Performance Evaluation of Two Layered Mobility Management using Mobile IP and SIP

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Background(1)

- Internet Mobility
  - To physically roam to any point on the network while retaining ongoing calls
  - To allow future incoming calls to reach the mobile node at its current location
- Two basic approaches for VOIP mobility Services
  - Seeking to address the mobility in the network layer by using Mobile IP (MIP) and related proposals
  - Finding to address the mobility problem in application layer by augmenting the existing VoIP application and signaling protocols such as H.323 and the Session Initiation Protocol
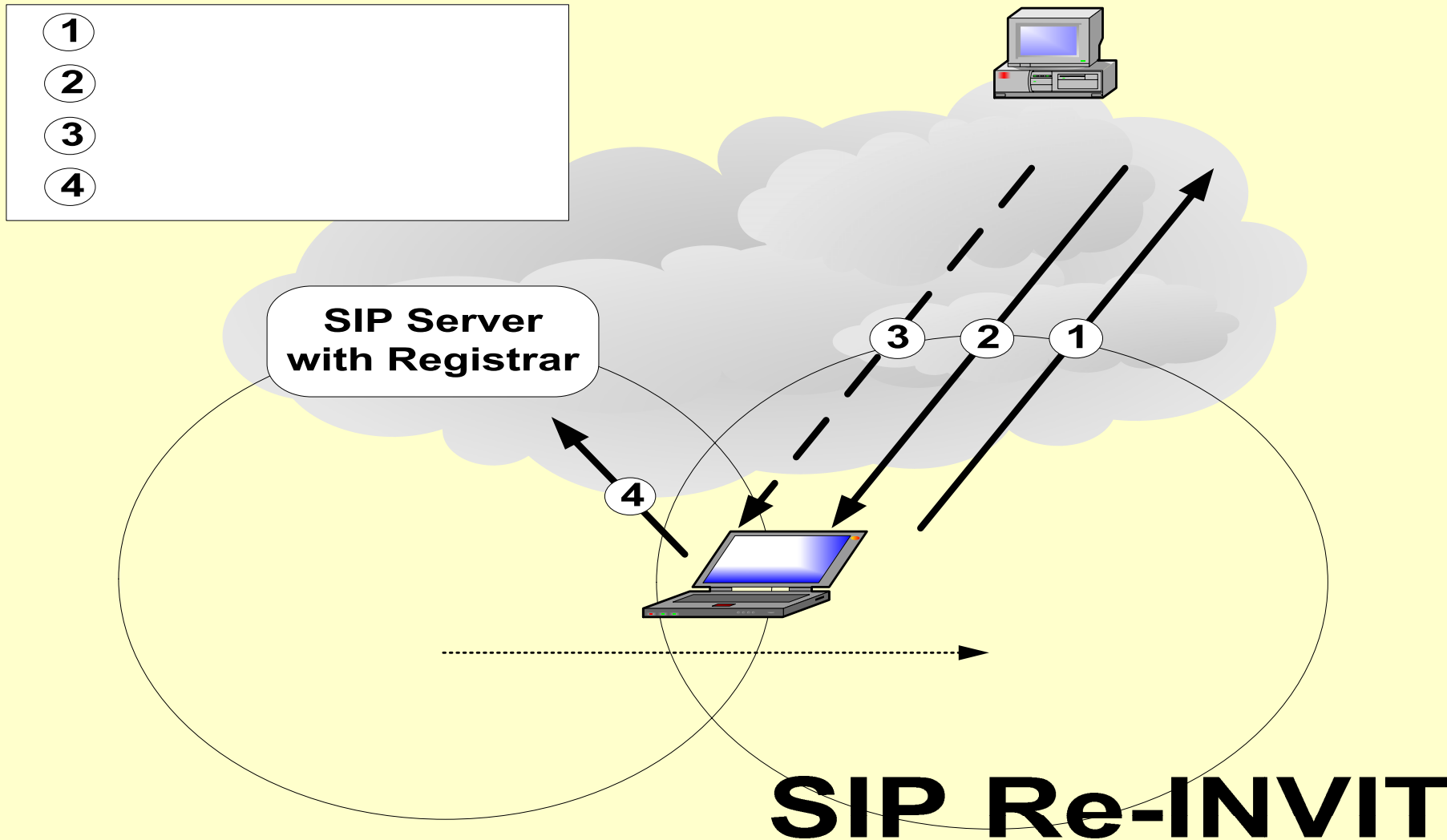
Background(2, Mobile IP)

1   **Agent Ad**
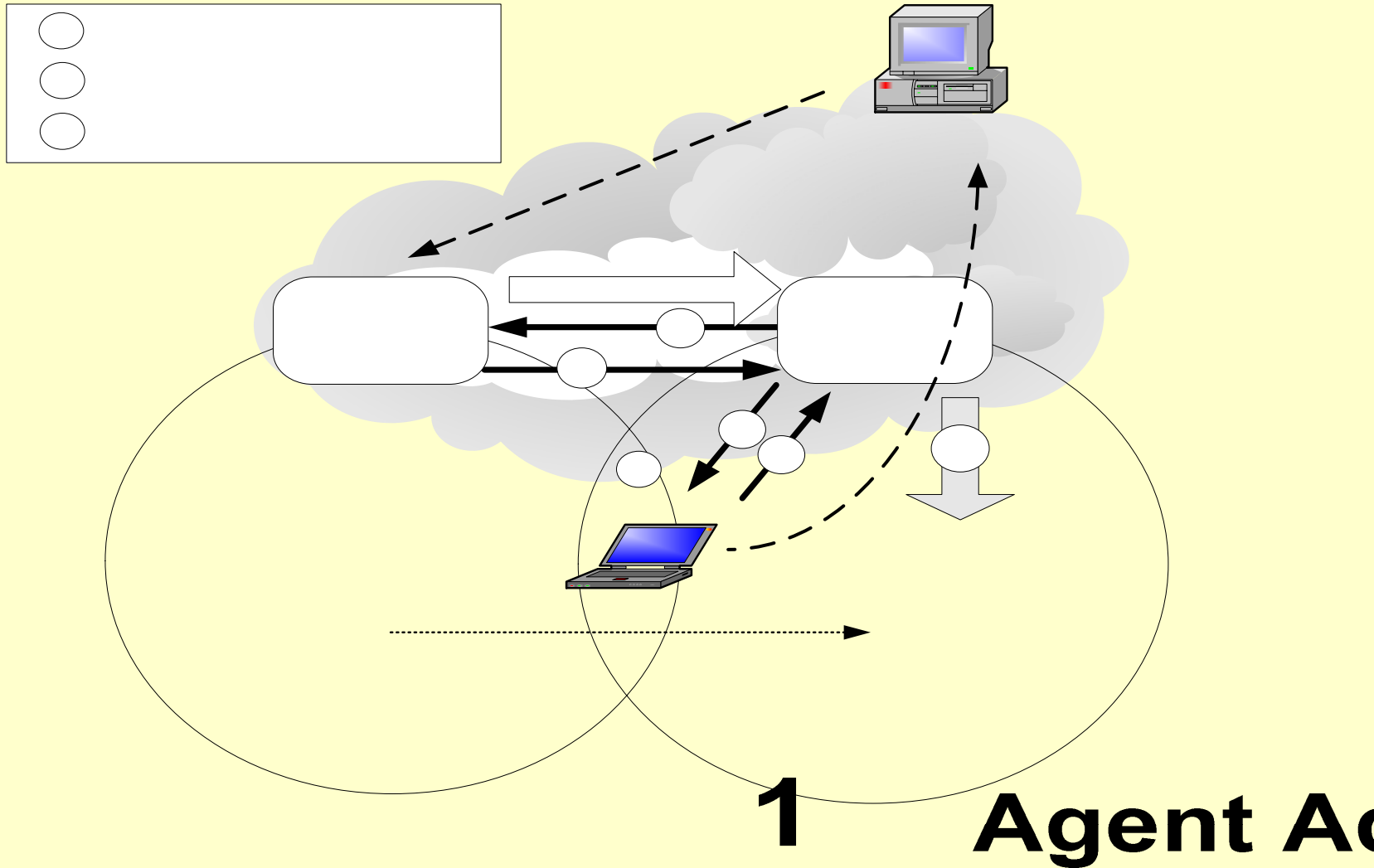
Background(3, Mobile IP)

➲ Limitation of Mobile IP for VoIP

- ◻ Poor performance for delay-sensitive multimedia applications

- ◻ Triangular routing problem and Encapsulation overhead

Background(4, SIP Mobility[3])

1
2
3
4

SIP Server
with Registrar

3 2 1

4

SIP Re-INVIT

Background(4, SIP Mobility[3])

- Limitation of SIP Mobility
  - it alone cannot take care of non-real-time application in its current form
  - The speed at which a mobile SIP node can acquire a new network address can contribute significantly to handoff delays

Motivation

⮕ the use of SIP mobility support mechanisms does not exclude the use of MIP mechanisms, but rather that both mechanisms may be used in an integrated fashion to provide a mobility management system that performs better than either scheme used in isolation.

Proposed Integrated SIP-MIP Architecture
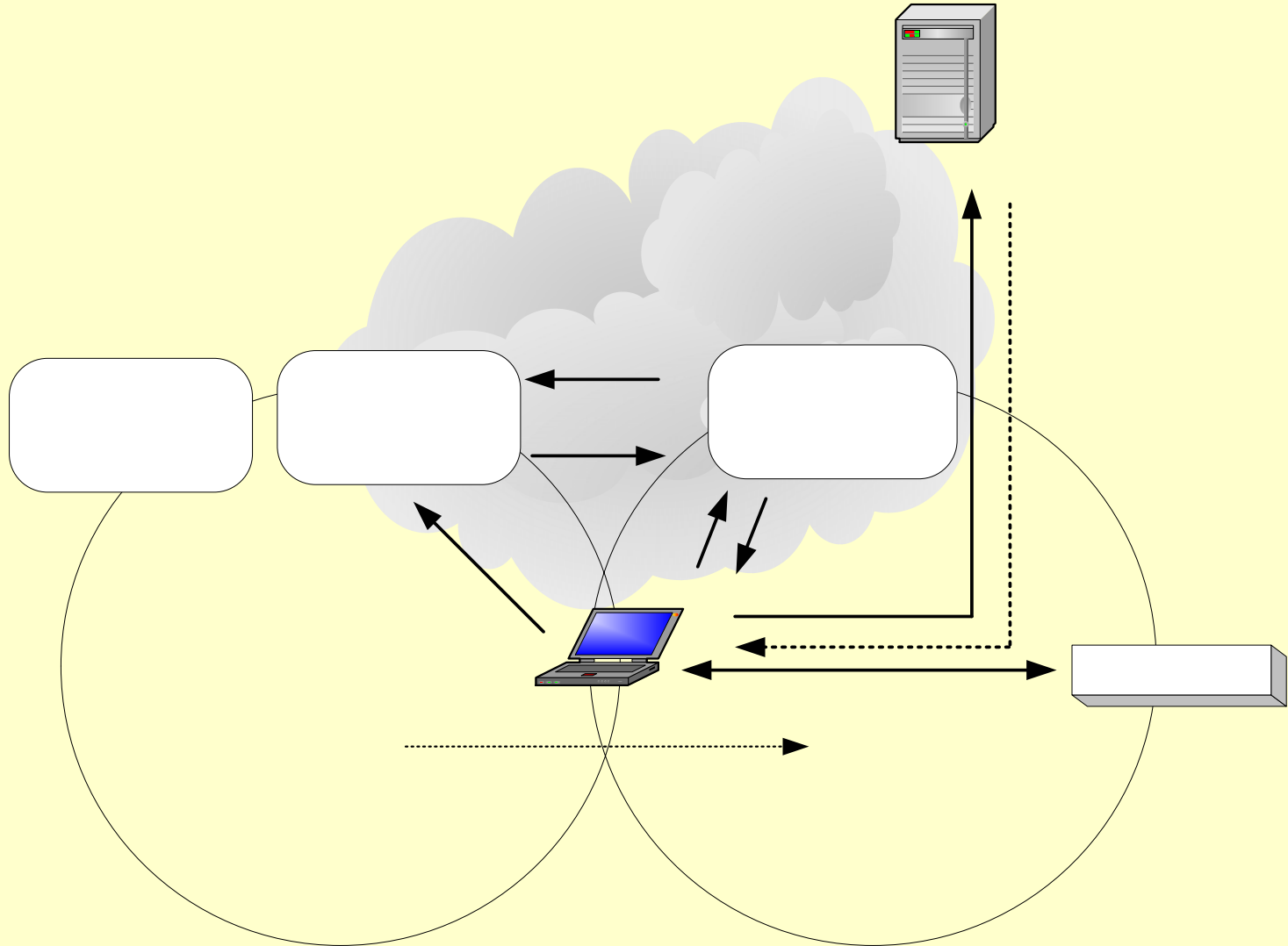
Registration in MIP+SIP

➲ The registration process in MIP

- To inform a home agent of a mobile node's new foreign network IP address and update the binding information between the home address of mobile node and its current care-of address
- This allows TCP connections, and non-SIP initiated UDP streams, to be maintained after movement.

➲ The purpose of SIP session re-establishment

- To inform correspondent nodes (i.e., SIP UACs), with established SIP sessions, of a mobile node's new current location IP address
- This allows CNs to redirect established media streams and signaling sessions directly to a MN's current IP address.

# Integrated Home Agents and SIP Registrars

➲ Our integrated mobility agents maintain two types of bindings

■ user address binding : the mapping between user-level SIP identifiers and a temporary IP address of a node

■ IP address binding : the binding between a permanent IP address identifying a node and its temporary care-of address

The mobility binding table

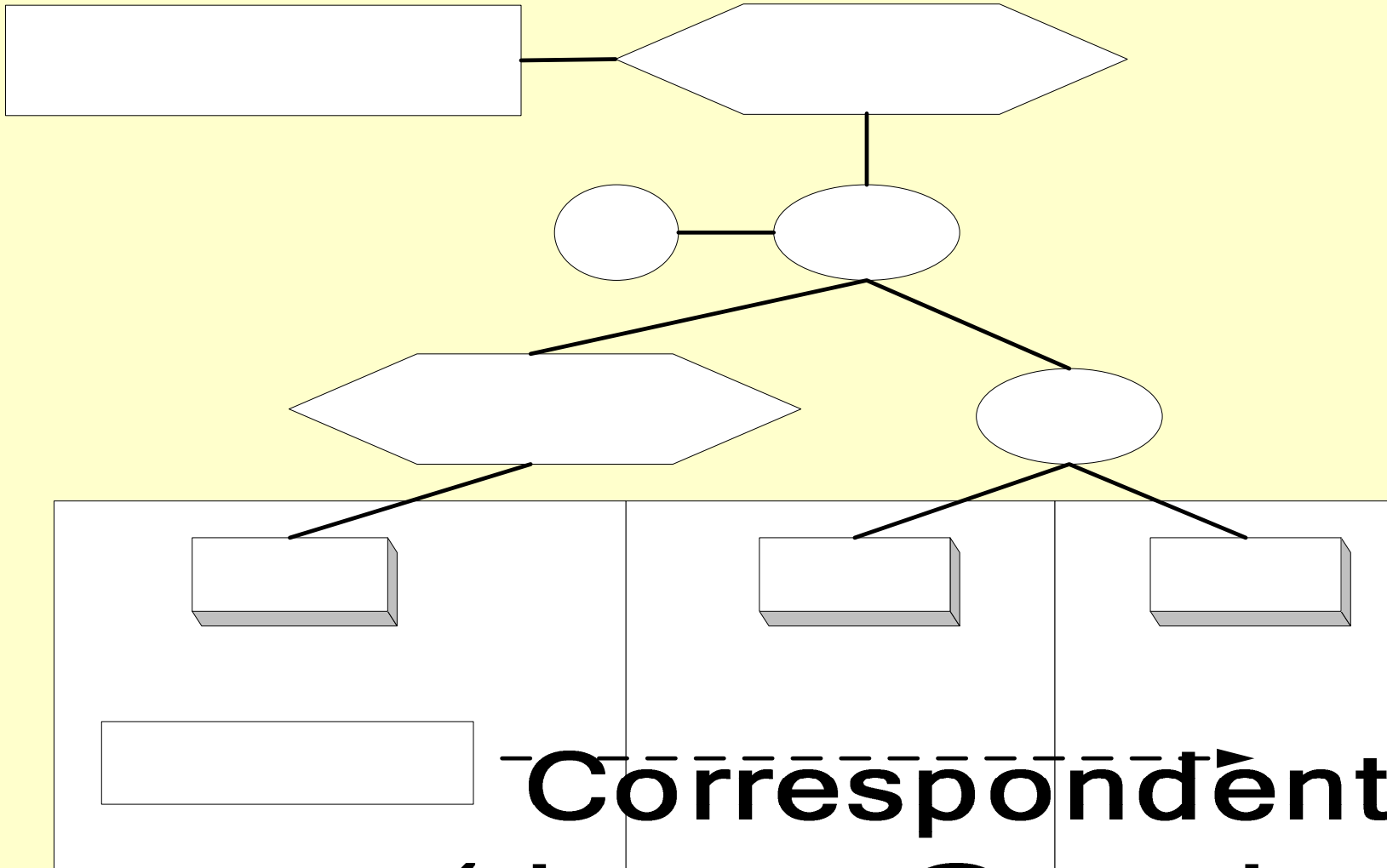|					

- ⮞ Home Address: mobile node's permanent IP address
- ⮞ Current Location: its current assigned mobile IP address (co-located care of address)
- ⮞ UserURI: mobile user's SIP address
- ⮞ ContactURI: mobile user's Contact URI
- ⮞ CoA: care-of address
- ⮞ Lifetime: validated registration lifetime
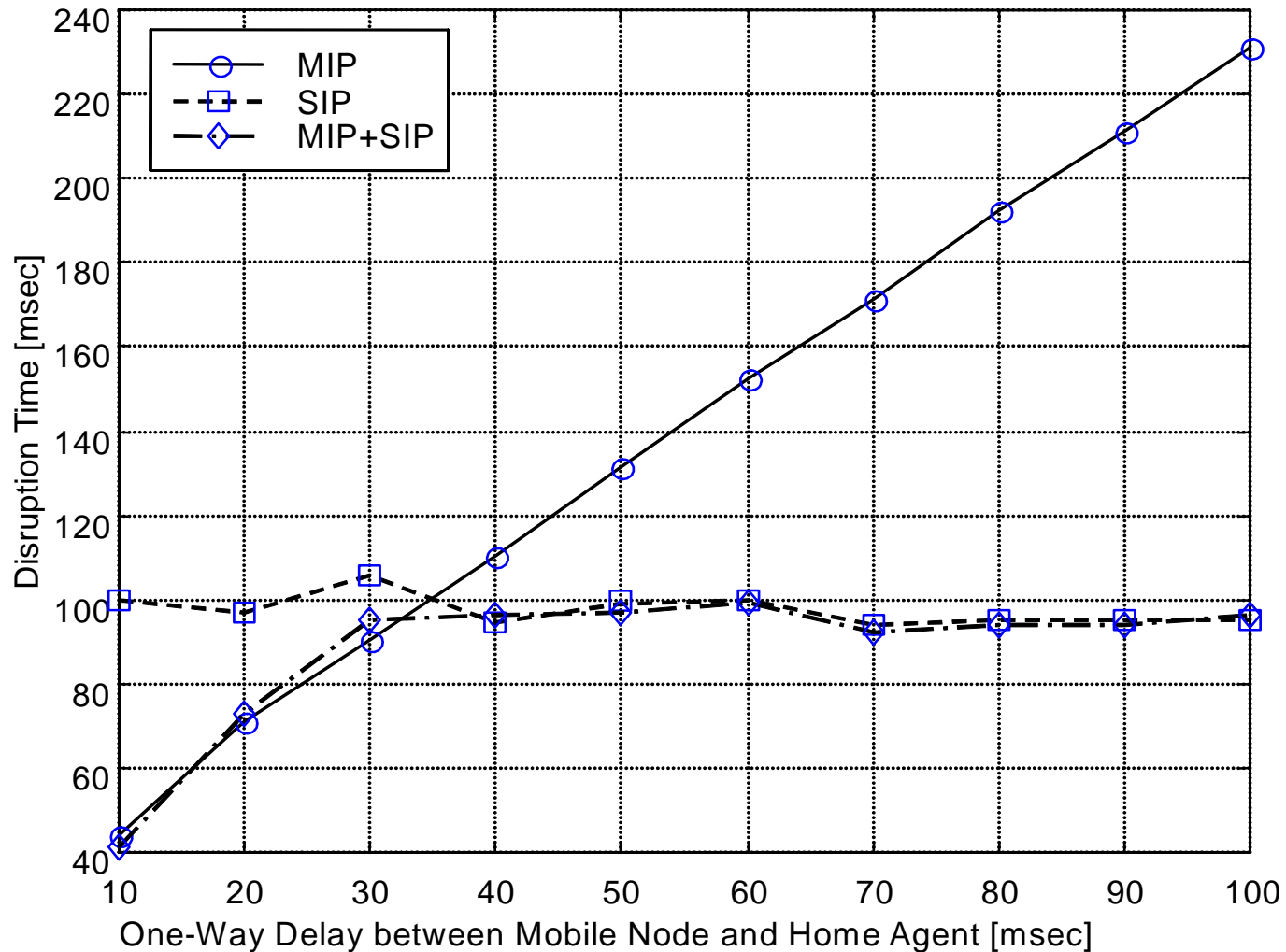
Message Flow for MIP+SIP
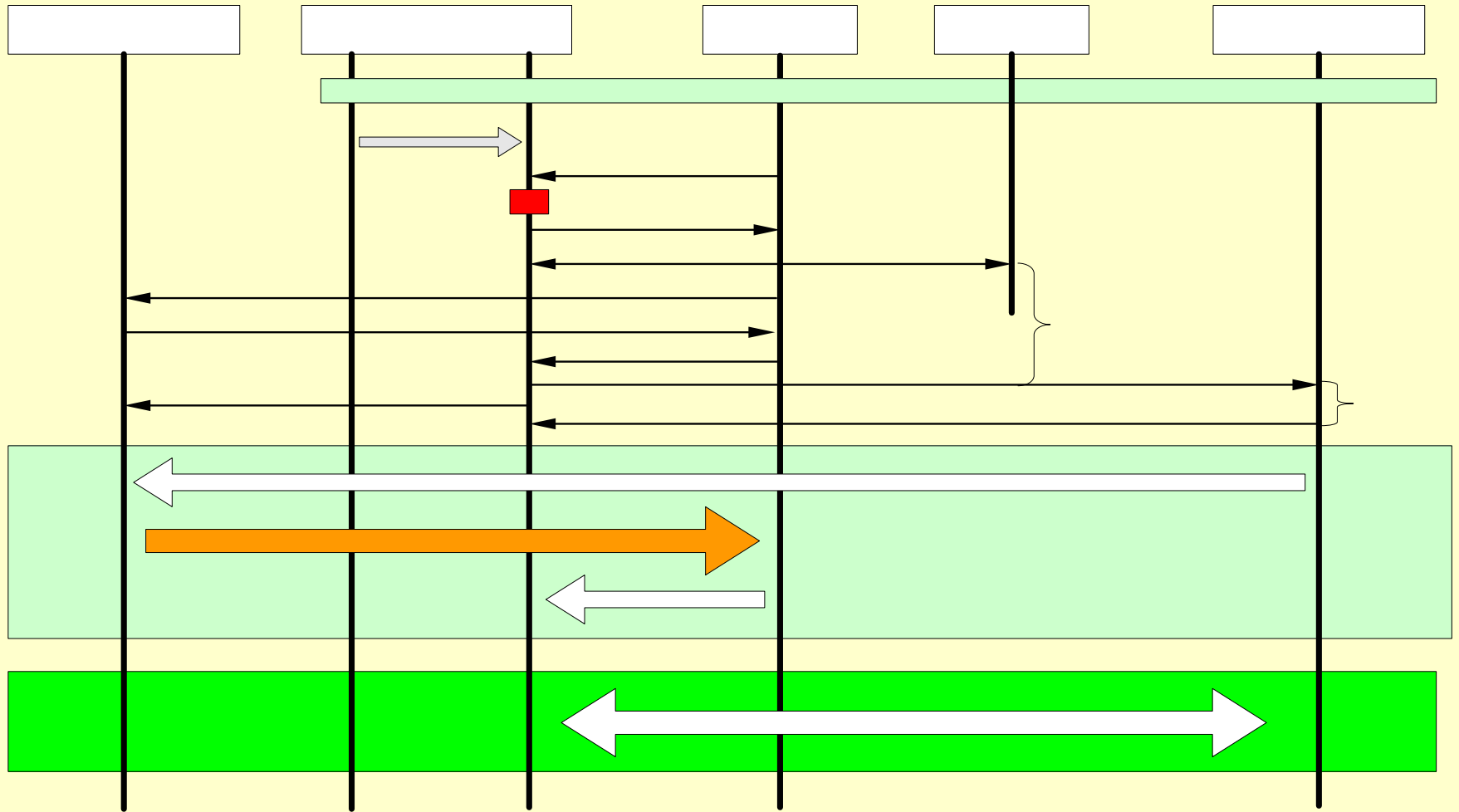
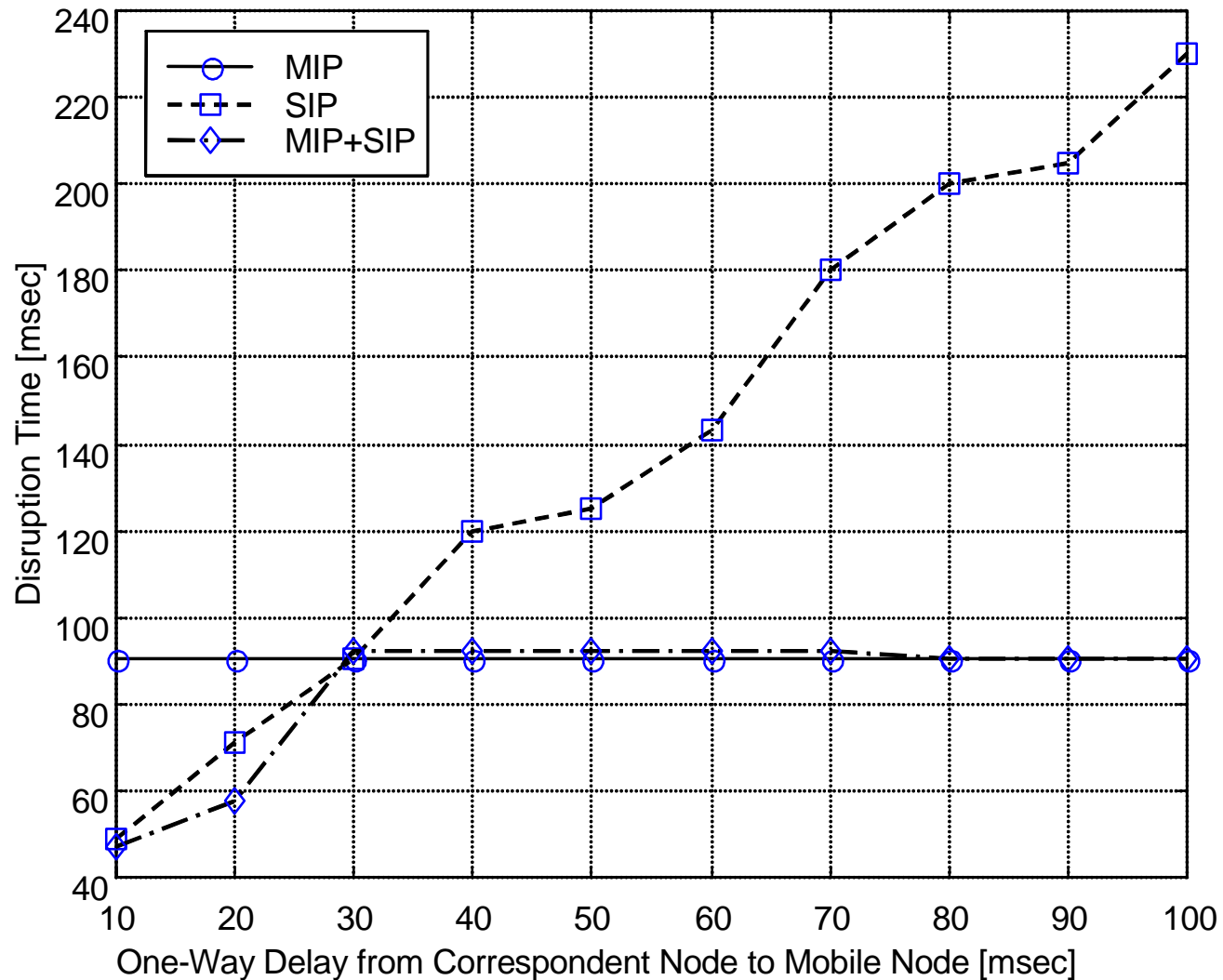**Home Agent**

Simulation Model

Correspondent N
(dougm@antd.nist.

Simulation Result[1]

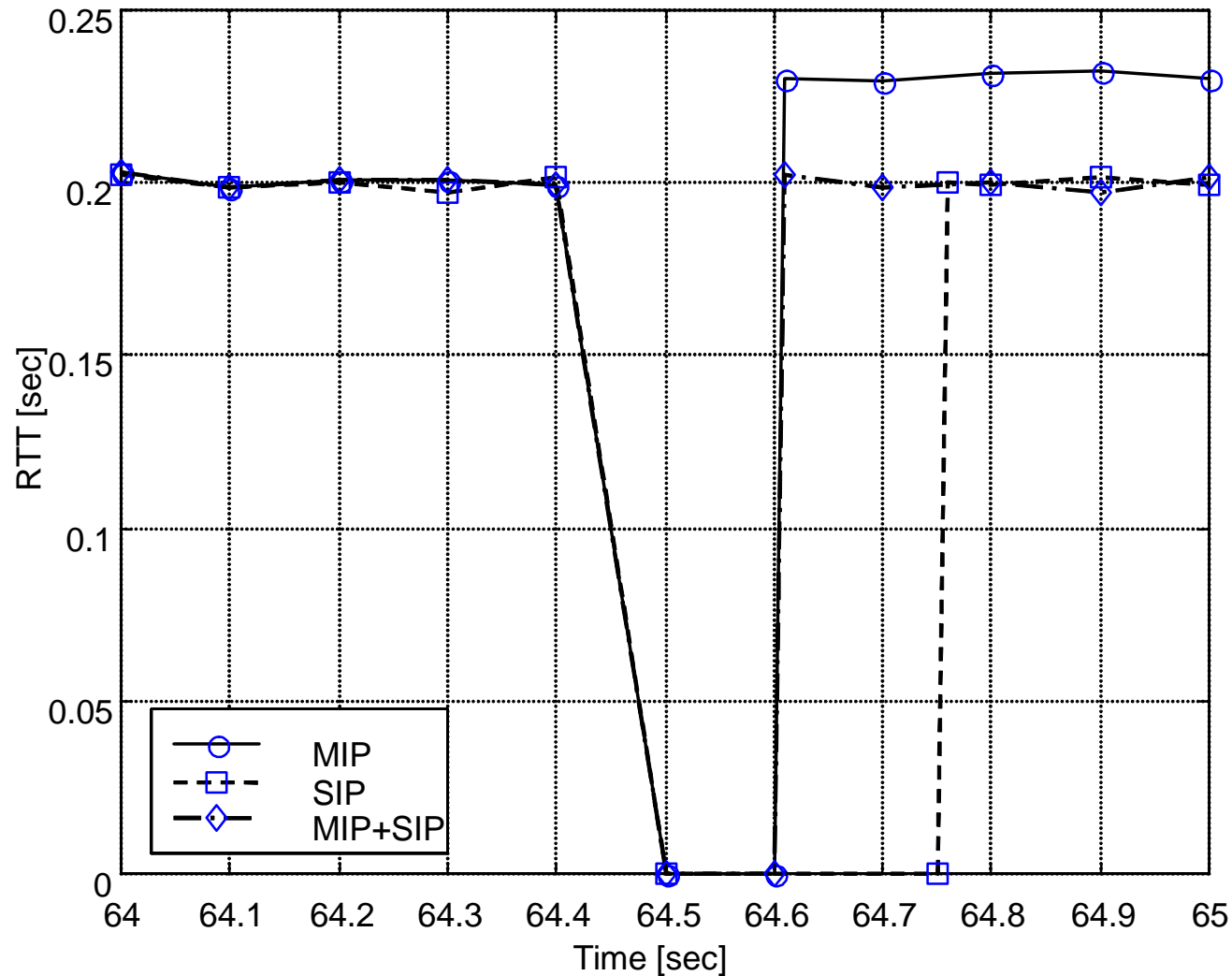## Disruption Time vs. Delay between MN and HA

Simulation Result[2]
Disruption Time vs. Delay between MN and CN

Simulation Result[3]
Disruption Time vs. Delay between MN and CN

Considerations

- We proposed an efficient approach to dealing with handoff in mobile, SIP-based, VoIP services
    - the proposed approach uses integrated procedures of both mobile IP and SIP-mobility to achieve better performance than either approach used in isolation
- Advantages
    - reduce packet loss and handoff latency by mutually compensating for mobile IP and SIP-mobility shortcomings
    - reduce signaling overhead since MIP and SIP registrations are combined for subsequent refreshes
- Future works
    - In future work we intend to further study our integrated mobility management approach and to compare its behavior against MIP with route optimization enhancements, MIPv6, and to examine further details of the protocol mechanisms for the integrated mobility agent