CSC2209
Computer Networks

Mobility

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Reminder

- No class next week!
  - Next class on October 31st (Tuesday)

Mobility

- Do we care?

Mobility

- Do we care?
  - In 10 years, a $500 PDA will have a 20x faster CPU and a 30x bigger hard disk than your desktop [Keshav' 05]
  - 1.4 billion cell-phones vs. 600 million PCs (in 2003)

- Internet is changing
  - Old user: sitting in front of well-provisioned, always-on, bandwidth-rich desktop
  - New user: on the run, multiple, power-constrained, sparse connectivity devices

The Mobility Problem

- Internet initially designed to assume hosts are static
- What breaks on the Internet if hosts are mobile?

The Mobility Problem

- Internet initially designed to assume hosts are static
- What breaks on the Internet if hosts are mobile?
  - Routing
  - Many assumptions under hierarchical delegation of IPs

Mobile IP Approach

- Mobile host has two addresses:
- Home address:
  - Never changes, uniquely identifies the host
  - In “home network”
  - Corresponding host addresses all packets to home address
- Care-of address:
  - Changes, perhaps frequently
  - In “foreign network”
  - Related to current location (IP routing gets it to the right place)

Mobile IP Issues

- Lots of pieces under the cover
  - Discovering agents
  - Registering addresses with agents
  - Authentication
  - Tunneling
  - Performance
- Key problems
  - Requires ubiquitous changes to network layer implementations
  - Unclear which apps need network layer transparency

Revisiting Motivation

- Simple solution to mobility
  - Boot up to new network
  - Use DHCP server to get new IP address
- Pros:
  - Simple, not much to deploy
- Cons:

Revisiting Motivation

- Simple solution to mobility
  - Boot up to new network
  - Use DHCP server to get new IP address
- Pros:
  - Simple, not much to deploy
- Cons:
  - IP address keeps changing
  - How will others find out about new address
  - Solution: use DNS names as identifiers

E2E Host Mobility

- Three components:
  - Addressing
  - Locating mobile hosts
  - Connection migration

Addressing

- Mobile hosts obtain a local IP address
  - No home agent, foreign agent
  - No tunneling
  - Communication occurs directly
- Problem: how does correspondent learns about mobile's address
  - Solution: if mobile host initiate connection SYN packet can tell the correspondent the correct IP address
  - How about incoming connections?

Locating Mobiles

- Observation: whenever connections are established, DNS lookup is performed

- Idea: use DNS
  - When mobile obtains new IP address, forces a DNS update
  - Force lookups setting TTL=0
  - Opportunity for a race condition
    - Application-level retries

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Revisiting Motivation

- What are driving apps for mobility?
  - Mobile host is a client for most apps (not a problem)
  - VoIP seems an important app where mobile host might be receiving first
    - However, VoIP has a call setup that does not need to be v. fast
      - Could use slow, robust mechanism (home-agent?) for VoIP
- Seems like the only problem is: connection migration

Connection Migration

- When changing IP, mobile host initiates new connection to correspondent, forces correspondent to migrate
- Uses token to show that connections are related

- Issues:

Connection Migration

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- Uses token to show that connections are related

- Issues:
  - What if both hosts move?
  - What if becomes disconnected for 30 seconds? 15 minutes?
  - Lots of details that need to get right

Taking a step-back

- Although not simple, solutions for supporting mobility exist
- Why hasn’t this take off?

Taking a step-back

- Although not simple, solutions for supporting mobility exist
- Why hasn't this take off?
  - Two kinds of Wi-Fi "providers"
    - Home, independent users
      - Most networks closed!
    - Hotspot providers
      - Sparse connectivity
      - Billing issues are very important
- Can we build this on campus?