

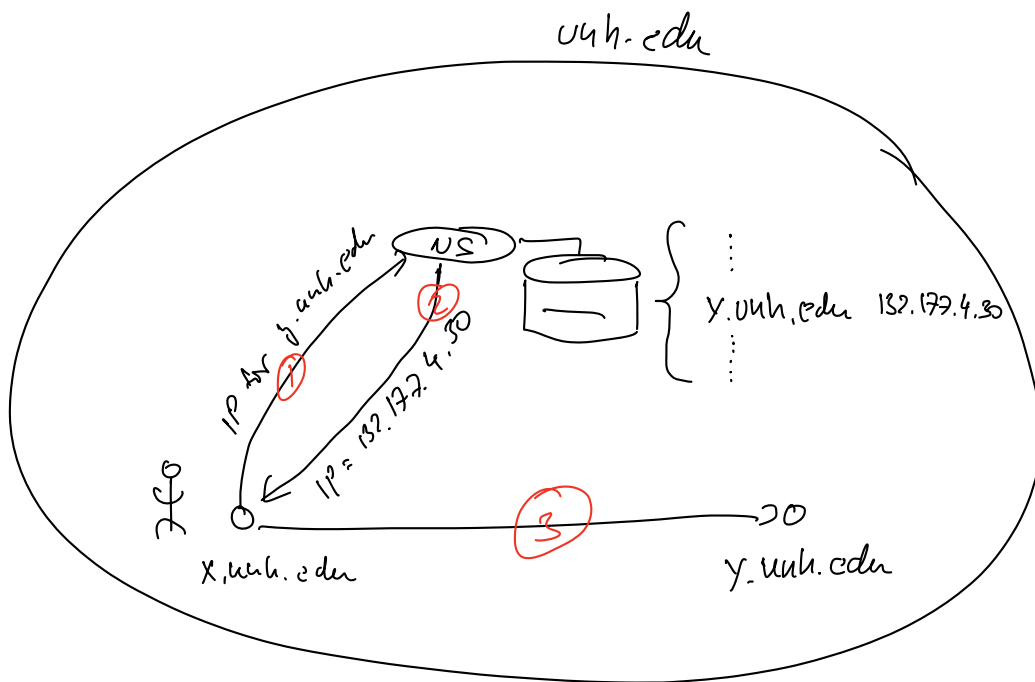
CS 725/825 & IT 725

Lecture 6

Networking Fundamentals

September 23, 2026

LOCAL NAME RESOLUTION

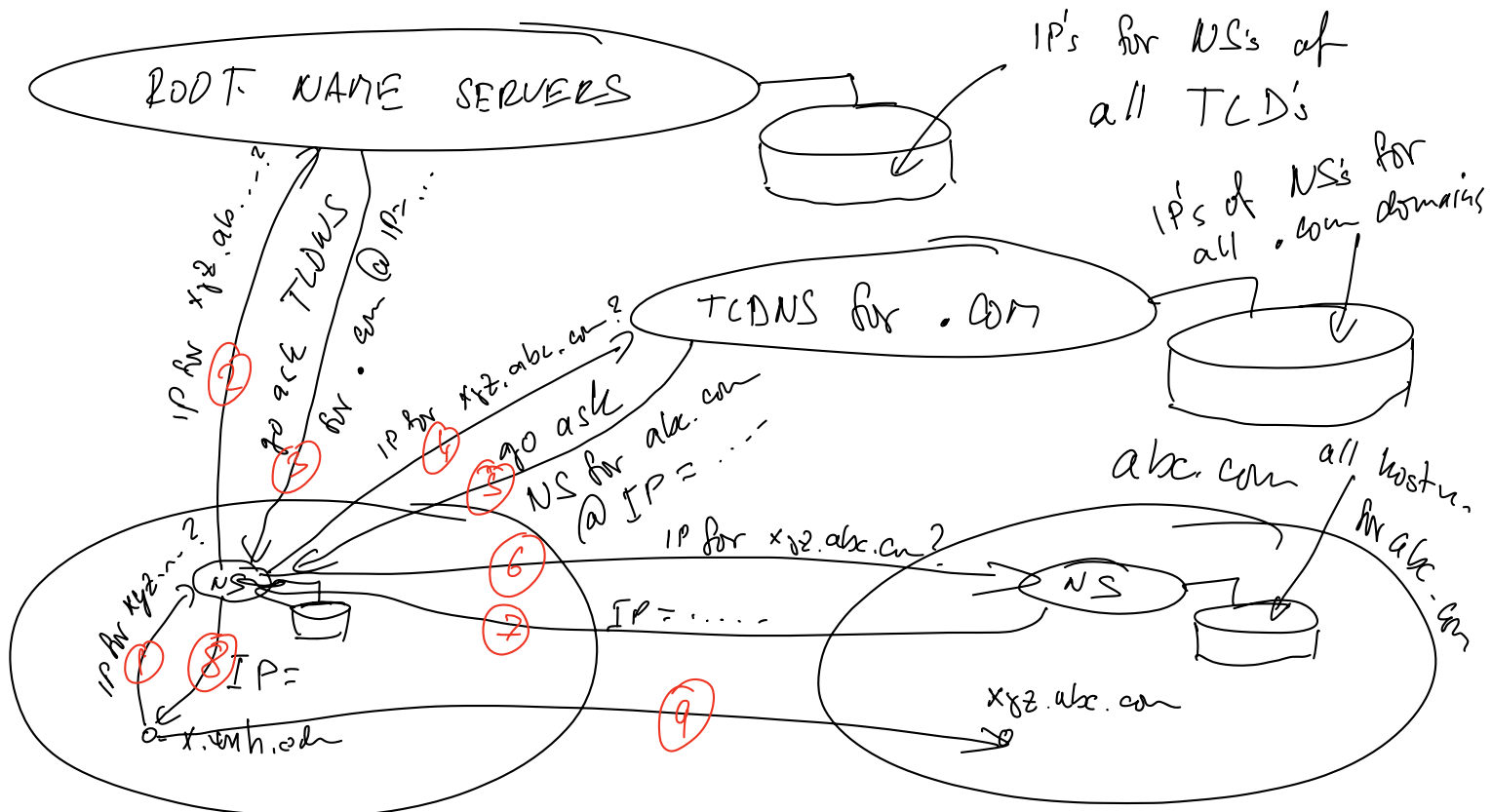


NS - name server

TLD - top level domain

E.g.: `.com` or `.edu`

GLOBAL NAME RESOLUTION



Root Name Servers

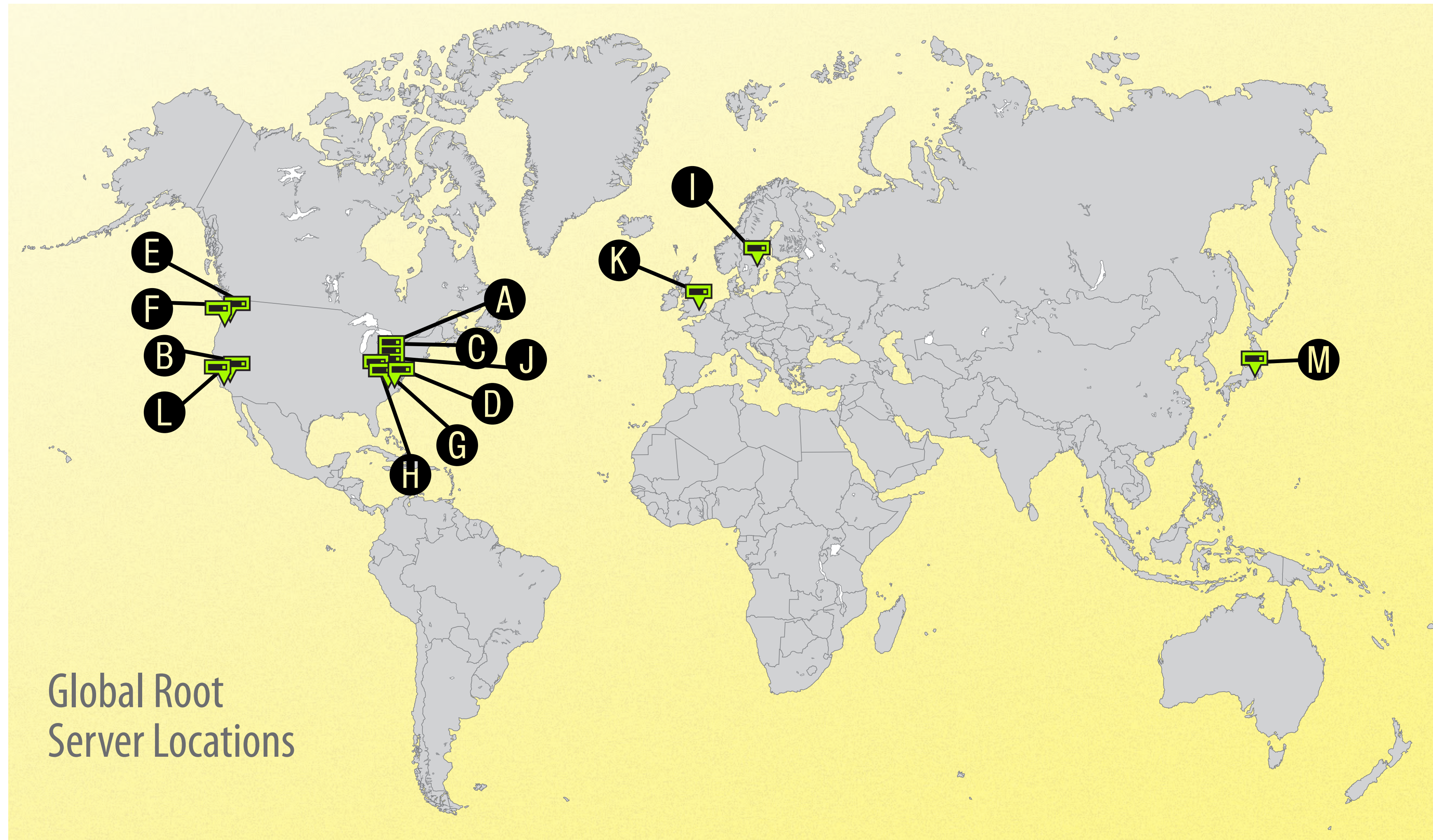


Image source: dyn.com

DNS Records (examples)

A	address record
AAAA	IPv6 address record
CNAME	canonical name record
MX	mail exchange record
NS	name server record
PTR	pointer record
SOA	start of authority record
TXT	text record

► DNS tools: [nslookup](#), [host](#), [dig](#)

DNS considerations

▶ Reliability and resilience

- redundant servers, automatic consistency maintenance

▶ Performance

- DNS lookup has to be completed before the next steps
- “in-house” or outsourced DNS servers

▶ Security

- basic protocol is not authenticated
- recursive servers return cached responses

Public Servers

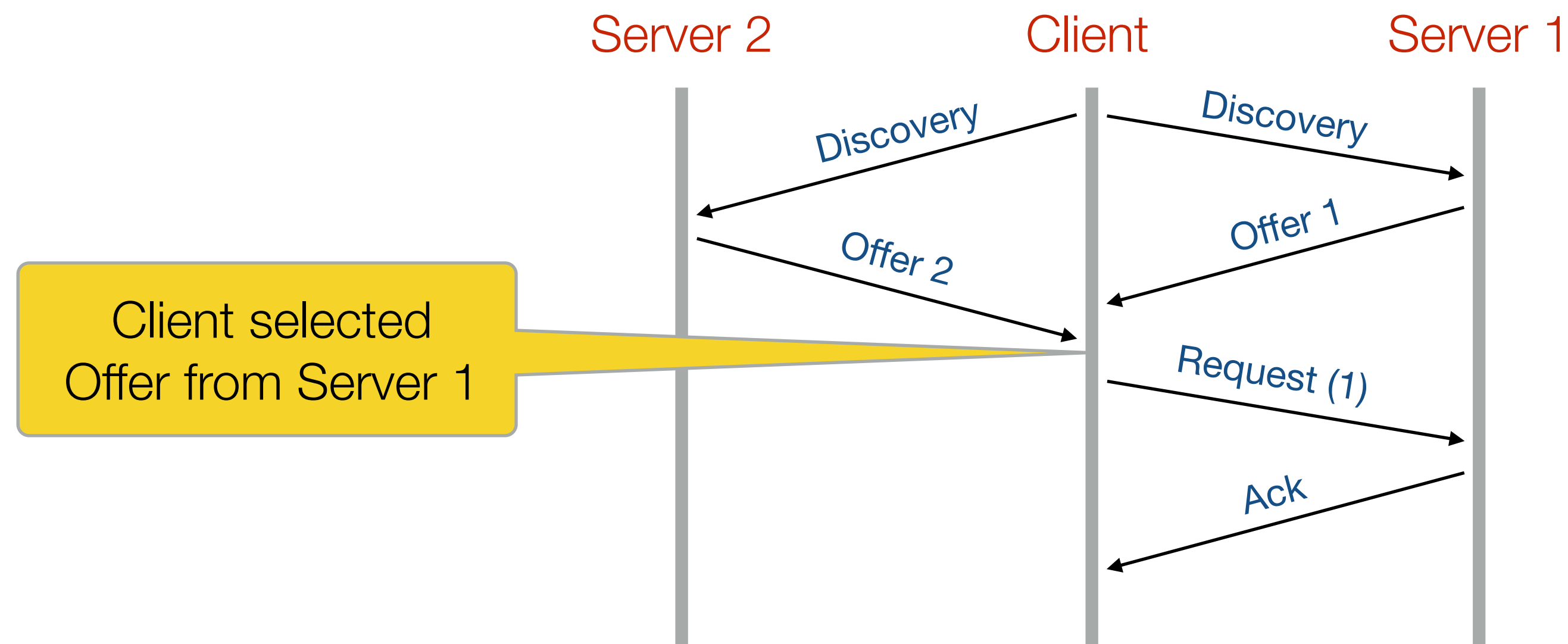
- ▶ Public Recursive Name Servers
 - faster
 - resistant to filtering
 - privacy (?)
- ▶ Examples
 - Google 8.8.8.8 and 8.8.4.4
 - Cloudflare 1.1.1.1 and 1.0.0.1

Google offices near St Pancras railway station in London

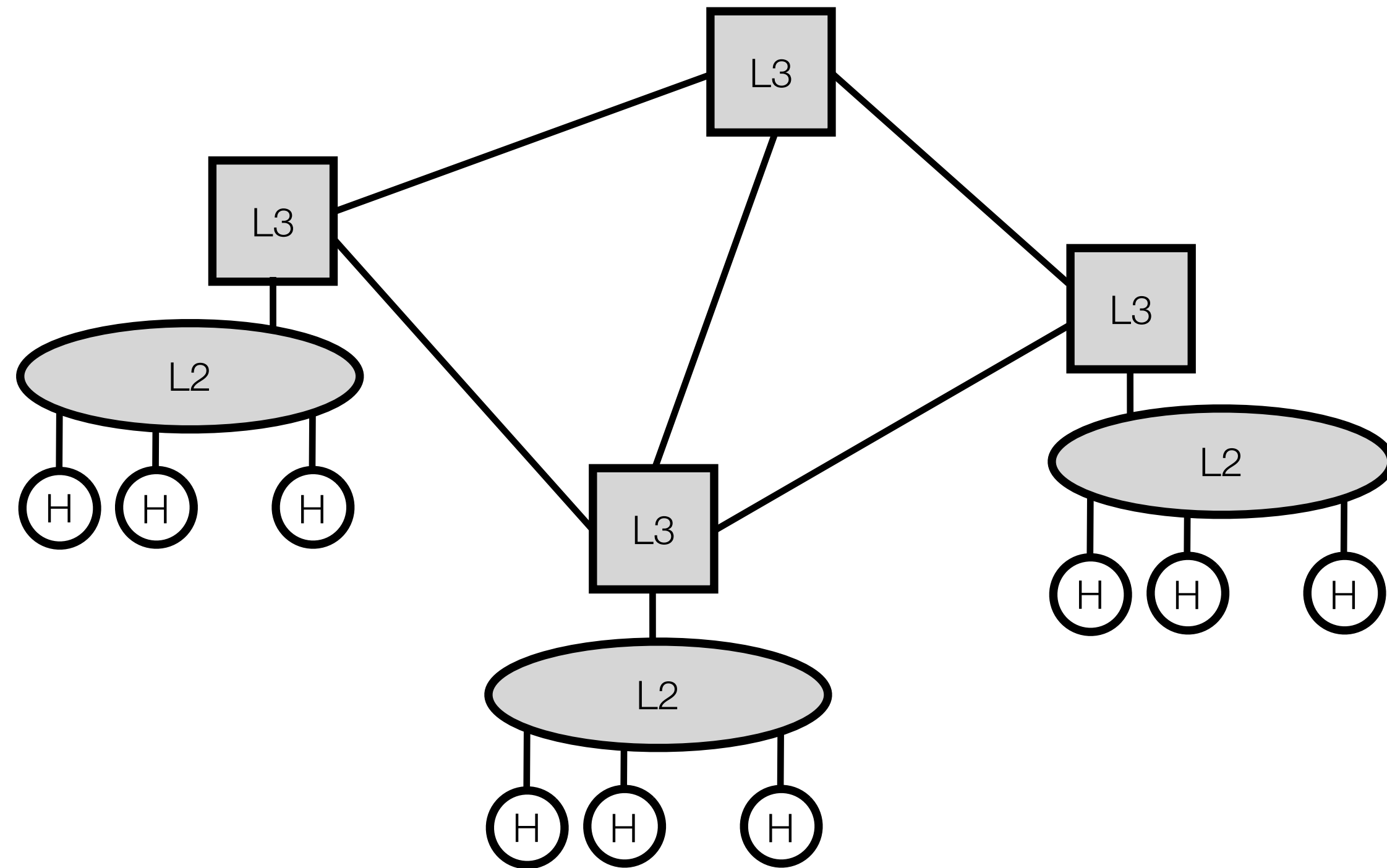


DHCP

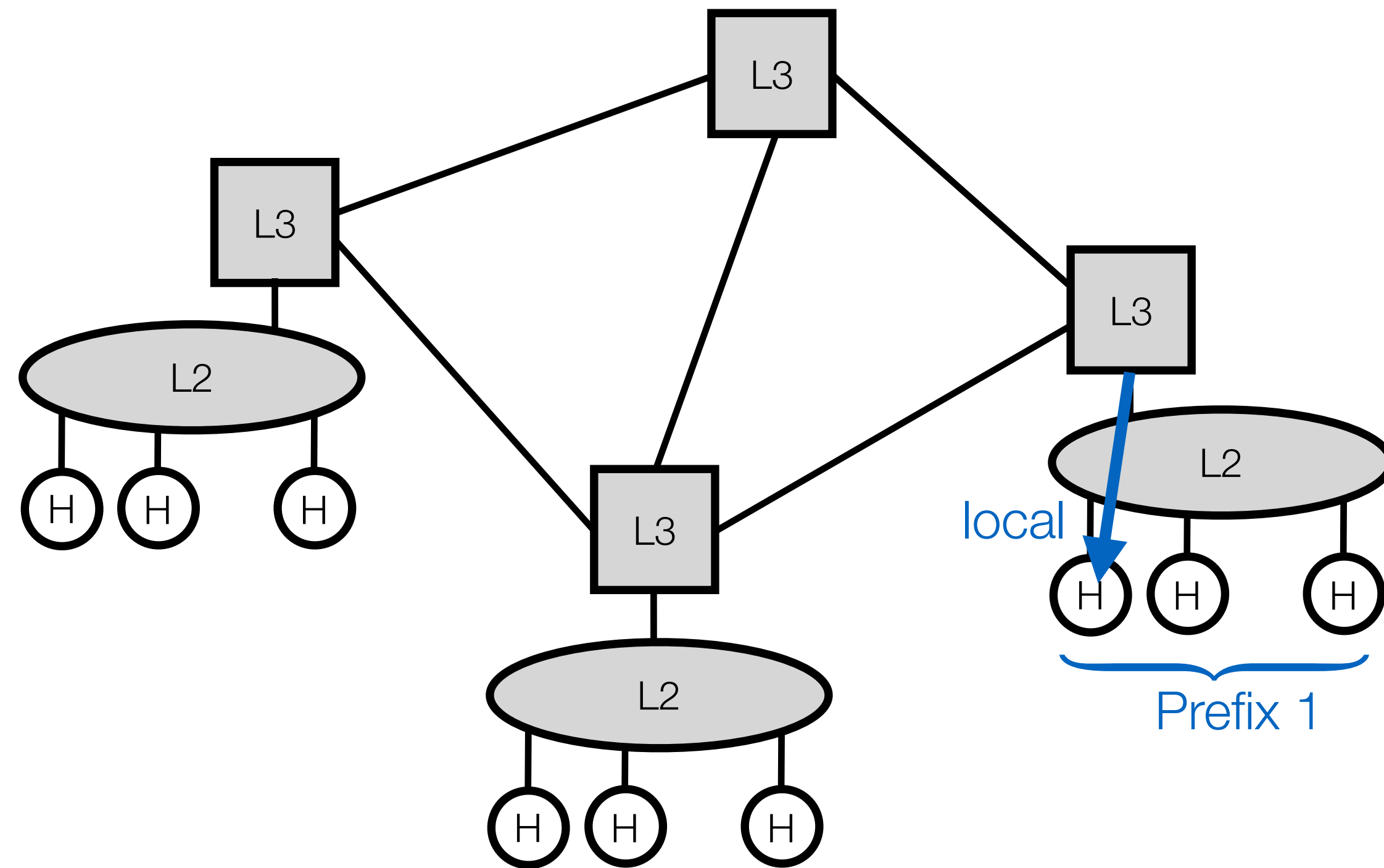
- **Dynamic Host Configuration Protocol**
 - to obtain IP address and other configuration params
 - one or more servers on the same subnet
 - utilizes IP broadcast (255.255.255.255) and UDP



Network Layer Routing

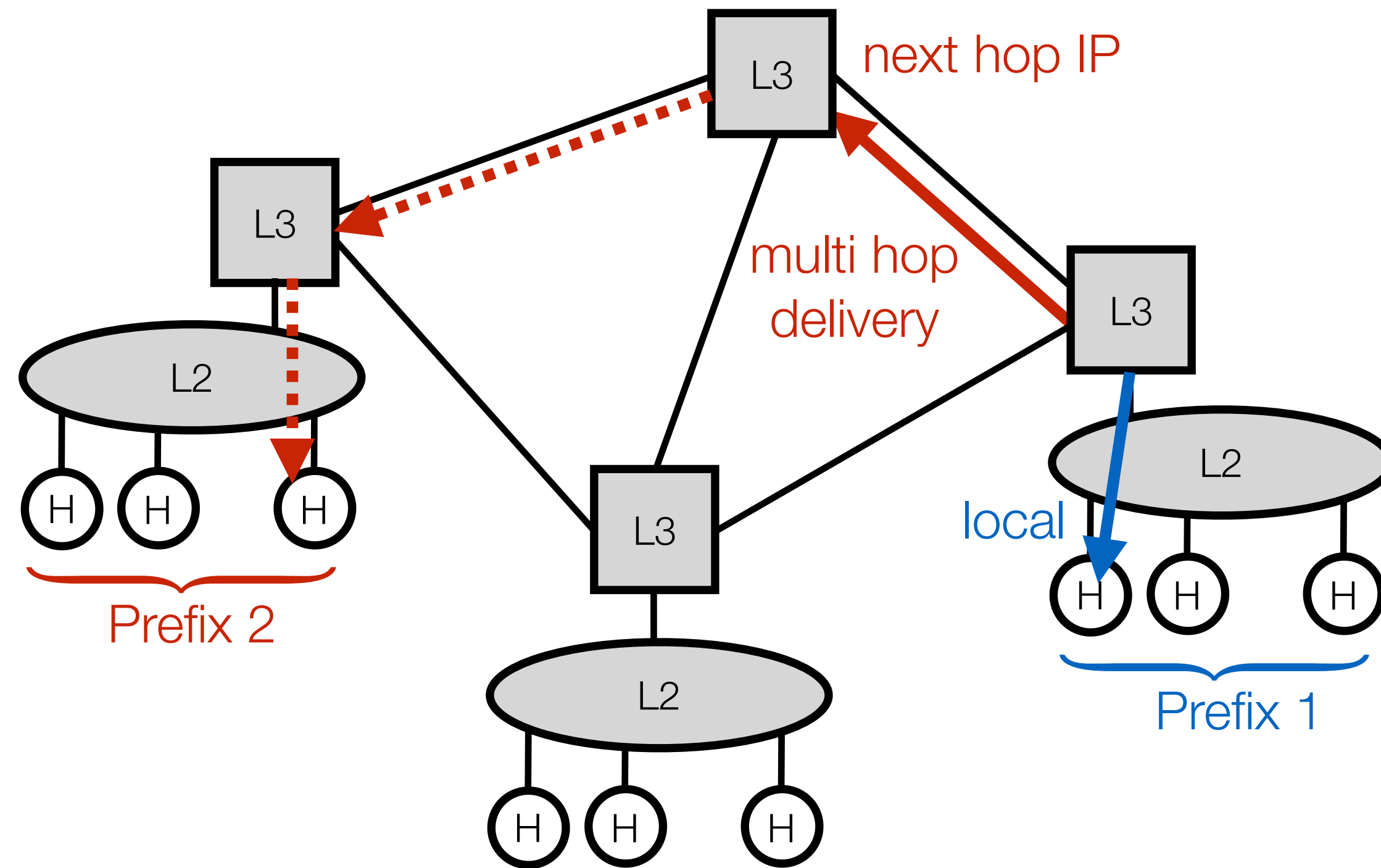


Network Layer Routing



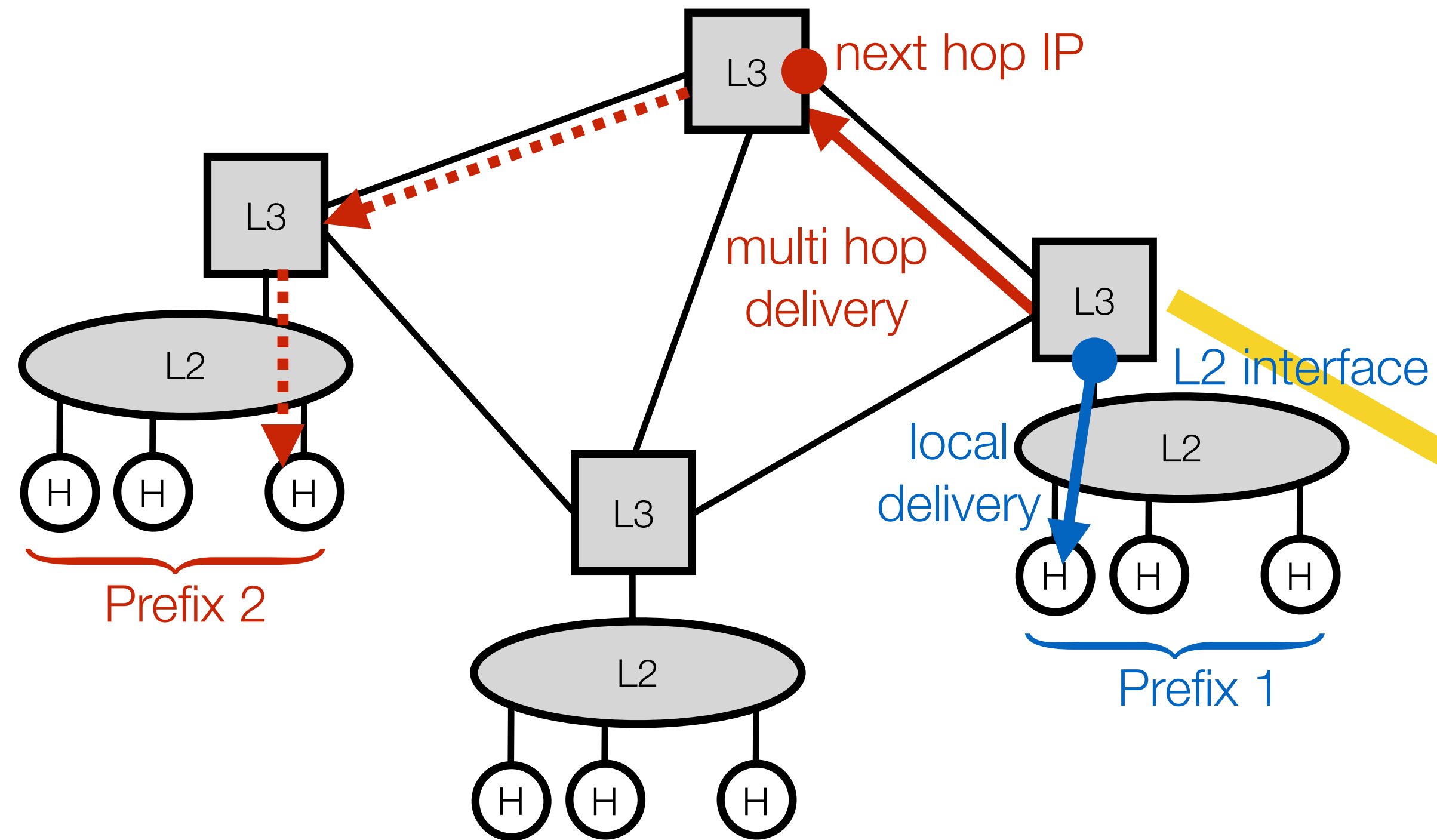
Local delivery: use ARP to find MAC of the destination and then send to that address

Network Layer Routing



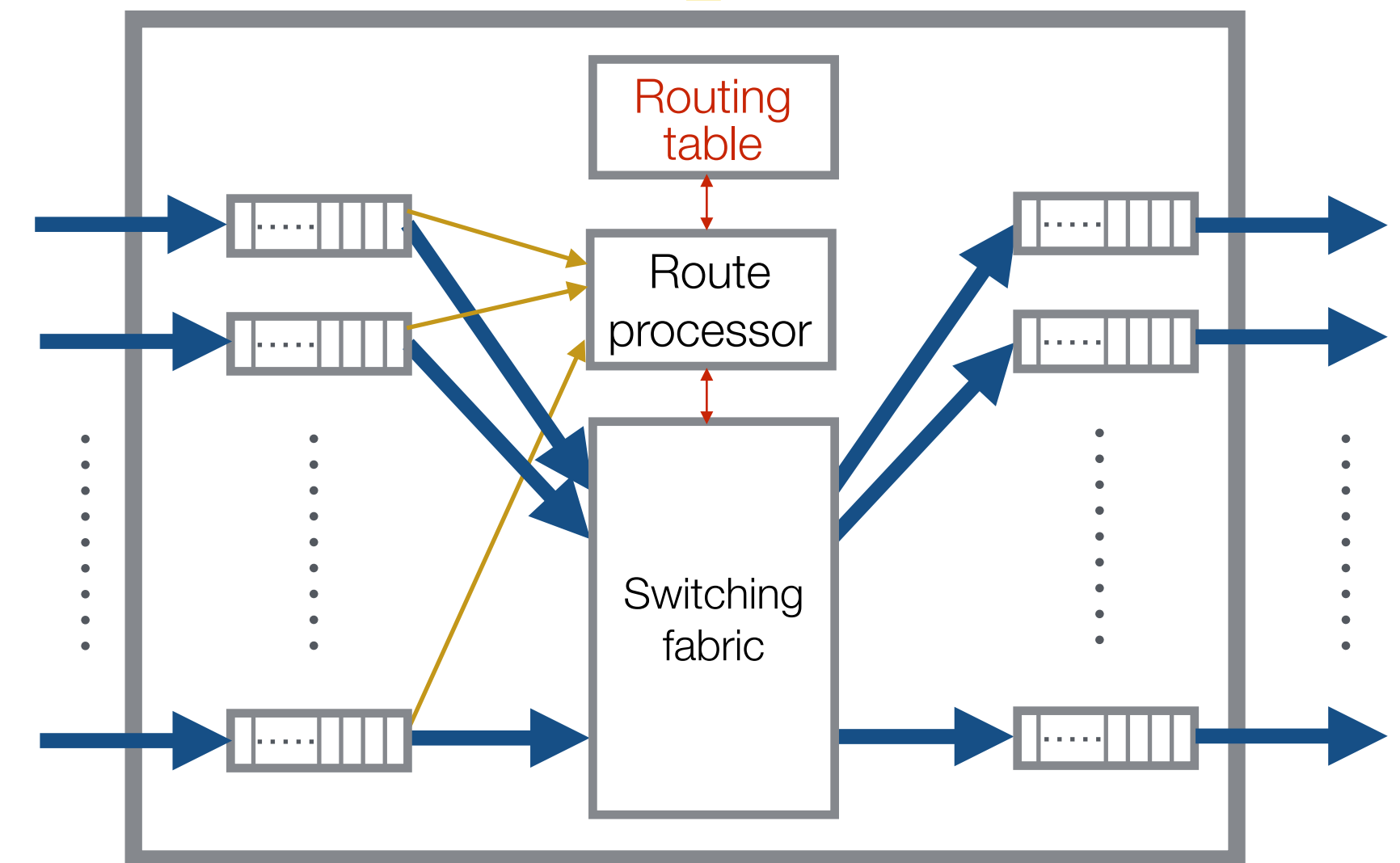
Hop-by-hop routing: “your next hop is to X, go there and ask for further directions”

Network Layer Routing



Prefix	Next hop
Prefix 1	L2 interface
Prefix 2	Next hop IP
...	...

Hop-by-hop routing: “your next hop is to X, go there and ask for further directions”



Routing table

Prefix	Next hop
Prefix 1	L2 interface
Prefix 2	Next hop IP
...	...

use ARP to find the MAC address of the destination

search the routing table to find the L2 interface to reach the **next hop**, then use ARP to find out the next hop's MAC address

Longest prefix match