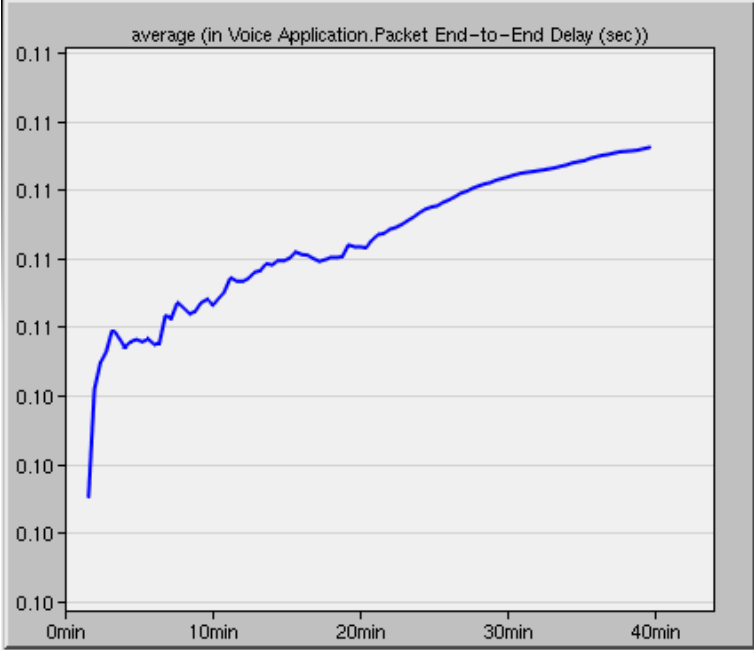


End-to-End Delay Comparison

WiMAX VoIP Packet End-to-End Delay: 0.061 – 0.065 seconds

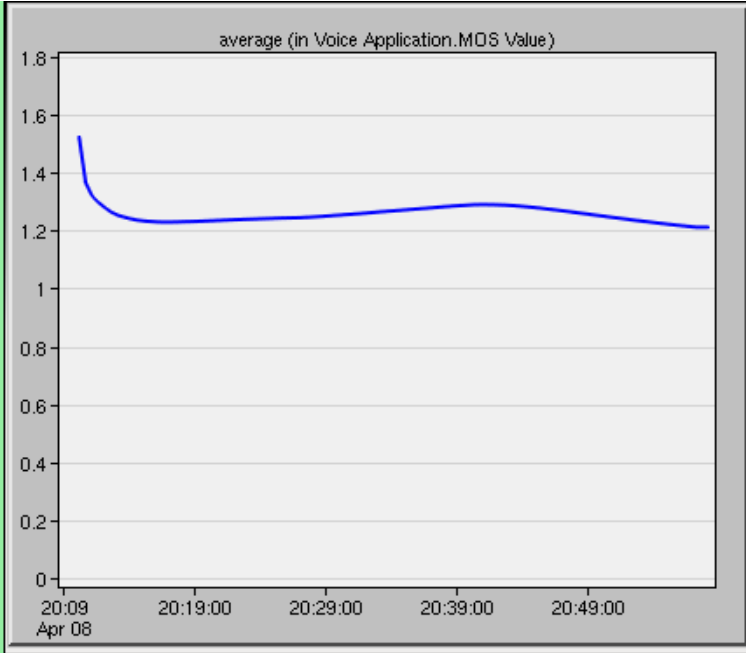


LTE VoIP Packet End-to-End Delay: 0.150 – 0.116 seconds

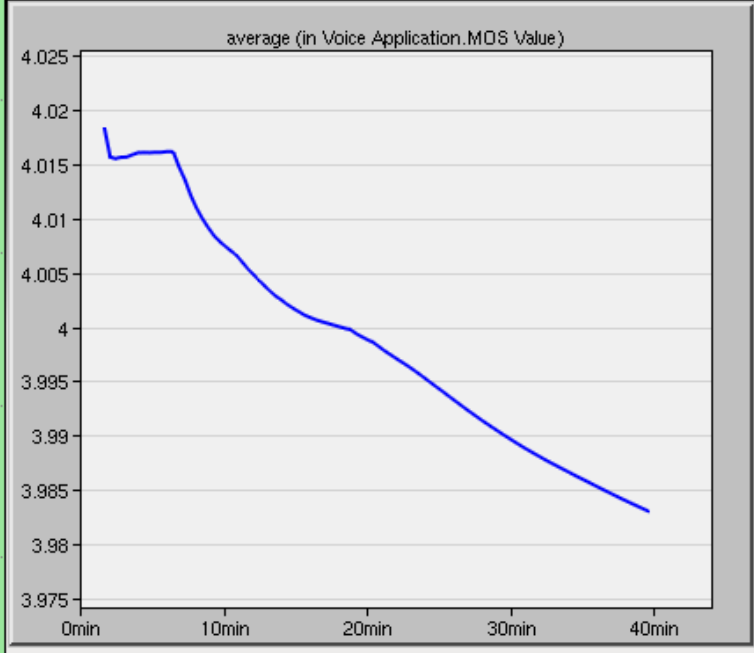


MOS Value Comparison

WiMAX MOS value for VoIP:
1.210 – 1.070

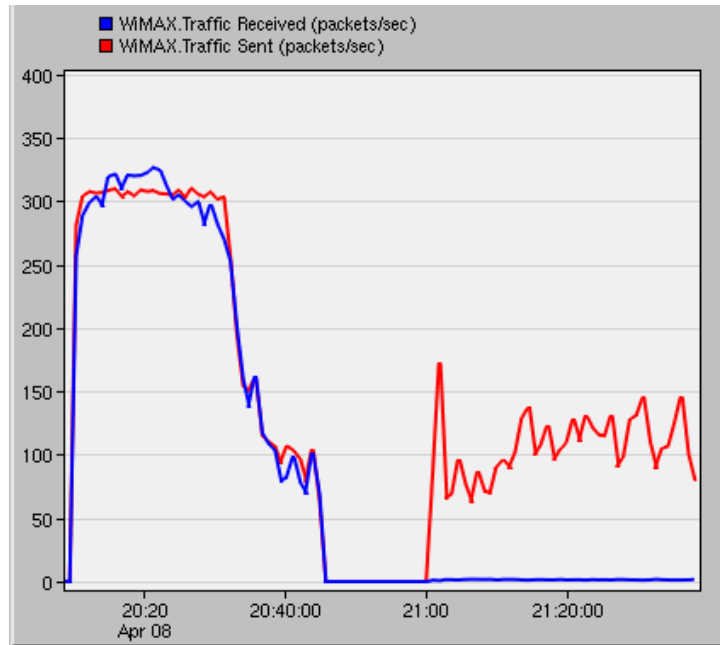


LTE MOS value for VoIP:
4.017 – 3.977

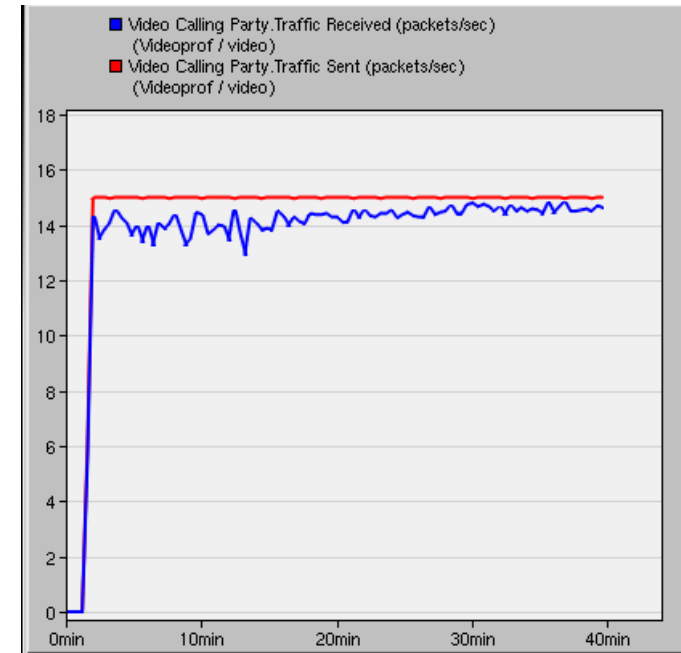


Video Content Packet Loss

WiMAX packet loss for video content



LTE packet loss for video content



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Conclusion

- Compared WiMAX and LTE performance using OPNET and Riverbed simulators..
- Average throughput is lower in WiMAX than LTE.
- The range of the jitter is bigger in WiMAX than LTE, however, maximum jitter < 3ms is negligible.
- The average End-to-End delay in WiMAX is less than LTE.
- MOS value in WiMAX is much lower than LTE.
- WiMAX exhibits more packet loss than LTE over video content.
- LTE outperforms WiMAX in the simulated network.

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References

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Thank you!