Of packets and their journeys.

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Contents

Chapter 1

Misc

1.1 Big Fat Protocol Table

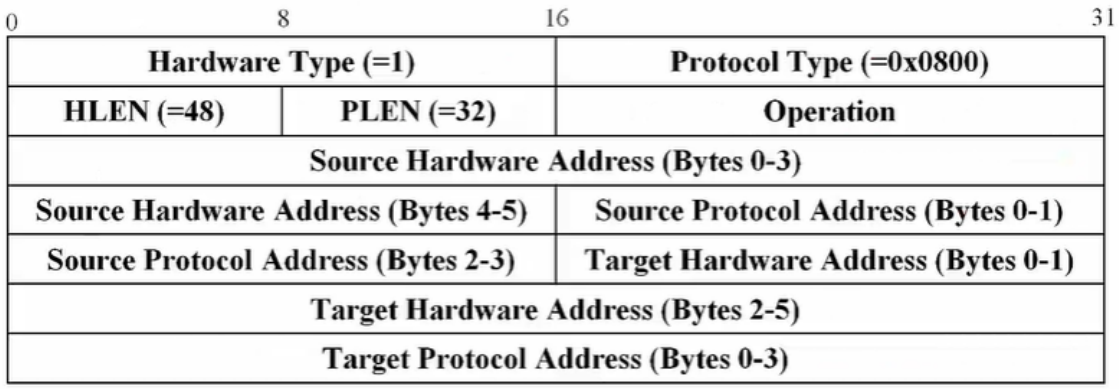
Name	Operates at Layer	Function	Remarks
ARP		Returns the MAC address corresponding to an IP address	Further discussion.

Chapter 2

Link Layer

2.1 ARP Protocol

- Operates at link layer.
- Used to find the MAC address m corresponding to an IP address a.
- Broadcasts "who is a? tell srcIPAddress." message. Host with IP address a replies.
  - Ex: `who is 10.11.63.71?  tell 10.09.63.43.`
- Each intermediate host maintains a cache of IP to MAC translations and updates its cache on parsing ARP replies and requests.
- The requesting host saves the reply MAC in its cache.
- Entries in said cache timeout periodically.
- The packet format is:



  - Hardware type specifies what link level technology we're using. For ex, it's set to 1 for ethernet.
  - Protocol Type refers to higher level protocol. It's 0x0800 for IP.
  - HLEN specifies length of the MAC address in bits.
  - PLEN specifies length of the protocol address in bits. It's 32 for IP address in bits.
  - Operation can be: request or reply.
- The terms involved are:

  - Originator: Host that generates ARP request.
  - Target: Host replying to the ARP request. It updates its cache with srcIP, srcMAC.

- When a host has to forward a datagram that specifies a destination IP address (that is within the LAN),
  1. It first checks its ARP cache for a map from dstIP to MAC.
  2. If no entry is found, it broadcasts an ARP request.
  3. While the request and reply move through the LAN, intermediate hosts refresh their caches.
- Note: Intermediate hosts NEVER reply to ARP requests.

2.1.1 Gratuitous ARP

- Generated by a host to inform others of its IP and MAC address.
- According to this, gratuitous ARPs are request packets and not reply packets.
- Both IPdst and IPsrc are set to IP host, and src MAC is set to host MAC.
- dst MAC is the broadcast address: `ff:ff:ff:ff:ff:ff`
- No reply is expected.
- Gratuitous ARP is used to:
  1. Inform hosts of changes to my IP or MAC address.
  2. Inform hosts that a host is now available.
  3. Help rectify ARP entries.
  4. Report IP address conflicts (duplicate IP addresses).
  5. Inform learning bridges of the new location of the host, or the location of a new host.
- Note that since ARP is a stateless protocol, even replies that were never requested are parsed and processed and thus, can function as gratuitous ARPs.