Evaluation and Comparison between WiMAX and Wi-Fi

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http://www.sfu.ca/~tlan/ENSC427Webpage.html
Brief Overview

- The Goals and Expectations
- Introduction to Wi-Fi and WiMAX
- Implementation and Simulation Results
- Comparison and Analyze
- Conclusions
- References
The Goals and Expectations

- To compare the behavior of Wi-Fi and WiMAX under different situations
  - WiMAX should be less sensitive to distance change and have better performance in long distance information exchange
  - Wi-Fi should have higher transmission speed in close range information exchange
RoadMap

- The Goals and Expectations
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Wi-Fi Information

- **Wi-Fi (IEEE 802.11)**
  - Wireless LAN (WLAN) technology to allow devices to connect to the internet without any wires
  - Using an access point or hotspot, wireless devices connect to these access points through radio waves
  - Limited range
    - up to 250m
  - Transmits up to speeds of 72.2 Mbps over a 20MHz channel
Wi-Fi Technology

Features

- Large Throughput
- Handles large file transfers
- Available in most areas
WiMAX Information

- Less commonly known comparing to 3G/4G, or Wi-Fi
- First proposed in 2001
- Based on standard 802.16
  - Channel range 10 GHz to 66 GHz
- 802.16e is now one of the two 4G standard
  - Channel improved with an extension of 2 GHz to 11 GHz
  - Speed up to 75 Mbps
  - Maximum distance of 50 km
WiMAX Advantages

- More signal coverage
- Better frequency utilization and bandwidth efficiency
- Lower energy usage
- Wide transmission range and distance
- Stable and relatively high transmission speed
- Low delay even in long distance transmission
The Idea

- To simulate Wi-Fi and WiMAX under the following environments
  - Single client to see the features of the WiMAX and Wi-Fi.
  - Different client with different distance away from the base station. Test out how distance affects the transmission effect.
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OPNET Implementation – Wi-Fi

Wi-Fi Topology

1 Ethernet Server
1 Access Point
2 Client Workstations
Application, Profile Definition
Simulation Results - Wi-Fi

Difference of receive speed between two clients and server:
OPNET Implementation - WiMAX

WiMAX Topology

1 Ethernet Server
1 WiMAX Base Station
1 Client Workstation
Application, Profile and WiMAX Configuration Definition
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Comparison and Analyze

Data receive rate at 10m
Comparison and Analyze
Data receive rate at 200m
Comparison and Analyze

Delay at 10m
Comparison and Analyze

Delay at 200m
Comparison and Analyze

Delay at 1000m
Comparison and Analyze

Throughput at 10m, 200m and 1000m
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Conclusion

- Wi-Fi have lower delays and better data receiving rate in shorter range
- WiMAX have relatively stable delay while Wi-Fi delay is greatly affected by the distance change
- WiMAX have overall higher throughput than Wi-Fi


Thank You!