Daedalus Group

Computer Science Division

University of California, Berkeley

Wide-Area Roaming Support

Daedalus Retreat

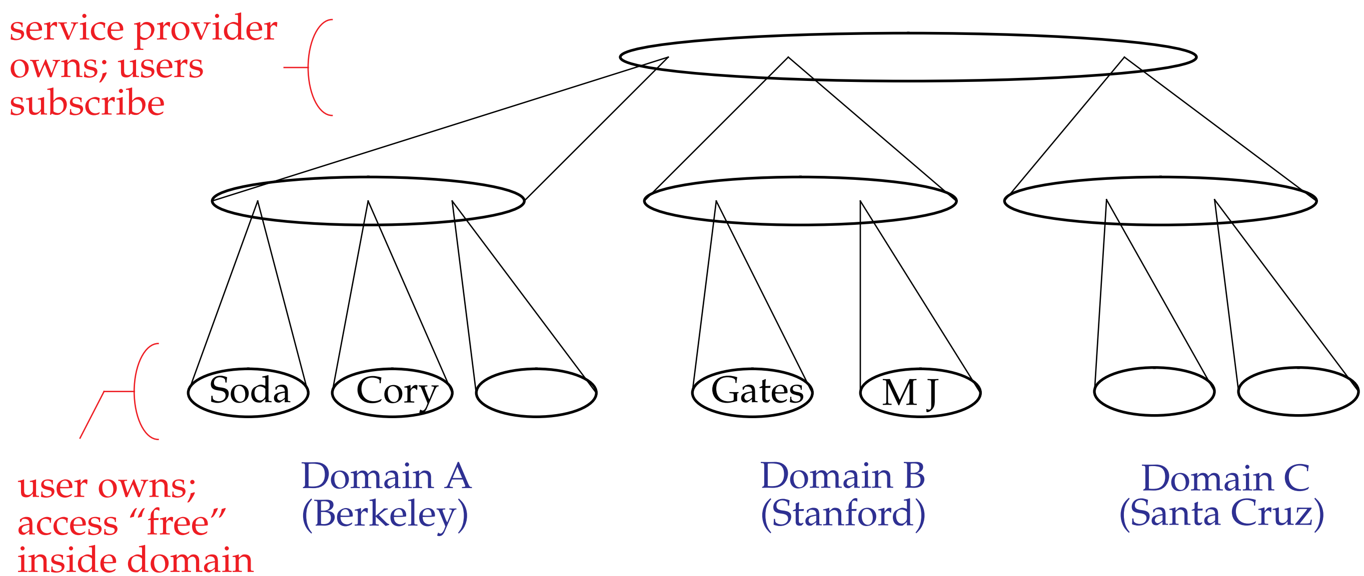
January 7-8, 1996

Todd Hodes, et al.

Motivation

Will Mobile IP be widely adopted?

We expect the world of wireless overlay networking will soon look like the following:



Note the existence of different, potentially cooperating *administrative domains* with independent infrastructures

Motivation, cont.

Leaving one domain for another should not force you to remain in the upper tier.

What is it going to take to allow roamers to access the networks at the bottom of the hierarchy?

→ A full set of services for wide-area roaming support

- Arrangement
- Authentication
- Accounting
- Resource Discovery
- Resource Access
- Resource Allocation

It is more than just a routing problem.

Context

Scale our infrastructure to allow mobile clients to obtain the *best possible* service from any participating administrative domain in a reliable and secure manner.
("Access is the killer app")

Why pay for CDPD when you're standing next to a WaveLAN basestation?

- Make non-local services as easy to use as local services
- Making local services available to guests should be attractive
- Make protocols secure to ensure fairness and accountability

We are assessing feasibility; in the real world, the problem will be getting (lots of) folks to buy into the plan

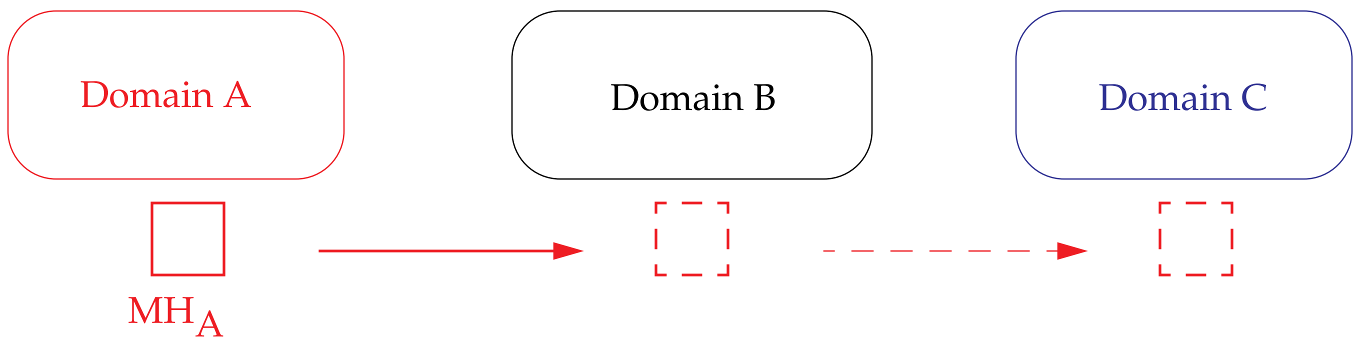
Scenarios

American General walks into NATO Headquarters

Salesperson visits a client site

Visit from Berkeley to Stanford; cooperation agreement and infrastructure in place

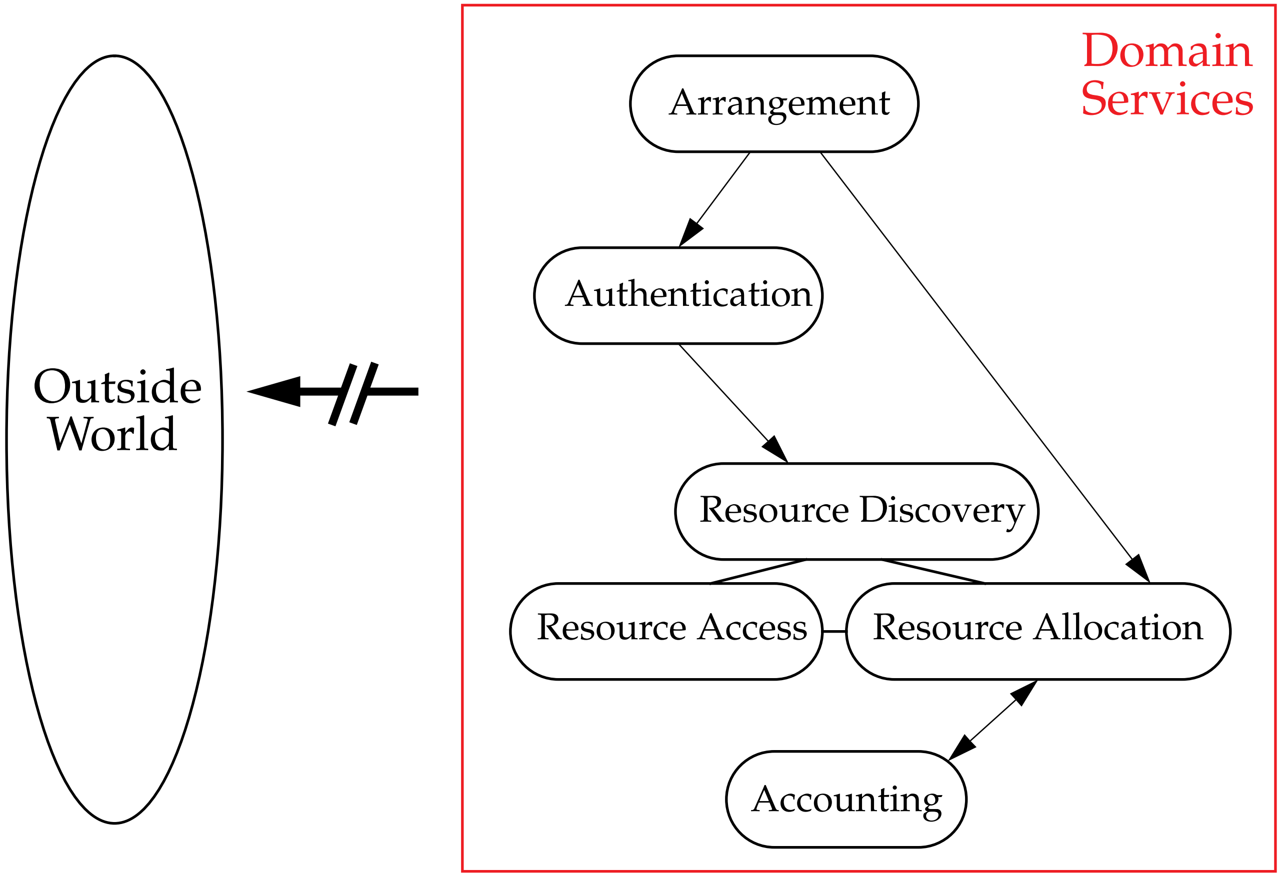
Visit from Berkeley to Naval Postgraduate School; no cooperating infrastructure in place



- Does the infrastructure trust the roamer?
- Does the roamer trust the infrastructure?

Architecture

Each domain should support a full suite of services for supporting both local clients and roamers



Services

Mobility support

- Location-dependent behaviors
  - 411, 911-style services
  - answer "where am I?"

Accounting

- Metering and "billing" services
  - Network usage, CPU time, paper/toner charges

Authentication, Security

- Ticket-based with local caching (e.g., Kerberos)
- Which entities?
  - mobile host, user, basestation
  - service-provider gateways
- Hierarchy and location of the authentication servers?
- Who can see the local to global bindings?
  - Anonymity, Caller ID services
  - Spoofing avoidance

Resource Management

Allow guests (limited) access to networks, CPUs, printers, file servers, etc.

Resource Discovery

- Work by IETF working group, Perkins
- Resource database management, naming are issues

Resource Access

- Wide-area “object name” consistency
  - “global” database, infer missing site-specific data
  - printers, rooms, buildings
  - embedding in applications -- portable, dynamic documents
- Differences in global and local accessibility

Resource Allocation

Policy choices

- Preferred user classes
  - Local users, Privileged Guests, Guests
- Accrued credit
  - Obtain resources based on how often roamers from the current domain roam in your home domain
- Optimizations
  - Keep proxy at boundary where network characteristics change

Mechanisms

- Service Classes
  - Shared: use dynamic fair allocation techniques
  - Guaranteed: have dedicated channel assignments
- Credit Schemes
  - Credit inflation/deflation
  - Overdraft protection
  - Bidding
  - --> demands fault tolerance

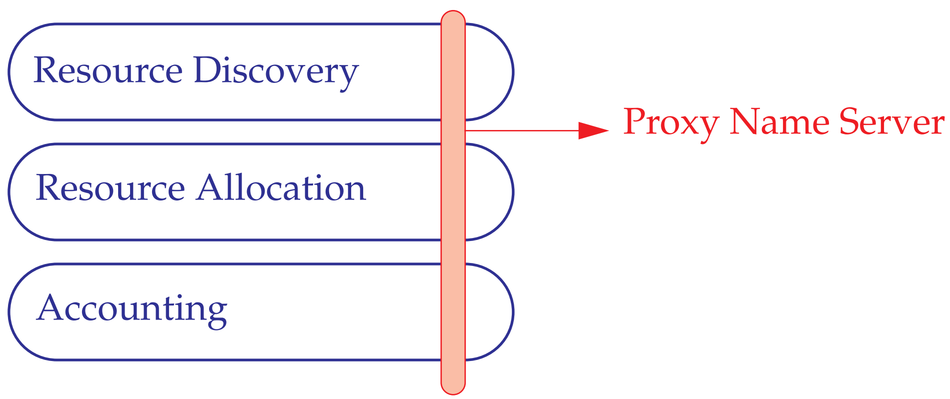
Some Current Work

Link Manager

- distributed load balancing of wireless network links
- support for variety of user classes via QoS requirements
- uses concept of *utility functions* to attempt global optimization

Proxy Name Server

- service for discovery or instantiating of local proxies
- DNS-style global scaling
- some load balancing of CPU and network resources



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Discussion

These are *initial* thoughts on work-in-progress; comments, pointers appreciated

What is missing or extraneous?

Will other administrative domains participate?

Topics:

- Policy decisions
- Setup of roaming agreements
  - bilateral vs. global?
  - authority/management?
  - scale and size?
  - automatic generation of new agreements?
- Credit scheme trade-offs?
- Specifics of how services are
  - geographically dependent?
  - expandable?
- Inevitable metering difference: packets sent vs. packets received