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## Chapter 4: ARP: Address Resolution Protocol

### Address Resolution Protocols: ARP and RARP

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32-bit Internet address



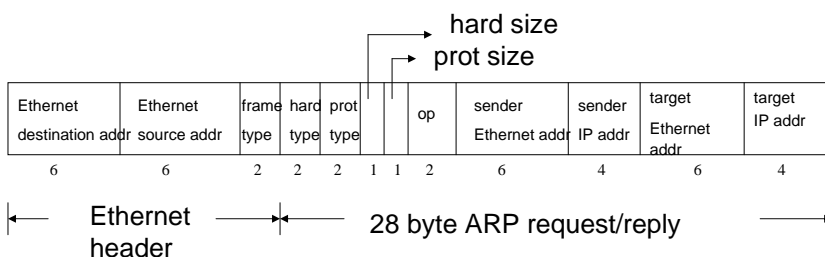
48-bit Ethernet address

## An Example

% ftp bsd

- ❑ Call *gethostbyname(3)* to convert hostname (bsd) to 32-bit IP address.
- ❑ Frame exchanged at the hardware level must be addressed to the correct interface.
  - ❖ But TCP/IP works with its own addresses: 32-bit IP addresses.
- ❑ Knowing a host's IP address does not let the kernel send a frame to that host.
- ❑ The function of ARP: dynamic mapping between 32-bit IP addresses and the hardware addresses
- ❑ Point-to-point links don't use ARP.
  - ❖ The kernel must be told of the IP address at each end of the link.
  - ❖ Hardware addresses such as Ethernet addresses are not involved.

## ARP Packet Format



## ARP Examples

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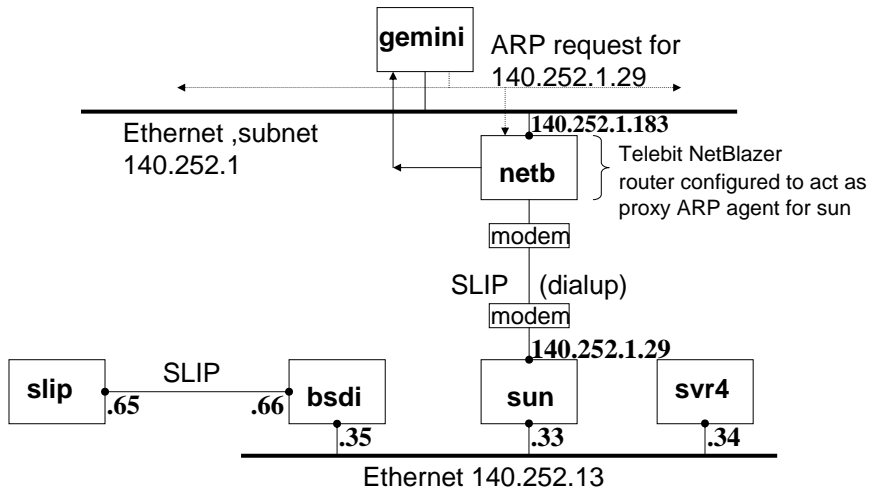
- ❑ **ARP request is sent by broadcasting**
  - ❖ Ethernet broadcast address is ff:ff:ff:ff:ff:ff
  - ❖ Every Ethernet interface on the cable will receive the frame and process it.
- ❑ **Ethernet frame type field is 0x0806.**
  - ❖ An ARP request or an ARP reply.
- ❑ **ARP reply is sent directly to the requesting host (not broadcast)**
- ❑ **ARP cache timeout: 20 minutes.**

## Proxy ARP

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- ❑ **Let a router answer ARP requests on one of its networks for a host on another of its networks.**
- ❑ **Fool the sender of the ARP request into thinking that the router is the destination host.**
- ❑ **The router is acting as a proxy agent for the destination host, replying packets to it from other hosts.**
- ❑ **Also called *promiscuous* ARP or ARP *hack*.**
  - ❖ To hide two physical networks from each other, with a router between the two.
  - ❖ Both physical networks can use the same network ID as long as the router in the middle is configured as a proxy ARP agent.

## Proxy ARP (Cont.)



## Gratuitous ARP

- ❑ A host sends an ARP request for its own IP address.
- ❑ Bootstrap time: the network interface configuration
- ❑ Provide two features:
  - ❖ Let a host determine if another host is already configured with the same IP address.
  - ❖ Change the hardware address
    - Update any other host on the cable that has an entry in its cache for the old hardware address
    - If a host receives an ARP request for an IP address that is already in the receiver's cache, then that cache entry is updated with the sender's hardware address from ARP request.