

# SIP in Mobile Applications

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VON Europe Spring 2000 (Stockholm)

June 20, 2000

## Overview

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- mobility – more than just wireless terminals
- SIP for mobility
- SIP bake-off

## Mobility in an IP Environment

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**Terminal mobility:** terminal moves between subnets

**Personal mobility:** different terminals, same address

**Service mobility:** keep same services while mobile

## Terminal Mobility

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- domain of IEEE 802.11, 3GPP, mobile IP, ...
- main problems:
  - handover performance
  - handover failure due to lack of resources in new network
  - authentication of redirection

## Personal Mobility

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- switch between PDA, cell phone, PC, Ethernet phone, Internet appliance, ...
- several “generic” addresses, one person/function, many terminals
- e.g., `tel:2129397042`, `hgs@cs.columbia.edu`,  
`schulzrinne@yahoo.com` or `support@acme.com`
- SIP is designed for that – proxying and redirection does translation
- but: need mapping mechanisms to recognize registrations as belonging to the same person
- some possible solutions:
  - dip into LDAP personnel database or `/etc/passwd` to match phone number and variations of name (*J.Doe*, *John.Doe*, *Doe*)
  - need dialing plan to recognize `7042@cs.columbia.edu` and `tel:2129397042` as same

## Service mobility

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Examples:

- speed dial & address book
- media preferences
- special feature buttons (voice mail, do-not-disturb)
- incoming call handling instructions
- buddy lists

→ independent of terminal (including pay phone!), across providers

## Service mobility

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- REGISTER can retrieve configuration information (e.g., speed dial settings, distinctive ringing or voice mail settings)
- but needs to be device-independent
- most such services (e.g., voicemail forwarding, call filtering) should remain on server(s)

Separate issue: how does the payphone (or colleague's phone) recognize you?

- PDA (IR)
- i-button
- fingerprint
- speech recognition, ...

One device, but changing set of owners!

## Service mobility – call handling

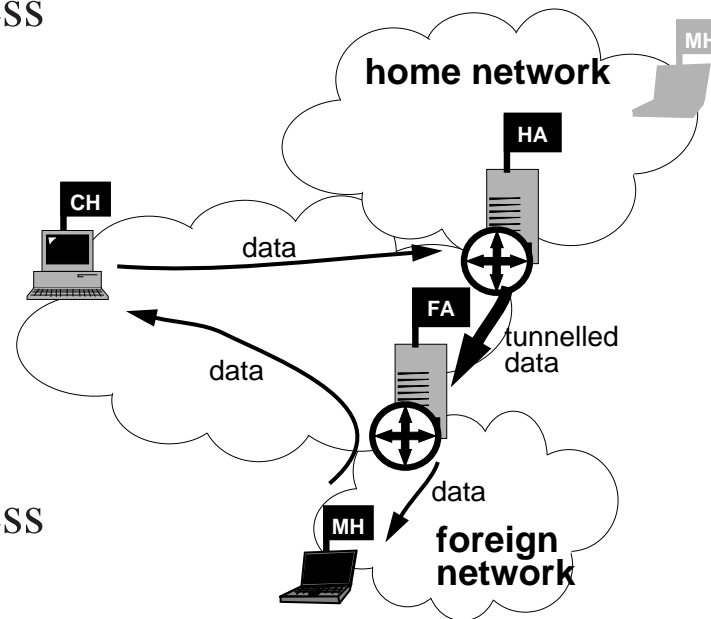
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- need uniform basic service description model → Call Processing Language (CPL)
- CPL = XML-based flow graph for inbound & outbound calls
- CPL for local call handling
- update CPL from terminal: add telemarketer to block list
- harder: synchronize CPL changes across multiple providers
- one possibility: REGISTER updates information, but device needs to know that it has multiple identities
- merging of call logs



## Terminal Mobility – Details

- move to new network  $\Rightarrow$  IP address changes (DHCP)
- mobile IP hides address changes
- but: little deployment
- encapsulation overhead
- dog-legged routing
- may not work with IP address filtering



- MH** mobile host
- CH** correspondent host
- HA** router with home agent functionality
- FA** router with foreign agent functionality

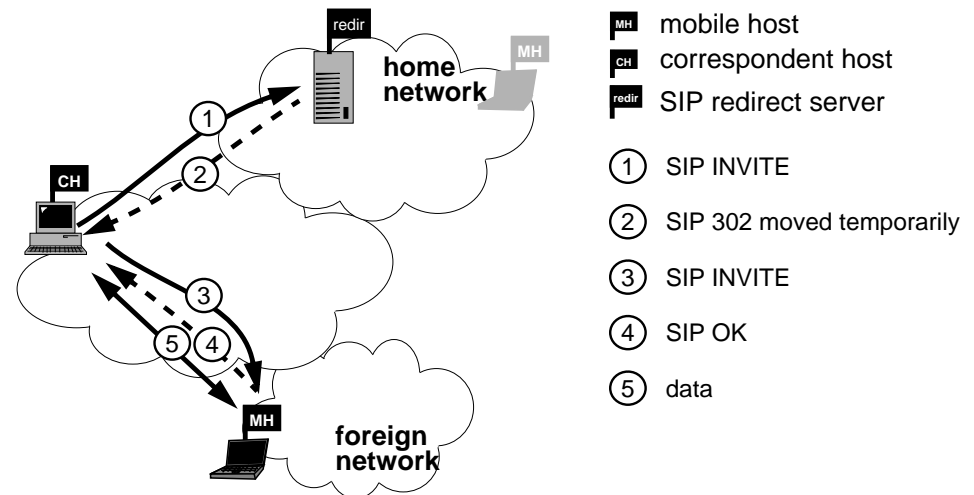
## SIP mobility overview

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- pre-call mobility  $\Rightarrow$  SIP proxy, redirect
- mid-call mobility  $\Rightarrow$  SIP re-INVITE, RTP
- recovery from disconnection

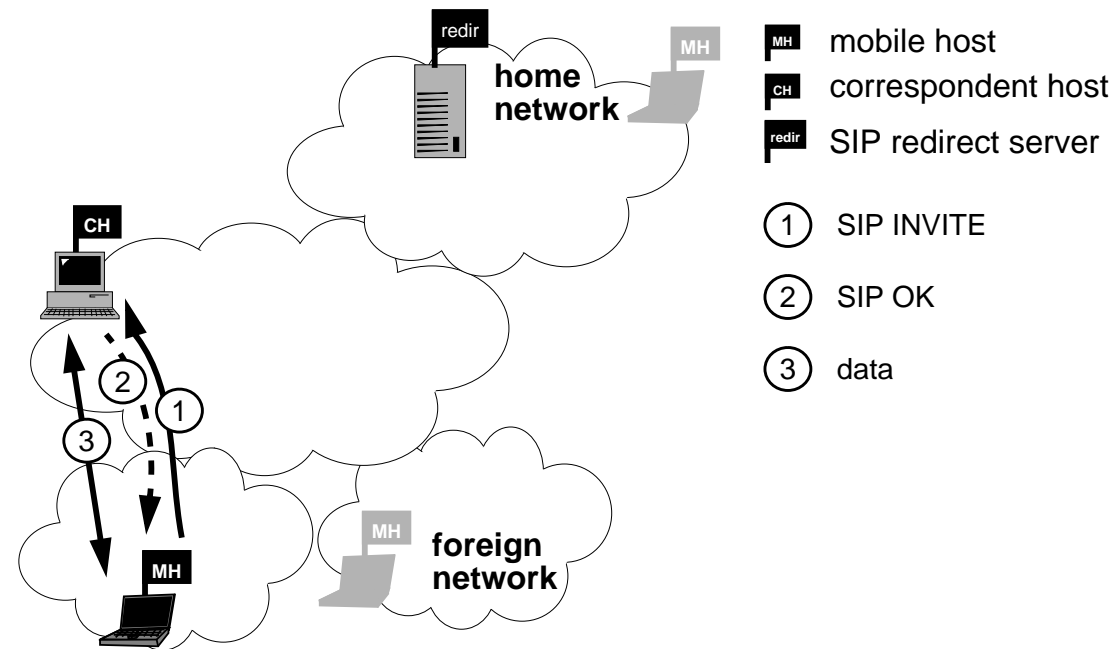
## SIP mobility: pre-call

- MH acquires IP address via DHCP
- optional: MH finds SIP server via multicast REGISTER
- MH updates home SIP server
- optimization: hierarchical LR (later)



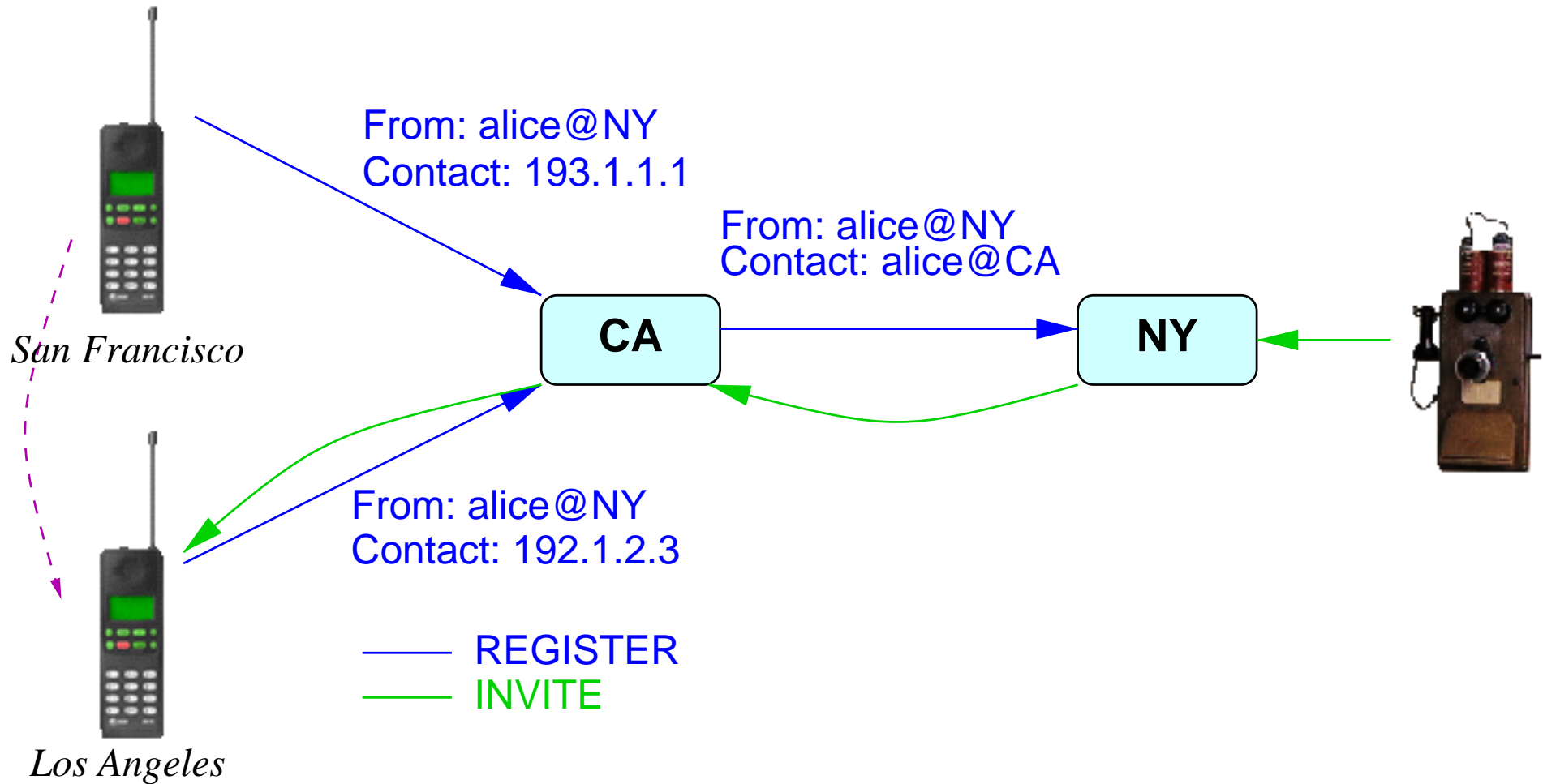
## SIP mobility: mid-call

- MH→CH: new INVITE, with Contact and updated SDP
- re-registers with home registrar



## SIP mobility: multi-stage registration

Don't want to bother home registrar with each move



## SIP and mobility: issues

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- doesn't work for TCP applications – solutions:
  - punt: “don't walk while telnet'ing”
  - application-layer awareness: restart web, email, ftp transfer – need for deep fade anyway...
  - NAT-style boxes controlled by SIP (see Telcordia ITSUMO project)
- but: works nicely for “vertical handoff” between different technologies - e.g., transfer call from mobile handset to office videophone when arriving at work

## Conclusion

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- mobility is more than just wireless handsets
- terminal, personal and service mobility
- SIP enables all three, but likely to be hybrid solutions

## For more information...

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**SIP:** <http://www.cs.columbia.edu/sip>

**RTP:** <http://www.cs.columbia.edu/~hgs/rtp>

**Papers:** <http://www.cs.columbia.edu/IRT>