ENSC 427: Communication Networks

Spring 2012 : Final Project Presentation

Video and Voice Backup over Mobile WiMAX

Group 6

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Roadmap

- **Introduction**
- Background Information
- Network Topology
- Simulation Scenarios & Results
- Future Work
- Conclusion
- Reference

Introduction

Project Idea :

- Real time video and voice back up from vehicle black box to server

Motivation :

- Data gets lost when internal storage device gets destroyed on accident
- The backing up of the black box information to main server will take care of this matter

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Background Information

Mobile WiMAX:

- Stands for Worldwide Interoperability for Microwave Access (WiMAX)
- Fully compliant with IEEE 802.16e OFDMA/TDD standard
- Supports high-speed (up to 75 Mb/s) wireless Internet technology over wide area (up to 50 km)

Background Information

Mobile WiMAX:

- Supports the connection across hotspots
- Switching connection between hotspots called "handover"

Background Information

Vehicle Black Box:

- Video, voice and data recording device that are installed on windshield in case of accident

Background Information

Vehicle Black Box (cont'd):

Video Record Specifications :

- Resolution: 640 X 480 (VGA) ~ 1920 X 1080 (Full HD)
- Frames Per Second (FPS) : 15 fps ~ 30fps

Storage Device:

- SD or Micro SD memory: 8GB ~ 32GB

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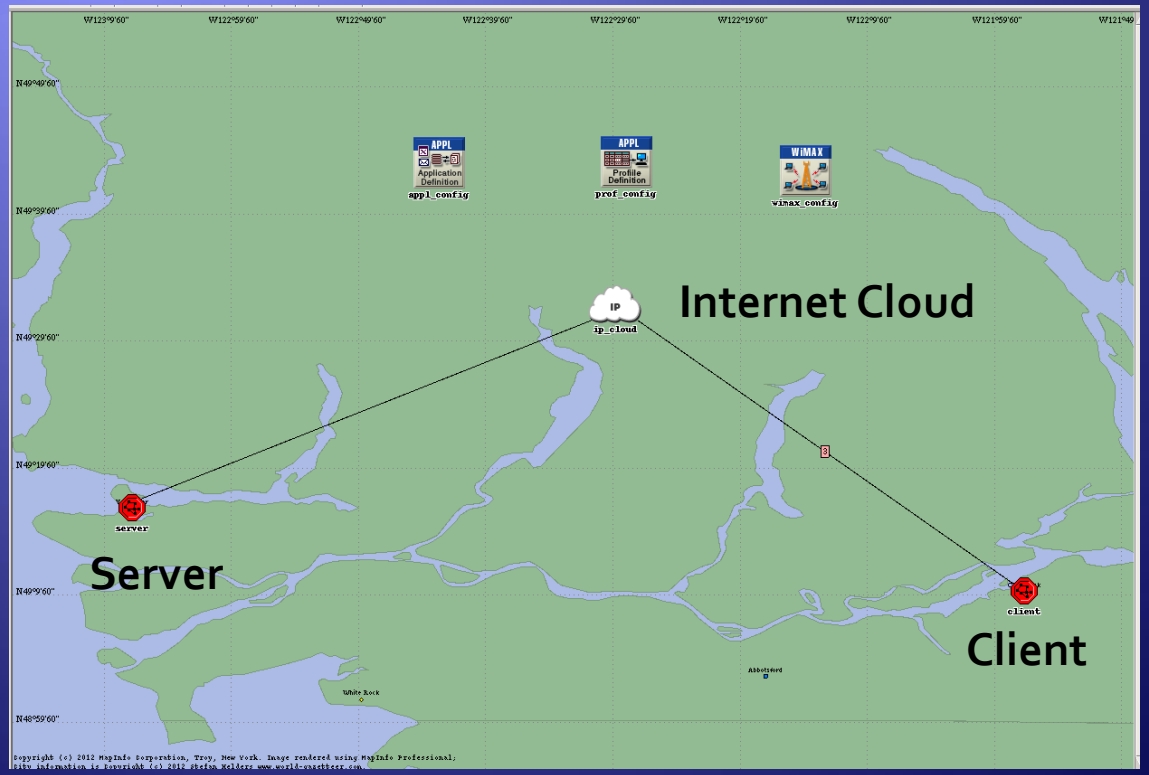
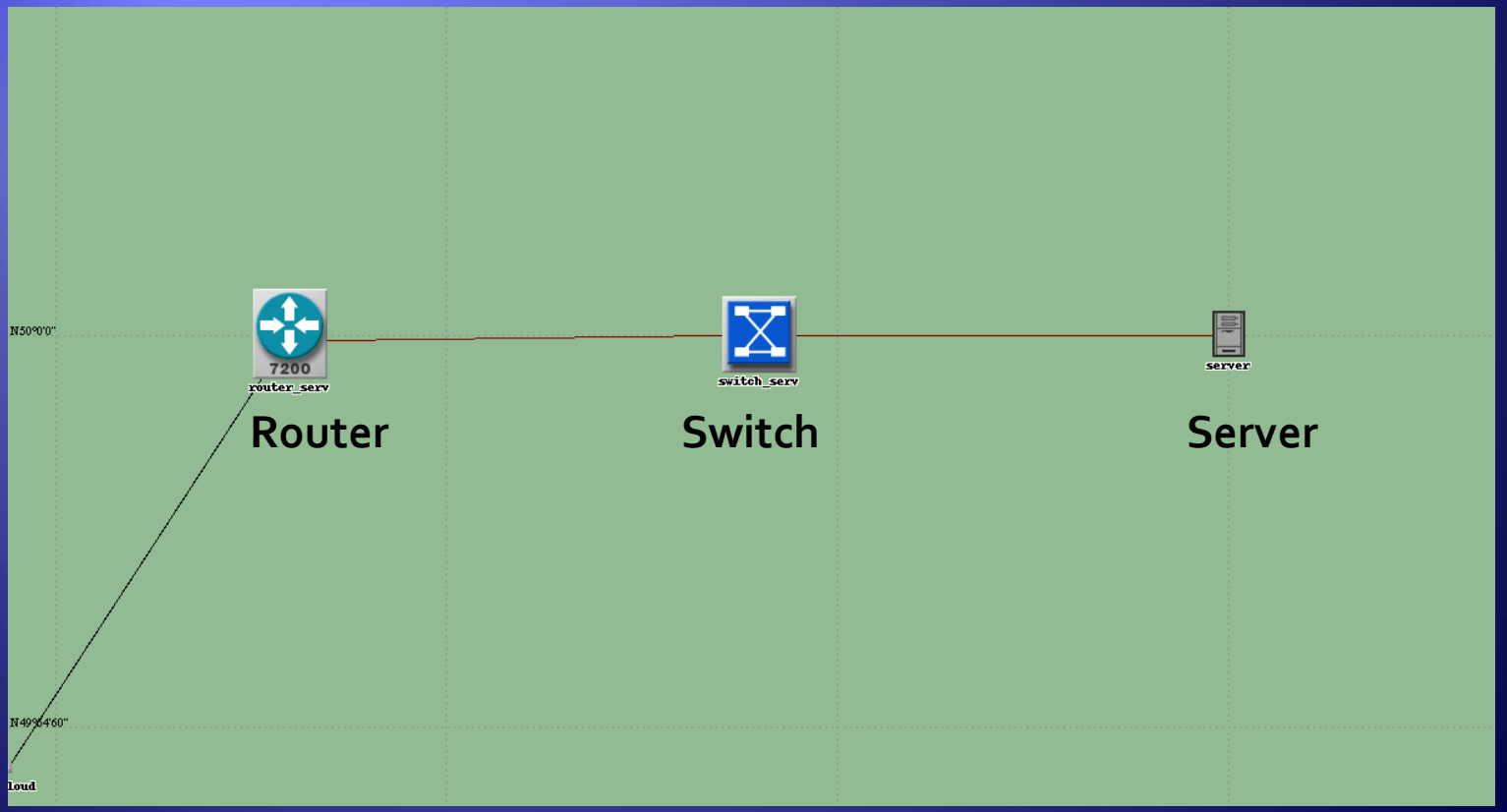
Network Topology

- Main Topology:
  - Two Subnets Connected through an Internet Cloud



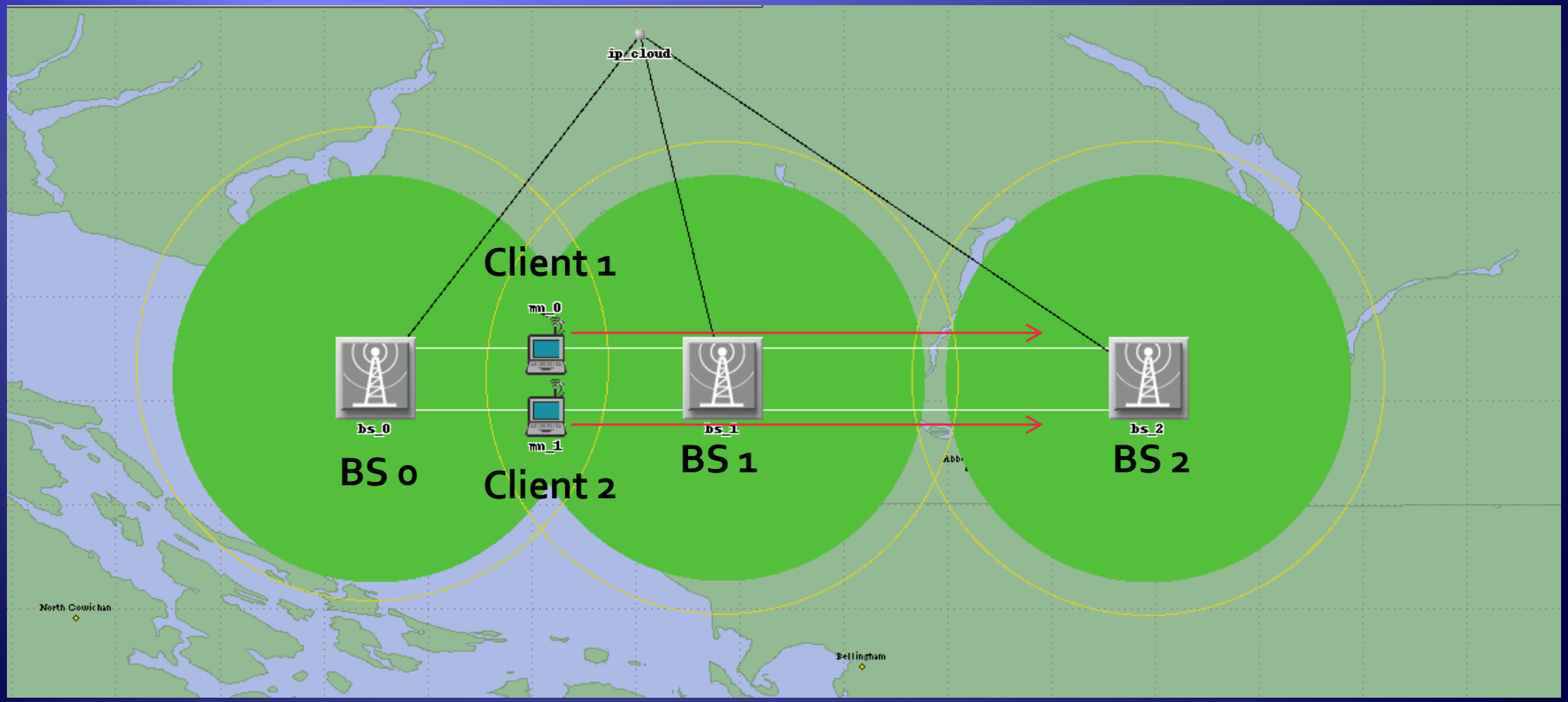
Network Topology

- Server Subnet: 1 router, 1 switch, and 1 server



Network Topology

- Client Subnet: 3 base stations and 2 mobile clients



BS : Base Station

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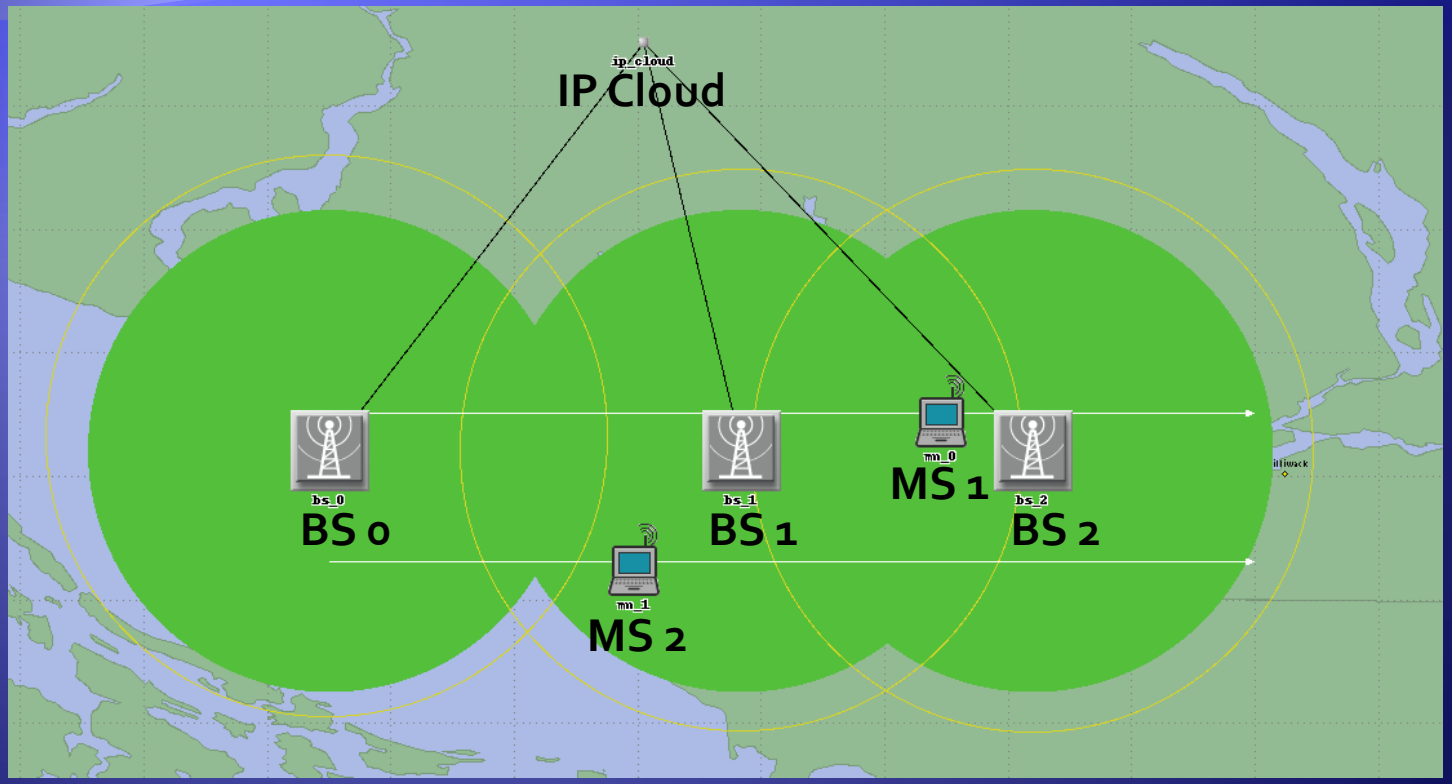
Simulation Scenarios & Results

- Scenario 1: Differing distance and speed



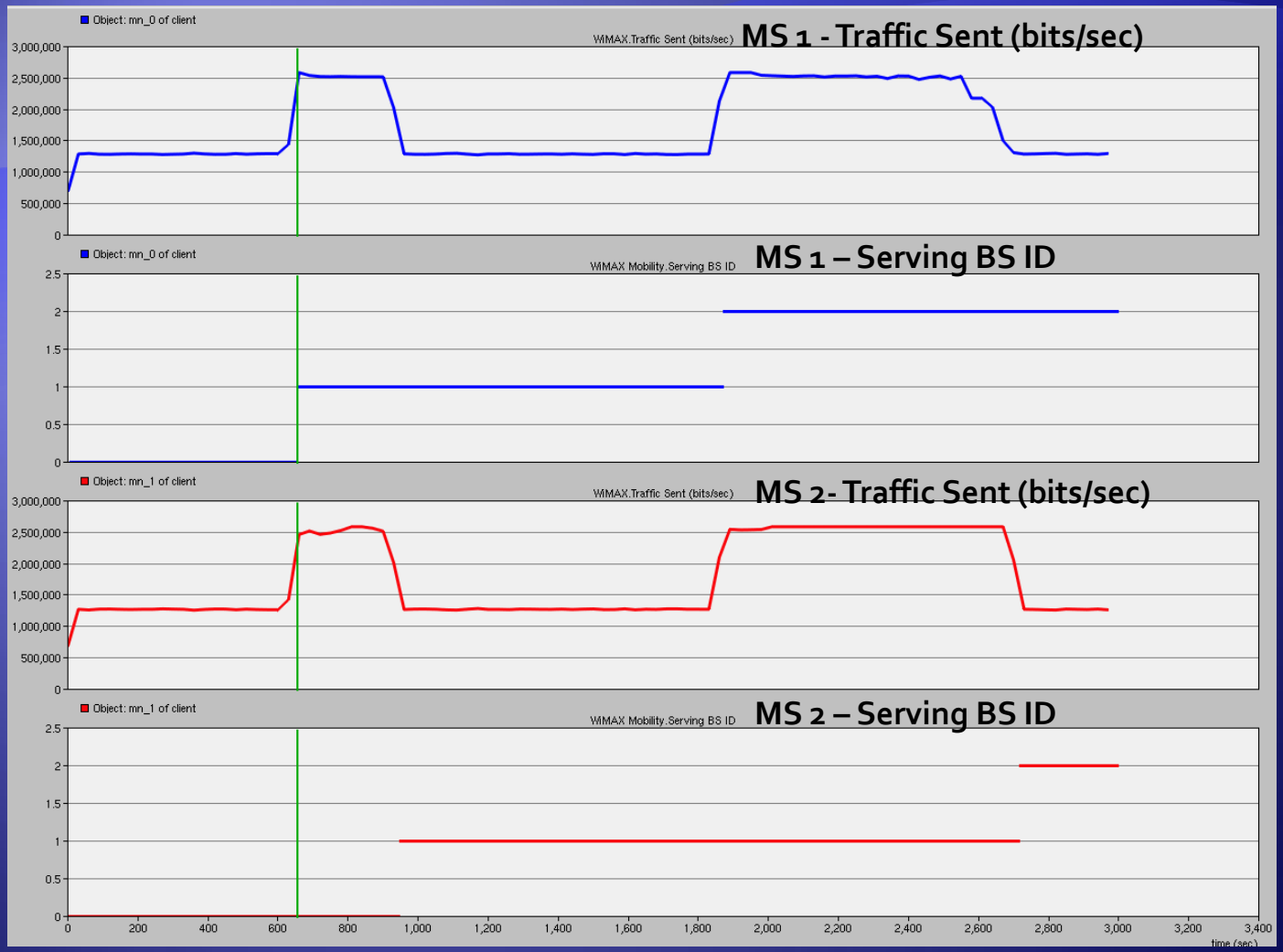
Distance from BS to client 1: **5** km

client 2: **15** km

Speed of: client 1: **120** km/hr

client 2: **80** km/hr

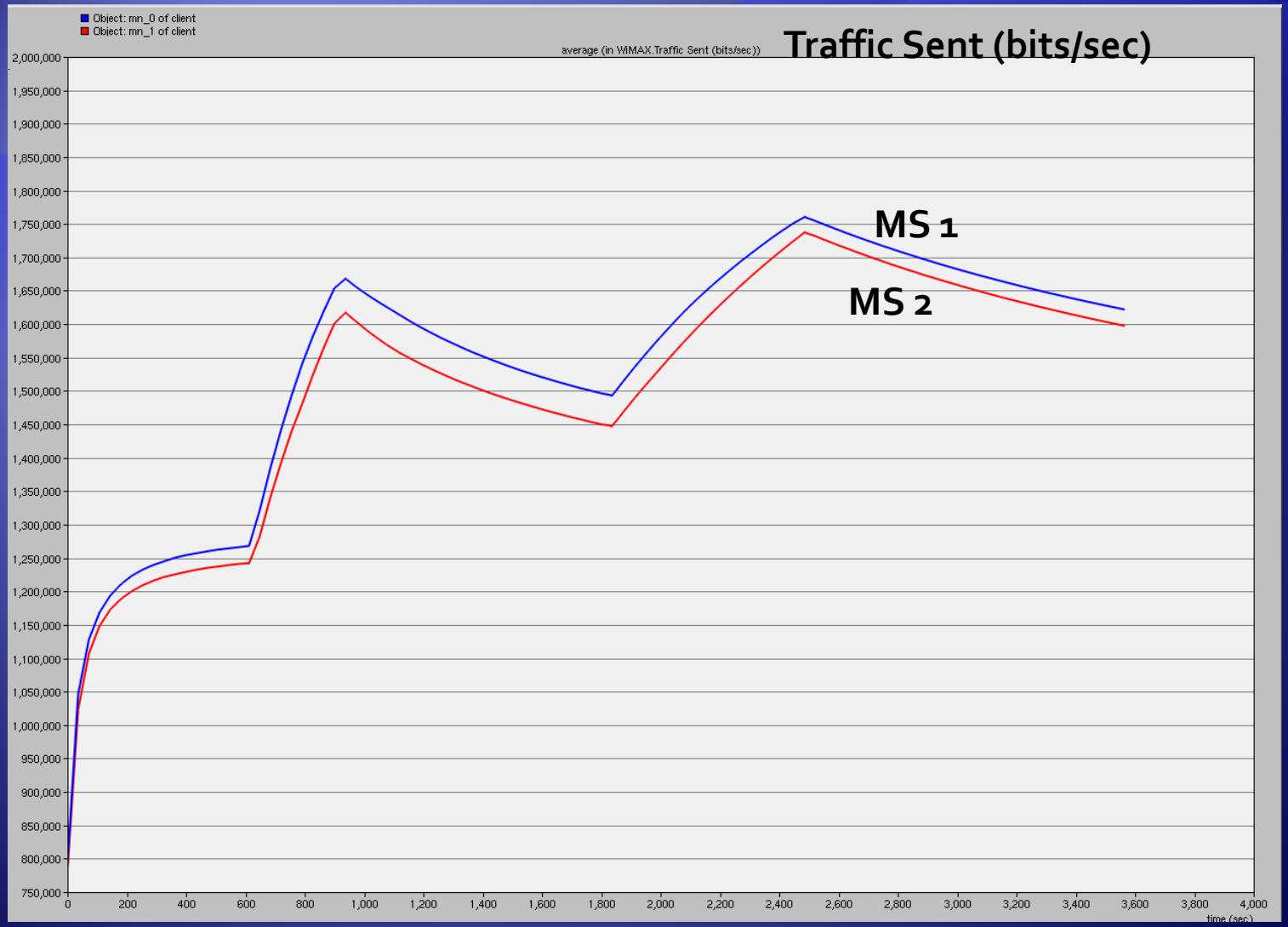
Simulation Scenarios & Results



BS ID: Base Station Identification

- Varying traffics related to number of clients sharing BS

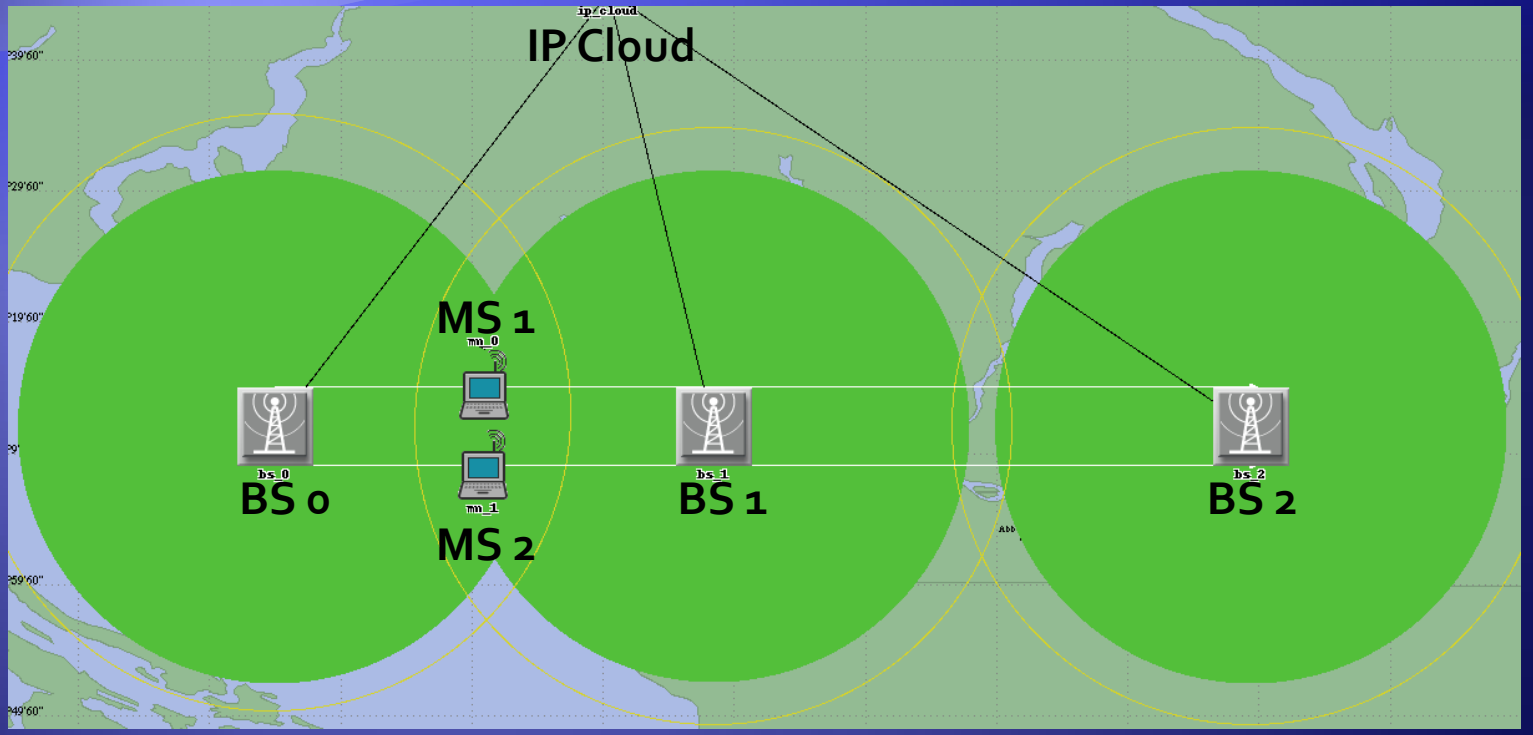
Simulation Scenarios & Results



Traffic Sent (bits/sec)

Simulation Scenarios & Results

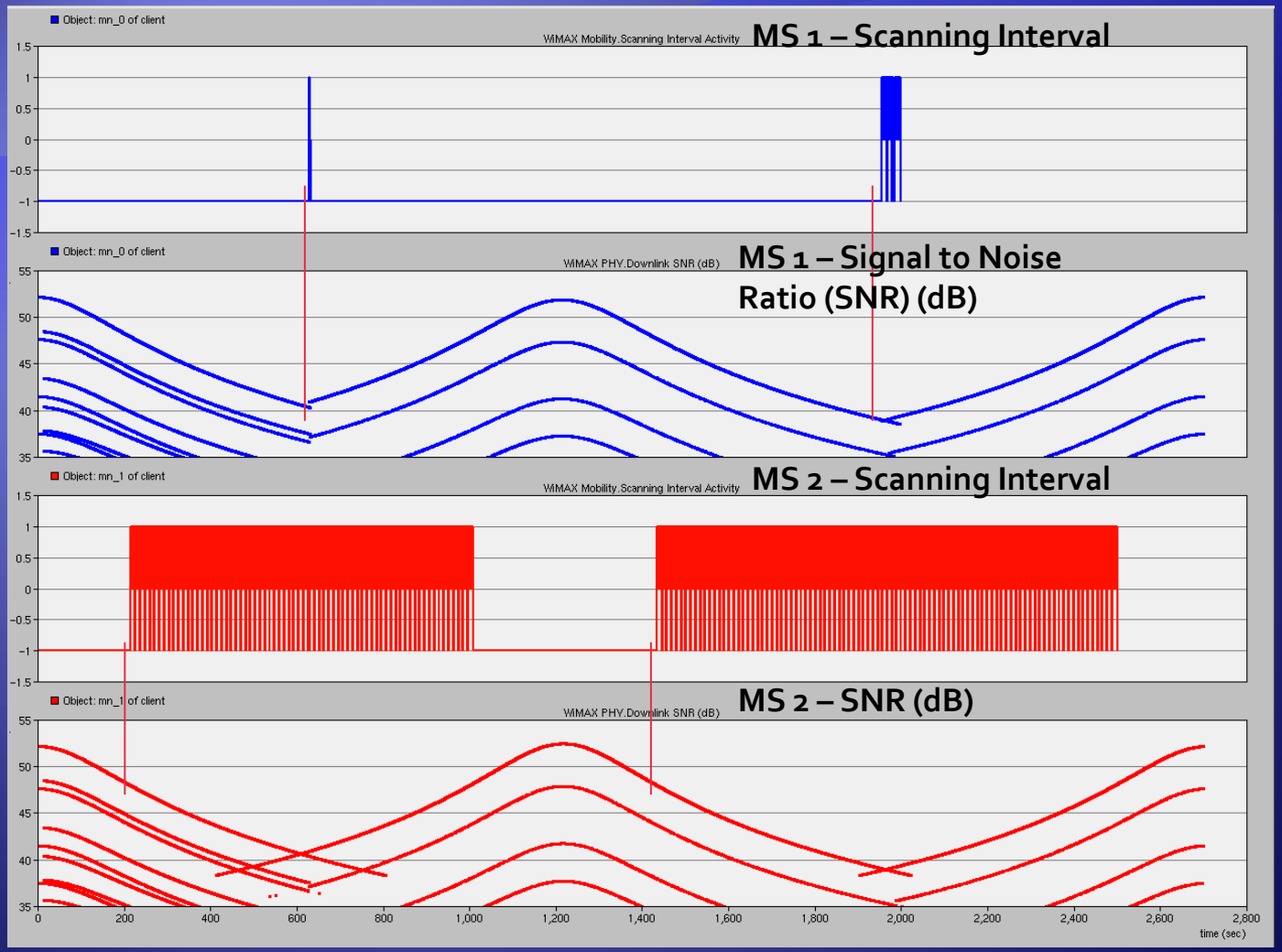
- Scenario 2 : Differing scanning threshold



Scanning threshold for: Client 1: 39 dB

Client 2: 48 dB

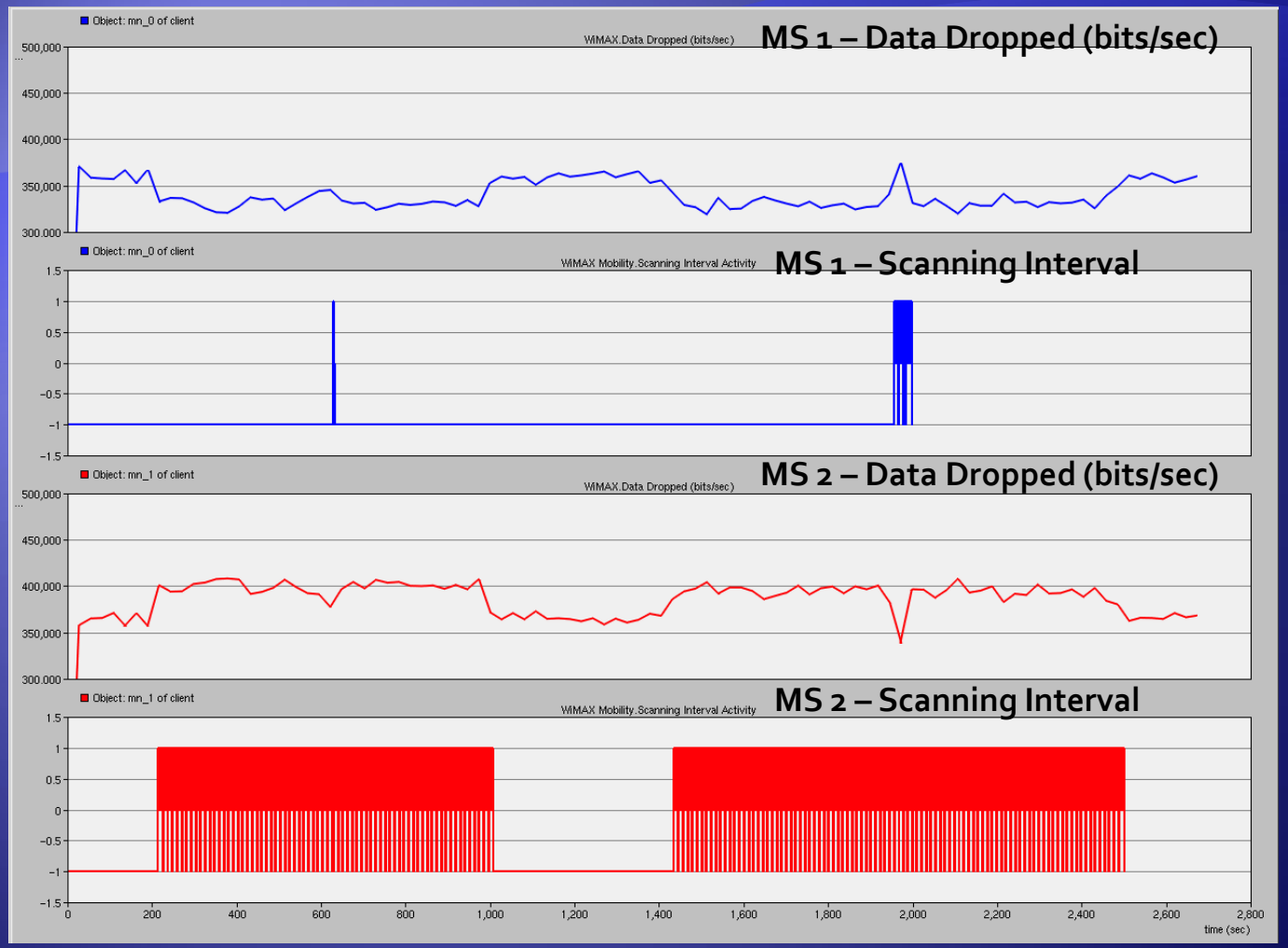
Simulation Scenarios & Results



- Client 1 scanning threshold: **39 dB**
- Client 2 scanning threshold: **48 dB**

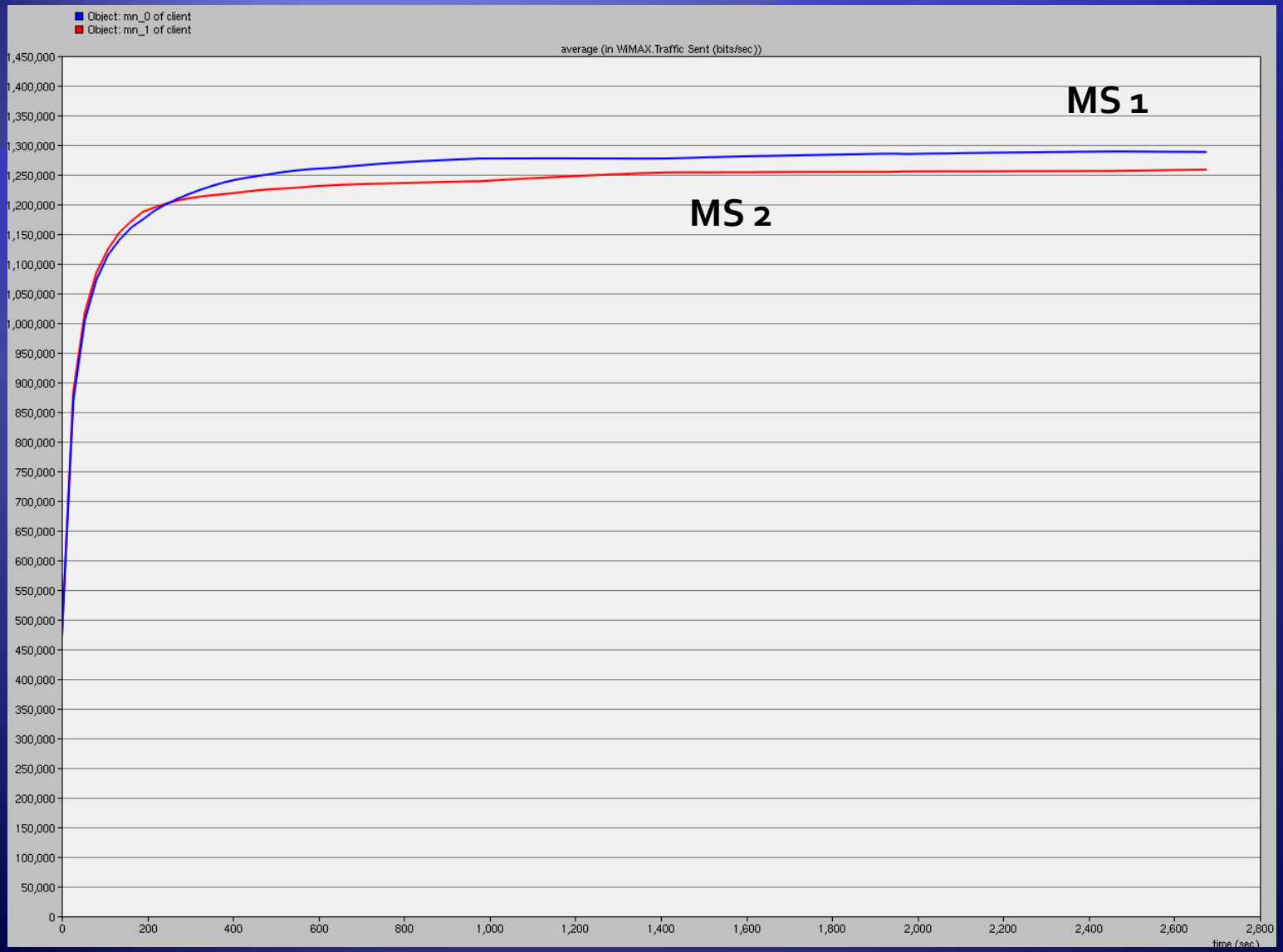
SNR: Signal-to-Noise Ratio (dB)

Simulation Scenarios & Results



- Scanning interval affecting data drops of clients

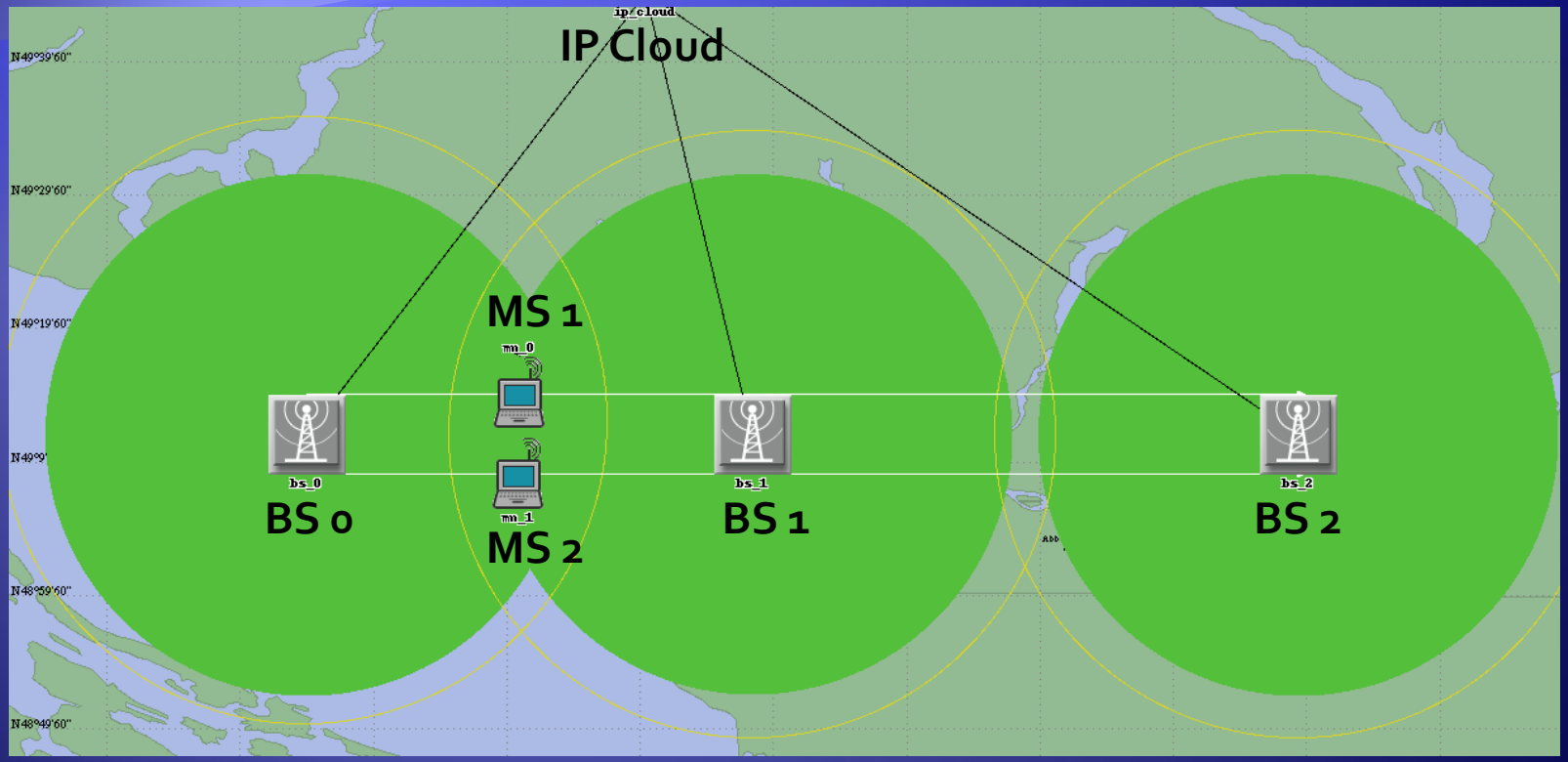
Simulation Scenarios & Results



Traffic Sent (bits/sec)

Simulation Scenarios & Results

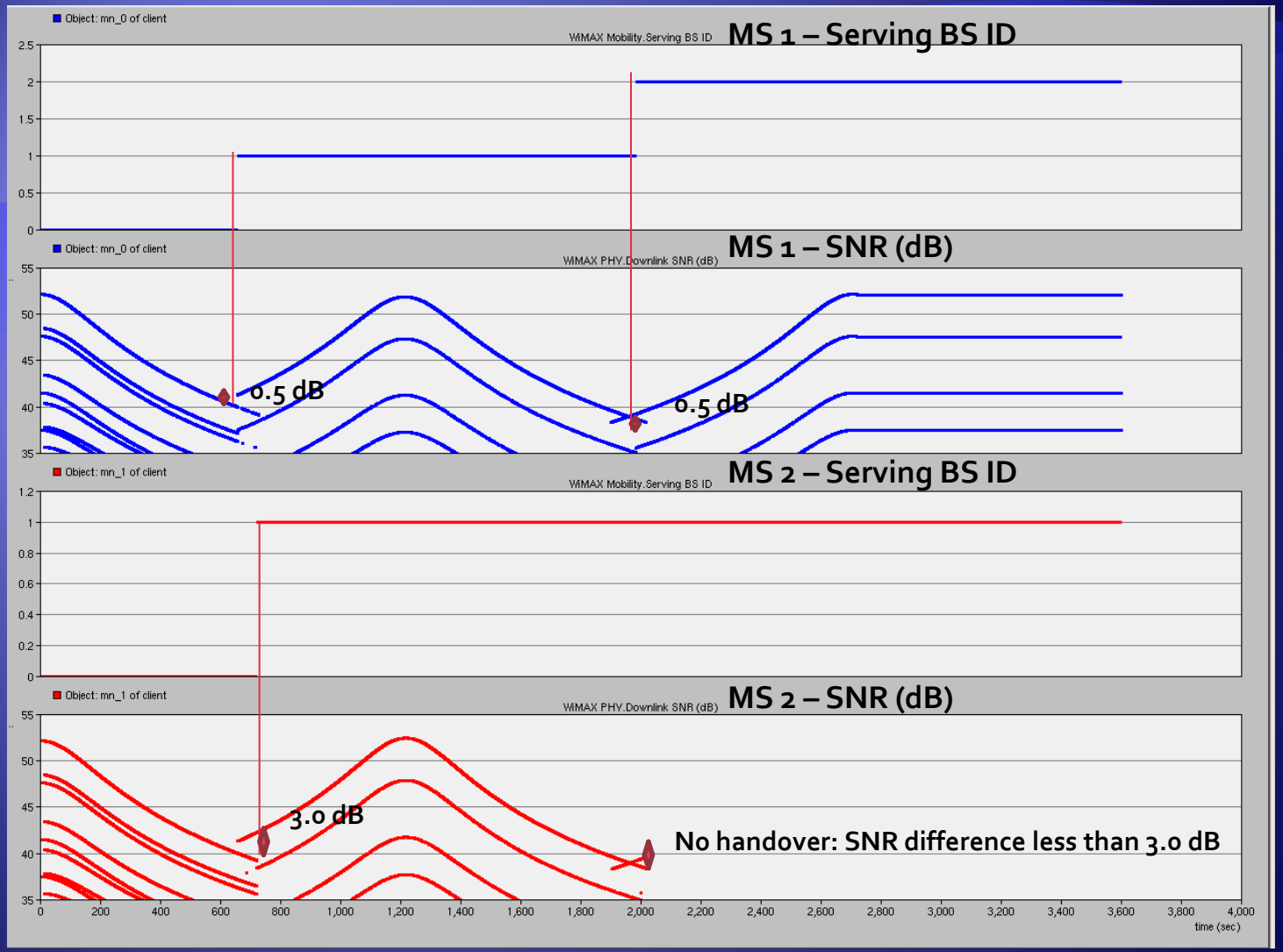
- Scenario 3: Differing handover threshold



Handover threshold of client 1: **0.5 dB**

client 2: **3.0 dB**

Simulation Scenarios & Results



Handover threshold of client 1: **0.5** dB

client 2: **3.0** dB

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Future Work

- Future work involves expanding the simulator with more complex situation: addition of clients sharing same BS and random movement trajectory rather than a straight-line motion.
- it is crucial to work on financial problems on streaming of data every second.
- Overflow of data flow can be expected, therefore, the video record should be turned on and record only at an instance of accidents.

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Conclusion

- Mobile WiMAX supports data transfer of black box in fast moving vehicles over wide area
- Handover threshold should be set low but with reasonable value to ensure the handover
- Scanning threshold also needed to be set low in order to minimize the data drops

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Reference

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Questions?