

CS 268: Mobility

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Mobility Motivation and Problem

- See wireless motivation
- Network Layer mobility
 - Movement = IP address change
- Problem:
 - Location
 - I take my cell phone to London
 - How do people reach me?
 - Migration
 - I walk between base stations while talking on my cell phone
 - I download or web surf while riding in car or public transit
 - How to maintain flow?

Solutions

- Mobile IP (v4 and v6)
- TCP Migrate
- Multicast

Mobile IP

- Use indirection to deal with location and migration
- Point of indirection: Home Agent (HA)
 - Resides in Mobile Host's (MH) home network
 - Uses MH's home IP address
 - As MH moves, it sends its current IP address to HA
- Correspondent Host (CH) contacts MH through HA
- HA tunnels packets to MH using encapsulation
- MH sends packets back to CH
 - tunnels packets back to HA (bi-directional tunneling)
 - sends directly to CH (triangle routing)

Mobile IP Properties

- Triangle routing
 - increases latency and consumes bandwidth
- Bidirectional tunneling
 - increases latency and consumes bandwidth even more
- HA is single point of failure
- Preserves location privacy
- CH does not have to be modified

Mobile IP Route Optimization

- CH uses HA to contact MH initially
- MH sends its location directly back to CH
- CH and MH communicate directly
- Lose location privacy
- CH must be modified

TCP Migrate

- Location: uses dynamic DNS updates
 - when MH moves to new IP address, it updates its home DNS server with new hostname to IP address mapping
- Migration:
 - when MH moves, it sends update to CH
- No location privacy
- Only works for TCP
- CH and MH need new TCP implementation
- No new infrastructure

Other solutions

- Multicast
 - Mobile host uses multicast address as its home address
 - Requires inter-domain multicast
- Network specific mobility schemes
 - Cellular phones, 802.11b
 - Cannot handle mobility across networks (e.g. move laptop from cell phone to 802.11b) or between same network type in different domains (e.g. laptop from Soda Hall 802.11b to campus 802.11b)
- Other mobility models
 - terminal/personal mobility:
 - e.g. accessing email through IMAP from different computers
 - session mobility:
 - e.g. talking on cell phone, transfer call in progress to office phone

Conclusion

- Not that important today
 - few portable, wireless IP telephony devices
 - cell phones have their own network-specific mobility schemes
 - IP-based wireless networks are not ubiquitous enough to be seamless
 - PDA (e.g. palm pilot) are too weak to do handle long-lived flows
- Future
 - cellular networks will become IP-based, need IP mobility scheme
 - PDA are becoming more powerful