

ENSC 427

Simulation of UMTS vs. Wi-Fi in ns-2

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Overview

- **Introduction**
- **NS-2 Reference Models**
- **Implementation**
- **Design Architecture**
- **Simulation Results**
- **Conclusion**
- **Reference**
- **Questions**

Introduction

Universal Mobile Telecommunication System (UMTS)

- **3G mobile cellular technology**
- **Based on GSM**
- **High speed quality networks**

Wireless Fidelity (Wi-Fi)

- **Exchange data wirelessly over computer network**

Introduction continue

Project goal

- Compare UMTS and Wi-Fi in NS-2 simulation

- Download bit rate
- End to end delay
- Multiple nodes simulation
- Mobile nodes

- Tools:

- ns-2
- E.U.R.A.N.E
- MATLAB
- PASCAL script
- Gnuplot
- GAWK

Implementation

Included multiple nodes

- Total of four nodes starting at a different time
- Each node are placed at certain distance from BS

Implemented mobile nodes (Only UMTS)

- Each node is moving in a speed of 3km/hr

Gnuplot

- Download bitrate
- End to end delay

NS-2 Reference Model

E.U.R.A.N.E UMTS Extension in NS-2

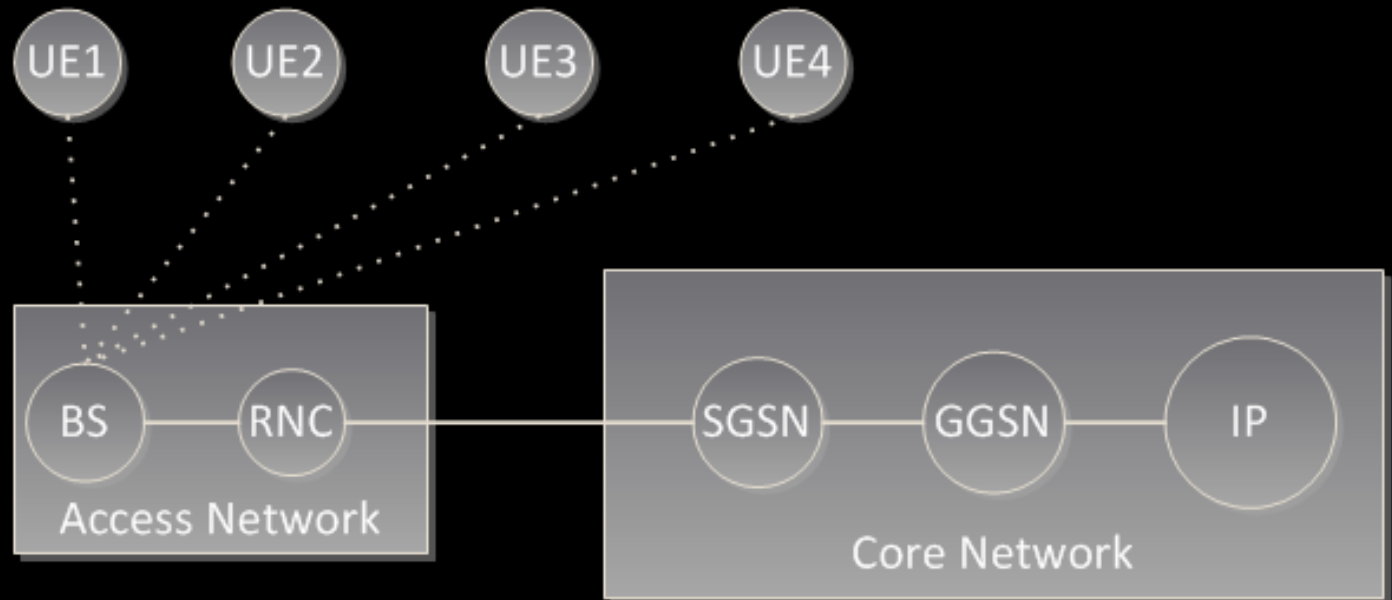
Included:

- Radio Network Controller (RNC)
- Base Station (BS)
- User Equipment (UE)

Supported:

- Forward access Channel (FACH)
- Random access Channel (RACH)
- Dedicated Channel (DCH)
- High-Speed Downlink Shared Channel (HS-DSCH)

UMTS Architecture



NS-2 Reference Model Continue

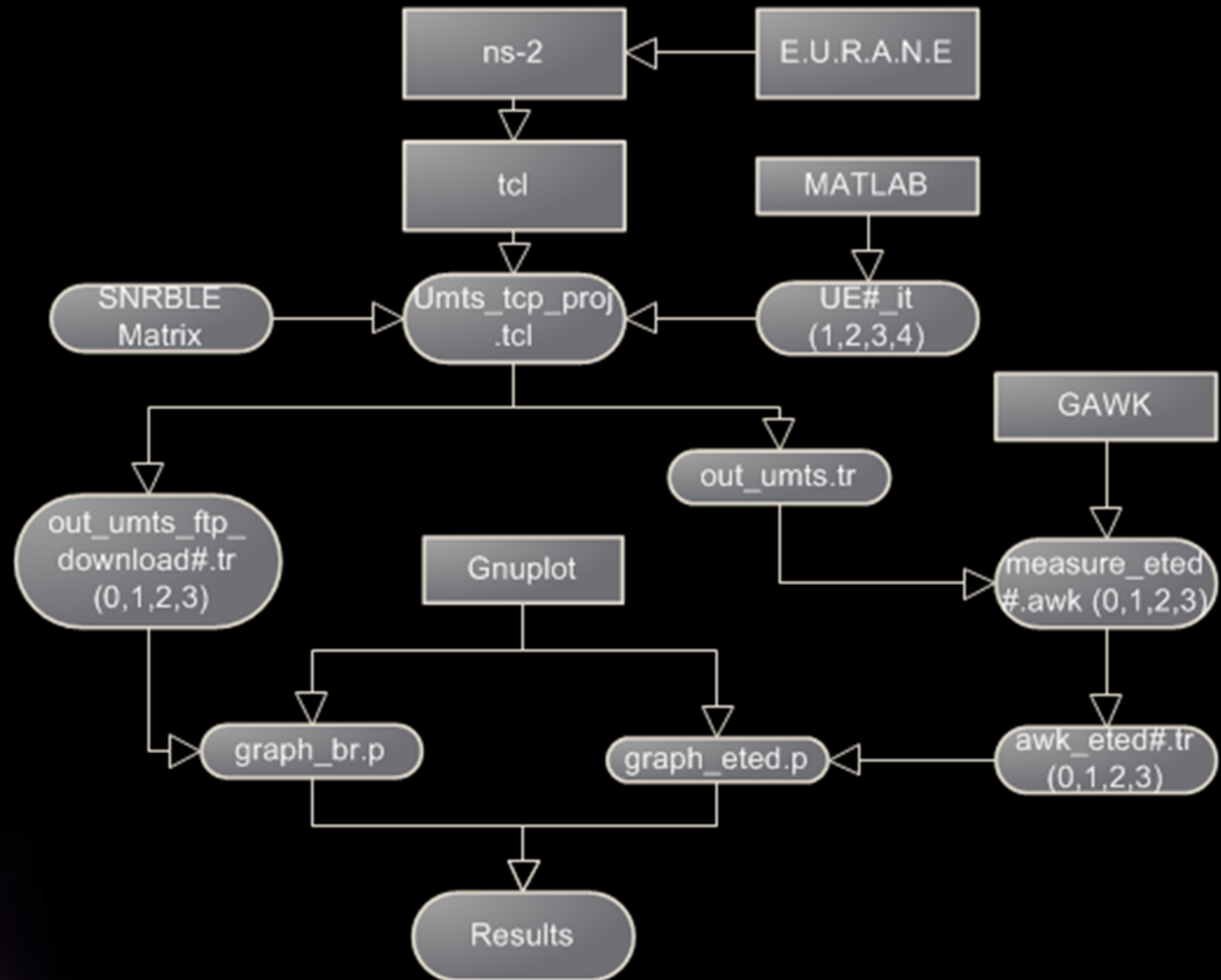
Marc Greis' Tutorial for NS-2

**X. Creating Wired-cum-Wireless and Mobile IP
Simulation in ns**

Included:

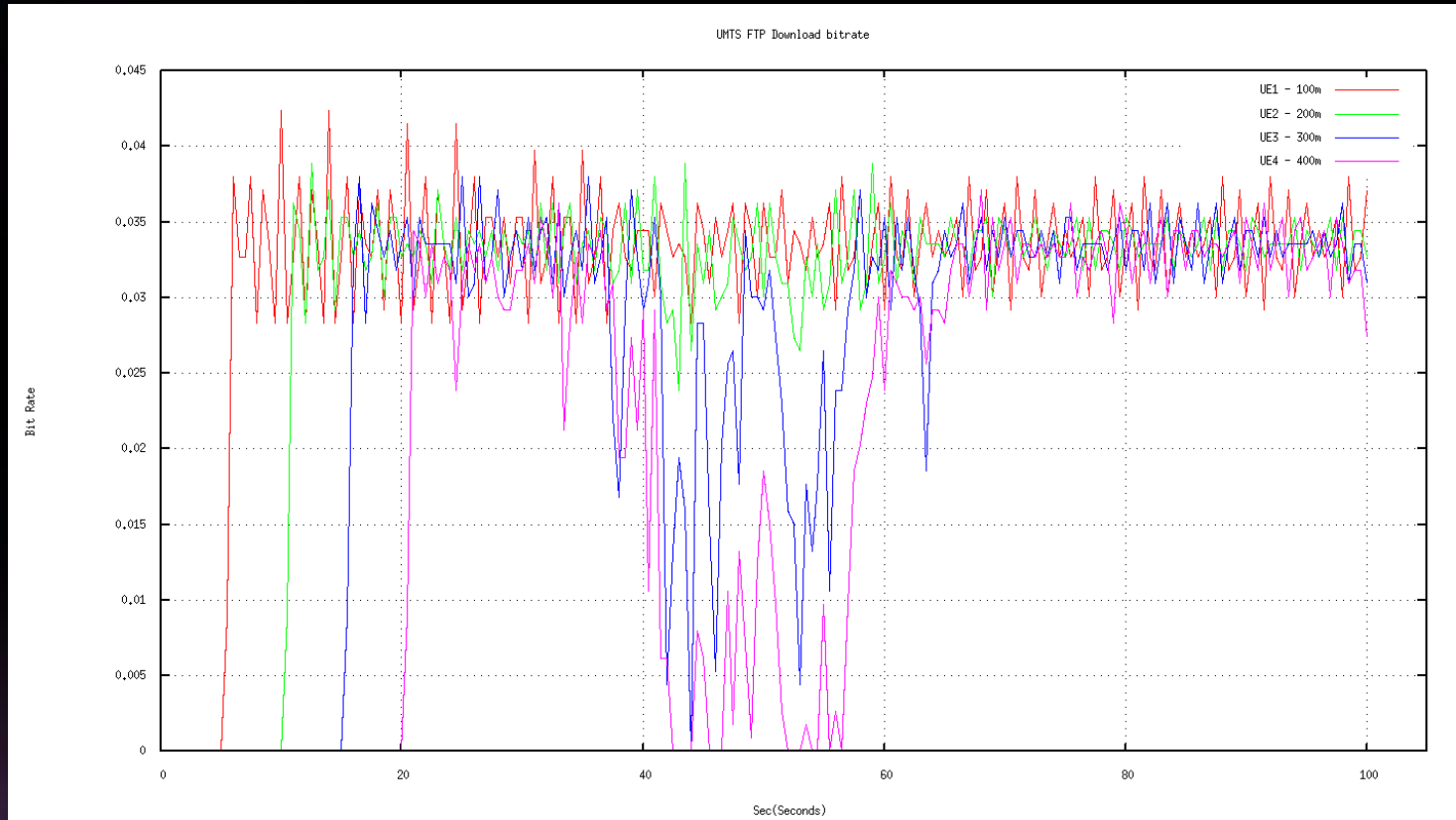
- **Multi-hop network**
- **Wired and Wireless LANs**
- **Mobile and fixed nodes**

Design Architecture



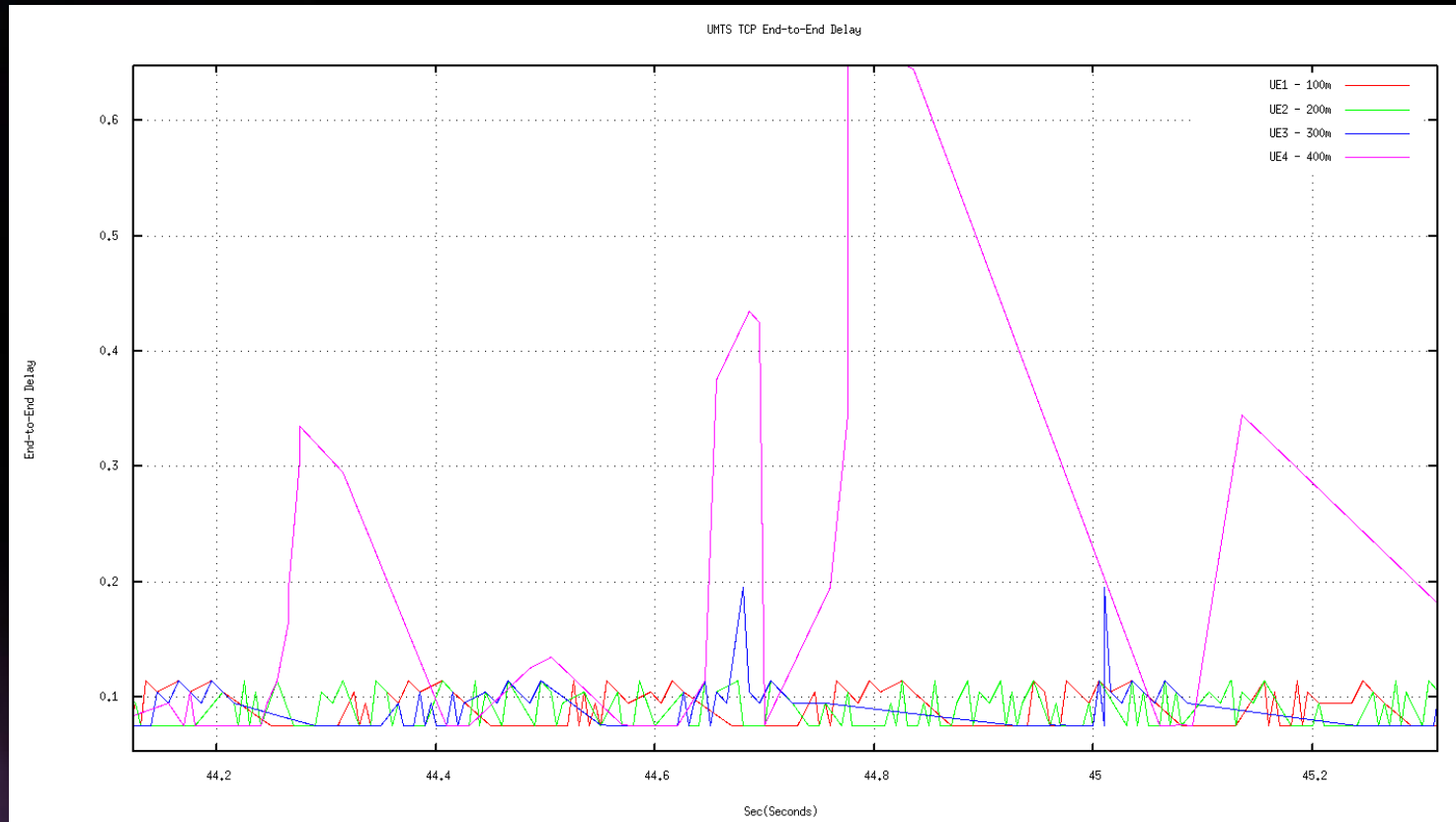
Simulation Results

UMTS - Download bit rate



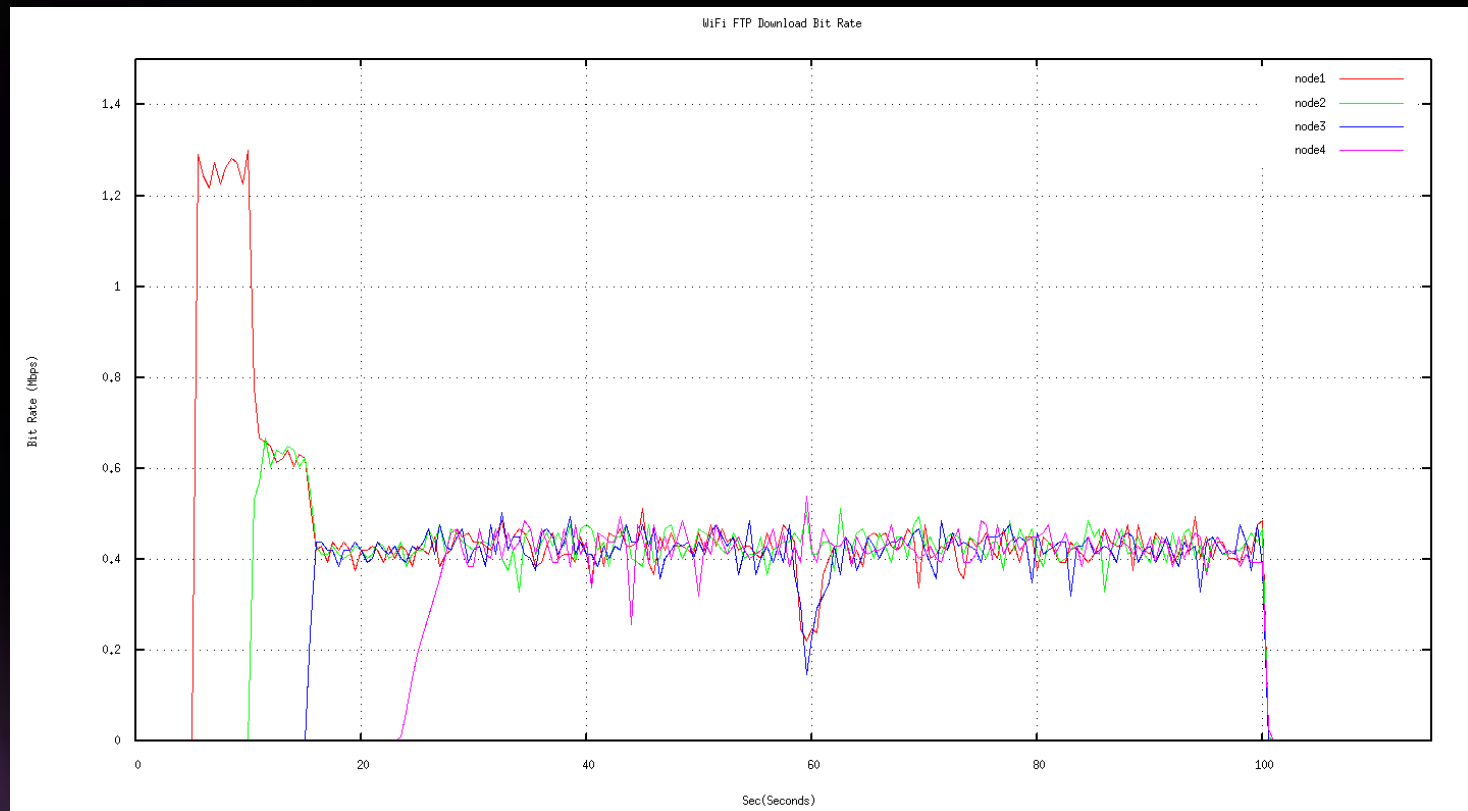
Simulation Results Continue

UMTS - End to end delay



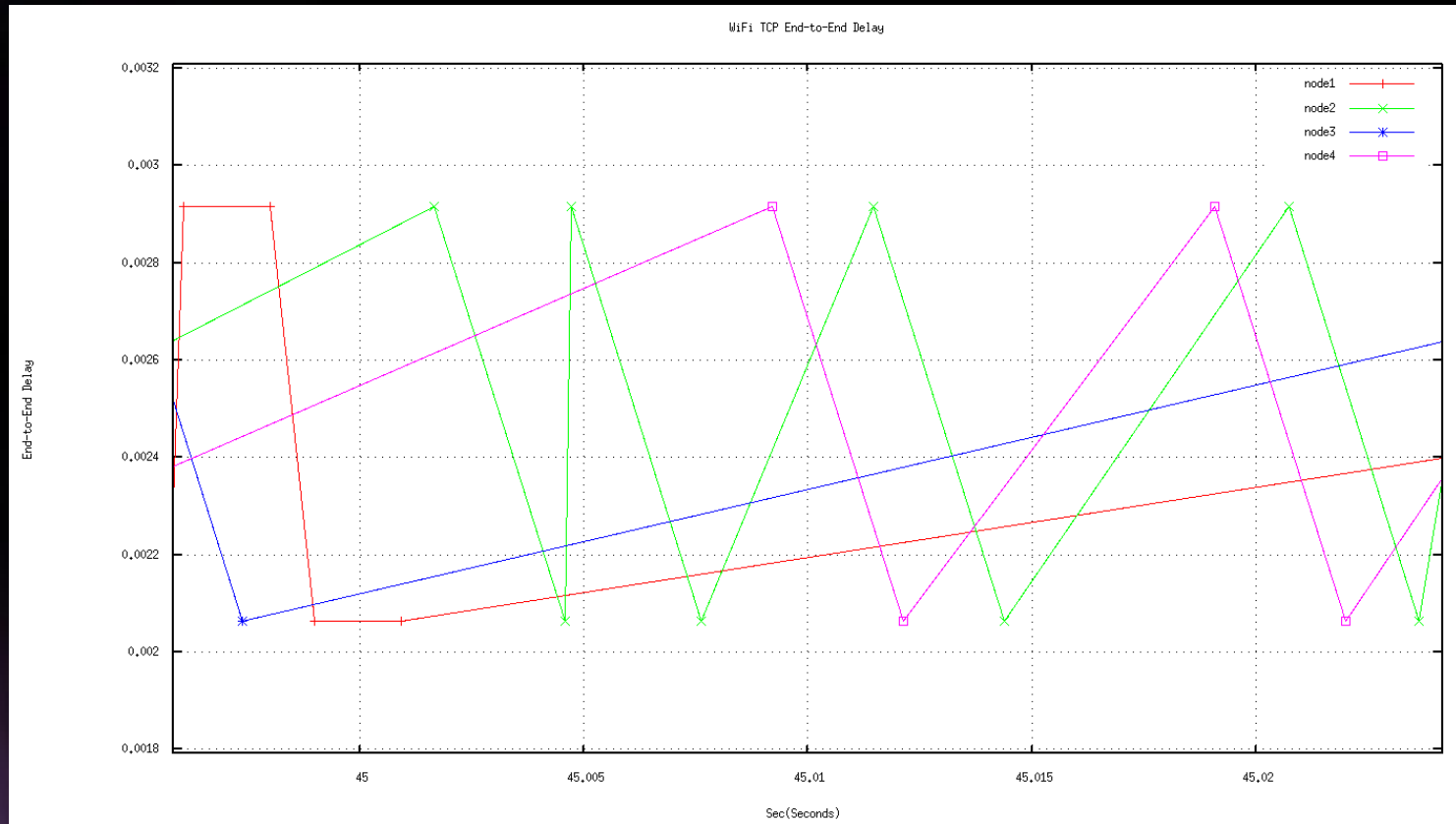
Simulation Results Continue

Wi-Fi - Download bit rate



Simulation Results Continue

Wi-Fi - End to end delay



Conclusion

Average Download Bitrate:

- Wi-Fi is about 10 times faster than UMTS

End to end delay

- For UMTS the end to end delay increases when distance is increased
- For Wi-Fi the end to end delay is consistent when distance is increased

ns-2

- More flexible for development
- More features requires more effort and increased difficulty

Reference

E.U.R.A.N.E, “EURANE User Guide,” release 1.6. September 22nd 2005, pp. 5-31.

EURANE. (2006, October 10). *EURANE Website*. Retrieved March 2, 2011, from <http://eurane.ti-wmc.nl/eurane/>

Peter Ramsdale, “Introduction to UMTS,” London WC2R 0BL, UK: IEE, Savoy Place, 1998, pp. 2-5.

Creating Wired-cum-Wireless and Mobile IP Simulations in ns. Marc Greis’ Tutorial for the UCB/LBNL/VINT Network Simulator “ns”. Available online: <http://www.isi.edu/nsnam/ns/tutorial/index.html>

