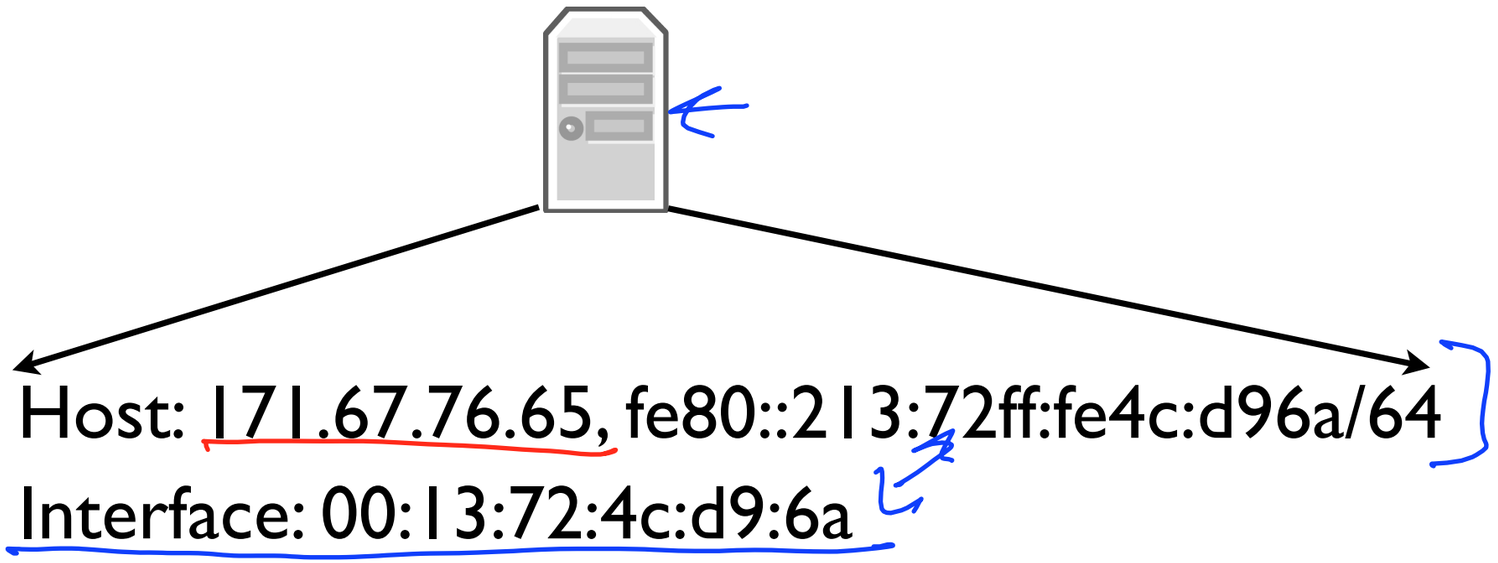
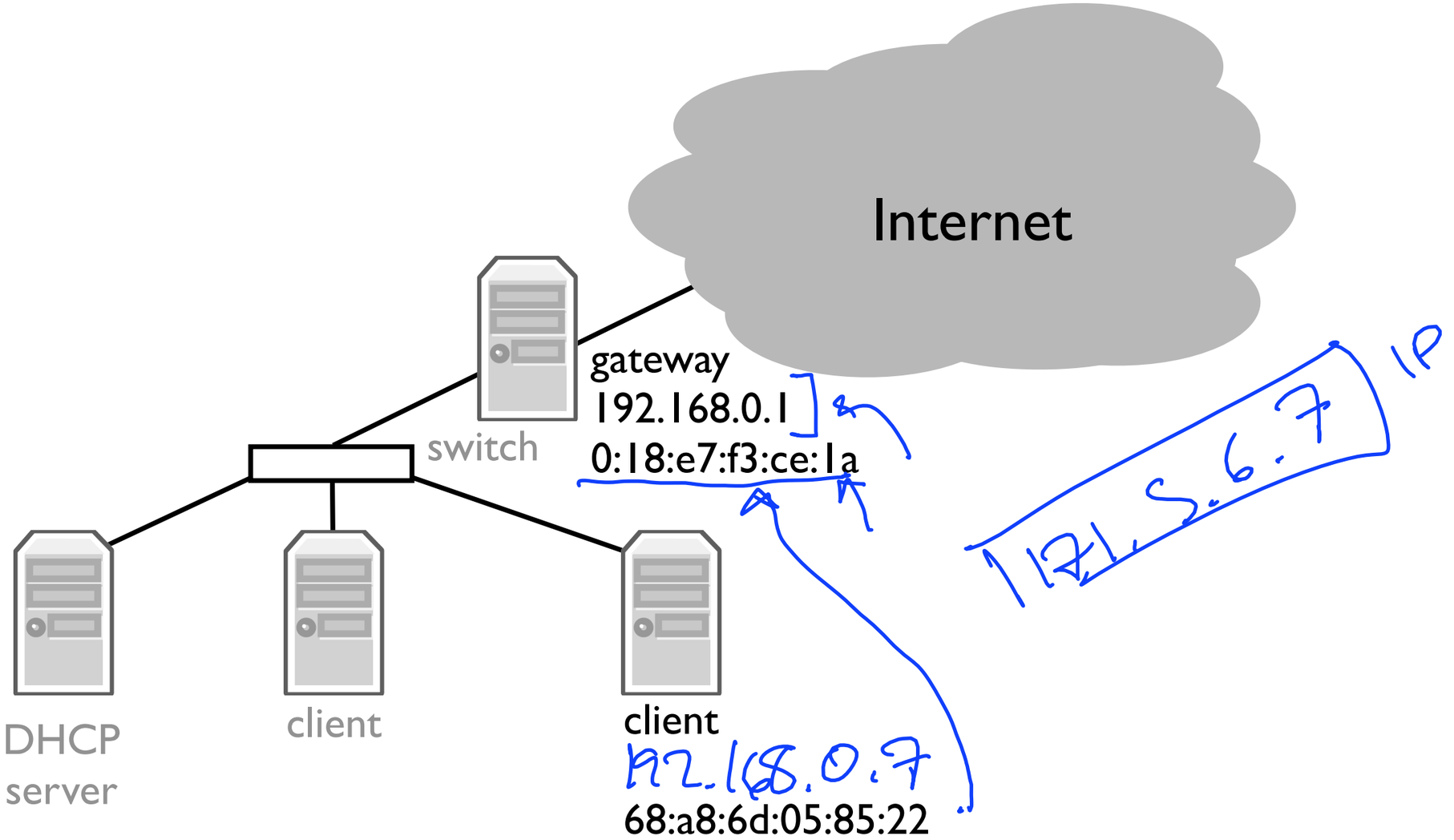
Address Resolution Protocol (ARP)

Layers of Names

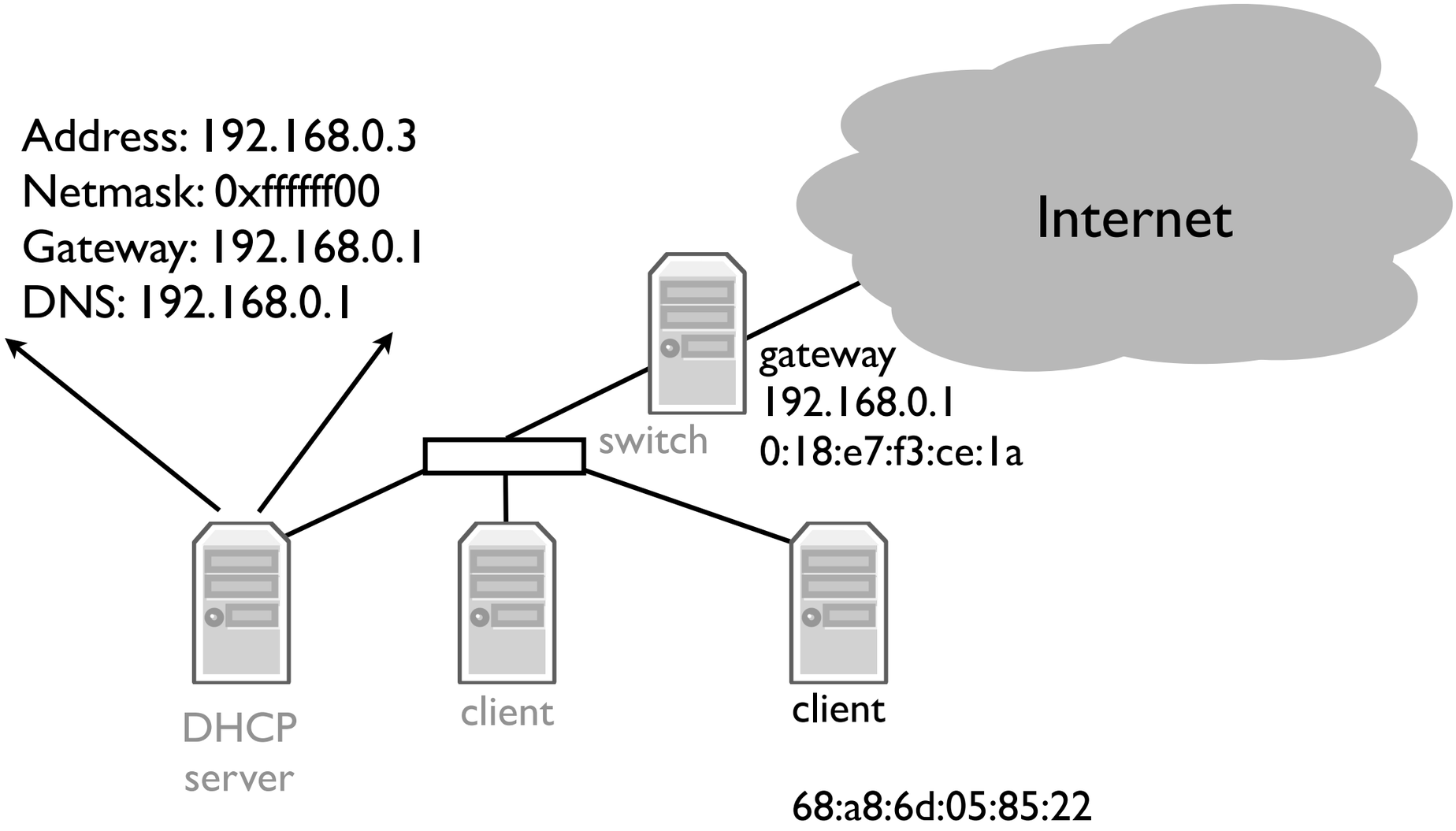
Application
Presentation
Session
Transport
Network
Link
Physical



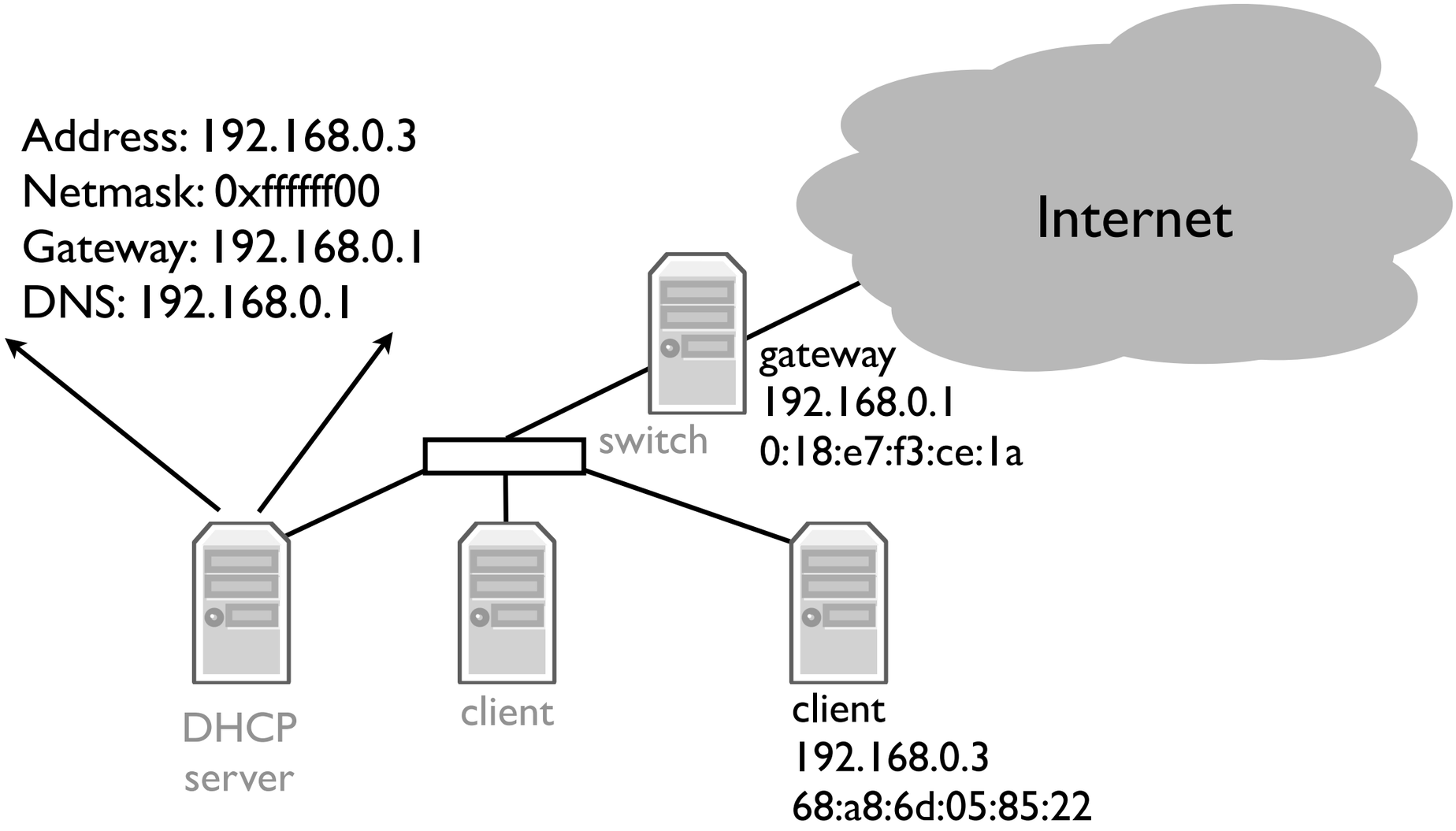
Example Problem



Example Problem



Example Problem



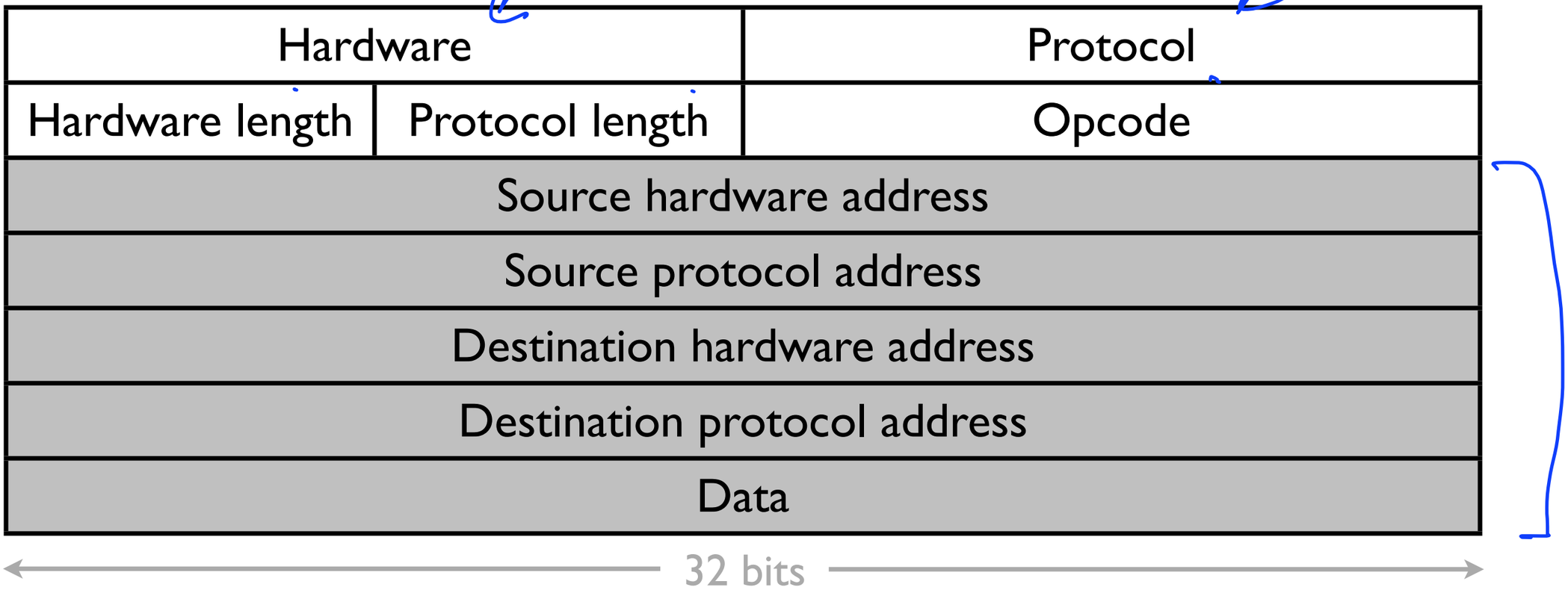
Mapping Layer 3 to Layer 2

- Given an IP address, need to know link address
  - Send a frame to the link address, whose payload is an IP packet
- Example: gateway
  - Case 1: IP packet destination is gateway IP
  - Case 2: IP packet destination is not gateway IP

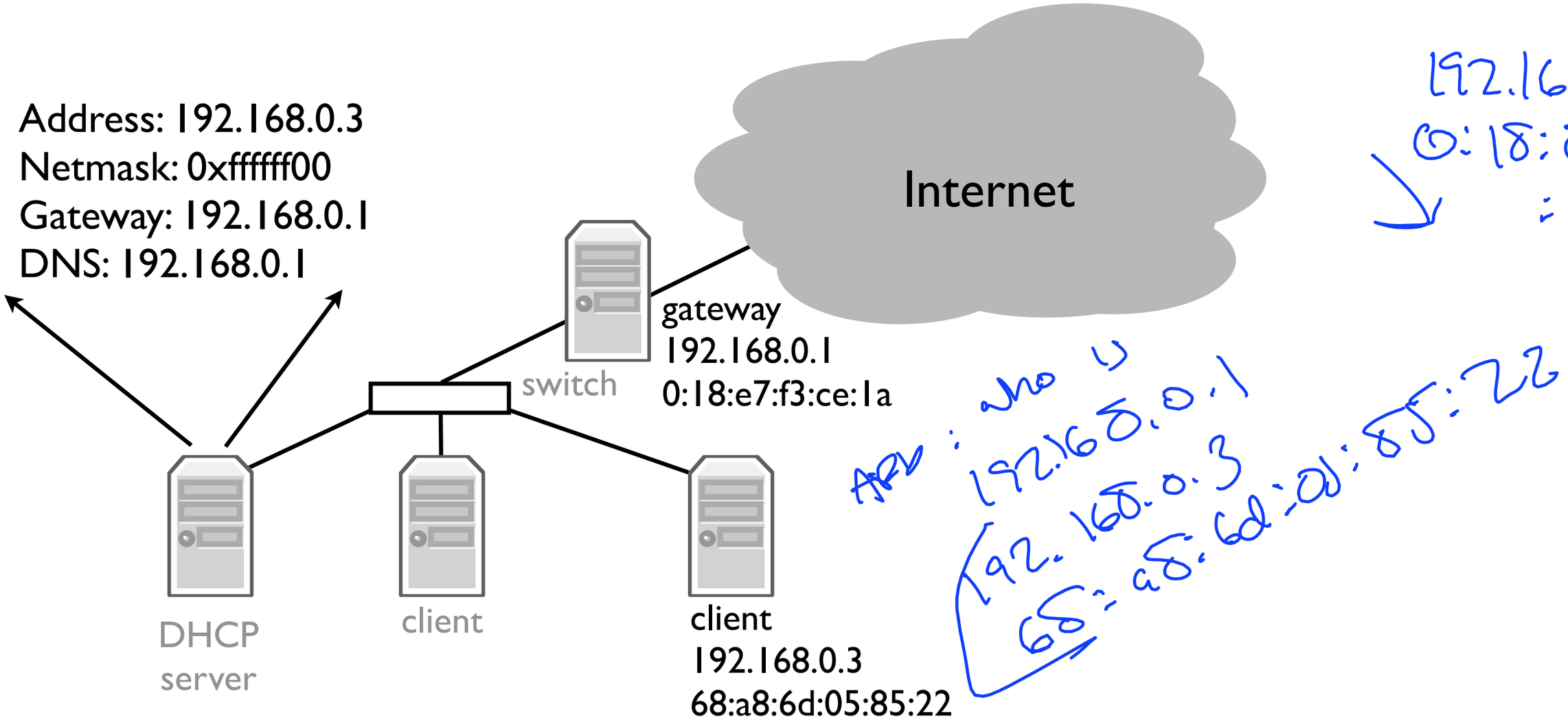
Address Resolution Protocol

- Generates mappings between layer 2 and layer 3 addresses
- Simple request-reply protocol
  - "Who has network address X?"
  - "I have network address X!"
- Request sent to link layer broadcast address
- Reply sent to requesting address (not broadcast)
- Packet format includes redundant data
  - Request has sufficient information to generate a mapping
  - Makes debugging much simpler
- No "sharing" of state: bad state will die eventually

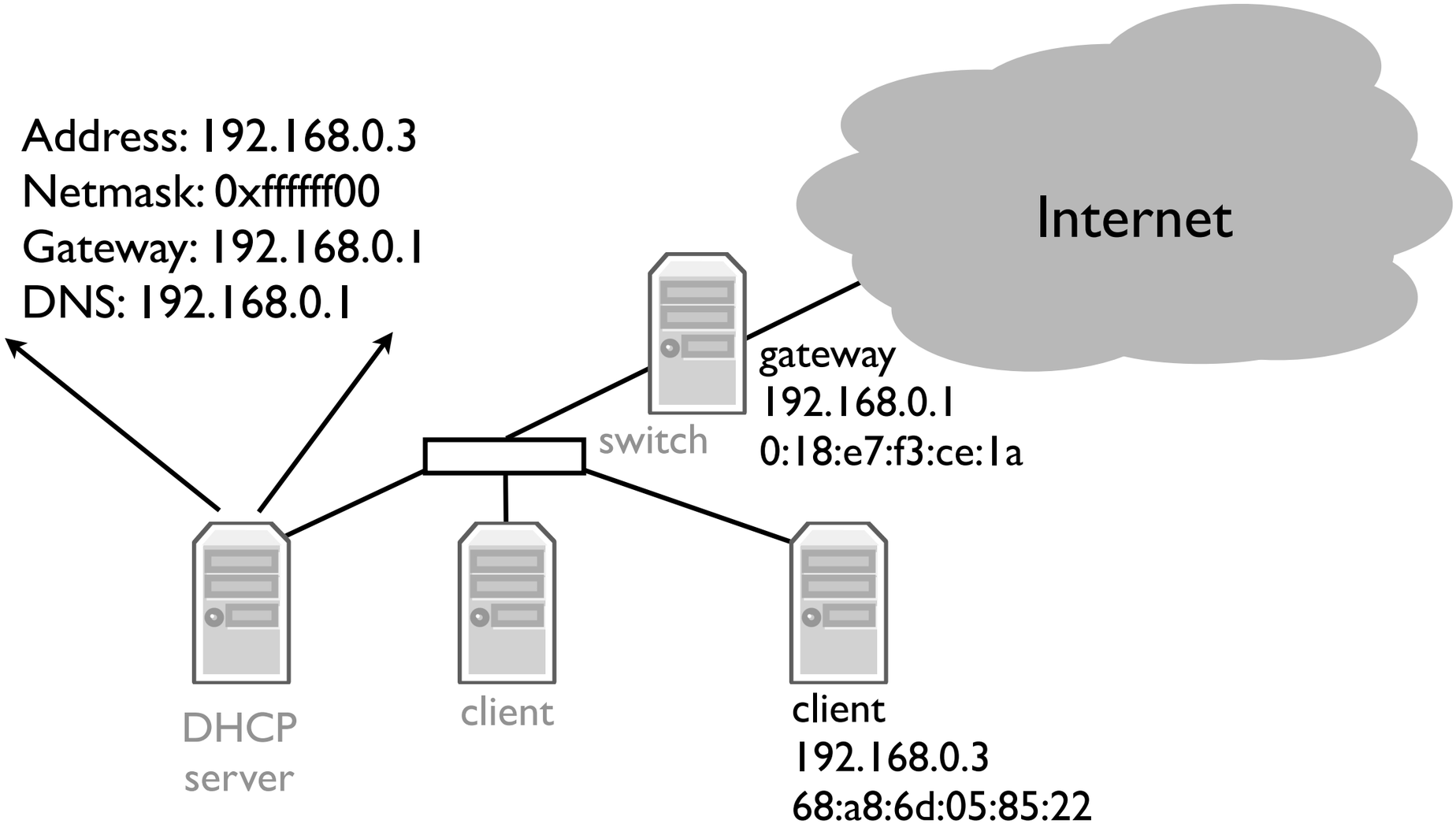
ARP Packet Format



ARP Request


Address: 192.168.0.3
Netmask: 0xffffff00
Gateway: 192.168.0.1
DNS: 192.168.0.1
Internet
gateway
192.168.0.1
0:18:e7:f3:ce:1a
switch
DHCP
server
client
client
192.168.0.3
68:a8:6d:05:85:22
192.168.0.1
0:18:e7:f3:ce
:1a
ARP: who is
192.168.0.1
192.168.0.3
68:a8:6d:05:85:22

ARP Reply


Address: 192.168.0.3
Netmask: 0xffffff00
Gateway: 192.168.0.1
DNS: 192.168.0.1
Internet
gateway
192.168.0.1
0:18:e7:f3:ce:1a
switch
DHCP
server
client
client
192.168.0.3
68:a8:6d:05:85:22

Reverse ARP (RARP)

- Obsolete protocol (replaced by DHCP)
- Reverse address resolution: what is the network address for my link address?