Analysis of Mobile IP in Wireless LANs

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Introduction

- **Mobile IP is a standard IETF (Internet Engineering Task Force) communication protocol which allows mobile node moves between different networks while it can keep its IP connectivity regardless of its location**

- **Mobile IPv4 is defined in RFC 3344**

- **Mobile IP is based on TCP/IP protocol stack**

Related Work

- **Planning and Analyzing Wireless LANs and Mobile IP Networks , *OPNETWORK 2003***
- **Wireless LAN Model User Guide , *OPNET***

Mobile IP Scenario
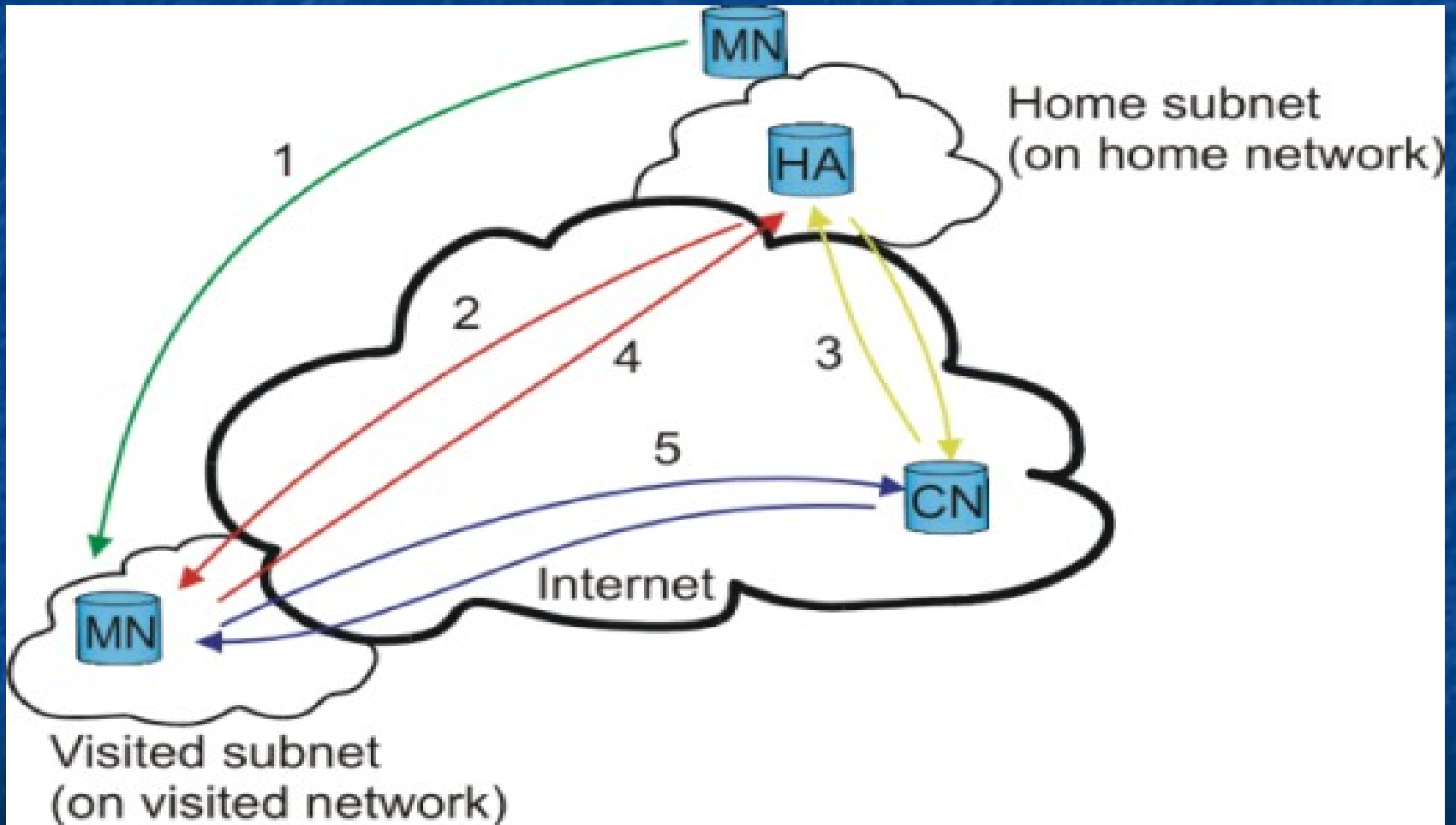
Motivation

- Need a protocol which allows network connectivity when our mobile node moves
- This protocol should not need massive changes to router software
- It should be compatible with existing IPv4 networks

Mobile IP: Terminology

➢ **Care of Address (CoA). It is an address of foreign agent with which mobile node registered**

➢ **Correspondent Node (CN). A node with which a mobile node is communicating.**

➢ **Foreign Agent (FA). Any network other than mobile node's network**

➢ **Home Agent (HA). Mobile node's home network. It assigns IP address to mobile node**

Mobile IP: Terminology

➢ **Mobile Node (MN). A node can roam between different networks.**

Operation of Mobile IP

- Mobility agents (i.e., foreign agent and home agent) advertise their beacons (advertisement messages)

- Mobile node can detect if it is in home network or foreign network

- If it is in a foreign network it obtains COA

- Mobile node registers its new COA with its home agent, possibly via a foreign agent

Operation of Mobile IP (Con.)

➢ **Home Agent sends registration reply to the mobile node**

➢ **All the packets that correspondent node wants to send to the mobile node, will be sent through an established tunnel between home agent and foreign agent**

➢ **Mobile node can communicate with correspondent node directly**
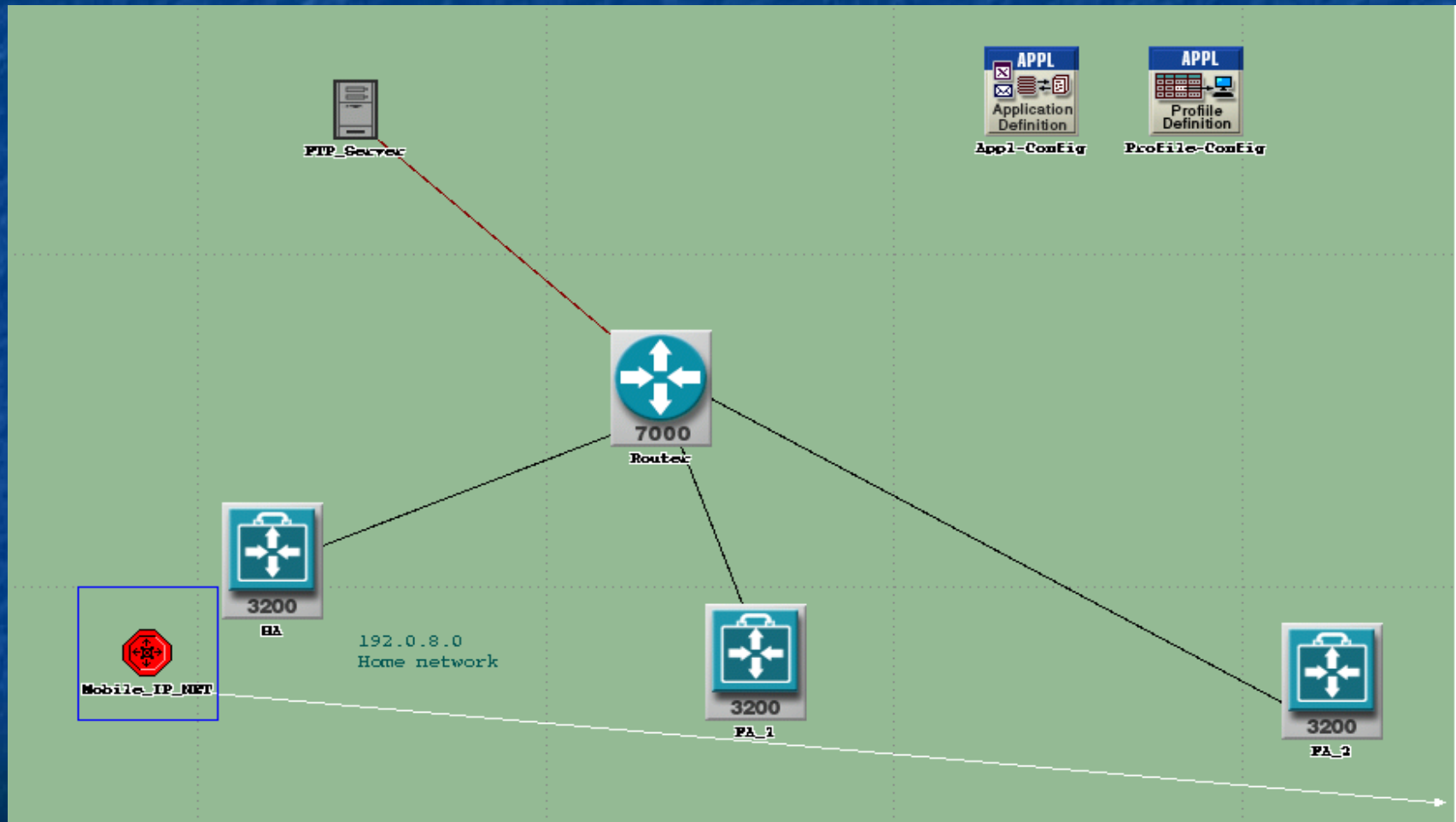
Simulation

Mobile IP in OPNET 14

> **Mobile IP capable router for Wireless LAN Network**

> **Mobile subnet which supports trajectory feature**

> **Ethernet work station with client-server application**
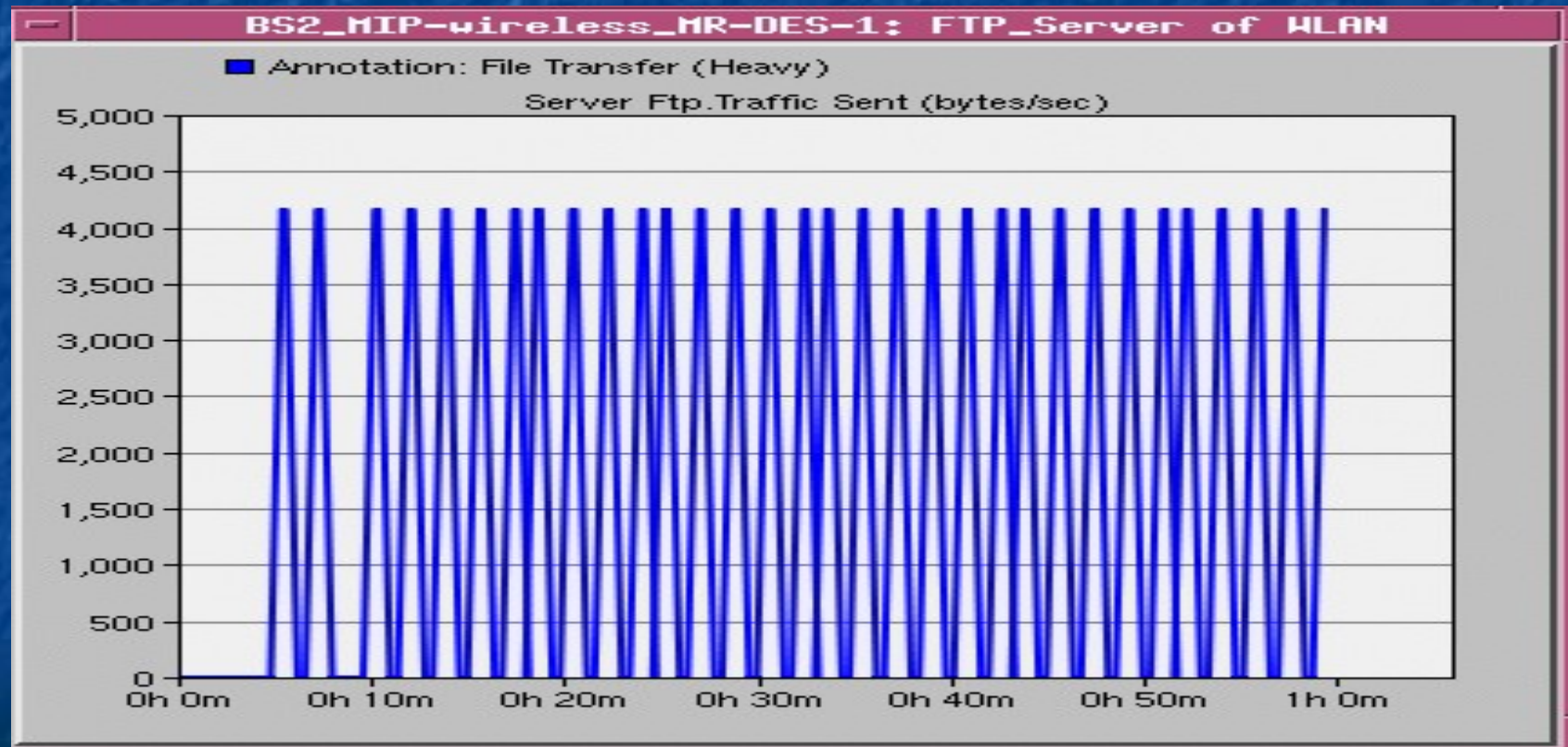
> **Cisco-7000 series router**

Simulation: Scenario-Node Position

Node Position (km)	Mobile Subnet	Home Agent	Foreign Agent1	Foreign Agent2
X	1.07	1.514	3.265	5.47
Y	2.78	2.27	2.711	2.87

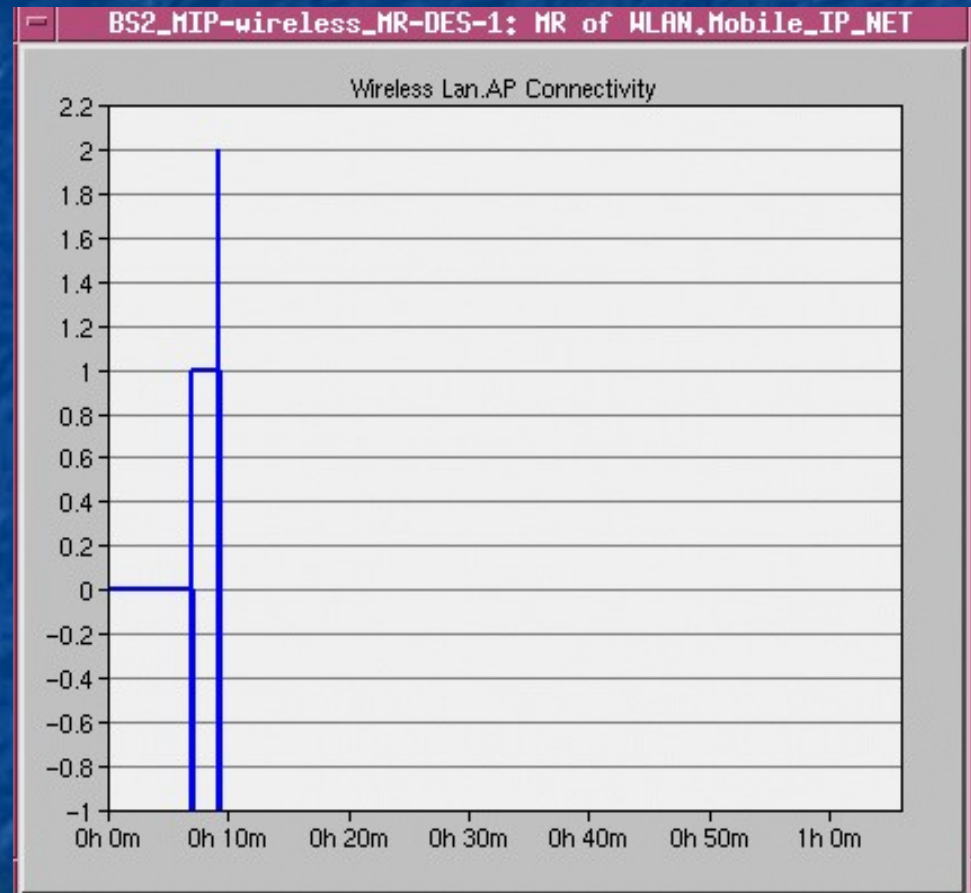# Simulation : Configuration

Simulation: Result
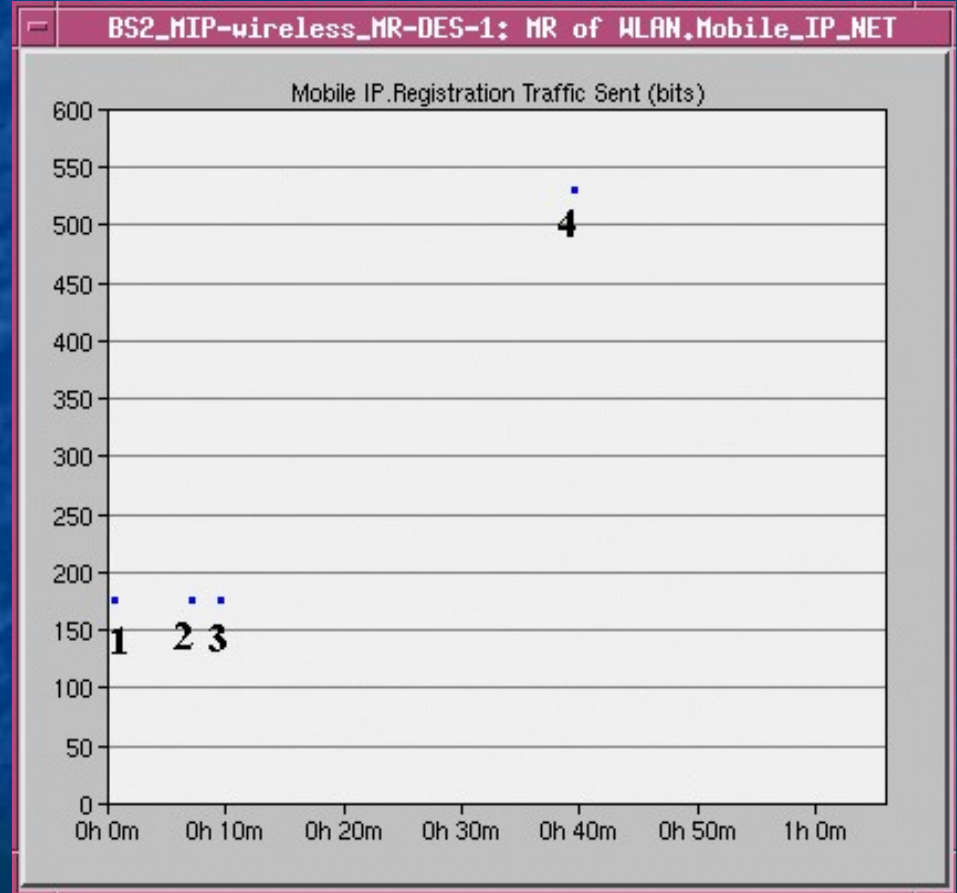
Simulation: Result

AP Connectivity

- From 0 to 7 minute mobile subnet is connected to its HA.

- From 7 minute to 9 minute our mobile subnet will switch to FA1

- From 9 minute to the end of simulation mobile subnet is connected to FA2
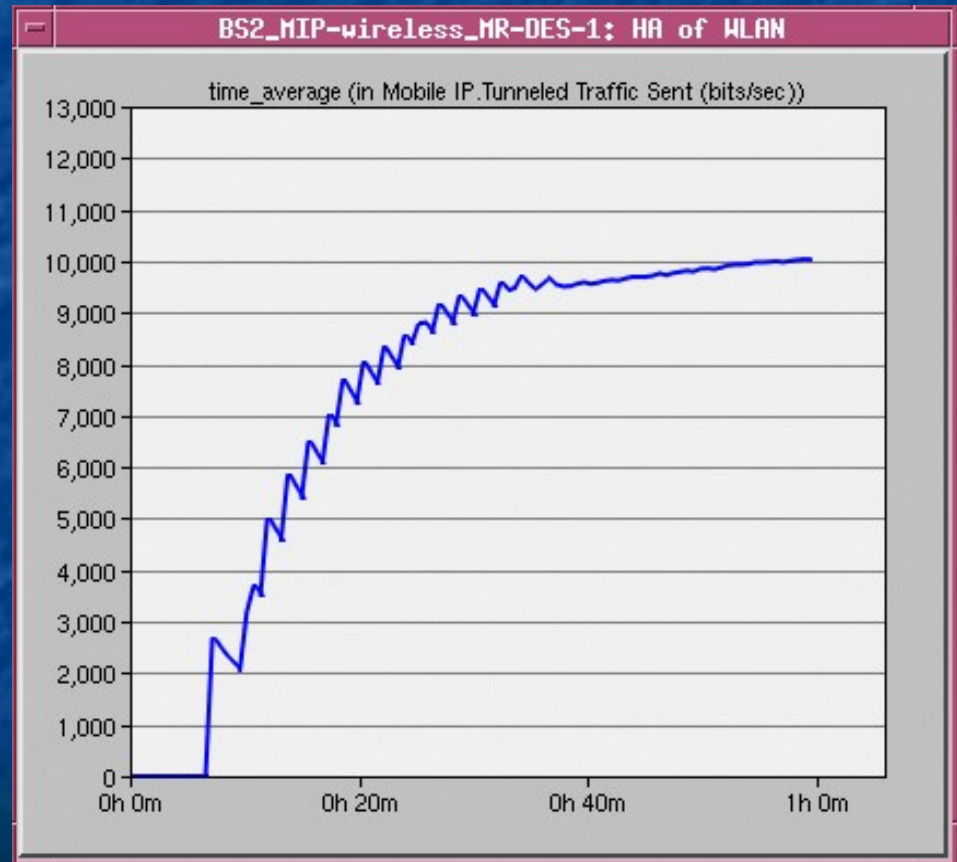
Simulation: Result

Registration

➤ **Dot 1: Registration between mobile subnet and HA**

➤ **Dot 2 : Registration between mobile subnet and FA1**

➤ **Dot 3: Registration between mobile subnet and FA2**

➤ **Dot 4: Reregistration between mobile subnet and FA2 when the registration time expires**

Simulation Result
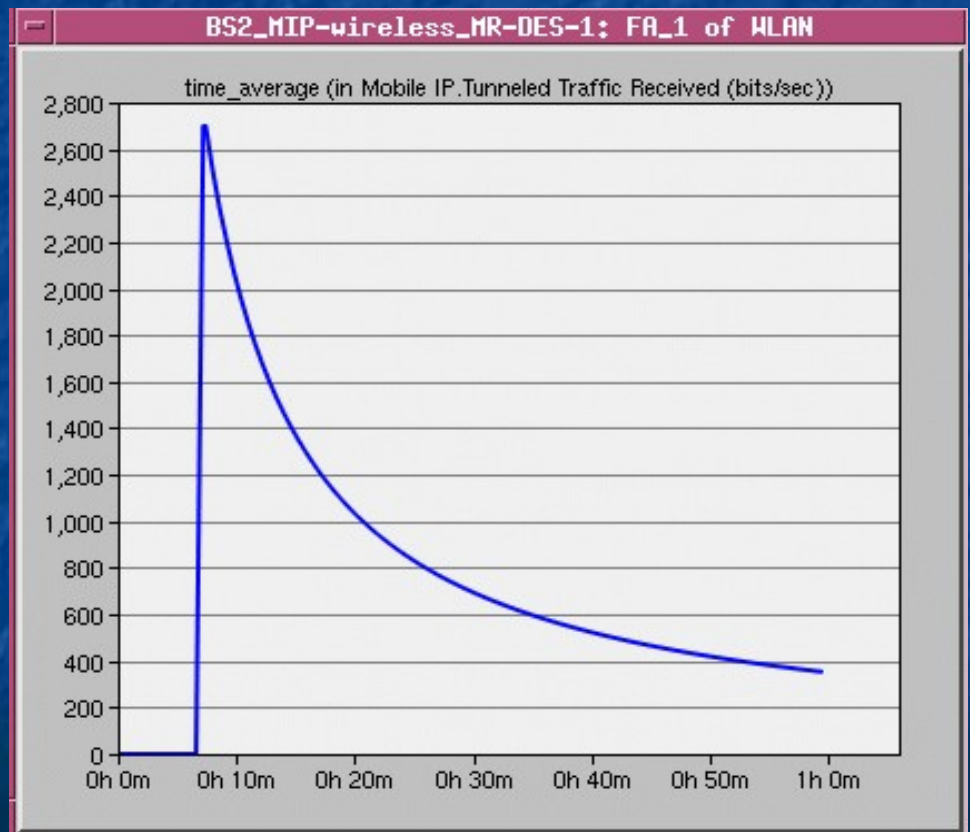
Tunneled Traffic: Home Agent

All the packets destined to
mobile subnet should go
Through HA even though
mobile subnet is not in the
range of HA

Simulation Result
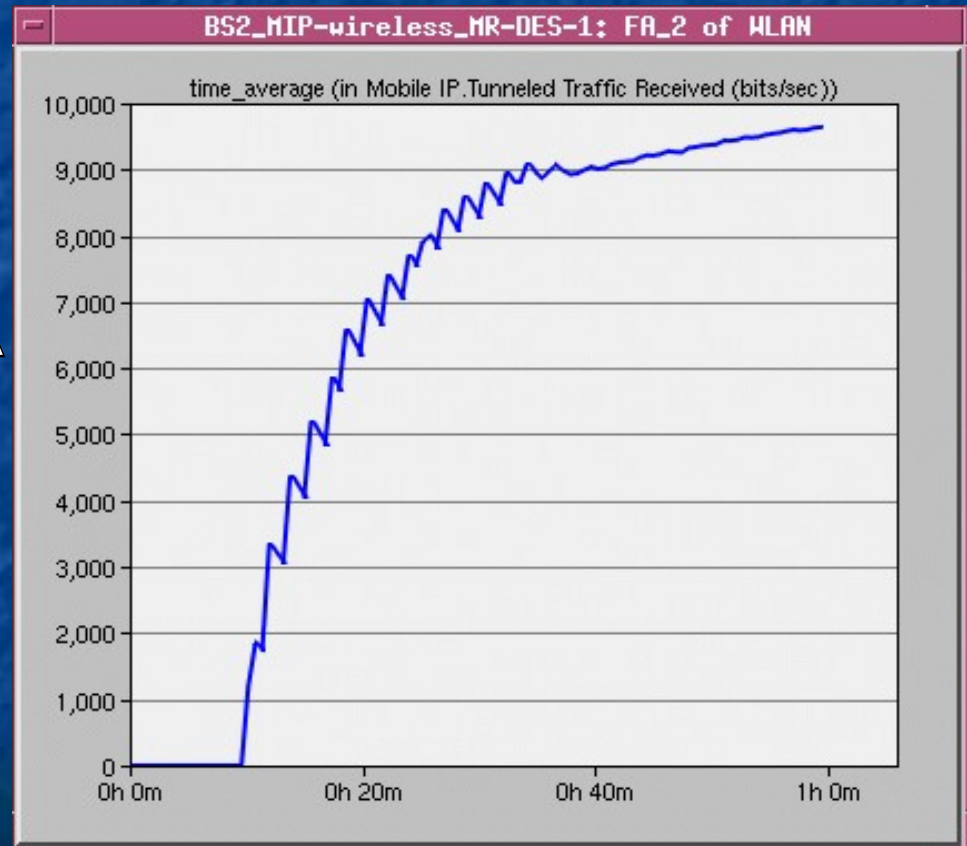
Tunneled Traffic: Foreign Agent 1

When mobile node is in the range of FA1, FA1 receives the tunneled traffic from HA

Simulation Result

Tunneled Traffic: Foreign Agent 2

After moving from FA1 to

FA2, mobile node will switch

to FA2 and then FA2 receives

The Tunneled packet from HA

Mobile IP in NS-2.31

- Similar scenario to simulate Mobile IP

- Assume TwoRayGround propagation

- 802.11 Mac layer protocol

- Destination-Sequenced Distance Vector (DSDV) routing protocol

Simulation

Mobile IP in NS 2.31:Secnario

| Node Position (m)	Mobile Node	Home Agent	Foreign Agent1	Foreign Agent2
X	80	100	400	800
Y	10	20	20	20

Mobile IP in NS-2.31 : Parameters

➢ **Node roaming speed: 10m/s**

➢ **Trajectory: From (80,10) to (900,20)**

➢ **Simulation Time : 400seconds**

➢ **FTP Flow Start Time : From 100second to the end of simulation**

Mobile IP in NS-2: Simulation result

Packet loss during registration process
(two small gaps in figure)

Unseamless connectivity during the handoff
between different subnets in Mobile IP
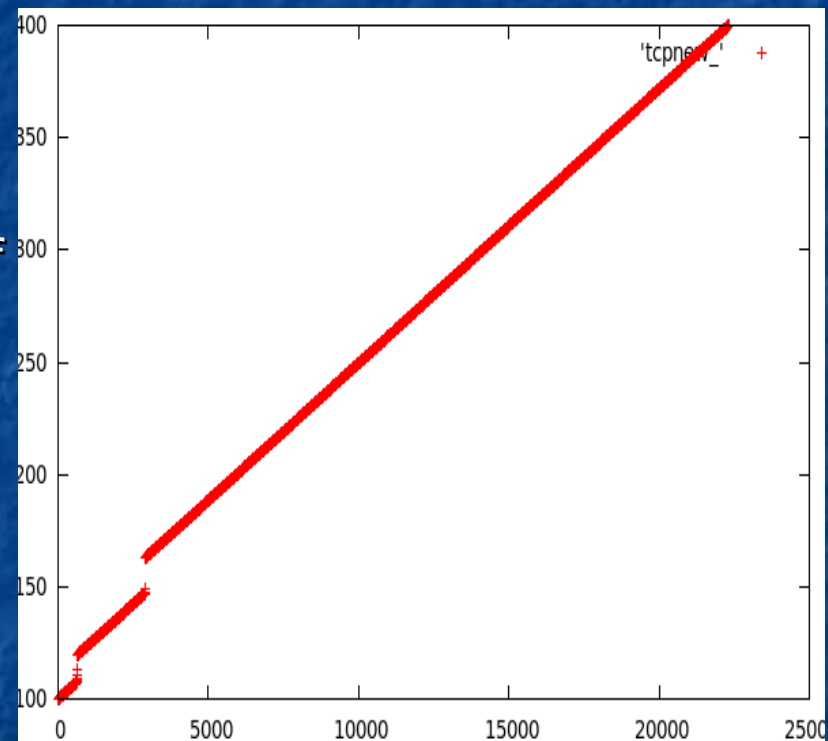
Conclusion and future work

➢ **In this project we showed the most technical details of Mobile IP. This helps a mobile node moves between different subnets and it keeps its IP connectivity even in a foreign network**

➢ **We simulated Mobile IP in OPNET 14 and NS-2.31 and got similar results and we used these results in order to understand Mobile IP operation better**

➢ **The hand off in Mobile IP makes unseamless connectivity**

Conclusion and future work

➢ **The future work can be implementing Mobile IP with co-located care of address (i.e., DHCP)**

➢ **Mobile IPv6**

References

➢ **MOBILE IPv4 – SIMULATION AND IMPLEMENTATION, Michal Skořepa,   Fakulta elektrotechniky a komunikačních technologií,2008.**

➢ **http://en.wikipedia.org/wiki/Mobile_IP**

➢ **http://en.wikipedia.org/wiki/Wireless_LAN**

➢ **Wireless LAN Model User Guide, OPNET**

➢ **Planning and Analyzing Wireless LANs and Mobile IP, OPNETWORK 2003**

➢ **Mobile Networking Technology, CEENet'2004 Workshop on Network Technology**

➢ **High Mobility in a Realistic Wireless Environment: a Mobile IP Handoff Model for NS-2, Claudio E. Palazzi, Computer Science Department, University of California, Los Angeles**

➢ **The ns Manual (formerly ns Notes and Documentation)**

➢ **Mobile IP, Charles E.Perkins, Sun Microsystems, IEEE Communication Magazine, May 1997**

➢ **OPNET 14 Tutorial**

Question