

Wireless Multimedia Systems Fall, 2008 (Topic 7)

Professor Eric Hsiao-kuang Wu (hsiao@csie.ncu.edu.tw)

1. Today's topic (II):

Mobility in IP Network

Suggested Reading:

♦ Required Reading:

- ♦ [Bhagwat96] Pravin Bhagwat, Charles Perkins, and Satish Tripathi, "Network Layer Layer Mobility: An Architecture and Survey

<I> Mobility Issues:

You will change your point of attachment to the network
The system should provide network-wide mobility

<II> **Current TCP/IP assume that end-systems are stationary.**

One solution is to provide additional services at the network layer in a backward manner compatible .

Transparent: mobile nodes are similar to stationary nodes. (the same naming and addressing)

A) ALL-IP System

- (1) Heterogeneous Wireless Network (Enhancing IP Service Provision over heterogeneous Network)
- (2) QoS Support for an ALL-IP System
- (3) Resource Management

B) Network Layer Mobility: An Architecture and Survey

- (1) TCP/IP : Internet Naming and Addressing

Internet Addressing (32-bit for IPv4, 128-bit for IPv6)

Naming: Name server responsible for mapping IP address and name

Hierarchical addressing scheme:

Network-id + host-id

Therefore, a mobile host must be associated with a new address when it moves

- (2) The Mobility Problem

Name & address

Name: a location dependent identifier of a host

Address: a host's point of attachment to the network

- a. Mobility Problem: Directory Service View

difficulty:

- a. DNS originally provide name lookup

- b. DNS attempts to optimize the access cost and not the update cost

- c. DNS clients caches DNS records

b. Mobility Problem: Internet View

TCP identifier was identified by

<source IP address, source TCP port, destination IP address, destination TCP port>

In order to retain transport layer sessions, a mobile host's address must be preserved regardless of its point of attachment to the network.

(3) Network-Layer Solution Architecture

Assumption:

Assume the rate of the change of location is slower than the time it takes for the mobile routing protocols

- ♦ a. Mobile host / Home Address / Home Network /d. Foreign Network
- ♦ b. Two-Tier Addressing
 - forwarding address for routing directive
 - home address for an end-point identifier
 - virtually connected to its home.
- ♦ c. Architecture Components
 - ♦ Forwarding Agent / Address Translation Agent
 - ♦ g (forward address) -> (home address) will occur in FA
 - ♦ f (home address) -> (forwarding address) will occur in ATA
- ♦ d. Location Update Protocol
- ♦ e. Packet Forward Operation
- ♦ f. Address Translation Mechanism

Mobile IP:

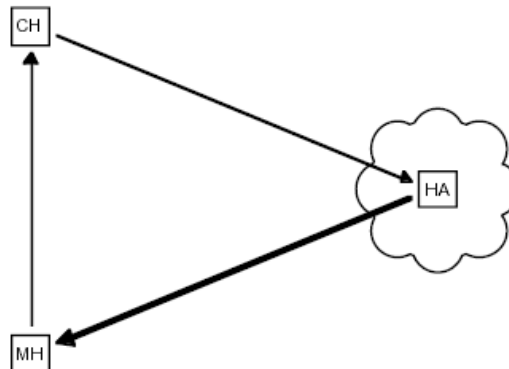


Figure 1. Basic Mobile IP.

CH: Corresponding Host

HA: Home Agent

MH: Mobile Host

- (1) Acquire a IP from friendly foreign network
- (2) DHCP from foreign network
- (3) Acquire foreign agent's IP address

(A) from CH to MH (through home agent)

f, g. Encapsulation (often called Tunneling)

If the mobile node moves again to another network attachment, it might cause

packet loss. Higher layer internet protocol will ensure reliable packet delivery.
 Foreign agent will de-capsulate the enclosed packet
 (B) from MH to CH (direct to CH)

Typical Example:

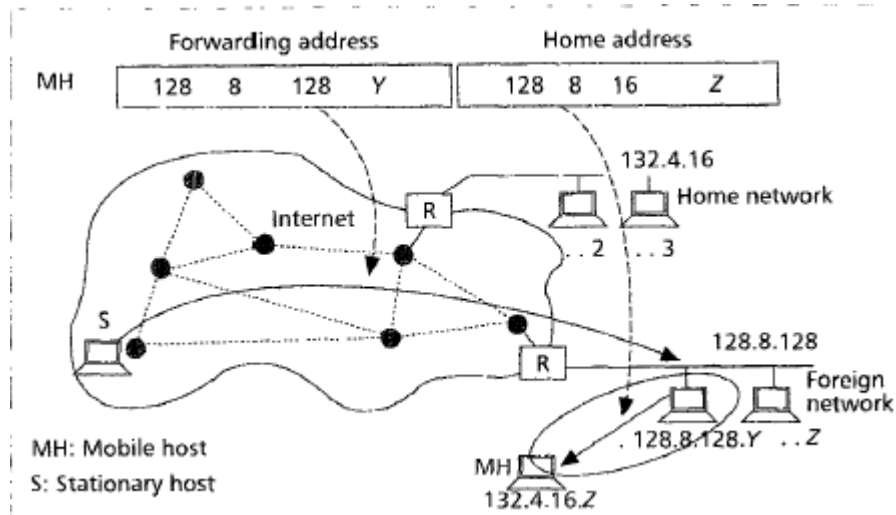
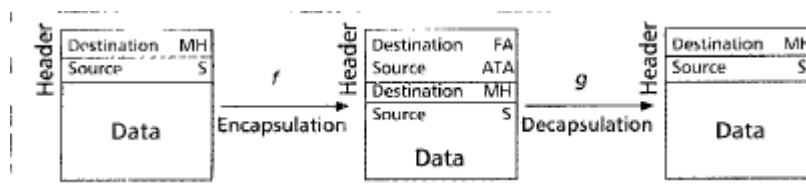


Illustration of Encapsulations:



Security Issues:



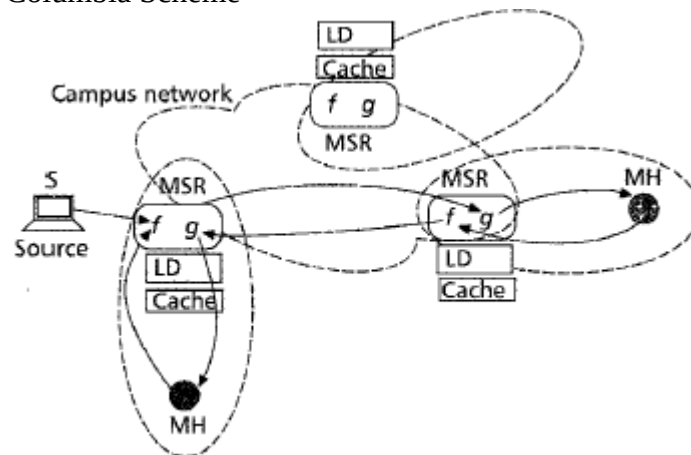
Figure 2. Problem with Source Address Filtering



Figure 3. Bi-directional Tunneling

(4) Mapping to Candidate Mobile Protocol, Some Solutions

- Columbia Scheme



- Mobile IP
- Mobile IP with Route Optimization

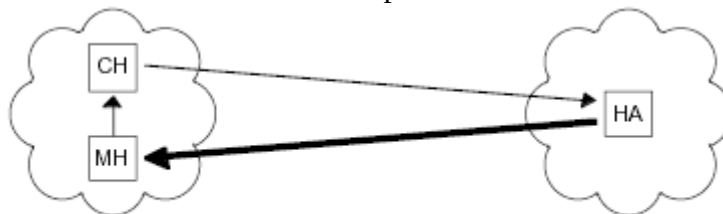


Figure 4. Behavior when CH is Close to MH

When home agent forwards the packet, it could issue ICMP to inform CH that MH has moved to the new place.



Figure 5. A Smart Correspondent Host.

- IPv6 Mobility Proposal

