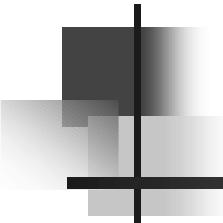


# OmniCon: A Mobile IP based Vertical Handoff System for Wireless LAN and GPRS links



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Srikant Sharma

Inho Baek

Yuvrajsinh Dodia

Tzi-cker Chiueh

Experimental Computer Systems Lab, Stony Brook University



# Outline

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- Introduction
- Motivation
- Design, Architecture, and Implementation
- Performance Evaluation
- Conclusion

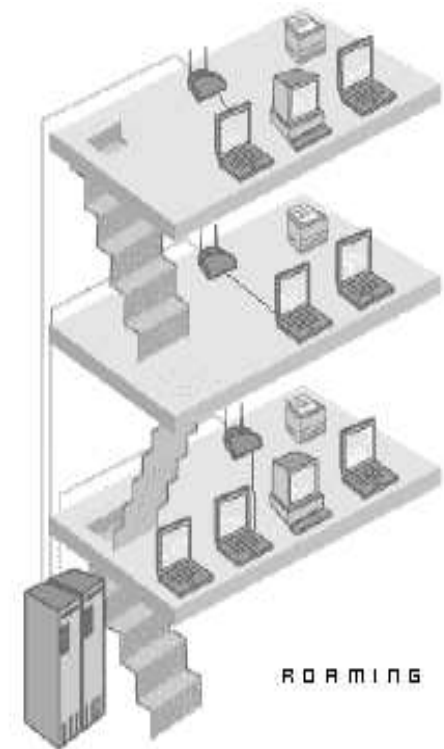
# Introduction

- Proliferation of HotSpots
- High bandwidth access without wires
- HotSpots are really spots, i.e. the coverage is spotty and limited
- Limited Mobility



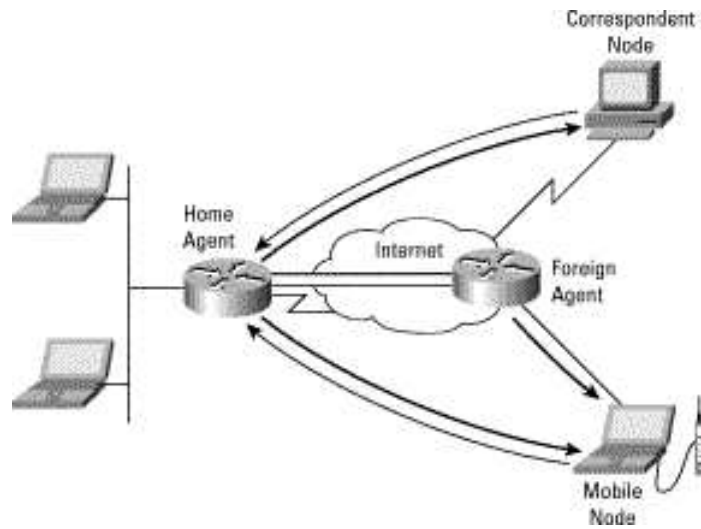
# Wireless LANs

- Hot-spots are typically 802.11b wireless LANs
- Limited Coverage
- Multiple Access Points for coverage extension and roaming
- Restricted to same IP subnet
- Problem of Dark-Spots persists



# Extended Roaming

- Across Multiple subnets
- Uses Mobile IP
  - A heavy-weight protocol





# Wireless WAN

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- GPRS, 3G etc.
- Wide connectivity
- Low-Bandwidth
- Can be used to Fill in the gaps



# Technical Issues

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- Mobile IP is a LAN solution not WAN
  - Does not support multiple interfaces
  - Horizontal handoff
- 802.11b and GPRS are different technologies
  - Bandwidth, latency, etc.
- GPRS (and 3G) networks do not support Mobile IP
- How to fill in the gaps using two vertically different technologies?



# OmniCon Goals

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- Bridge the gap between 802.11b and GPRS
  - Enabling technology for the use of most available/desired interface
- Extend Mobile IP to support different technologies without modifications
- Deal with disparity in WLAN and GPRS link characteristics



# Architectural Constraints and Choices

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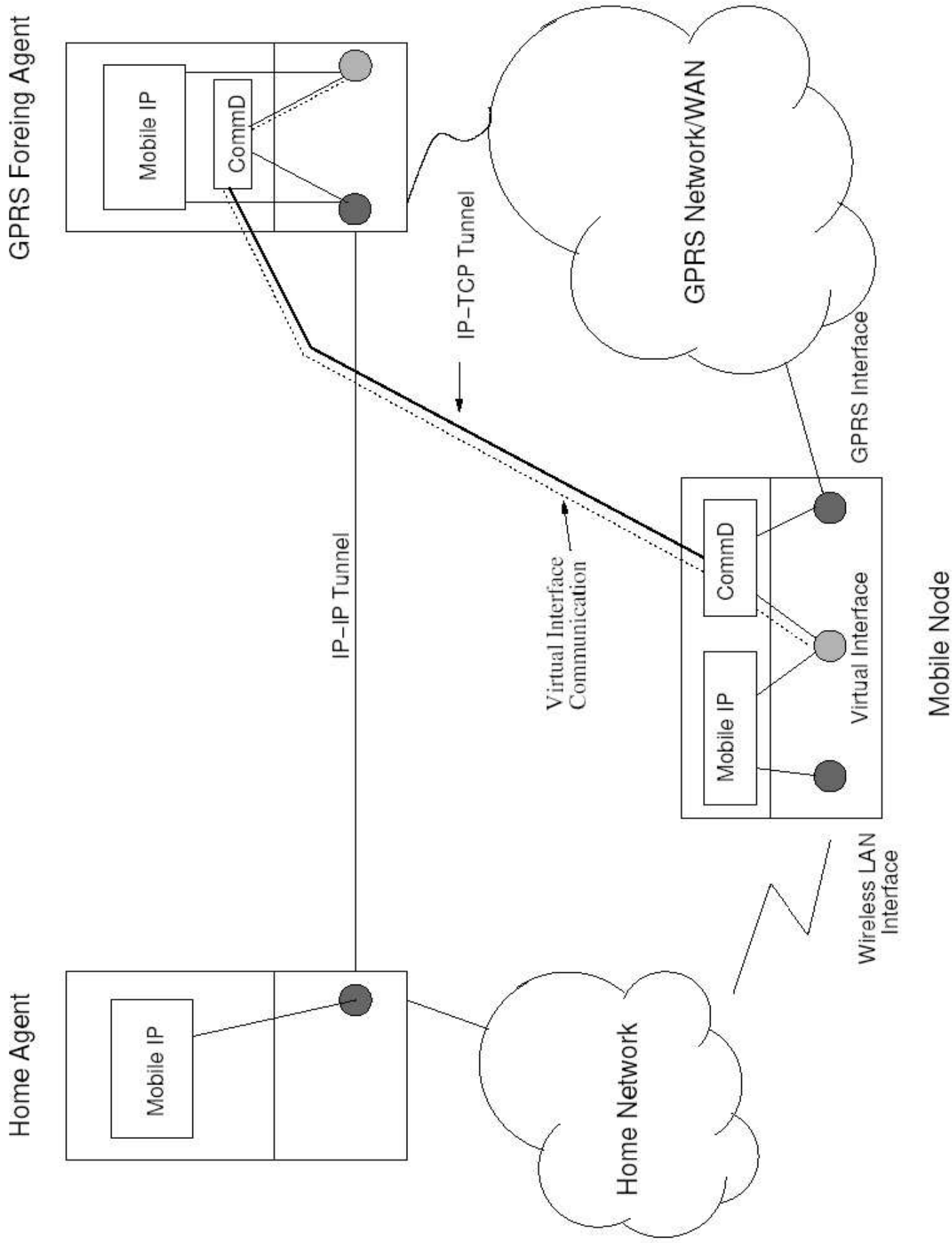
- Indirection mechanism
  - Tunneling issues
    - Communication agent, FA, or HA
    - GPRS Foreign Agent
- Network Address Translation
  - Cannot setup an IP-IP tunnel
  - Mobile IP cannot alter interface addresses
  - Virtual Network Device
  - IP over TCP tunnel



# Constraints and Choices...

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- Handoff mechanism
  - Triggered handoff
  - Ping-pong effect
  - Decision Module
- Link disparity
  - WLAN support up 11 Mbps, 2ms RTT
  - GPRS supports only 128 kbps, 1 sec RTT
  - Traffic Shaping



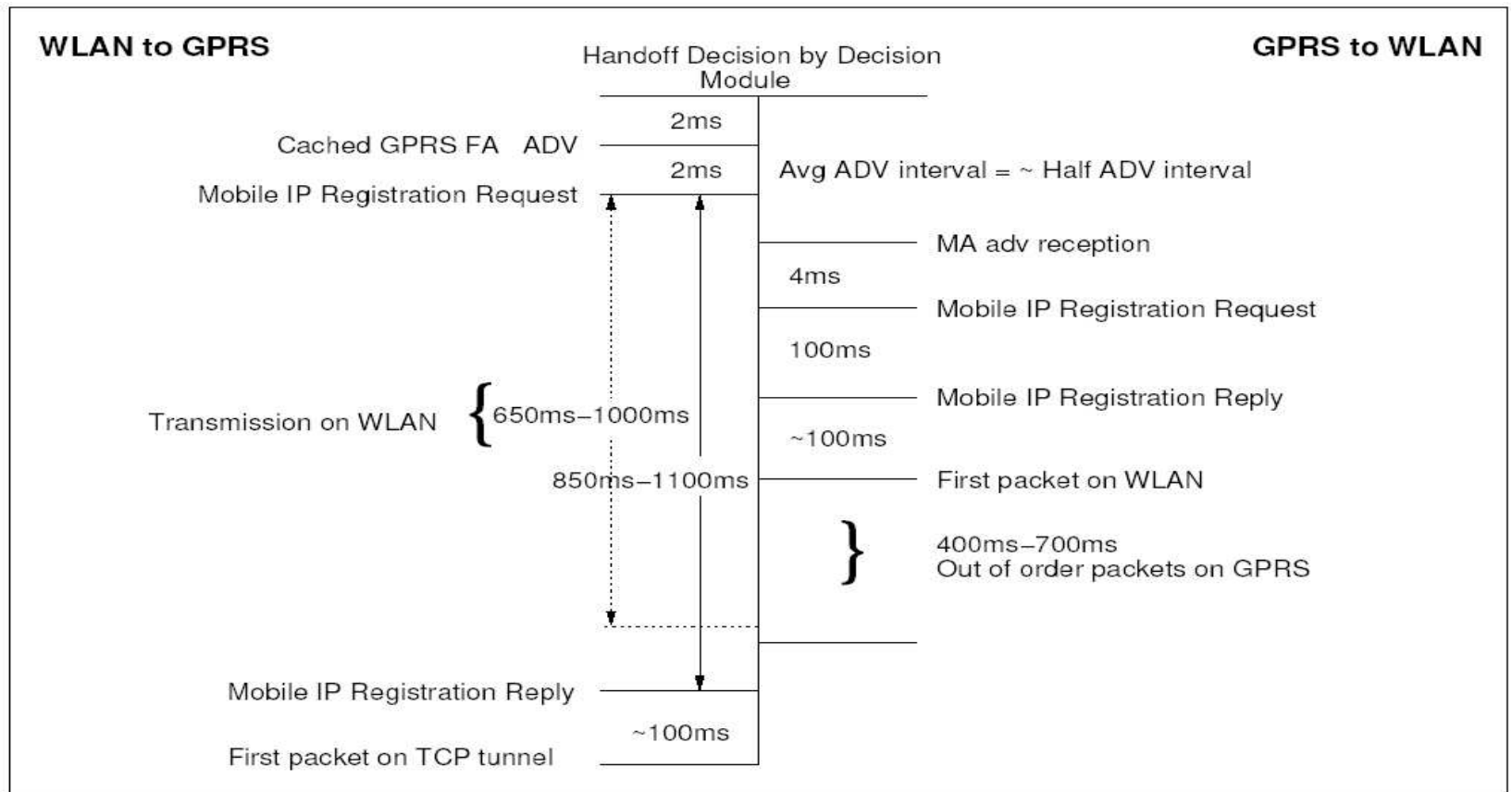


# Prototype Components

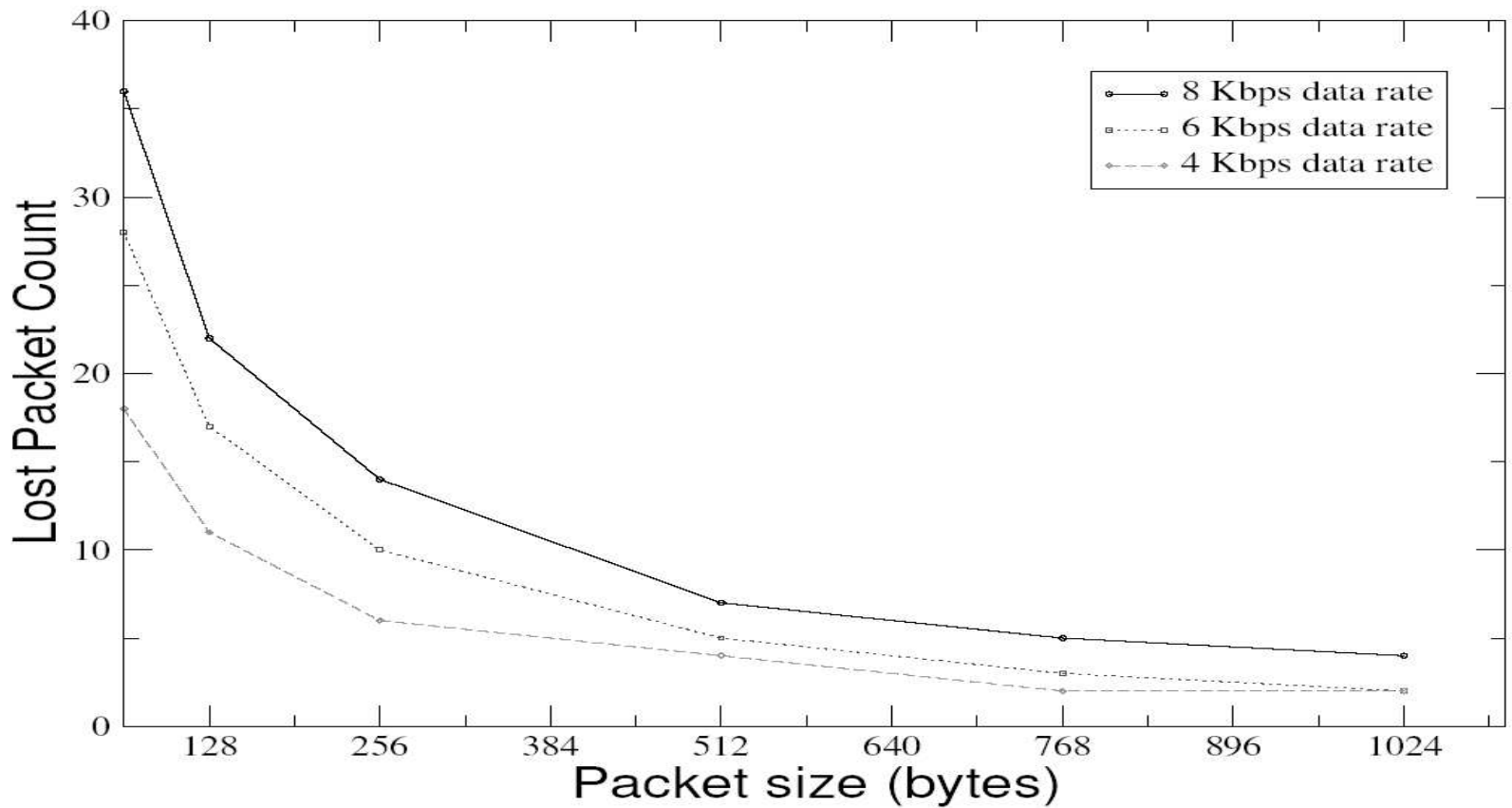
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- Virtual Device
- Communication Daemons
- Decision Module
- Traffic Shaper

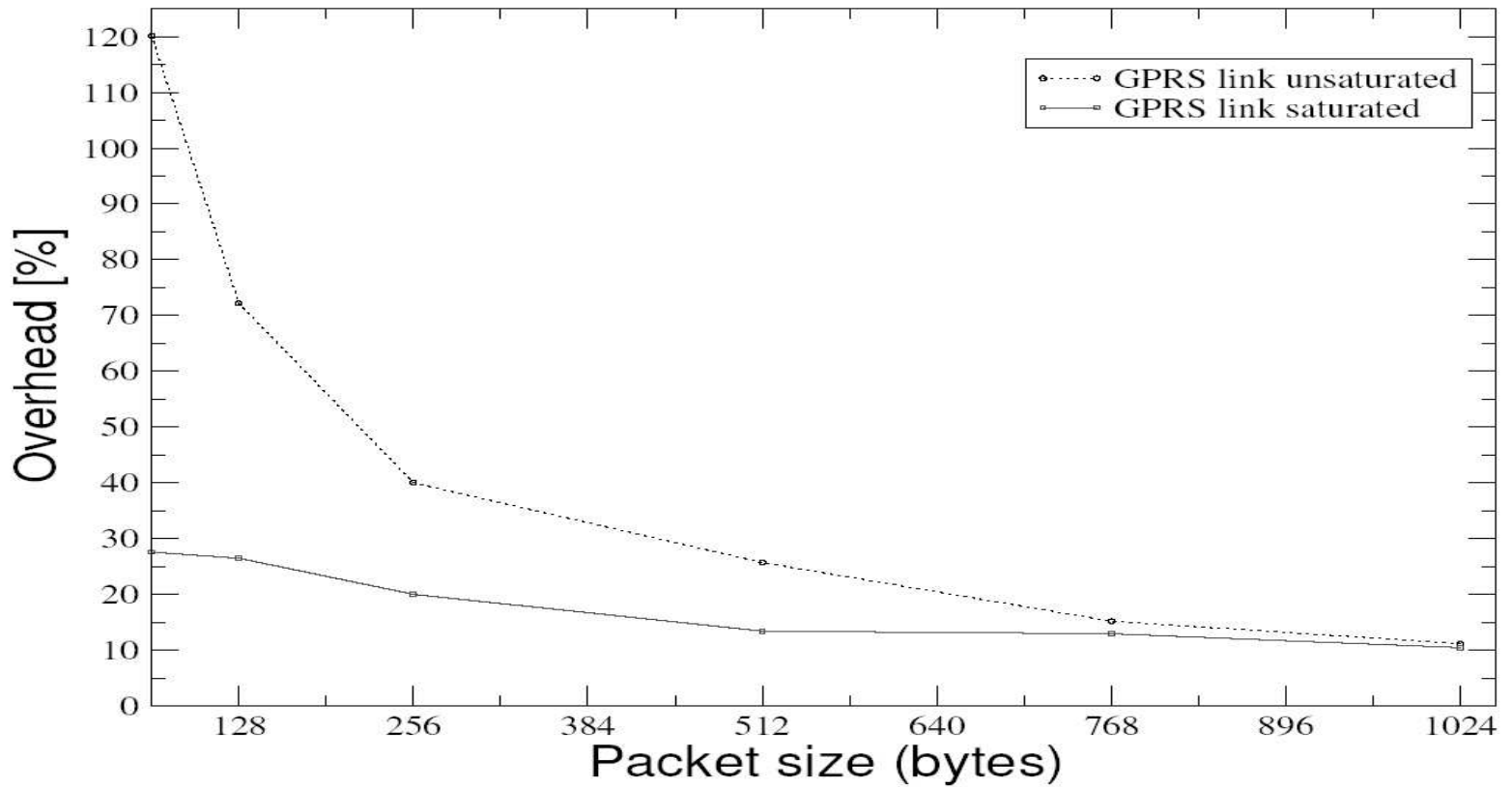
# Performance... Timeline



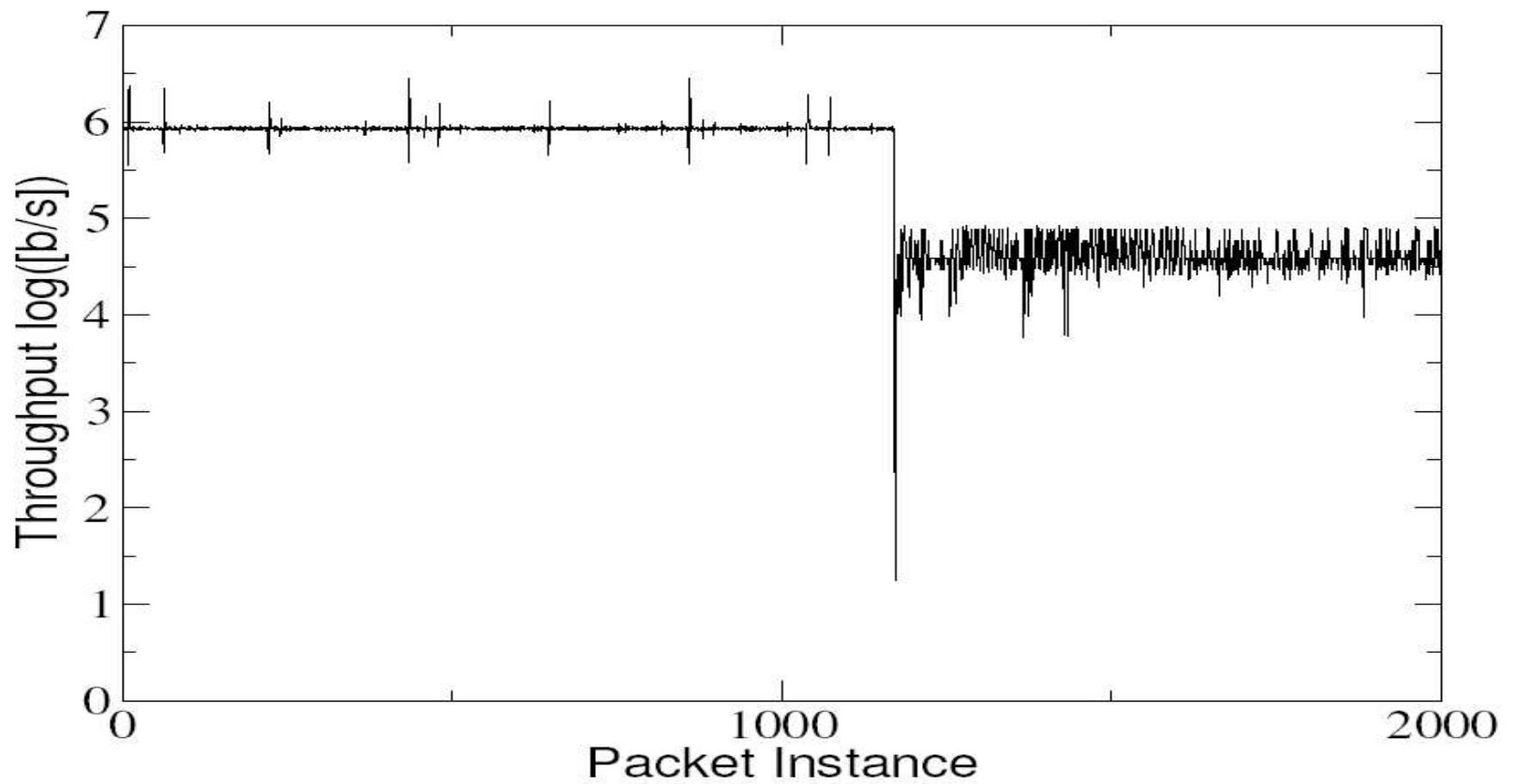
# Performance... Packet loss



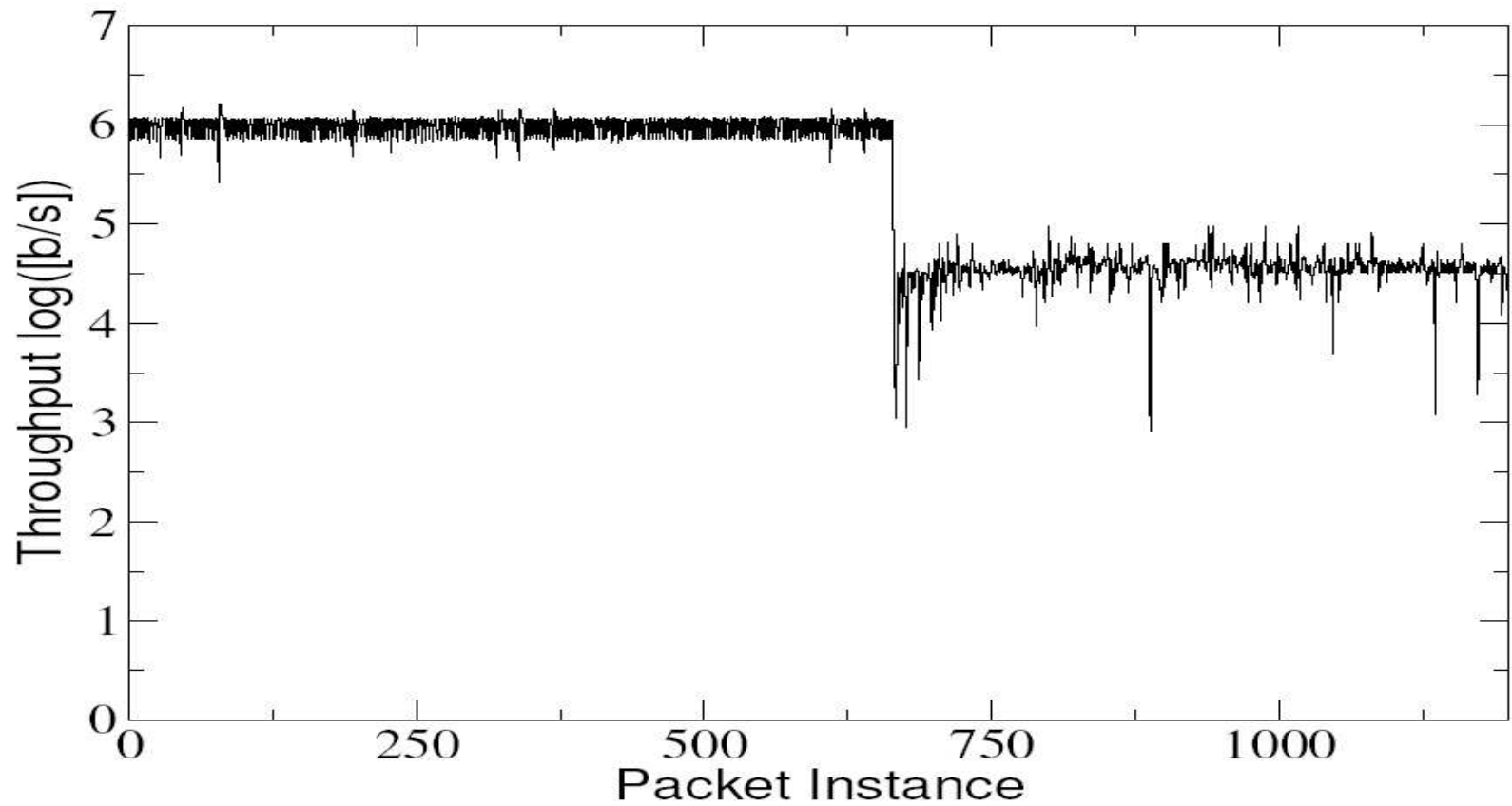
# Performance... Overhead



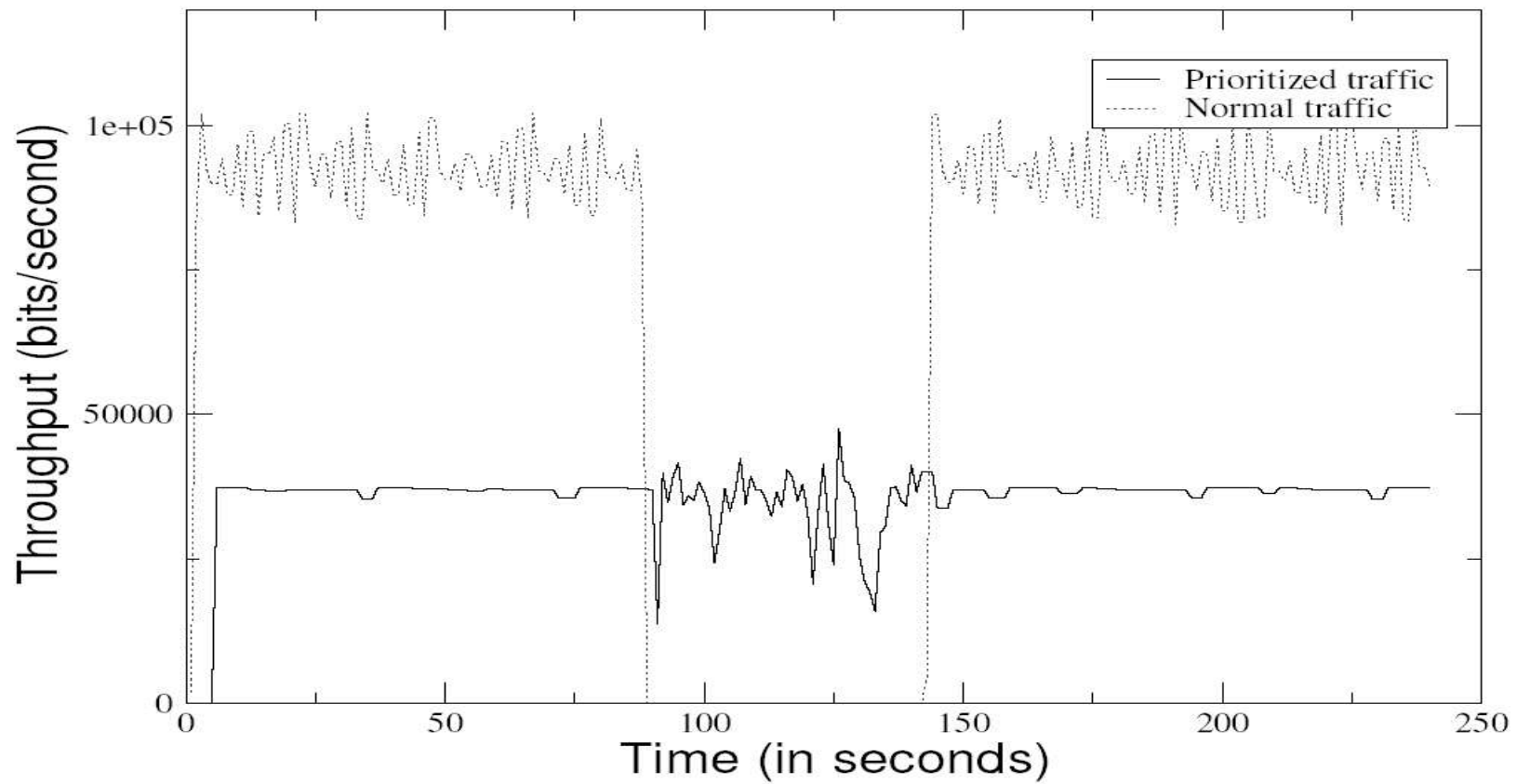
# Performance... UDP traffic



# Performance... TCP



# Performance... Traffic prioritization





# Conclusion

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- OmniCon completely solves the coverage problem
- A generic vertical handoff solution independent of technology
- Deals with NAT issues
- Gracefully handles Link disparity