

Using DNS to Support Host Mobility

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Objectives

- Supporting host mobility
 - getting packets to and from hosts as they move
- Properties desired:
 - scalability
 - fault-tolerance
 - transparency
- Questions:
 - can DNS be extended to solve this problem?
 - can appropriate end-host behavior help?

Issues Related to Mobile IP

- HA needs to be physically located on the home subnet
 - active participant in routing
 - single point of failure
- HA is the single registration authority
 - latency of communication
 - scalability
 - difficulty of separating local and global protocols
 - (hierarchical mobility agents may help)
- Route optimization:
 - CH maintains a **binding cache** of MH addresses
 - CHs do not share their binding caches

DNS-based Solution

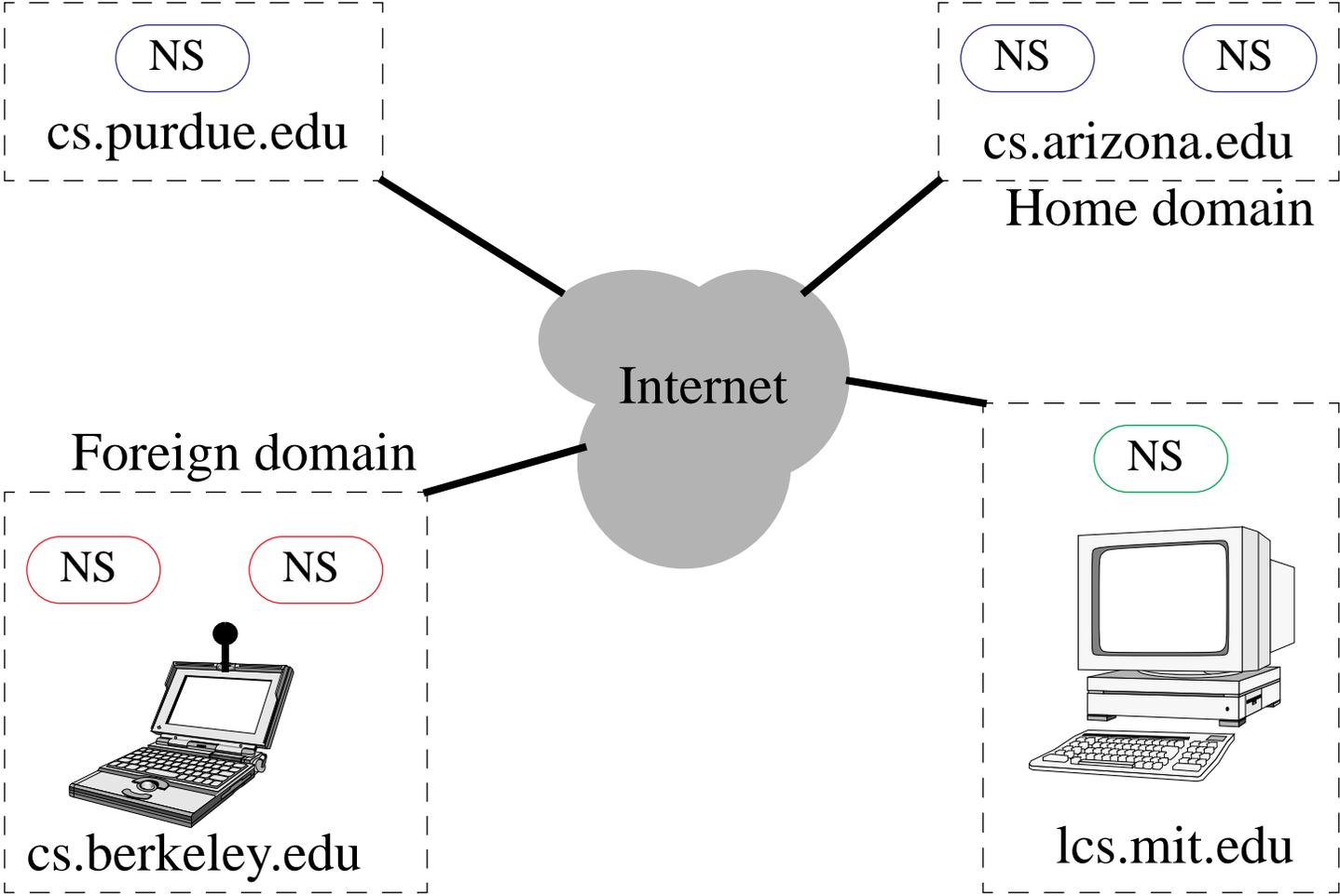
- Our approach:
 - Directory lookup model: enhance DNS to map from MH's name to **current** address
 - DNS is hierarchical, replicated and distributed
⇒ scalable and fault-tolerant

- Basic issues:
 - Locating the MH before initiating a connection
 - Discovering that MH's address has changed between connections (cached address is stale)
 - Handling address changes during a connection

Locating Mobile Hosts

- MH behavior:
 - determines (a subset of) name servers for local domain
 - updates resource records (RRs) **dynamically**
 - informs authoritative name servers for home domain of its current location (only the first time it registers in a foreign domain)
- Home domain name server:
 - adds records to point to servers in MH's local domain
- Name server in CH's domain:
 - does iterative lookup via home domain name servers
 - caches addresses of name servers and MH

Scenario



Handling Address Change

- With no changes to CH
 - appropriately chosen time-to-live (TTL) values
 - larger for name server address, smaller for MH address
 - modulated by mobility pattern
 - local routing support to avoid disruption in traffic
 - similar to forwarding by foreign agents in Mobile IP with route optimization
- With changes to CH
 - explicit error message sent back by router on old subnet forcing an **authoritative** DNS lookup
 - timeouts (such as during SYN exchange for a TCP connection) forcing an authoritative DNS lookup

Address Change During Connections

- TCP/IP model uses end-point addresses to identify connections
 - problem when hosts are mobile
- Need to decouple network and transport addressing
 - extend TCP/UDP headers to include transport-layer identifiers separate from IP addresses
 - applications only use transport-layer addresses
- Alternative solution: fixed multicast address for each MH
 - need scalable multicast routing
- Mobile IP solution: encapsulation/decapsulation

Summary

- Dependence on intermediate agents to do routing impacts fault-tolerance
- Our solution: handle mobility by efficient translation from name to current address with some local routing support
 - DNS with dynamic updates
 - security issues to be resolved
- Applicability to other environments
 - DHCP **reconfigure** operation: address change on-the-fly
 - IP phone: looking up dynamically assigned IP address of callee's computer

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